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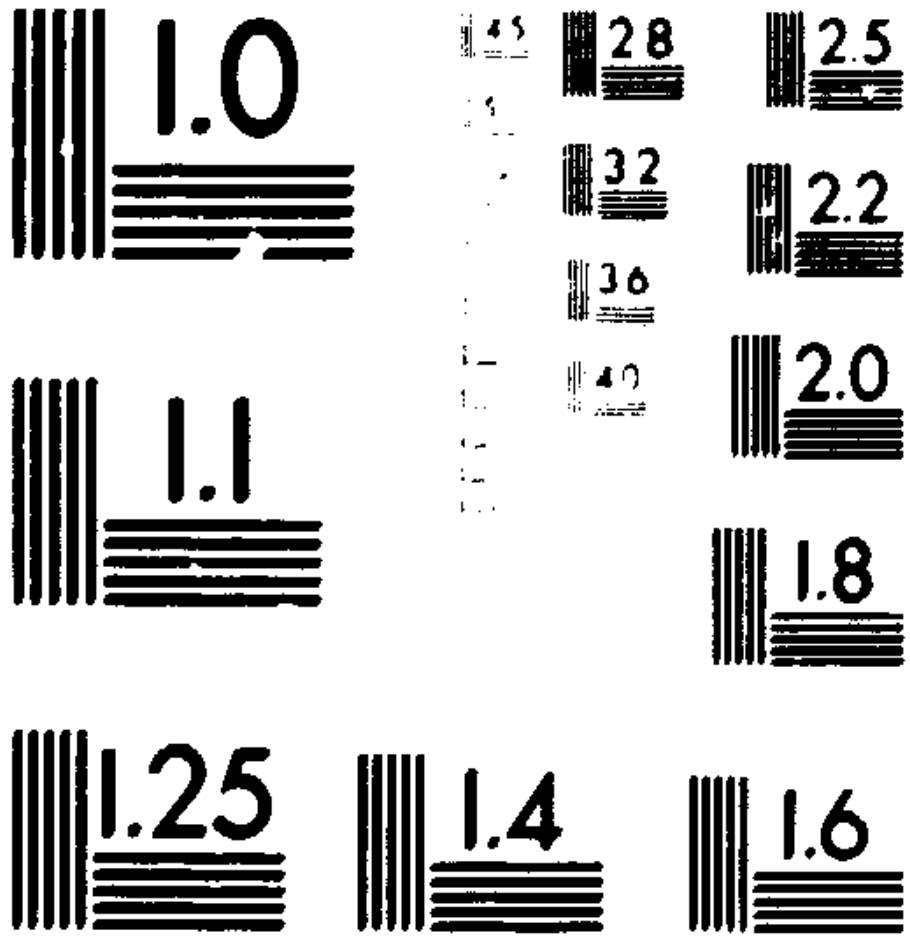

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1984

Peru.

STUDY OF THE MANUFACTURING SECTOR FOR CAPITAL GOODS TO THE PERUVIAN MINING INDUSTRY

UC/PER/84/066

Boliden Contech Ab, Sweden

3422

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FOREWORD

This document has been prepared by Mr. Hans Svensson, UNIDO mining consultant. The study was carried out in Lima during four weeks in May 1984. The report was then finalized at the UNIDO office in Vienna, June 1984.

The views expressed are those of the consultant and do not necessarily reflect the views of the UNIDO secretariat.

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1 INTRODUCTION

This report presents the results of an investigation of the industrial sector for the manufacture of mining machinery and equipment. The Consultant has restricted himself to capital goods for the mining sector, which includes all steps from exploration through mining to metallurgy (ore benefication to obtain ore concentrate). Consequently, the study does not consider capital goods for smelting and refining. This is because machinery and equipment used in this sector is different from that in the mining sector.

2 SHORT REVIEW OF PERUVIAN MINING PRODUCTION AND FUTURE PROJECTS

The mining industry in Peru can be divided into sectors on the basis of various mining production outputs. These four sectors are:

- large scale mining
- medium scale mining
- small scale mining
- artesan mining (peasant mining on very small scale)

The type and performance standards of the capital goods used in these four sectors are different and this fact has been considered in the report.

2.1 MINE PRODUCTION OUTPUT IN 1983

Production figures for 1983 showing the mining production output for copper, lead, zinc and silver are compiled in table 1. The table shows that the production output originates mainly from large and medium scale mining operations.

TABLE I

MINING PRODUCTION IN PERU 1983
(Metal production)

Type of operation	Copper tonnes	%	Lead tonnes	%	Zinc tonnes	%	Silver kg	%
Large scale mining	288,783	88.3	70,982	37.6	190,012	38.9	383,309	26.3
Medium scale mining	24,679	7.5	99,493	52.7	264,992	54.4	943,970	64.7
Small scale mining	6,120	1.9	10,535	5.6	17,704	3.6	89,783	6.1
Artesan mining	7,463	2.3	7,690	4.1	15,292	3.1	42,938	2.9
TOTAL	327,000	100	188,700	100	488,00	100	1,460,000	100

SOURCE:
Producción Minera del Perú en 1983, Sociedad Nacional de Minería y Petroleo.

Among other major mineral commodities produced, are the following:

Iron	2,850,175 tonnes
Molybdenum	2,632 tonnes
Tin	2,487 tonnes
Tungsten	430 tonnes
Cadmium	60 tonnes

2.2 COMMENTS TO 1983 YEAR'S PRODUCTION AND PROSPECTS FOR 1984

The total ore production calculated on extracted tonnes of ore decreased by 13% compared with 1982 year's production. The main reason for the decrease was labour conflicts, which temporarily shut down many mines.

In 1984, total copper metal production is expected to reach 350,000 tonnes which represents a 10% production increase compared to 1983. This production is equivalent to 1,250,000 tonnes of copper concentrate.

The objective of lead production in 1984 is to maintain the 1983 production level, which was approximately 185,000 tonnes of metal, equivalent to 372,000 tonnes of lead concentrate.

Although zinc production was somewhat irregular during 1983, the mining industry will maintain the same production level as in 1983, i.e. approximately 480,000 tonnes of metal, equivalent to 1,094,000 tonnes of zinc concentrate.

Silver production is, however, expected to increase by 8% to 52,000,000 ounces (1,617,000 kilogrammes) in 1984.

The decrease in iron ore production by 26% during 1983 was caused by a labour conflict, which halted mine production for 40 days. Plans exist to increase the production level by 16% in 1984, which means a total ore production of 3.3 millions tonnes.

2.3 METAL MINING PROJECTS AND EXPANSION PLANS

2.3.1 International trend

According to the Commodities Research Unit (CRU), London, almost 400 new mine projects or expansion plans worldwide might come on-stream in order to produce copper, bauxite, lead, zinc, silver, nickel, molybdenium, iron ore, uranium and gold within the next eight years.

It should be pointed out that out of these 400 projects, about 125 are copper projects.

The majority of the new projects are expected to come on-stream before 1988. A large proportion of the projects will be located in the Western Hemisphere, firstly in Latin America and secondly in North America.

2.3.2 Main projects and expansion plans in Peru

2.3.2.1 Copper

1) Southern Peru Copper Corporation's expansion programmes for Toquepala and Cuajone's open pit mines.
2) Centromin's Cabriza expansion programme.
3) Centromin's project for development of the Tambo Grande and La Granja deposits.
4) Centromin's project for development of the Atamina deposit.

5) Minero Perú's project for development of the second stage of the Cerro Verde deposit.
6) Empresa Minera Especial Tritaya S.A., 45% Centromin, 45% Minero Perú and 10% COFIDE, continued with the development of their project in Southern Peru.
7) Minera Los Montes' mine operation programme at Monterrosa mine.

2.3.2.2 Lead, zinc and silver

1) Centromin's project for development of the Andaychagua mine.
2) Centromin's expansion programme of the Casapalca mine.
3) Centromin's modernization and expansion programme for other mines. Some projects are completed and investments in new mining equipment has been made.
4) Cía. Minera Milpo's expansion programme.
5) Cía. Minera El Altiplano completed its expansion programme.
6) Sociedad Minera Gran Bretana's expansion programme for Azulcocha mine.
7) Cía. Minera San Jynacio de Morococha's modernization and expansion programme for its San Vicente mine.

2.3.2.3 Gold

1) Centromin's exploration programme for the development of its first alluvial gold mine, Madre de Dios.
2) Texas Gulf Exploration has commenced exploration work upstream of Centromin's camp area.

2.3.2.4 Remarks

Mining projects and expansion plans mentioned on the previous pages are mainly small and medium scale projects. This is in accordance with the general trend in the mining sector worldwide, i.e. huge mining development projects are unusual nowadays. However, the Cerro Verde II expansion project is one of the world's largest copper projects, see section 7. For a mining project of this magnitude and the infrastructure needed, financing is normally the critical part of the project. This is also the case with Cerro Verde II, which has been delayed.

Large projects are mostly financed by international funds. This will in turn give a low impact on the local manufacturing industry, as the loan terms are linked to investment in equipment and machineries from foreign countries.

3 MANUFACTURERS OF CAPITAL GOODS FOR THE MINING INDUSTRY

3.1 MINE EXPLORATION AND EXPLOITATION

The main capital goods used in this branch of mining are listed in table 2. Included in the table are also main consumables, as these represent an important part of the manufacturing industry.

Table 3 shows how the capital goods and the main consumables are distributed between the different mining activities. It is very clear that the main items of equipment for drilling, blasting and loading are provided virtually to 100 % by imported capital goods.

3.2 ORE CONCENTRATION

The main capital goods for ore concentration are listed in table 4. For this type of goods, there is a great number of local manufacturers. Only main manufacturers have been listed in the table. There are also many small work-shops acting both as sub-contractors or working directly to the mine client.

Table 5 shows the capital goods and main consumables distributed between the different activities of ore concentration. Compared to table 3, the distribution between local manufacturing and import is quite different. For the ore concentration, approx 70-80 % of the total demand is met by domestic manufacturers.

TABLE 2

MAIN ITEMS OF MINING EQUIPMENT FOR THE PERUVIAN MINING INDUSTRY

BRANCH OF MINING: EXPLORATION AND EXPLOITATION

EQUIPMENT	NO OF MAIN MANUFACTURERS		BRANCH OF MINING			TYPE OF GOODS		
	DOMESTIC	FOREIGN WITH REPR. IN PERU	EXPLORATION	EXPLOITATION	ORE CONCENTRATION	CAPITAL GOODS	CONSUMABLES	OTHER
Ore transport	3	9		X		X		
Grinding equipment for drill steel and bits	-	7	(X)	X		X		
Drilling booms	-	7	(X)	X		X		
Drill bits	4	21	X	X			X	
Bucket wheel excavator	-	2		X		X		
Cable bucket excavator	-	2		X		X		
Mining trucks	-	10		X		X		
Front-end loaders	-	10		X		X		
Mine cars	6	3		X		X		
Compressors	1	10	(X)	X	(X)	X		
Compressor tanks	4	1	(X)	X	(X)			X
Dust collector	1	5		X	(X)			X
Drill core analyzing equipment	-	1	X			X		
Hoisting equipment	2	9		X		X		
Exploration equipment	-	1	X			X		
Drilling equipment						X		
- for exploration	1	6	X			X		
- for exploitation	-	24		X				
Mine safety equipment	9	4	(X)	X	(X)			X

TABLE 2 CONT. ON NEXT PAGE

TABLE 2 (contd)

EQUIPMENT	NO OF MAIN MANUFACTURERS		BRANCH OF MINING			TYPE OF GOODS		
	DOMESTIC	FOREIGN WITH REPR. IN PERU	EXPLORATION	EXPLOITATION	ORE CONCENTRATION	CAPITAL GOODS	CONSUMABLES	OTHER
Explosives	7	2		X			X	
Blasting equipment	1	1		X				X
Charging equipment for explosives	-	4		X		X		
Concreting equipm. for guniting	-	3		X		X		
Steel structures	2	--		X				X
Spec. designed mine excavators (mainly for open pits)	-	8		X		X		
Mine lamps	-	6		X				X
Locomotives	-	16		X		X		
Air and water hoses	4	11	(X)	X	(X)		X	
Mine doors	2	--		X				X
Mine rails and accessories	3	7		X			X	(X)
Roof bulting equipment	-	5		X		X		
Ventilation fans	3	5		X		X		
Winches	5	8	(X)	X	(X)	X		

SOURCE:
Anuario Minero-Comercial, La Minería en el Perú 82.

TABLE 3

CAPITAL GOODS AND CONSUMABLES FOR DIFFERENT MINING ACTIVITIES

BRANCH OF MINING: EXPLORATION AND EXPLOITATION

MINING ACTIVITY	CAPITAL GOODS: ORIGIN		CONSUMABLES: ORIGIN	
	DOMESTIC	FOREIGN	DOMESTIC	FOREIGN
Exploration	10%	90%	25%	75%
Exploitation				
- Drilling	-	100%	90%	10%
- Blasting	-	100%	95%	5%
- Loading	-	100%	-	-
- Transport	10%	90%	80%	20%
- Crushing, small crushers	50%	50%	95%	5%
- Crushing, large crushers	-	100%	75%	25%
- Hoisting	20%	80%	-	-
- Rock reinforcement	-	100%	20%	80%
- Air compressors, small	20%	80%	-	-
- Air compressors, large	-	100%	-	-
- Air and water distribution	80%	20%	-	-
- Drainage	50%	50%	-	-
- Others	25%	75%	-	-
TOT. EXPLORATION AND EXPLOITATION	10-15%	85-90%	80%	20%

Main consumables:
Drill bits for exploration (diamond bits)
Drill bits for exploitation drilling
Drill steel
Explosives
Detonators and cords
Wear parts for crushers
Reinforcement consumables
Rails and accessories

SOURCE: Mission estimate.

TABLE 4

MAIN ITEMS OF MINING EQUIPMENT FOR THE PERUVIAN MINING INDUSTRY

BRANCH OF MINING: ORE CONCENTRATION

EQUIPMENT	NO OF MAIN MANUFACTURERS		BRANCH OF MINING			TYPE OF GOODS		
	DOMESTIC	FOREIGN WITH REPR. IN PERU	EXPLORATION	EXPLOITATION	ORE CONCENTRATION	CAPITAL GOODS	CONSUMABLES	OTHER
Agitators and air conditioners for flotation	4	4	--		X	X	X	
Feeders	5	4		(X)	X	X		
Autoclaves	2	--			X	X		
Weighing machines	3	9		(X)	X	X		
Balls for ball mills	3	5			X		X	
Pumps	6	30		(X)	X	X		
Calcinators	-	3			X	X		
Flotation cells	5	5			X	X		
Cyclones	4	3			X	X		
Classifiers	6	5			X	X		
Sieves	5	7			X	X		
Dosifiers	1	--			X	X		
Mechanical elevators	6	--		(X)	X	X		(X)
Various concentration equipment								
- Spiral	5	4			X	X		
- Jigs	3	2			X	X		
- Portable conc. plants	4	2			X	X		
- Pre-concentrators	4	2			X	X		
- Heavy media separation	3	1			X	X		

TABLE 4 CONT. ON NEXT PAGE

TABLE 4 (contd)

EQUIPMENT	NO OF MAIN MANUFACTURERS		BRANCH OF MINING			TYPE OF GOODS		
	DOMESTIC	FOREIGN WITH REPR. IN PERU	EXPLORATION	EXPLOITATION	ORE CONCENTRATION	CAPITAL GOODS	CONSUMABLES	OTHER
- Gravity separation	2	3			X	X		
- Magnetic separation	1	2			X	X		
- Pulp analyzer	-	2			X	X		
Laboratory equipment	1	10			X	X		(X)
Crushing equipment								
- Jaw crushers	3	4			X	X		
- Cone crushers	3	4			X	X		
Milling equipment								
- Ball mills	4	8			X	X		
- Stone mills	-	2			X	X		
- Rod mills	4	3			X	X		
- Other types	4	4			X	X		
- Rods for rod mills	-	4			X		X	
- Balls for ball mills					X		X	
- Wear parts	5	3			X		X	
Sampling	2	2			X			X
Equipment for registration and automatic analysing	-	4			X			X
Transport equipment								
- Conveyors	4	10		(X)	X	X		
- Spare parts	5	10		(X)	X		X	
Filters	4	7			X	X		
Ore bins	6	--			X			X

SOURCE: Anuario Minero-Comercial, La Minería en el Perú 82.

TABLE 5

CAPITAL GOODS AND CONSUMABLES FOR DIFFERENT MINING ACTIVITIES

BRANCH OF MINING: ORE CONCENTRATION

MINING ACTIVITY	CAPITAL GOODS: ORIGIN		CONSUMABLES: ORIGIN	
	DOMESTIC	FOREIGN	DOMESTIC	FOREIGN
Crushing, small equipment	90%	10%	90%	10%
Crushing, large equipment	-	100%	50%	50%
Grinding, small equipment	90%	10%	90%	10%
Grinding, large equipment	-	100%	50%	50%
Mechanical concentration, jigs, tables etc.	95%	5%		
Flotation	80%	20%	85%	15%
Separation, cyclones, magnetic separators etc.	95%	5%		
Classification	80%	20%		
Dewatering filters	40%	60%		
Transport feeders, conveyors etc.	40%	60%		
TOTAL	70-80%	20-30%	85%	15%

Main consumables:
Balls for ball mills
Flotation reagents
Wall parts for crushers and mills

SOURCE:
Mission estimate.

3.3 COMMENTS ON THE LOCAL MANUFACTURING AND IMPORTATION OF CAPITAL GOODS

3.3.1 General comments

As shown in tables 2 - 5, only 10-15 % of the market demand for capital goods for exploration and exploitation is met by domestic manufacturers. The market demand for capital goods for ore concentration is, however, met by the domestic manufacturing industry, to approximately 70 - 80%.

In table 6, the market demand is distributed according to scale of mining operations.

It should be remembered that the manufacturing of mining machinery and equipment in Peru commenced in the early 1940's - the industry has consequently more than 40 years of experience - the market share is comparatively small, especially in the exploration and exploitation areas. This situation can be improved by, for instance, governmental measures, incentives or private industrial ventures.

TABLE 6

CAPITAL GOODS PRODUCED BY PERUVIAN MANUFACTURERS DISTRIBUTED ON TYPE OF OPERATION (ESTIMATE)

TYPE OF OPERATION	EXPLORATION AND EXPLOITATION	ORE CONCENTRATION
Large scale mining	< 10%	30%
Medium scale mining	10-15%	60-80%
Small scale mining	15%	95%
TOTAL	10-15%	70-80%

SOURCE:
Mission estimate

3.3.2 Comments on capital goods for exploration and exploitation activities

The mining industry in Peru has been established for many years while the modern Peruvian industrial manufacturing sector has about 40 years of experience. However, Peru does not possess manufacturing facilities to produce certain basic items of equipment and machinery, or manufacture under licence. Much of the basic equipment and machinery produced does not require high technology to manufacture. Some examples are listed below:

- Mine lamps	No manufacturing but 6 different importing companies.
- Mine locomotives	No manufacturing but 16 (!) different importing companies.
- Rails and accessories	This equipment, which can be considered both as capital goods and consumables, are low-technology items and ought to be produced by domestic manufacturers. The high costs of domestic steel and the high quality demands imposed by clients has given rise to the high import volume.

Local manufacturing of capital goods is mainly concentrated on low-technological goods such as mine cars, low-capacity compressors, steel structures etc.

Some high-technological manufacturing can, however, be found, e.g. the manufacture of diamond drill bits for exploration. This activity is carried out under American licence.

Insufficient domestic industrial promotion and inadequate incentives of the Peruvian authorities and, what might be the main reason, aggressive marketing by foreign companies, have sacrificed the local makes of capital goods to imports. Mining people are in general also considered to be very conservative and this attitude has not promoted the domestic industry. The justification of this attitude of mining companies is, of course, the intimate knowledge of well-

known foreign mining equipment, their capacities and operational costs etc., see section 3.3.3.

It is positive to see that the domestic production of certain consumables is very high, e.g. explosives which are covered to nearly 100 % by domestic manufacturers. Some of these explosives producers also export their products to other Latin American countries, e.g. Argentina and Mexico.

High capacity compressors, so called screw compressors, and large size crushers and mills are not manufactured in Peru and this represents a large part of the low market coverage. Discussions of and plans to manufacture these items under licence are, however, in progress. This type of production planning should be carried out together with the mining companies. There should be more co-operation between the mining companies and the domestic manufacturers, see also section 9.2.1.

3.3.3 Comments on capital goods for ore concentration

Concerning ore concentration equipment, the market coverage is quite different to that of the exploitation field. The Peruvian manufacturing covers aproximately 70-80% of the country's demand for capital goods. Only large equipment, such as high-capacity crushers, mills and flotation equipment, and high-technological goods such as filters and conveyors, are imported. Competition between domestic and foreign manufacturers is very keen, but by maintaining good quality products and, most important, by keeping lower prices, the Peruvian manufacturers can retain their market shares.

The main type of capital goods manufactured for this sector is so called low-technological goods. However, the client should demand the same high quality and efficiency from this type of equipment as from all other high-technology equipment. It is doubtful whether the client always gets what he wants. Poor design of e.g. a flotation cell may incur heavy losses if the design of the equipment gives lower ore recovery than a correctly manufactured one, see the following example:

A poorly designed flotation cell gives 1 % lower recovery than standard equipment.

Normal recovery	87% of a 25 % Cu concentrate (copper)
Reduction of recovery due to poor design	1%
Ore to be treated	2,000 tonnes/day with 1.5% Cu (copper)
Cu-loss per day	1% x 1.5% x 2,000 = 300 kg Cu-metal per day
Cu-price	USD 0.70 per pound
Economic loss due to bad design	USD 116 per day equal to USD 40,600 per year (25% of the actual value due to reduction for costs such as smelting and refining charges, etc).

In other words, poor design of a flotation cell which results in a 1 % lower recovery will result in annual losses exceeding the purchase price for two flotation cells!

The losses may be even higher.

This simple cost calculation shows clearly the importance of high quality even in a low-technological product. Mining people are aware of this and that is why their desicions are based - or ought to be based - on this type of cost calculations.

Flotation reagents - an important consumable for the flotation process - are covered to approximately 85 % by local manufacturing. The only Peruvian manufacturer of these products operates fully modernized production facililties and invests heavily in research. This company is also working under licence from well-known chemical enterprises. Low import customs duty favours, however, low price foreign manufacturers of flotation reagents in the Peruvian market.

4 ANALYSIS OF THE MANUFACTURING SECTOR FOR CAPITAL GOODS TO THE MINING INDUSTRY

4.1 NUMBER OF ENTERPRISES AND REGIONAL DISTRIBUTION

The total number of enterprises working with deliveries to the mining industry is approximately 50, of which around 25 are partly engaged in the manufacture of capital goods. Most of the enterprises are manufacturing consumables such as explosives, drill steel, wear and spare parts, but they also include smaller enterprises; so-called "work shops".

Of the 25 enterprises engaged in the manufacture of capital goods, only about 10 have substantial deliveries to the mining sector and to the metallurgical sector.

The manufacturing sector for capital goods is mainly located in the industrial areas of Lima - Callao. Of the above mentioned 25 enterprises all except 2 are in the Lima-Callao areas. This strong geographic concentration carries both advantages and disadvantages for the companies and for the country itself. As a matter affecting the national economy, the government has to attempt de-centralization by giving incentives to the establishment of private and official enterprises in the provinces.

Some advantages of localization in the Lima-Callao industrial areas

- Most mining enterprises have their head offices in the Lima area.
- Close contact with authorities, industrial organizations etc.
- Near to import/export harbour in Callao.
- Lack of good infrastructure in the provinces.
- Easier to employ qualified employees especially higher educated people such as technicians, engineers etc.

Some disadvantages of localization to the Lima-Callao industrial areas

- The enterprises have in general limited space for expansion.
- The authorities can call for investment in environmental control to reduce the existing problems with smoke, dust, noise etc.
- Distant from the mine consumers, especially with regard to training and service facilities and close personal contact.

4.2 PRODUCT MIX AND COMPETITION

The product mix does not vary significantly within the actual enterprises -many of the enterprises are manufacturing all types of capital goods without having the right technological background and knowledge.

The enterprises have, in general, a large product mix, up to 60 different goods which has a restrictive influence on technical product research.

Of the above mentioned 25 enterprises manufacturing capital goods for the mining industry, the following summarizes the competition:

- at least 4 enterprises manufacture pumps
- at least 7 enterprises manufacture fans
- at least 15 enterprises manufacture mine cars
- at least 7 enterprises manufacture crushers
- at least 10 enterprises manufacture mills
- at least 12 enterprises manufacture flotation cells

The enterprises all strive to find their "niche" within their respective manufacturing areas in order to avoid this heavy competition. For example, 15 enterprises have mine cars in their production line and 12 enterprises manufacture flotation cells. This picture cannot be good either for the manufacturing companies or for the mining industry or for Peru itself. As a comparison it can be mentioned that Sweden, which is regarded as a major mining country, has only one manufacturer of flotation cells.

The real effect of this heavy competition is:

- lower quality of delivered goods in order to achieve lower prices;
- working with illegal sub-contractors or working illegally themselves.

4.3 MANUFACTURING CAPACITY

The manufacturing enterprises show all types of production lines such as:

- foundry (based on scrap iron) to final machinery;
- purchase of raw steel material (cast steel and metal) for working to final machinery;
- assembly to final product only.

The total production line which exists in some of the enterprises should be carefully examined. No enterprise with a volume such as that of some of the Peruvian companies can possibly maintain the necessary technological expertise within all its lines of production. The Consultant cannot see that a manufacturing company for capital goods should have a foundry section within the company. This cannot be sound economic practice especially when specialized foundry operations exist in the same industrial areas.

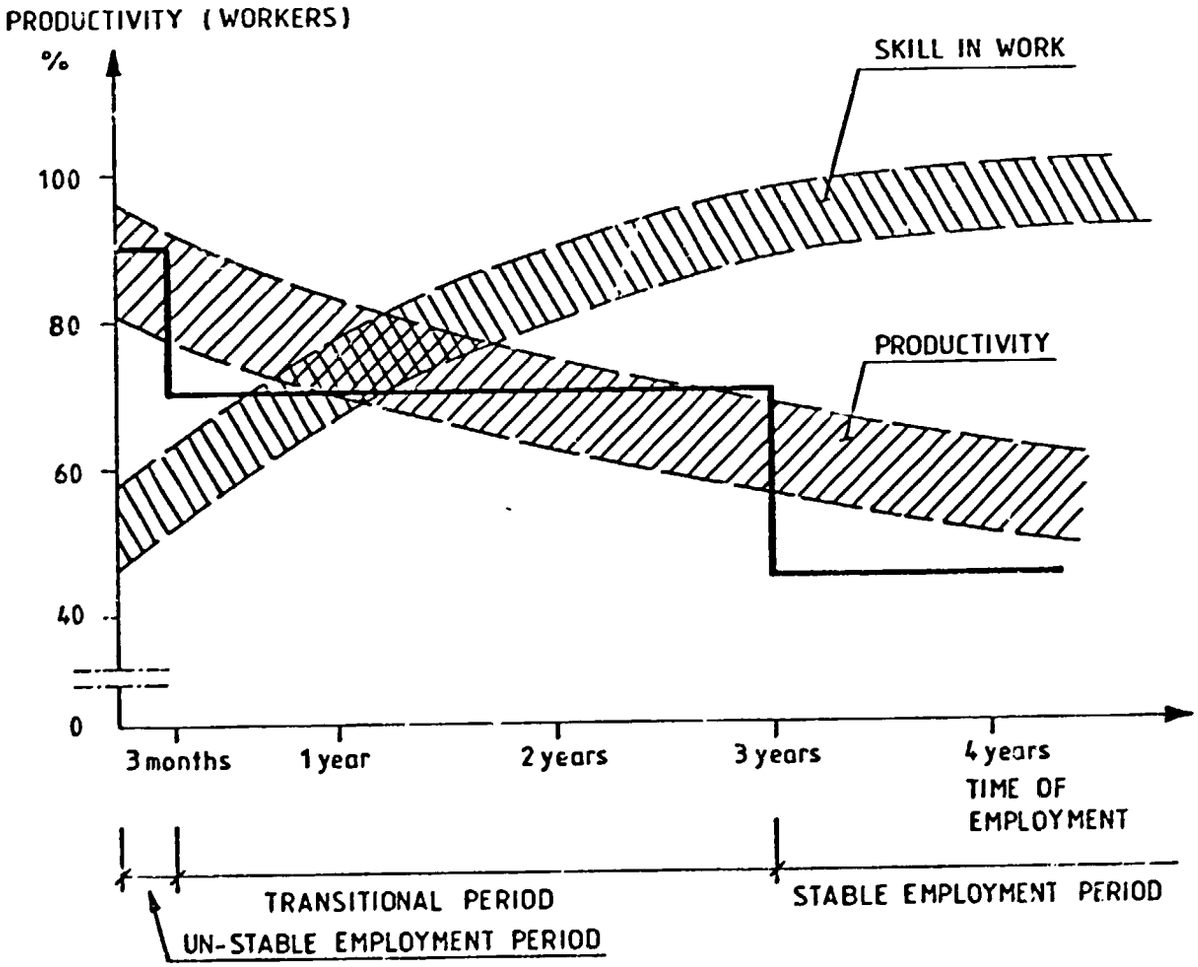
A general underlying principle in all industrial countries is <u>product specialization.</u> The Peruvian manufacturing industry must accept this policy in order to be able to keep up with foreign competition.

The enterprises are today working with low capacity, normally 60 - 80 % of installed capacity. This is mainly due to the low level of investment in mining - most of the mining projects are presently dosed down. The effect of this will be that some of the economically weak enterprises will probably go into liquidation.

4.4 PRODUCTIVITY

Productivity, i.e. the labour output, varies from enterprise to enterprise. A general reflection , however, is that the existing "labour stability law" has a negative infuence on productivity. The following graph gives a general view of the effect of this controversial law.

PRODUCTIVITY AS A FUNCTION OF PERIOD OF EMPLOYMENT



SOURCE:
Data provided by Peruvian manufacturing companies.

Productivity decreases drastically with length of employment. After 3 years, when the "labour stability law" has fully come into effect, productivity can be as low as 45%. On the other hand , working skills have been improved which has had a positive influence on the quality.

4.5 QUALITY AND PRODUCTION CONTROL

The enterprises can be divided into four groups depending on how the product technology is transferred into the company:

- Enterprises working under licence from well-known international enterprise(s).
- Enterprises working under licence from lesser known international enterprise(s).
- Enterprises working with self-developed products (in most cases copies).
- Enterprises working with mixed production, i.e. under licence and own development.

Enterprises working under licence, i.e. those who have some kind of pressure upon them from the patent holder, have from a general point of view a considerably higher quality in the final product. These enterprises also have more modern production methods and routines as they have access to the technical know-how of patent holder. Besides this, there are usually frequent follow-ups of production and quality control by the mother company.

It is noteworthy that a certain backlog of product development can be observed in those enterprises working with their own product research. This is serious as these enterprises might face problems in the future. The product quality is also lower than for a product manufactured under licence.

Very few enterprises indeed utilize ITINTEC's (Instituto de Investigación Tecnológica Industrial y de Normas Técnicas) service concerning quality control. This service is mainly used for larger tendering if the client so requires (product certification).

4.6 USE OF SUB-CONTRACTORS

The use of sub-contractors takes place to a varying extent and for the following reasons :

- The enterprise operates as an assembly plant and the manufacturing is done by sub-contractors.
- Sub-contracting is an integral part of the manufacturing, where specific services are bought on a continous basis.
- To reduce peaks in production especially when short delivery times are required.
- As a result of the labour stability law, since the enterprises do not want to hire temporary workers for temporary production peaks.
- Due to labour conflicts when the enterprise cannot or will not utilize over-time for its ordinary crew.

According to information received, 70 % of all manufacturing units -mostly small work shops - are not legally registered. A large numbers of the legally registered companies utilize these illegal companies in order to reduce the peaks in their own production or to force the prices down heavily.

The contractor may have strong control over the sub-contractor, especially regarding production time and quality. From a general point of view, the products delivered by sub-contractors have lower quality.

The illegal sub-contractors work with temporary employers (from the street), and do not fulfil the labour laws and tax regulations.

This is a very seroius trend which has occured in Peru - and it has to be stopped. The Consultant therefore recommends, very strongly, maximum collaboration between the Peruvian authorities and the industrial organization (Asociación Nacional de Industria) in order to prevail upon the legal companies not to utilize the illegal work shops.

The general state of depression within the mining industry and temporarily closed mining projects has obviously forced the legal enterprises into the present situation. The strong competition (e.g. leasing plants ordered by Banco Minero were manufactured for sale at half international prices) is forcing companies to deliver products in the cheapest possible way.

Another example is the manufacture of mine cars by at least 15 companies. This hard competition has resulted in a quality deterioration of the mine cars.

4.7 BOTTLENECKS AND CONSTRAINTS

Existing bottlenecks and constraints are numerous, below are listed the most important.

- The effect of the "labour stability law", see section 4.4
- Lack of good infrastructure in Peru, especially concerning post, telephone and telex, which, in the first place, has a restrictive influence on export prospects.
- Major problems with the harbour in Callao (tardy handling, material losses, corruption etc.)
- High customs duties on raw material which are not produced in Peru.
- High prices for Peruvian raw material and in many cases a lower quality than for corresponding imported materials.

  Example:
  * Price of nitroglycerine for manufacturing of explosives is 6 times higher than international prices.
  * Soldering of the tungsten bit in drill steel is carried out with a silver alloy. As the Peruvian product does not fulfil the quality requirement, this component for drill steel manufacturing has to be imported.
- The enterprises have difficulty keeping abreast of all changes of laws and regulations, especially those affecting their export possibilities.

As mentioned in earlier sections, the "labour stability law" has affected the Peruvian industry very seriously, especially the manufacturing sector. Below are listed the negative effects;

- Lower productivity, see graph in section 4.4.
- Enterprises are forced into increased use of illegal sub-contractors.
- The enterprises can work with two plants, one legal plant or company and one illegal plant where either an illegal work crew is employed or the plant is hired out to a sub-contractor.

4.8 PRODUCTION COSTS

It is always difficult to get correct production costs from the manufacturing sector due to the competition factor.

Generally speaking, it can be noted that capital goods manufactured in Peru are 5 - 15 % lower in price than international products. This comparision is between ex-factory Peru and ex-factory abroad. Taking into account freight costs and customs duties, the real price differences are higher.

Low-technological products manufactured in Peru are normally more than 5 - 15 % cheeper while high-technological products are in the same price class as imported products.

Some enterprises, who are manufacturing without any form of licence, are selling their products at half international price. As earlier mentioned, the leasing plants for small scale mining were sold to Banco Minero for 50% of international price.

The labour cost in Peru is 35 % of the total cost which is low compared to highly-industrialized countries. This lower labour cost is, however, offset by more expensive raw material, ex. steel plates, copper bars etc.

4.9 TRANSFER OF TECHNOLOGY

Peruvian enterprises have to buy foreign know-how in order to increase the level of technology within their companies. The mining enterprises demand high-technological capital goods with the highest possible capacity and reliability. This equipment has been developed during a continuous research programme. There is no possibility that local manufacturers in Peru will be able to develop and manufacture mine equipment with a high level of capacity and serviceability without this long-term commitment to research.

How can foreign technology be transfered to Peruvian manufacturers of capital goods for the mining sector? Some possibilities are listed below:

- Manufacturing under licence.
- Importation of vital high-technological components.
- Engage outside consultants for the manufacturing design and process, if required, and increase quality control.
- Sign a management agreement with the patent holder.

Mining technology is always open to improvement, like all modern industry. Compared with e.g. the computer and electronics industry, however, technical progress in the mining industry is rather unspectacular . In spite of this, the manufacturing industry has to be aware of and follow up current developments. Mining enterprises have to reduce their costs in order to survive, (see also section 6.3.1), and this cost reduction is accomplished through the introduction of adequate and modern mining technology and equipment.

4.10 SERVICE

A general rule-of-thumb in the selling of mining equipment is that 50 % of the sale is service, both pre- and/or after-sales service.

The Peruvian manufacturers have to build up, through their sales organizations, a well established and good working service organization. In general, foreign suppliers have, through their subsidaries, branches or representations, a very good service. The goal for local manufacturers is therefore to reach this degree of service level.

4.11 TRAINING AND EDUCATION

TECSUP, Instituto Technologico Superior, in Peru is a new education center for training and education of technicians in maintenance and operation of machinery in the Peruvian industry. The aim of this new education center - such training and education has been missing up today in Peru - is to increase the technical level and update the knowledge of the technicians. This will also, in the long run, promote the local manufacturing of high-technological equipment.

The use of computer systems and microcomputers has not yet been accepted in Peru, mainly due to high customs duties. TECSUP will also educate and train technicians in this technology.

5 THE ANDEAN PACT AND ITS IMPACT ON PERUVIAN EXPORT OF CAPITAL GOODS

5.1 ANDEAN PACT DECISION NO 146

Under the auspices of the Andean Pact industrial integration scheme - Peru is a member along with Bolivia, Columbia, Ecuador and Venezuela - the Metalworking Sector Industrial Development Program is in operation.

This programme, approved by the Andean Pact Decision No 146, July 1979, describes the allocation of key industries to the different member countries and gives restriction on the operation of foreign enterprises.

Peru has been granted exclusive manufacturing rights for the main types of mining machinery and equipment under this program and consequently, according to the Andean Pact, equipment manufactured in Peru is exempt from all import duties in the Pact countries.

5.2 THE REAL EFFECT OF THE ANDEAN PACT DECISION NO 146

How does this decision work and what impact does it have on Peruvian exports to the Andean countries?

According to Peruvian manufacturers of capital goods, this Decision No 146 has no significant importance for the export trade to the Andean countries. This is a unanimous answer from all manufacturers. The export trade which has taken place does not result from this decision. Exemption from all import duties has of course some importance for the export of capital goods and consumables. Due to the difficult financial situation in many of the Andean countries, the possibility for Peru to offer attractive credit lines to buyers of Peruvian products, e.g. through FONEX, Fondo de Exportaciones, and Peru's Central Bank, has a much better impact on Peruvian exports.

The main objections against the Andean Pact Decision No 146 are the following:

- The Andean Pact is a governmental project between the different Andean Pact countries. The industrial associations in Peru (Asociación Nacional de Industria), have had little opportunities to influence the project.
- The selection of allocation of key industries to the Andean countries is debateable. In many cases where products are allocated to a certain country, the country concerned is lacking in both resources and appropriate technology for the manufacturing.
- Some countries have an overvalued currency which results in high costs for the receiving country.

The allocation of key industries according to this decision is open to discussion. Taking a long-term view, each country has to try to develop its own manufacturing sector. It is therefore recommended that other forms of agreements be worked out.

Restrictions on foreign investment in Peruvian enterprises must be carefully studied. This type of restriction can inhibit technological development in Peru and thus further reduce the possibility to improve local production.

To promote foreign interest, action to permit 49 % ownership by foreign investors must be taken as soon as possible. This fact has already been realized in some cases with good results for the Peruvian manufacturing and mining industries.

5.3 RECOMMENDATIONS

1) Each country should form a co-operation organization consisting of industrial and governmental members.
2) Credit terms for export to and from the different countries have to be studied and coordinated in order to get a correct trade balance.
3) Each country should work out realistic long-term plans for its manufacturing industry.

4) A study of exhange rates should be carried out (over- or under-estimated exchange), using assumed long-term inflation etc. in order to get equivalence in prices.

5) A study of transport facilities and costs in and between the different countries and the their influence on final prices should be performed.

6 HOW TO INCREASE THE DEMAND OF CAPITAL GOODS TO THE PERUVIAN MINING INDUSTRY

6.1 GENERAL

Mining activity is to great extent dependant on international metal prices, operational costs, production taxes, labour laws etc.

A vigorous, active mining industry promotes demand for mining machinery and equipment.

It is therefore important that a restructuring of the industrial sector in order to promote new industries and to increase the efficiency of existing enterprises is coordinated with a governmental restructuring or review of the mining industry.

Let us therefore study some possiblities for increasing mining activity, not only by means of governmental actions but also through the efforts of the mining enterprises themselves. It takes time before any concrete results can be observed, therefore it is important to start this discussion immediately.

6.2 GOVERNMENTAL ACTIONS

6.2.1 Production taxes

Instead of having production taxes fixed and unaffected by conditions over which the mining enterprises have no influence, e.g. international metal prices, there should instead be some form of excess profits tax, designed for periods of extraordinarily high metal prices. This would be a more palatable form of taxation, although it is extremely problematic to apply in practice.

However, the Consultant does think that this form of production tax, (i.e. production tax as a function of metal prices) will have a stimulative affect on the mining industry. This tax system will give mining enterprises the possibility to increase development activity (preparation of new mining levels or areas) even during periods with low metal prices.

Since January 1st 1984, Peru has had a new export tax on mining commodities which is based on international metal prices. Two tax levels, 5 and 10 %, have been established according to table 7 on next page.

This new export tax is deductible from the company's income tax. Consequently, the real effect of this is that the new export tax is an advance payment of 1984 year's income tax which should be paid 1985. This advanced payment is thus financed by the mining enterprises.

The Consultant has two comments on this new tax system:

Firstly it is extremely problematic, as earlier mentioned, to levy a tax based on metal prices. As can be seen in table 7, mining of polymetalic ores containing e.g. lead, zinc and silver, which is common in Peru, will give rise to different tax levels for each metal. It is difficult to give priority to selective mining.

Secondly this tax system will not promote the mining enterprise since the system is simply advance payment of income tax. The fixed tax levels of 5 and 10 % will also create problems when metal prices are located in the transitional areas of 0 - 5 and 5 - 10 %.

TABLE 7

EXPORT TAX ON METAL COMMODITIES

COMMODITY	TAX LEVEL 5%	10%	TAX - METAL PRICE JULY 1984
Copper	0.75-0.90 USD/lb	>0.90 USD/lb	0% - 0.60 USD/lb
Lead	0.35-0.40 USD/lb	>0.40 USD/lb	0% - 0.22 USD/lb
Zinc	0.35-0.40 USD/lb	>0.40 USD/lb	5% - 0.39 USD/lb
Tin	5.00-6.25 USD/lb	>6.25 USD/lb	5% - 5.69 USD/lb
Silver	8.50-10.0 USD/oz	>10.0 USD/oz	0% - 7.45 USD/oz
Gold	350-400 USD/oz	>400 USD/oz	0% - 347.60 USD/oz

Explanatory notes:

lb pound (0.4536 kg)
oz troy ounce (31.1 g)
> greater than

SOURCE:
1/2 Decambio, Febrero 1 al 15, 1984.

6.2.2 Promoting new mining projects

The list of new mining projects in Peru is long, but due to lack of financing, the majority of these projects has been delayed. Attractive incentives for foreign investors must be found in order to get these projects realized. Examples of some incentives for foreign investors are the following:

- Introduce a tax reduction or a grace period during some years after the completion of the project.
- Confirm the investor's right to select a buyer for his production, and to be entitled to receive the gross sales receipt in dollars. Even if the voluntary approach to selling the ore has been accepted in Peru, an affirmation that export sales will not be handled by the government market agency must be settled.
- Give the investor the right to select his transportation option (in order to achieve the most efficient transportation.)

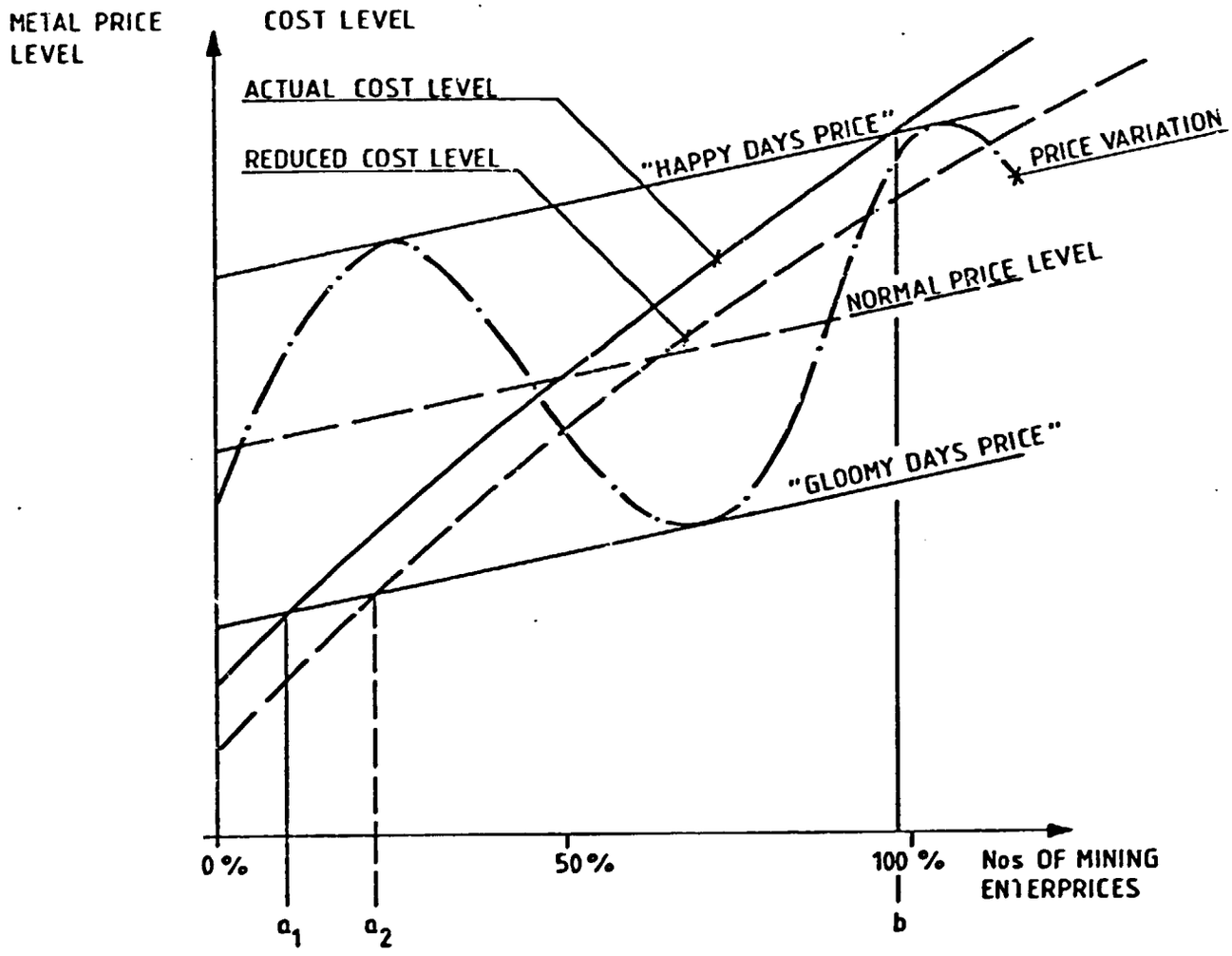
6.3 ACTIONS TO BE TAKEN BY THE MINING ENTERPRISES

6.3.1 Adjustment of cost level to actual metal price level

Metal prices vary constantly between a top and bottom level, the so called "Happy days' price" and "Glooomy days' price". These variations also show that a given mining project may experience both price levels during its lifetime. As the economics of a mining project is usually based on the normal price level, the project ought to have a sufficiently long life, in other words an adequate ore reserve, to enable it survive one or more price cycles, see graph on page 38.

These price levels must also be seriously concidered by existing mines. The "Happy days' price" level can lead a mine to produce at maximum level without taking the operation cost into consideration, so that the mine has no time to introduce cost reductions. When eventually the metal price falls, the mine

GRAPH SHOWING INTERRELATION BETWEEN COST AND METAL PRICE LEVELS.



Example: a_1 Only 10% of the enterprises can work profitably during the "gloomy days price"

a_2 By reducing the cost level, 20% of the enterprises can work profitably.

b Even with "Happy days price" some mining enterprises are working with losses if not cost reduction measures are taken.

Source: Consultant

owner may find itself running at a loss, since it has not controlled its operation costs in due time. It may then be too late to start with rationalization and other cost reduction measures.

The example given above can be seen in all mining countries, including Peru. As regards Peru, the picture is complicated by the "Labour stability law", which means that an increase in productivity can be difficult to carry out since all personnel have to be retained.

It is very important that the Peruvian mining industry strive for a cost level below the international cost level for the same metal. In all highly industrialized countries, there is a clear trend towards reducing mining costs.

This cost reduction policy must also be carried out in Peru with maximum efforts. According to experienced metals market analysts, there will be no drastic increase in metal prices in the near future.

Example:

Copper production has a short doubling time. No less than 124 copper projects are listed in the world. Copper may be substituted to a great extent by other materials (e.g. fibre optics instead of copper cable).

Lead prices are low mainly due to the reusage of lead scrap. This situation will continue and in Peru, this has an impact on silver production since these two metals are mined together.

Silver and gold are highly speculative metals with frequent large price variations. The silver price will in the future be at a relatively high level, but not at a "Happy days' price" level.

6.3.2 Development of medium and small scale mining operations

6.3.2.1 General

As earlier mentioned, the Peruvian mining industry can be divided into four groups;

Large scale mining
Medium scale mining
Small scale mining
Artesan mining

Large scale mines are very few in number, therefore the Consultant is directing our suggestions towards the other groups.

During the last decade there has been an increasing interest in the development of small scale mining.

Some of the advantages of small scale mine operation in the 80's and the 90's can be summarized in the following:

1) Easy to adapt to market swings, satisfying the demand for limited offtake.
2) Small deposits are easier to find. There are many existing mineral deposits well documented.
3) Many small mineral deposits are high grade multimetal deposits.
4) Small mines are relatively less expensive to develop. They offer a short construction time, quick return of capital and a limited risk for investors.
5) Small mines offer a widespread labour market over a vast area.

6.3.2.2 Appropriate equipment

During the 60's and the 70's, there was a strong demand for high-technological equipment for medium and large-scale operations. This was a reflection of the outstanding market for the various metals.

Small-scale mining was therefore approached by means of the equipment of the medium and large-scale mines.

The small mine requires quite a different type of equipment. It is not certain that this equipment needs to be as highly mechanized as for the larger operations.

The Peruvian small scale mining industry is in great need of mining equipment but it should be the right technology according to the mining conditions. This is a field with great potential for the capital goods' manufacturing sector but it requires a close cooperation between the mining and manufacturing industries.

Banco Minero del Perú must undertake extensive responsibility for the development of small scale mining and, as can be seen in the next section, they have started in a profitable way, both for the mining and manufacturing sector.

6.3.2.3 Leasing of mining equipment

Banco Minero has taken a useful initiative by leasing an ore concentrating plant to a collective of several mines (several mine owners).

Central ore concentration can thus serve 5 - 10 different mines with similar ore minerals. Due to the state of the infrastructure in the mining area, road conditions etc, the various mines can be situated up to 30 km from the central plant.

If the mines can fulfil the requirements of Banco Minero, such as ore resources, ore grades, number of mines, infrastructure, Banco Minero signs a leasing

agreement with the mine owners to make an ore concentration plant available. If so required, Banco Minero can also assist in the training of responsible technicians for the plant and can also carry out tests for the ore concentration process and assist the mine owners in signing a sales contract for the ore concentrate.

The leasing contract is a leasing-sale contract. The mine owners will buy the plant, normally within 18 months. The terms of payment are good with a repayment period of 10 years.

Twenty ore concentration plants with capacities from 30 to 200 tonnes per day has been delivered. Table 8 will show the estimated costs for these plants.

According to Banco Minero, the result of this leasing agreement has been successful. Some collaboration problems between the mine owners do of course arise, but these have always been settled.

All deliveries of the complete plants have come from Peruvian manufacturers. The competition was extremely hard with prices far below international price levels for some equipment.

This initiative from Banco Minero is a good example of how to increase mining activity and this has the result of increased demand for capital goods.

Similar actions are recommended for other types of equipment and also for technical services such as:

- leasing-purchase contract for compressors
- leasing-purchase for drilling and loading equipment
- technical services for geology, mine surveying, administration etc.

If necessary, governmental emergency credits or other types of support-loans may help the mining and manufacturing industries to start this leasing-purchasing activity.

TABLE 8

ESTIMATED INVESTMENT COSTS IN USD FOR ORE CONCENTRATION PLANTS

ACTIVITY	COSTS, USD, PER LEASING PLANT 30 tonnes/day	50 tonnes/day	200 tonnes/day	TOT. COSTS, 20 PLANTS
Complete plant	250,000	320,000	1,160,000	6,820,000
Electric supply	38,000	49,000	95,000	960,000
Civil work	100,000	128,000	450,000	2,714,000
Basic implementation	37,000	48,000	173,000	1,019,000
Transport	5,000	7,000	25,000	146,000
Taxes	20,000	26,000	92,000	550,000
TOTAL COSTS	450,000	578,000	1,995,000	12,209,000
NUMBER OF PLANTS	6 units	13 units	1 unit	20 units

SOURCE:
Access to information from Banco Minero del Perú.

6.3.2.4 Promoting local manufacturing

International financing of mining projects generally includes an allocation for purchase of capital goods. With local financing, through the World Bank (WB), Banco International del Desarrollo, BID[1] or local banks, the international tendering can be formulated in such a way that the local manufacturing industry is promoted.

An example of this promotion is CENTROMIN's international tendering for the supply of crushers and grinding mills for its Andaychagua mine project:

> "Peruvian manufacturers are entitled to a 15 % higher price provided that at least 40 % of the equipment is locally manufactured".

It is necesssary that this form of incentive is not abused. The above conditions have been approved by BID[1] and are considered to be a appropriate incentive, since neither the manufacturer nor the client can use it in a wrong way.

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[1] In English: The Inter-American Development Bank, IDB

7 EXAMPLE OF AN EXISTING MINING PROJECT AND ITS IMPACT ON THE PERUVIAN MANUFACTURING SECTOR

7.1 PROJECT DESCRIPTION

The Cerro Verde copper deposit located in Southern Peru is owned by the State Mining company Minero Perú S.A.

Mining operations started in 1979 with the first stage by mining the oxide ore from the copper zones of the ore deposit.

The second stage, called Cerro Verde II, which is now subject to mine planning, will be an open pit with a production of 7 million tonnes per year, equivalent to 20,000 tonnes per day. As the ore mined will be sulphide copper minerals, the project includes a new flotation plant.

The project is still not totally financed.

7.2 INVESTMENT COSTS AND THEIR IMPACT ON THE PERUVIAN INDUSTRY

The total project, including taxes but not working capital and interest during construction, is calculated at USD 234 million. Divided up into Peruvian and imported goods we get the following:

Purchase of capital goods		
Peruvian	USD 3,847,830	9.5%
Imported	USD 36,575,894	90.5%
TOTAL	USD 40,423,724	100%

Purchase of material		
Peruvian	USD 14,887,281	51.8%
Imported	USD 13,873,434	48.2%
TOTAL	USD 28,760,715	100%

Peruvian capital goods and materials thus represent 27.1% of the total delivery. When the cost of local sub-contracting (civil works) is taken into account the total Peruvian share will be 55.7%.

7.3 COMMENTS

This project will, percentage-wise, have a small influence on the Peruvian industrial sector for capital goods. Of the total value, 40.4 million dollars, only 50,000 dollars is allocated to capital goods for mining.

The manufacturing sector will, in any case, be strongly involved in this project since 51.8 % of the material, such as steel structures, will be Peruvian purchase.

This type of large scale project will not be common in Peru and other Latin American countries. The types and sizes of equipment required for the Cerro Verde II are not manufactured in Peru. The policy or strategy of the manufacturing sector should, as pointed out earlier in this report, be to cover more energically the requirements of the medium and small scale operations.

8 EXPORT TRADE OF MINING MACHINERY AND EQUIPMENT

8.1 PROMOTION OF EXPORT TRADE

Peru is strongly promoting its export sales through e.g. FOPEX which was created to promote the export of manufactured goods and handicraft.

Another very well-known, promotion is the TECNOMIN Fair in Lima where Peruvian manufacturers have the possibility to exhibit their products for international visitors.

Peru can also offer attractive credit lines through FONEX to the buyers of Peruvian products. The repayment periods can vary from 1 to 5 years, grace period not included, but can be extended up to 10 years. In addition to the FONEX credits, Peru's Central Bank has credit agreements with Bolivia and Cuba.

The Andean Pact, provided that it will be revised so as to offer better promotion of trade excharge between the countries, might give Peru good prospects for export of capital goods to the Andean countries.

The manufacturers or their sales agencies have to establish export oriented representation in potential importing contries. This is important with regard to the inadequacy of infrastructure in Peru and other Latin American countries and also with regard to the service levels required.

The financial situation in most Latin American countries encourages interest in counter trade. This form of export promotion has to be studied with higher priority by FOPEX. As can be seen in the following review of export to different countries, Venezuela and Columbia for example might be interesting counter trade countries (bauxite and coal respectively). Argentina could eventually also belong to these countries.

FOPEX: Fondo de Promoción de Exportaciones No Tradicionales

8.2 REVIEW OF PERU'S POSSIBILITIES FOR EXPORT TRADE

1) Bolivia

Peruvian industry has to develop a better market in Bolivia than exists at present. As the manufacturing industry of capital goods is considerably less developed than in Peru, the Bolivian mining industry should be a prime customer for Peruvian capital goods.

2) Ecuador and Columbia

Within the coming 10 years, the mining industry will be highly developed in these two countries. According to the new mine law, Ecuador for example will welcome foreign companies. This country has, on the whole, no existing industry for capital goods to the mining industry. Both hard and soft ware are needed and will have to be imported.

The same conditions are valid for Colombia, but this country has a well developed manufacturing industry although it is not directed to the mining industry.

If Peru enters these markets, it will have to launch a marketing drive now. Colombia may be an interesting country for counter trade, (coal-capital goods,) since the Cerrejón coal project soon will be on-stream.

3) Venezuela

Venezuela is widely known as a difficult country to do business with, a view shared even by the Andean Pact countries. Delayed payments for goods and services and the country's efforts to expand its own capital goods' industry have meant that many foreign enterprises have refrained from launching export promotions.

Nevertheless, Venezuela is an interesting market and is open for counter trade business.

4) Chile

Chile, no longer a member of the Andean Pact, has a highly developed mining industry. Having been under American influence for many years, the capital goods' industry for the mining sector has not been developed to the same extent. Peru has - political aspects aside - good possibilities for the export of captital goods, especially to the northern region of the country. Export of certain consumables, e.g. sulphuric acid for copper leaching, is going on today. Collaboration in mining between Peru and Chile would be of great importance for the two countries.5)Argentina

Argentina is, compared with Peru, Chile and Bolivia, a young mining country. The country has many mining projects under evaluation of which at least three projects can be implemented in the near future if financing can be settled. As the Argentine mining industry considers Peru as a good mining country, Peruvian promotion for the sale of capital goods should be seriously studied. Counter trade might be interesting.

6) Brazil

Brazil will probably be of no interest to the Peruvian export trade within the nearest future.

7) Mexico

Mexico may be an interesting market for the Peruvian export trade as the mining industry is very much like the Peruvian industry. Proximity to the United States has naturally great importance for mining. However, it is important to bear in mind that Mexico is a Latin American country. It wishes to free itself from American influence and to strengthen its collaboration with other Latin American countries.

8) Central American countrie

These countries are now promoting their mining industries as for example:

- Nicaragua

  Rehabilitation and expansion of the mining industry, specifically the gold mining sector.

- Costa Rica and Honduras

  General review of the mining industry.

A general survey of the demand for capital goods in these countries is recommended. It can be mentioned that Peru is today making some deliveries of capital goods to the mining industry in Nicaragua under the financial aid programme between Peru and Nicaragua.

9) Rest of the world

The launching of export trade outside the above mentioned countries can only be realized by highly specialized and modern Peruvian enterprises, e.g. the Peruvian explosives factories some of which have very high internally developed technology.

9 BRANCH - PRODUCT SUGGESTIONS FOR RESTRUCTURING

9.1 AIM AND DIRECTION

It is suggested that Peruvian manufacturing of capital goods for the mining industry be directed to the medium and small scale mining operations. As earlier described, future development in the mining sector will be concentrated in these areas. The size of the machinery and the limited volume of production for large scale mining cannot justify the structuring of the manufacturing industry for the large scale mining operations alone.

It is recommended that manufacturing enterprises become more specialized in particular mining products and that they try to find their "niches". This will relieve the extremely hard competition and also result in technological progress and quality improvements.

It is also of the highest importance that the enterprises look at technological developments in countries competing in the world market.

It might be dangerous for an enterprise to become too specialized in the mining industry for capital goods only. As pointed out earlier demand of machinery is strongly linked to international metal prices. It is therefore wisest to have a "bread-and-butter" fabrication, in other words fabrication of material and/or consumables for the mining industry and/or fabrication for branches other than mining.

The proposed tax relief might encourage mining enterprises to maintain normal mining activities even during "Gloomy days' metal prices" and consequently to permit a continuous production level to be maintained in the manufacturing sector.

9.2 IDENTIFICATION OF NEW PRODUCTS

Based on this study of capital goods for the mining industry, the following pages give suggestions for new products which can be manufactured within the existing range of production or will, in some cases, require new enterprises. The list is by no means complete but it may give some information for the establishment of future production goals.

These new products must be manufactured under licence. Studies of the importation of vital components, and high-technological products have to be carried out as well as study of technical assistance from abroad.

The suggestions have been expressed as short-range and long-range goals covering the first five years and 5 - 10 years respectively.

9.2.1 Short-range goals

PRODUCTS	COMMENTS
1) Screw compressors	Existing manufacturer of piston-type compressors is actually discussing with international compressor manufacturers for the manufacture of screw-compressors under licence (import of vital components). Can be integrated into existing production line.
2) Locomotives, diesel and battery drive	Can be integrated into existing manufacturing line. The existing Peruvian representative is supposed to continue the sale.
3) Mine lamps, charging equipment and accessories	New industry to be set up or to be integrated with local manufacturing of safety equipment.

4) Drilling equipment, hand-held rock drills, drill wagons	In spite of hard international competition, it is recommended that manufacturers, existing representatives and the mining industry study conditions for the manufacture of drilling equipment. Export to the Andean Pact countries should be considered. A study of the former factory established in Bolivia and the reasons for its failure should be carried out.
5) Charging equipment for ANFO explosives	The increased use of ANFO explosives, which is locally manufactured, creates a good market for this equipment. Does not demand high-technological manufacture but requires high quality control. Can be integrated with existing production line.
6) Reinforcement equipm. such as guniting equipm. and accessories, reinforcement bolts etc.	An increased demand from the mining enterprises and the mine workers to increase safety in the mines will also increase the demand for such equipment and consumables. Can be integrated with existing production lines.
7) Metallurgical equipm. and technology	New metallurgical technology such as gold cyanidation of placer deposits will call for a new type of metallurgical equipment. Requires foreign technology but does not demand high-technological manufacturing. Can be integrated in existing production plans.

<u>Manufacturing of material and consumables ("bread-and-butter" manufacturing).</u>

PRODUCTS	COMMENTS
1) Rails and accessories	The existing import of this material ought to be completely substituted by local products. Can be easily integrated in existing production line.
2) Air and water pipes, ventilation tubes and accessories (valves, crane, couplings etc.)	Same comments as above. Manufacturing of ventilation tubes, plastic or woven material, may require new production lines.

9.2.2 Long-range goals

Regarding long-range goals, i.e. the future manufacturing within 5 - 10 years, it is of the highest importance to maintain close collaboration between the manufacturers and the mining people. The suggestion is that this new industry will start with assembly plants with a gradual transition to local manufacturing. Examples of mining capital goods for this long-range goal are as follows:

- Loading equipment with pneumatic, diesel or electric drive.
- Drill jumbos, pneumatic and all-hydraulic jumbos.
- Complete manufacturing of drill steel and bits.
- Manufacturing of a more complete range of metallurgical equipments.

To reach this long- range goal, governmental incentives must be established in order to attract international enterprises to establish assembly plants in Peru.

9.3 POTENTIAL FOR SHORT-RANGE GOALS

Production of capital goods, suggested in the programme of short-range goals, can on the whole be carried out in existing manufacturing facilities. A redistribution of manufacturing would be desirable, such as manufacturing of high-competitive goods, mine cars, flotation cells etc.

A "Buy national policy" should be worked out by the industrial organizations, Asoción Nacional de Industria and Sociedad Nacional de Minería y Petroleo.

Based on short-range objectives, the following market potential has been calculated by taking into account existing mining production and future projects which can be realized within the near future. This can be regarded as a moderate estimate.

PRODUCT	VOLUME
Screw-compressors	10 units/year
Locomotives	10 units/year
Mine lamps	2000 units/year and charging equipment and accessories
Rock drills	100 units/year
Drill wagons	25 units/year
Charging equipment	10 units/year
Reinforcement equipment (guinting machines etc.)	10 units/year
Reinforcement bolts etc.	500,000 units/year *
Rails	10,000 m/year and accessories
Air and water pipes	10,000 m/year and accessories
Ventilation tubes	5,000 m/year

* According to a recent study the need of reinforcement bolts is more than 1 million bolts per year.

10 RECOMMENDATIONS

Based on the mission's fact finding and study of the manufacturing industry for capital goods to the mining sector, many recommendations can be put forward. However, such recommendations must be realistic with regard to the economic and political situation in Peru as well as to the availability of human resources.

The recommendations listed below are to be seen as providing a broad outline for the restructuring of the manufacturing industry. To carry out this restructuring successfully, close cooperation between the parties concerned is required. These parties are:

- Manufacturing enterprises
- Mining enterprises
- Industrial organizations
  - * Asociación Nacional de Industria
  - * Sociedad Nacional de Minería y Petroleo
- Government

The Andean Pact countries should also be added to this list since one objective of the restructuring of the manufacturing sector will be to increase exports to these countries. Exports will also be directed towards other Latin American countries and eventually to selected countries in the rest of the world.

10.1 RECOMMENDATIONS FOR ACTION BY THE GOVERNMENT

The mission's recommendations, listed below, are mainly directed towards companies and institutions involved in the mining industry. However, in order to ensure that these recommendations have the maximum chance of succeeding, urgent consideration should be given to specific problem areas over which the Government alone can exercise control.

The following suggestions should be taken into account if and when Government policy towards the mining industry is reviewed.

1) Improvement of the control of illegaly working manufacturing enterprises.
2) Improvement of the infrastructure with regard to post, telephone and telex
communications.
3) Improvement of import and export facilities and routines in the Callao harbour.
4) Revision of the customs duties for importation of:
   - Complete mining equipment
   - High-technological components for assembly in Peru
   - Low-technological components for assembly in Peru
   - Spare parts and raw material.

   Regard must be given to existing Peruvian material and manufacturing facilities, as well as to the domestic quality and price levels of goods/material concerned to be improved.
5) Revision of the tax system and incentives for establishment of foreign investors in Peru.
6) Revision of the Andean Pact and improve its impact on the Peruvian manufacturing sector, see section 5.

10.2 RECOMMENDATIONS DIRECTED TO THE MANUFACTURING ENTERPRISES

1) Increase specialization of manufacturing in order to avoid hard competition on standard products.
2) Try to find "niches", where you have outstanding competence in your fabrication.
3) Follow up international developments in the field of capital goods for the mining industry.
4) Study the possibilities of working under licence for manufacturing well-known products. Make contact with Peruvian representatives of products which fit into your production line.
5) Do not hesitate to engage foreign experts for new production lines.

6) Revise the production line, use sub-contractors for unprofitable sections.
7) Improve quality control, utilize e.g. ITINTEC's services.
8) Increase service and technology sales.
9) Make use of governmental institutions, e.g. FOPEX, to study or to increase your export sales.
10) Do not utilize illegal sub-contractors.
11) Keep close contact with the mining enterprises and their mines.

10.3 RECOMMENDATIONS DIRECTED TO THE INDUSTRIAL ORGANIZATION - ASSOCIÓN NACIONAL DE INDUSTRIA

1) Request the members not to utilize illegal sub-contractors.
2) Increase collaboration with the mining industrial organization -Sociedad Nacional de Minería y Petroleo - and their mining enterprises to discuss their requirements on mining equipment.
3) Try to encourage the mining industry to buy home-produced capital goods - "Buy national policy".
4) Increase the flow of information to members regarding new laws, regulations and taxes.
5) Increase the flow of information to members regarding the export trade - an Export Trade Section should be established which should be the counterpart of the private industry to FOPEX.

10.4 RECOMENDATIONS DIRECTED TO THE MINING ENTERPRISES

1) Increase collaboration with the manufacturing sector. Give them your requirements for and future trends in capital goods for the mining industry.
2) Try to give preference to home-produced capital goods and material - "Buy national policy".

3) Give the Peruvian manufacturing sector incentives for new mining projects - try to relieve the obligations of foreign financing regarding the delivery of capital goods.

11 LIST OF VISITS

As the basis for this report, data have been collect d during visits to the following factories and institutions. A primary list of visits was made up in cooperation with Ministerio de Industria but was finally completed during the mission in order to get a representative selection of the different branches.

a. Mining companies

1. Hierro Perú
2. Centromin
3. Minero Perú
4. Cía de Burnaventura S.A.
5. Sociedad Minera "El Brocal" S.A.
6. Mauricio Hochschild & Cía, S.A.

b. Factories (F) and Representatives (R)

1. FIMA, Fabricación Industrial de Maquinarias S.A. (F)
2. ALGESA (F)
3. MEPSA, Metalurgica Peruana S.A. (F)
4. FAMESA, Fabrica de Mechas S.A. (F)
5. COMPASA, Compresores Andinas S.A. (F)
6. REN. SA, Reactivos Nacionales S.A. (F)
7. COMESA, Comercial de Metalica S.A. (F)
8. Plusmetal Ingenieros S.A. (F)
9. EXSA, Explosivos S.A (F)
10. Boyles Brothers (F)
11. MAGENSA, Maestranza General S.A (F)
12. Fagersta SECOROC del Perú S.A. (F + R)
13. AGA, Cía AGA del Perú S.A. (F + R)
14. Atlas Copco Peruana S.A. (R)
15. Wiese Representaciones S.A. (R)
16. Boliden Rawmet (R)

c. Contractors

1. OISA; Orihucla Ingenieros S.A.

d. Governmental institutions

1. Ministerio de Industria
2. Ministerio de Energía y Minas
3. ITINTEC, Instituto de Investigación Tecnología Industrial y de Normas Técnicas.

e. International institutions

1. UN/UNIDO
2. JUNAC, Junta de Acuerdo de Cartagena

f. Educational institutions

1. UNI, Universidad Nacional de Ingeniería
2. TECSUP, Instituto Tecnologico Superior

g. Industrial organizations

1. Sociedad de Minería y Petroleo
2. COFIDE, Corporación Financiera de Desarrollo S.A.
3. Price Waterhouse (Moreno Patiño y Asociados)

h. Banks

1. Banco Minero del Perú
2. Banco Central Hipotecario del Perú
3. Banco Central de Reserva del Perú
4. Banco Mundial
5. BID, Banco Interamericano de Desarrollo

Private consultant

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