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UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION

S/F REPAIR AND MAINTENANCE

OF

INDUSTRIAL EQUIPMENT

SURVEY CONDUCTED IN THE DEMOCRATIC REPUBLIC OF THE CONGO

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REPAIR AND MAINTENANCE OF INDUSTRIAL EQUIPMENT

SURVEY CONDUCTED IN THE

DEMOCRATIC REPUBLIC OF THE CONGO

IN DECEMBER 1968

FOR

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION

B Y

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MEMBERS OF RESEARCH AND DEVELOPMENT

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I. PURPOSE AND CONCLUSIONS

A. PURPOSE

The purpose of this report is to give an account of the survey on Industrial Equipment Maintenance and Repair means and methods conducted in the Democratic Republic of the Congo and to draw therefrom the necessary inferences in the form of possible recommendations for their improvement.

B. RESULTS OF SURVEY

From the survey it follows that :

1°) Most D.R.C. manufacturing industries are run by private interests and are at present not faced with serious problems concerning the Maintenance and Repair of their equipment.

2°) Among public sectors two are definitely found wanting with respect to maintenance of their equipment. These are Public Works Mechanisation Workshops and Hospitals.

3°) The main factors having a detrimental influence on the standard of Equipment Maintenance and Repair are, in the order of priority importance :

a) the shortage of spares,
and then
b) the lack of qualified personnel.

C. CONCLUSIONS AND RECOMMENDATIONS

1°) To remedy the situation, we recommend :

as top priority

a) the sending to the D.R.C. of a mission of experts and consultants for the reorganisation of the Maintenance and Repair Services in the abovementioned sectors ;
b) the setting up of a Provisionment Control Department.

as second priority

c) assistance for the repair of T.P.M. workshops machine tools and for the supply of original spare parts for vehicles and automotive machines ;

d) the organisation of seminaries and grant of training and refresher course scholarships.

2°) These various programmes should allow of scheduled time extension if need be.

3°) It is not practicable to recommend other long-term programmes, as these are contingent upon the march of the country's industrial development.

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II. INTRODUCTION

A. SUBJECT

The UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION (UNIDO) has resolved to embark on a long-term campaign aiming at the improvement of the Maintenance and Repair Services of the industrial equipment now existing in developing countries.

With this object, UNIDO has selected a number of typical regions, where the fullest possible investigation has been made of the conditions obtaining in this respect.

The purpose of this report is to give an account of the local survey carried out in the DEMOCRATIC REPUBLIC OF THE CONGO and to draw therefrom the necessary inferences.

B. AIMS OF SURVEY

1. To enable UNIDO the selecting, among regions visited, of those where it is recommended to initiate as a priority, a campaign for the improvement of industrial equipment Maintenance and Repair Services.
2. To devise a technical aid short- and long-term scheme for the benefit of the selected regions.
3. To bring to light vital needs calling for urgent assistance.
4. To work out a long-term assistance scheme for developing countries covering maintenance and repair facilities.

C. LINES OF REPORT

In the first place, we attempted to assess the relative size of the present various industries in the D.R.C., as well as the part they played in the economy of the country and/or in the export trade.

Working from this data, we next tried to examine the situation, from the Maintenance and Repair standpoint, of the most typical firms belonging to the leading branches of industry.

We endeavoured to trace the main central workshops dealing with the maintenance and repair of equipment in the country and we made a survey of such facilities.

The analysis and study of the information thus collected provided us with a general picture of the Maintenance and Repair Service set-up and also of the position with spare part stocks in the D.R.C.

Finally, we arrived at the necessary conclusions and made the recommendations we deemed fit to enable UNIDO to pursue the task they had assigned themselves.

III. PRELIMINARY SECTION

A. RELATIVE IMPORTANCE OF VARIOUS D.R.C. INDUSTRIES

No recent official statistics are available relating to D.R.C. industrial activity.

It should however be noted that, in consultation with Banque Nationale du Congo, the Ministry of National Economy has just produced a questionnaire to take a census of all the operations of industries established in the CONGO.

Some further time will thus elapse before the relative comprehensive and accurate data comes to hand.

This being so, we adopted as a working basis a Report on Trends for the D.R.C. Industrial Development and Diversification Plan, prepared by IRES (LOVANIUM) and giving a number of relevant details.

We inferred therefrom the relative size of the various main sectors of Congo economy in the 1964 Gross Home Product Structure and the comparative importance of the various branches of industry in 1963.

These details are set out in the following Tables I and II respectively.

TABLE I

D.R.C. GROSS HOME PRODUCT STRUCTURE - 1964

Agriculture		34,3 %	
Mining		19,7 %	
Industry :	Exports	24,- %	Total : 46 %
	Home Market	22,- %	
		100,- %	

TABLE II

RELATIVE IMPORTANCE OF THE VARIOUS D.R.C. MANUFACTURING INDUSTRIES - 1963

	%
Food, beverages and tobacco industries	48,6
Textile industry	9,4
Ready-made clothes and shoe industries	8,8
Leather industry	
Wood industry	4,1
Paper industry	0,7
Printing and publishing	2,-
Rubber industry	1,-
Chemical industry	7,5
Non-metal mineral products industry	9,-
Basic metallurgy	1,1
Metal products manufacture	7,1
Other industries	0,7
	100,-

It should be observed that these Tables give no figures concerning transport, a major branch which assigns conditions to all the activities of the country.

According to a survey carried out by the U.S. Department of Commerce, the 1964 gross national product structure showed the following breakdown into the main sectors :

		%
Industry		17
Mining		7
Agriculture		13
Administration, Trade, Transport	(± 15 % each)	45
Building and public works		1,8

Although the figures from these two sources do not quite tally and are a few years old, they may be considered as being still sufficiently representative, for the purpose of our survey, of the comparative size of the various D.R.C. industries.

B. GEOGRAPHICAL LOCATION OF D.R.C. INDUSTRIES

Industrialisation centres in two main districts : the Lower-Congo Kinshasa area and the Katanga area.

These two areas account for 3/4 of the most elaborated economic activities, about 8/10 of manufacturing production and 3/4 of mining operations.

There is a third centre, Kisangani, but this is now far less important. It was favoured by EEC experts, who considered its development to be desirable to counteract the Kinshasa area tendency to overexpansion.

But, at present, industrial operations in this area are markedly curtailed ; hardly a few factories are still working.

Considering the time allowed for our survey, we preferred to go fully into the problem in the Lower-Congo Kinshasa area, at the same time obtaining as much information as possible concerning the other areas, to make sure that a similar situation obtained in such areas.

C. INDUSTRIAL SECTORS COVERED BY SURVEY (*)

a) Public transport

1. OTRACO (Shipyard)
2. OTRACO (Railway workshop)
3. PUBLIC WORKS (Waterway equipment maintenance shops)
4. PUBLIC WORKS (Mechanisation centre)
5. TCC (Congo Public Transport) (Maintenance shops).

b) Manufacturing industries

b1) Food industry

6. BRALIMA (Brewery)
7. MARSAVCO (Margarine factory)
8. CONGOFRIGO (Food preservation)

b2) Textile industry

9. UTEXCO

(*) See under Appendix I the table summarising the main information obtained when visiting the various concerns under survey.

b3) Ready-made clothes, shoe and leather industries

10. BATA (Shoes, leather)
11. ATELIERS JOCK (Clothing)
12. SOTEXCO (Clothing)

b4) Fats industry

7. MARSAVCO (Soap works)
13. AMATO (Oil, Soap)

b5) Wood industry

14. SOCOBELAM (Peeled wood)

b6) Chemical industry

15. PLASTICA (Processing of plastics)

b7) Tobacco industry

16. LAURENS (Cigarettes)

b8) Metal products manufacture

17. RAY-CONGO (Coachwork)
18. CHANIMETAL (Foundry - workshops - shipyard)
19. CHANICO (Road machines - Lifts)
20. MECANICONGO (Mechanical workshop)

b9) Non-metal products manufacture

21. BOUKIN (Bottle works)

c) Agriculture (*)

ATELIER D'ENTRETIEN DE MATERIEL AGRICOLE

d) Hospitals (*)

HOPITAL CENTRAL DE KINSHASA (Collective installations)
HOPITAL REINE ELISABETH (d°)

e) Sundries

ENTRELCO (Electric installation contractors).

(*) Although there are not, so to speak, industrial sectors, they have been included in our survey as requested by UNIDO.

D. RESULTS OF SURVEY

1°) Public transport sectors

In all public transport sectors (water-borne, rail, road), the main factors having a detrimental influence on the adequacy of equipment maintenance and repair are, generally speaking, the following : the lack of spare parts and the shortage of qualified labour both for the maintenance and repair and for the operating of the equipment.

The position is particularly critical in the Public Works mechanisation shops (T.P.M.), charged with the maintenance and repair of motor vehicles belonging to the State and of road maintenance machines. The condition of machine tools and tooling in these shops is quite unsatisfactory.

2°) Manufacturing industries sector

The respective positions with equipment maintenance and repair in the various branches of these industries are quite similar.

These industries have organised themselves to meet the main problems with which they are faced in this respect.

The only factor, which still has an adverse effect on the adequacy of maintenance and repair of their equipment, is the shortage of qualified native personnel, which these industries make up for by employing foreigners, mainly at managerial level.

3°) Agricultural sector

Large farms, mostly under foreign management, have their own maintenance and repair workshops.

Small farmers very seldom have the workshops, spare parts and qualified labour to deal with the current maintenance of their material.

There are but a very small number of agents for makes of agricultural equipment, providing on the spot technical service both for the supply of spares and for the maintenance of machinery.

4°) Hospital sector

Hospitals have no facilities whatever for the maintenance of their equipment.

However, there are some local private firms, which would be capable of carrying out most of the necessary repairs.

E. CONCLUSIONS AND RECOMMENDATIONS

To remedy the situation, we recommend :

1°) For the Public Works mechanisation shops sector

a) the sending to the D.R.C. of a mission consisting of 5 experts for a period of two years to re-organise the Public Works mechanisation shops, T.P.M. service.

b) the sending of consultants with expert knowledge of the various types and makes of machines, for a total period of 6 months.

c) the granting of 7 scholarships of 6 months each for the further training of correlative personnel.

d) the supply of parts required for the repair of T.P.M shops existing machine tools.

e) the supply of essential original spare parts for the repair of motor vehicles and automative machines.

2°) For the hospital sector

The sending to the D.R.C. of an expert, for a period of 18 months, charged with the task of organisating, in agreement with the Government department concerned, a hospital equipment maintenance service.

3°) To improve training

To palliate the shortage of qualified personnel, particularly at native managerial staff level, we recommend the organisation in the D.R.C. of training and refresher course seminaries in the various fields of equipment maintenance and repair.

4°) To palliate the lack of original spare parts

We recommend the forming, within the Ministry of National Economy of a provisionment control department, with the duty of seeing that supply contracts include provisions for short- and long term assistance, among other things for the supply of spare parts.

5°) Time length of programmes

The scheduled periods covered by the various programmes should allow of extension, if this proved necessary.

6°) Long term programmes

As things are now in the D.R.C., the recommendation of other long term programmes is not practicable, as these are contingent upon the march of industrial development of the country.

IV. D.R.C. INDUSTRIAL EQUIPMENT REPAIR

MAINTENANCE TECHNICAL SURVEY

A. PUBLIC TRANSPORT SECTORS

1°) Water-borne Transport

a) In addition to its Kinshasa shipyard, OTRACO operates shipyards in Matadi, Boma and Mbandaka (the former Coquilhatville).

All these shipyards are designed for the maintenance and repair of river equipment. They are integrated shops, coupled with other operations.

They are however independent sections with a responsible management and they work to maintenance and repair programmes.

b) They cannot be considered as being centralised workshops, as they are entrusted with the maintaining of but a part of OTRACO equipment.

Their field of activity covers the whole fleet, viz. 380,000 tons.

The equipment of these yards is fairly complete, although a number of machines are obsolete and should be replaced.

These yards do not seem to be able to keep pace as desirable to maintain the entire fleet in a proper state of repair. It should be noted that OTRACO is partly assisted by a private shipyard in the repair and maintenance of river equipment.

The standard of work may be considered as satisfactory.

These shipyards form a part of the operating company and belong to the Congo State.

c) The availability of stocks of spare parts is the crucial problem regarding the maintenance and repair of internal combustion engines.

Although the freeing of imports, introduced by the 1967 monetary reorganisation, has materially improved the position with spares in many industrial sectors, it looks as if, in the field of transport, the special spare part supply problem remains attended by difficulties and much delay.

It should be observed that this refers to special spare parts (spares for internal combustion engines), that cannot be made locally, on account either of their very nature, or of the material they are made of, or of the requisite manufacturing precision, or of the heat treatment they have to be subjected to.

It seems that the present shortage, which we shall find later to a varying extent according to sectors, is due to :

- an excessive spare part consumption due the faulty operation of the machinery by crews ;
- the cumulative delay over the period of restricted imports ;
- the lack of credit for stock replenishment ;
- the slowness of transport and delays attending supply and clearance administrative procedure.

d) The shipyard mechanical workshop is able to provide or repair most general mechanical parts ; still, it is short of a number of machines to enable it to complete the range of parts to be made available to the maintenance shop (*).

Yet, there will remain a very large number of special spare parts that cannot be locally produced and will have to be imported.

e) For the sake of comprehensiveness it should be mentioned that navigable waterway maintenance comes under the Ministry of Public Works. This Ministry has its own shipyards for the maintenance of such equipment as dredgers, ferries, etc.

(*) It would appear that there is a renewal schedule covering a number of machines and, further, that some have actually been ordered or are in the process of being delivered.

The Kinshasa shipyard does not appear to work to a definite maintenance programme. It attends first to the most pressing work and is thus able to cover the maintenance of 50 % of the equipment. But the yard is however suitably fitted out to cope with the work it may be called upon to perform.

Though it has a fairly full stock of spares, its work is all the same considerably interfered with for want of special parts. These difficulties appear to be mainly ascribable to administrative protraction, short credit and late payments. These circumstances make for a noncommital attitude on the part of suppliers.

The yard is capable of producing or repairing small current mechanical parts. The spare part store is relatively well organised and kept.

The main concern of the yard is the rebuilding of river ferries, many of which disappeared during the events following the establishment of Home Rule.

The reopening to traffic of the road system is contingent upon the availability of these ferries. The shipyard is turning out new ferries, at the same time training teams, who will in turn undertake inland the building of such units.

2°) Rail transport

a) All organisations charged with the operating of railways in the Congo have their own maintenance and repair workshops. This is due to the size of the country and railway network disjunction.

So it is that OTRACO has a wagon maintenance and repair shop, as well as a shunting locomotive overhaul-shop and a main locomotive overhaul-shop in Thysville. C.F.L. (Chemin de fer des Grands Lacs) has workshops in Kisangani, Kongolo and Kalemie (the former Albertville). VICICONGO has railway workshops in Aketi and Isiro (the former Paulus).

b) The Kinshasa wagon maintenance and repair shop services all C.F.M.K. (Chemin de fer de Matadi à Kinshasa) wagons. This railway and the road are the only lines of communication of the Congo with the ocean over national territory.

Its available equipment is complete and enables it to carry out its tasks under reasonable conditions with a fair standard of work.

In addition to current inspection service and supply of engines, the Kinshasa locomotive depot has to deal with the overhauling of shunting locomotives.

It is adequately equipped to perform these tasks under suitable conditions, but has no machining shop. Machining is done by ATELIER DE THYSVILLE.

All these facilities are Congo State owned.

c) The same problem occurs here regarding the provision of special spares for engines. The shortage is ascribable to the same reasons as stated under 1°) c).

d) All these shops are able to manufacture or to arrange for the manufacture and dressing of current mechanical spares covered by their operations.

The quality of these parts is satisfactory.

e) These various workshops have spare part stores. But these do not carry the full range of necessary items.

3°) <u>Road transport</u>

- <u>Goods traffic</u>

We propose only to review the position with maintenance and repair of equipment for road upkeep, as this is essential for the repair of the road network, which is a condition of the proper reopening of road transport.

It should further be noted that road transport is operated either by the private sector, which directly or indirectly undertakes the upkeep of its own material, or by some semi-public concerns, which also look after the maintenance of their fleet in their own workshops.

It should first be pointed out that most of the road maintenance equipment has ceased to exist or is out of use.

a) The country has 5 main mechanisation centres and about 10 secondary centres called T.P.M. They come under the Ministry of Public Works. For want of adequate technical assistance and, probably, mostly for want of credit, they have registered a disastrous deterioration in output and efficiency. Basically, these workshops have also to deal with the maintenance of government vehicles (lorries, cars).

These different centres are independent of one another. They seem to be deprived of efficient management at the various level.

There is no maintenance and repair programme.

b) The main centres are equipped with a service station and the various operating sections, such as : lorry maintenance and repair, bodywork, road machine maintenance and repair, engine overhaul shop and mechanical workshop. In most cases the equipment is still there, but is incomplete or short of implements and tools. In other words, it is now hardly ever used.

T.P.M. mechanisation centres belong to the Congo State.

c) One of the reasons of the almost complete standstill of mechanisation centres is the lack of spares (only one maker has provided with his lorries a fairly substantial batch of spare parts).

This shortage of spares is put down to many causes, only to mention : the diversity of makes and types of vehicles for maintenance, the lack of credit and administrative delays. There does not seem to be any organised section charged with the task of laying in supplies of spares.

d) The motor vehicle sector is among those which cannot do without imported original spare parts. In addition, special tooling partly depending on makes and types of vehicles is a requisite, and it is generally lacking.

e) Needless to say, where spare part stores to exist, these are short of parts and are run on arbitrary lines.

- Public transport of passengers

Under this heading, we propose to review public bus transport.

a) T.C.C., the leading public transport concern in the Congo, has its own maintenance and repair shops, divided into different specialised operating sections under the responsibility of a technical manager, supported by engineers and trained personnel, forming a properly graded establishment.

b) These shops are equipped with a service station and comprise the various operating sections : electricity, tyres, engine overhaul, injection, gear boxes, rear axles. A general mechanical workshop undertakes the manufacture of some parts. These shops are suitably fitted out.

T.T.C. is owned to the extent of 65 % by the Congo State and 35 % by private enterprise.

It should be noted that another small private company also operates some definite forms of public transport. However, this company has no maintenance and repair shop. Such work is looked after by the local agent of the make of vehicles.

c) T.C.C. carries a very large stock of spares (1.6 million dollars in value), often as complete assemblies. Nevertheless, stocks are inadequate due to a shortage of credit and delays attending administrative formalities.

In cases of emergency or accident, the concern orders parts by air.

d) T.C.C.'s mechanical workshop is capable of producing current mechanical parts, but these form only a small percentage of the items required.

e) T.C.C. runs a well kept spare part store.

B. MANUFACTURING INDUSTRIES SECTOR

a) It is not intended to deal separately with each branch under this heading. There is a great similarity in the respective position of these various branches ; they only differ from one other in minor details, as can be gathered from the detailed reports (Table under Appendix I).

In actual fact, all the firms include maintenance and repair facilities. These vary in importance according to the type of operation and, therefore, the kind of equipment used, and also depend on the size of the company.

To draw a broad picture, let us say that the relative personnel ranges in number from a few to about one hundred persons.

Generally speaking, these facilities form and independent section, with nearly always a foreigner in charge.

However, we came across a large textile factory with maintenance sections forming an integral part of each shop and coming directly under the production manager, butthat was an unusual instance.

Maintenance and repair programmes are not always properly determined and planned, mostly in certain minor industries, where this requirement is not felt to the same extent and where the equipment comes more directly under the supervision of its responsabile users. Still, occasionally we found a firm working to a planned maintenance and repair schedule, which was kept strictly up to date and practically followed.

b) The centralised workshops belong to the large concerns (mines, textile works, etc). Some are suitably fitted out, although not always with all the equipment which would enable them to cope with a greater number of orders, particularly for parts.

Generally speaking, integrated centralised workshops are very busy. They are not much likely to attract outside customers and are hardly tempted to work for them.

However, there is in Kinshasa a large-size metal products manufactory (CHANIMETAL). This is fairly well fitted out and actually does jobs for many local industries and even others in the country. At the time of our visit, the manufactory did not appear to be overworked and was, in case of emergency, in a position to cope with a large number of orders.

Centralised workshops include several sections : mechanical engineering, sheet metal work, electrical engineering and even, in occasional cases, a foundry and a few heat treatment furnaces.

Their equipment consists of the range of machines basically required for the production of current mechanical parts, namely :

- drill
- radial drilling machine
- shaping machine
- planing machine
- boring machine
- grinding machine (not always)
- gear-cutting machine (not always)
- milling machine (usually the universal type)
- lathes (all sizes)
- press.

The number of these machines depends on the importance of the workshop.

For sheet-metal work there is the following equipment :

- shearing machine
- folding machine
- bending machine
- sheet metal planishing machine
- cutting bench
- heat treatment furnace
- power-hammer
- forge furnace

as well as arc welding, oxy-acetylene welding and argon welding sets.

The electrical engineering section includes the small machines required for the maintenance of motors and general electrical equipment, occasionally a fully fitted out winding-shop.

The foundry section, to which a pattern-shop is attached, has a few furnaces, mostly electric, for cast iron and steel, and special furnaces for non-ferrous metals (bronze, brass, aluminium and anti-friction alloys). One or two furnaces enable to give materials the required characteristics. An analysis laboratory is attached to these shops.

Their standard of work is very satisfactory from the precision viewpoint. However, the quality of materials and their heat treatment are a major problem, as these are often a vigilantly kept trade secret of the makers of the original parts.

As most of these shops are integrated, they belong to the parent companies, which are owned either by the State or the private sector.

c) All industries have available a range of essential spares and wearing parts, enabling them to cope with first needs.

If, before the freeing of imports, a very difficult situation prevailed concerning spare part stock replenishment, at present restrictions are mostly internal and are related to the cash position of firms, which no longer have enough capital to finance spare part stocks. However, on the whole, the situation is steadily improving. By following a sound stock policy, firms endeavour to ensure an adequate supply, at the same time avoiding overstocking.

d) General mechanical spare part manufacturing facilities exist in the two main industrial areas (Kinshasa, Katanga). Such is not the case with the Kisangani area.

These facilities exist, either because centralised workshops are present, or because of the means available to small maintenance shops forming an integral part of a firm, or because there are independent shops capable of turning out these parts.

The quality of parts made in these shops is satisfactory.

The proportion of parts that can be produced locally varies considerably from one industry to another. Unfortunately, we were not able to obtain definite figures on this point.

Firms usually do not take into consideration the origin of the parts they use. Considerable enquiries into the accounts of the firms would have been necessary to form an opinion on this matter.

We shall therefore have to estimate the position as accurately as possible. It appears, in the case of some industries (ready-made clothes, cigarette factories, motor cars), that nearly all spares are genuine and are therefore imported.

For the textile industry a 20 % proportion of locally made parts was quoted.

Judging from what we have seen, this figure appears underestimated and 30 % seems to us a more likely proportion.

We think there is not one single industry, which could obtain the local production of over 40 % of its spares under economically and technically acceptable conditions.

e) Most industries have a well run store with indexed items and stock movement cards. Generally speaking, the larger the store, the more elaborate its organisation.

C. AGRICULTURAL SECTOR

a) Although this sector has no so-called "industrial equipment", the trend towards mechanisation of agriculture tends to make it an increasingly industrialised operation.

In the D.R.C. large farms are mostly owned by private companies, which have a workshop for the maintenance and repair of their own equipment. This does not apply to small farmers, who generally have not got the minimum tooling required for the routine upkeep of their equipment.

b) There are no centralised shops for the repair of this equipment, except the case of quite occasional agents for some makes.

c) On the whole, only such agents carry a stock of a few spare parts, but very often a tight cash position precludes the avalability to them of all the spares there should preferably be at disposal on the spot.

d) Generally speaking, the equipment used in farming (lorries and tractors, etc) requires original spares for maintenance. So no local shops exist for the manufacture of such parts.

Still, there are a few workshops specialised in the production of small agricultural implements, but they cannot claim to be agricultural spare part manufacturers.

e) As there exist but a few spares for this kind of equipment, there are practically no stores.

D. HOSPITAL SECTOR

Hospitals have no means at their disposal for the maintenance of their own equipment.

They are utterly unprovided with spares, very few of which could, as a matter of fact, locally be made.

There is no need to add that there are no stores, either in hospitals or outside, holding a stock of spare parts. However, a number of local private firms are to be found, which would be able to carry out most of the necessary repair work.

V. PREVAILING FEATURES AND CRITICAL ANALYSIS OF MAINTENANCE AND REPAIR WORK

A. SUITABILITY OF MAINTENANCE AND REPAIR FACILITIES

1°) Public transport sectors

Means and ways available to those responsible for maintenance and repair in the public transport sectors are satisfactory in some of them, though open to improvement. However, in the case of a number of shops (T.P.M. mechanisation centres), the greater part of the maintenance equipment is there, but it is now useless, and some accessories and a large quantity of tools are missing.

The position is very serious indeed with respect to the maintenance of cars, lorries and road upkeep machines, as well as engine maintenance workshops. Hundreds of vehicles are idle. Some have covered but a short distance (a few hundred km). This leads to very important wastage.

In the water-borne and rail transport sectors, shops are finding it difficult to keep up with the working rate required to cut equipment idle time down to a minimum. At present, this situation does not seem to interfere much with transport. Nevertheless, it is to be feared that, when the economic and agricultural revival gathers momentum, it will lead to a shortage of means of transport.

2°) Manufacturing industries sector

In this sector, means and ways available to firms are generally adequate, though in some cases open to improvement. Often these firms have got a programme of improvements, which is being implemented or will, when the cash position permits, be carried into effect.

It did not seem to us that loss of production or idle time was referable to deficient maintenance or repair in these industries. As a matter of fact, few firms are presently working at full production capacity. This leaves breathing-space for the maintenance and repair of their equipment.

3°) Agricultural sector

Medium- and large-size farms have maintenance and repair facilities with which they are satisfied. When certain heavy repairs are too much for them, they turn to agents for makes or other workshops for outside help.

On the other hand, small farmers have no maintenance and repair shop. This often involves a long and costly unavailability of their machines.

4°) Hospital sector

This sector is completely deprived of facilities for the maintenance and repair of their equipment. One can readily imagine the possible consequences of this state of affairs with respect to public health and the efficient working of hospital services.

B. INDUSTRIAL SECTORS OR EQUIPMENT FACING A PARTICULARLY SERIOUS MAINTENANCE AND REPAIR PROBLEM

It emerges from the above that it is the public transport sector which faces the major maintenance and repair problems, and that the position with motor vehicles and engines is particularly serious.

The maintenance of hospital equipment is also a serious matter, considering its bearing on public health.

C. FACTORS AFFECTING THE STANDARD OF EQUIPMENT MAINTENANCE AND REPAIR

The lack of qualified personnel and of original spare parts are the main factors having a detrimental effect on the standard of equipment maintenance and repair.

The state of repair of maintenance equipment (machines and tools) also has an adverse effect, though to a smaller extent, on maintenance standards.

D. IMPACT OF LACK OF STANDARDISATION AND USELESS DIVERSITY OF EQUIPMENT ON ITS MAINTENANCE AND REPAIR

It is obvious that the lack of standardisation makes for a great increase in the number of spares and faces equipment maintenance and repair personnel with a new difficulty.

So the want of standardisation makes things worse as regards the impact of factors having a detrimental influence on the standard of equipment maintenance and repair.

On this subject it is worth mentioning that the Public Works Department has found 112 different types and makes among the vehicles for the maintenance of which it is responsible.

Such a diversity is the more to be regretted as it is not offset by any technically valid advantage.

E. AVAILABILITY OF PUBLIC OR PRIVATE CONCERNS DEALING WITH MAINTENANCE AND REPAIR

There are no public or private firms exclusively concerned with maintenance or repair work for third parties.

In actual fact, each firm, whatever its branch of activity, possesses its own maintenance and repair section. Some firms (UTEXCO in Kinshasa and GECOMIN in Lubumbashi) have even got a maintenance shop per manufacturing sector or factory, connected with a centralised workshop that makes certain current spares or emergency repair parts.

There are also mechanical engineering shops (CHANIMETAL and MECANICONGO in Kinshasa) able to produce the same sort of parts.

The efficiency of these workshops is satisfactory, although some of the parts turned out are not always of the same quality as the original ones. This is probably a matter of quality of materials used or of heat treatment.

With regard to cost price, these parts cannot stand comparison with the imported parts in spite of the extra transport charges they carry.

F. EXISTENCE OF A NATIONAL POLICY GOVERNING EQUIPMENT MAINTENANCE AND REPAIR

The full significance of the industrial equipment maintenance and repair issue has not been overlooked in Government circles. There are several applications planned for assistance in the training of personnel, the setting up of centralised shops for maintenance and repair work or the production of spare parts, or for the formation of an industrial equipment maintenance and repair central service.

The latter application for assistance may be taken as a first step towards the laying down of a national policy in this field.

VI. PERSONNEL

A. AVAILABILITY OF QUALIFIED MAINTENANCE AND REPAIR PERSONNEL

For want of statistical material we were not in a position to work out the number of workmen, foremen and managerial staff having received or receiving instruction in maintenance and repair work.

With a very few exceptions, native workmen have not yet attained either the skill or know-how of those in industrialised countries. However, when this labour is properly followed and supervised, it is able to do its job in a fairly satisfactory way.

There are very few native foremen who are really qualified in the meaning attached to the word in industrialised countries. Even if there were more, these would have to be backed up by suitable managerial staff. The great trouble with the country is precisely the almost complete absence of trained managerial staff.

In private industry, where this shortage is made up for by the almost exclusive employment of foreign managerial staff, maintenance and repair problems are on a minor scale.

On the other hand, in the public sector such problems remain unsolved or take far too much time to solve.

In a number of public sectors, native managerial personnel receives the help of foreign specialists, but these are not always in sufficient number and moreover, as they do not come into the actual operations, their efficaciousness is thereby often quite restricted.

The lack of qualified personnel at all levels, as already stated, is one of the main factors having a detrimental effect on the standard of equipment maintenance and repair work.

B. TRAINING FACILITIES

Up till 1964, there was no training school, where instruction was specially aimed at equipment maintenance and repair work. Most of the officials engaged on this work were trained by the various firms or organisations, some having their own school (BATA, OTRACO).

Since 1964, the B.I.T., within the UNITED NATIONS DEVELOPMENT PROGRAMME (UNDP), has undertaken the implementation of a programme for the establishment in the D.R.C. of an Advanced Vocational Training Institute (Institut National de Perfectionnement Professionnel - I.N.P.P.).

This institution has given top priority to the in-plant training of labour and has provided assistance to about fifty firms in various branches and particularly in the field of maintenance and repair.

To date some 2,500 workers have been trained or are in the process of being so in various techniques.

These include almost all those occurring in maintenance and repair work : general mechanics, industrial electricity, farm mechanics, motor-car mechanics (petrol and diesel), welding, electronics.

The institute also runs training and refresher courses for intermediate superintending staff and instructors. It has a Central Management and so far only one Regional Management for the Kinshasa area. A centre will shortly open in Boma and the setting up of a new Regional Management in Lubumbashi is planned to take place in 1969.

Although the ground already covered is substantial and promising, one should have no illusions on the immense extent of the task that remains to be fulfilled.

But there is a much more serious matter, the lack of managerial personnel. Now, their training takes much longer than that of intermediate superintending staff. In other words, it will take years to make good the shortage.

We do not know of any institute specially concerned with the training of managerial personnel in the field of industrial equipment maintenance and repair.

Nearly all firms themselves train their maintenance and repair personnel. Some of them have developed systematic training programmes, often with the help of I.N.P.P.

VII. FUTURE POLICY

A. MAINTENANCE AND REPAIR REQUIREMENTS AND DETERMINING OF PRIORITIES

1°) Maintenance and repair requirements

In ordre to make out the requirements of maintenance and repair, we have tried to ascertain for the various industrial sectors under survey to what extent the factors bearing on the standard of equipment maintenance and repair work had a beneficial or adverse influence.

To this effect, we have weighted the influence of the different factors, awarding the following marks :

- 0 : good
- 1 : fair
- 2 : poor.

A "good" grading means that the factor has a sufficiently good influence on the standard of maintenance, so that under the present circumstances it entails no serious consequences from the production standpoint. The word "production" should be construed in its broadest sense.

A "fair" grading means that the factor has just enough influence on the standard of maintenance, so that under the present circumstances it entails no serious consequences from the production standpoint.

A "poor" grading means that the factor has, under the present circumstances, a detrimental influence on the standard of maintenance, so that it brings about serious consequences from the production standpoint.

TABLE III : MAINTENANCE AND REPAIR REQUIREMENTS AND PRIORITIES

Sectors	Factors affecting the adequacy of maintenance and repair facilities							
	1	2	3	4			5	6
	Equipment	State of equipment	Amount of original spare parts	Qualified personnel			Total marks per sector	Priority per sector
				Managerial	Foremen	Operative		
1. **Public transport**								
- water-borne	0	1	2	1 (a)	0	1	5	II
- rail	0	0	1	1	1	1	4	II
2. **Public works**								
- navigable waterways	0	1	1	1 (b)	1	1	5	II
- road machines (TPM)	1	2	2	2 (b)	2 (b)	1	10	I
3. **Manufacturing industries**	0	0	0	0 (c)	1	1	2	III
Total marks per factor of sectors 1, 2 and 3	1	4	6	5	5	5	-	-
Priority per factor of sectors 1, 2 and 3	III	II	I	II	II	II	-	-
4. **Agricultural**	1	1	1	1	1	1	6	II
5. **Hospitals**	2 (d)	2 (d)	2 (d)	2 (d)	2 (d)	1	11	I

a) Foreign advisers with no authority to make decisions
b) Inadequate number and qualifications
c) All managerial staff foreign
d) Non-existent

Table III gives weighted values. It shows in columns 1 to 4 factors having an influence on the standard of equipment maintenance and repair. These different factors have been condensed as much as possible, so as to concentrate on the main ones to which secondary factors can easily be related.

These different factors are :

- Equipment

  This word means the availability of workshops, machines tools, tooling in adequate quantity for the satisfactory maintenance and repair of equipment. We would draw attention to the words "in adequate quantity", which should not be construed to mean that in some cases the availability of supplementary machines or tools would not improve the situation.

- State of equipment

  This refers to the present condition of shops, machines, tools, ... that have to enable the performing of maintenance and repair work. Such equipment may be worn out, in a state of disrepair, incomplete, etc.

- Amount of original spares

  As already mentioned, it is not possible to do entirely without original spares. To say the least, there are some parts which it is practically impossible to make locally. If these are missing, the corresponding equipment cannot be repaired.

- Qualified personnel

  Marks awarded indicate sometimes the amount, sometimes the measure of qualification and therefore in all cases the efficiency of personnel.

  Qualified personnel has been subdivided into managerial, foremen and operatives, weighting not being the same for the different categories of personnel in the various sectors.

The various sectors have been grouped in the same manner as in the previous chapters.

However, the Passenger Public Transport sector has been included among the manufacturing industries as the respective positions are similar and as the concern under survey is run by private interests, whilst being mostly owned by the Congo State.

2°) Priority per sector

Table III also shows (column 5), by adding up the figures along the horizontal lines, total marks awarded the various sectors under review. Such total ranges from 0 to 12, it is being understood that the lowest marks are the best. We thus arrives at the priorities per sector, shown in column 6. Such priorities are shown by means of roman figures with the following meaning :

I : first priority
II : second priority
III : third priority.

It follows that the sectors requiring urgent assistance are those covering the maintenance of public works road machines, also including the Government fleet of cars (10 marks out of 12) and that of hospitals (11 marks out of 12).

Then come the other sectors, practically on equal terms, namely :

- Agricultural sector : 6 marks out of 12
- Water-borne public transport sector : 5 marks out of 12
- Navigable waterways public works sector : 5 marks out of 12
- Rail public transport sector : 4 marks out of 12.

Finally, the manufacturing industries, usually under the management of private interests or foreigners, range third for priorities (2 marks out of 12).

3°) Priority per factor

By adding up the figures of the different columns, one obtains the marks awarded the various sectors having an influence on equipment maintenance and repair. We have derived there from priorities per factor, which are shown by means of roman figures with the same meaning as under 2°) above.

As the agricultural and hospital sectors are special, their marks have not been taken up in the totals, in order to avoid a misrepresentation of the results concerning the priority of factors to which improvement efforts will have to be directed. Such sectors cannot really be considered as industrial.

For factor appraisal the lowest marks are the best. Total marks may range from 0 to 10. Consequently, priority factors rest on the lack of original spares (6 marks out of 10) and of qualified personnel (5 marks out of 10).

It should be observed that the various categories of personnel : managerial, foremen and operatives, carry the same total number of marks. This is a mere coincidence, the relative importance of such different categories varying according to the various sectors under survey.

B. RECOMMENDATIONS ON THE IMPROVEMENT OF EXISTING MAINTENANCE SERVICES

1°) Assistance to public works mechanisation shops (T.P.M.)

It emerges from a study of Table III, see par. A above, that it is the public works mechanisation shops sector that is in urgent need of assistance.

It further appears from this Table that such assistance should cover all the factors having an influence on the standard of equipment maintenance. In other words, these shops need complete reorganisation.

We suggest that this assistance should take the form of expert and consultant service as well as the granting of training scholarships, and of the supply of the requisite parts for the repair of the existing machine tools in the shops. In addition, credits should be placed at the disposal of these shops to cover the purchase of essential original spare parts.

The experts should include :

- an engineer who is a specialist in motor-car mechanics and organisation

- an engineer or technician who is an internal combustion engine (petrol and diesel) specialist
- a technician who is a car electric installation specialist
- a technician who is a specialist in mechanics and machine tools
- an expert with specialised knowledge of the building up of stocks of spare parts and of the organising of a perpetual inventory system
- consultants with expert knowledge of the different types and makes of machines, to help the above mentioned experts in particular fields.

The services of the team of experts would cover a total period of 24 months and that of consultants 6 months.

The scholarships would be granted for the training abroad of the correlative personnel in the various specialised fields of maintenance of motor vehicles. There would be 7 such scholarships each for a period of 6 months.

The assistance would likewise cover the in-plant training of the correlative personnel.

2°) <u>Assistance to hospitals</u>

Table III shows that hospitals too are a sector in which urgent action is quite necessary. As, in this case, there appears to be no sort of organised service, we suggest that assistance should take the form of services provided by an expert, whose terms of reference would cover the organising, in agreement with the Government departments concerned, of a hospital equipment maintenance service. This service should develop programmes and make recommendations regarding maintenance budgets, as well as promote and supervise implementation.

The services of the expert would cover a period of 18 months.

It is suggested that such assistance should cover a period of two years.

In view of the restricted amount of services to be rendered and the urgency of the requirements, private firms could be entrusted with the performance of maintenance work in the hospitals (as was the case a few years ago).

However, the necessary credits should be made available to the various hospitals.

C. RECOMMENDATIONS ON THE ESTABLISHMENT OF NEW MAINTENANCE FACILITIES AND INTRODUCTION OF MAINTENANCE PROGRAMMES WITHIN CONCERNS

1°) Considering that practically all organisations or firms have got a maintenance and repair shop, we do not feel it is to be recommended to set up now new maintenance shops, whether centralised or regional or at national level.

A case for the installation of a new centralised maintenance and repair shop could only be made out within the framework of the formation of a new industrial depot in an area, where there is no mechanical engineering shop able to do that work. The fact is that the co-ordinating of work in such a shop as well as the determining of priorities among various industries not always coming under one and the same general management are attended by great difficulty. Finally the profitability of such a shop is quite questionable and only social or communal compelling motives could warrant its installation. Even if this central shop were set up under the abovementioned conditions, it would not relieve the "customer" industries from the necessity of having within their own organisation maintenance and repair workshops of varying importance according to the kind and size of the firm.

2°) Most firms and organisations have developed maintenance programmes, but these are seldom clearly formulated and carried out with a measure of strictness. In order to streamline equipment maintenance and repair methods and organisation, we recommend training seminaries for managerial staff and foremen responsible for maintenance and repair services (see E. below).

D. RECOMMENDATIONS ON THE IMPROVEMENT OF EXISTING STORES AND THE OPENING OF NEW STORES

1°) Most firms and organisations possess relatively well organised spare part stores. To improve the running of these stores, we suggest the holding of the seminaries mentioned under E. below.

2°) We are of opinion that there is no point in opening a new materials or spares centralised store for equipment maintenance and repair. The number of parts common to different industries is comparatively small, so that this store could only carry stocks of currently used materials or parts, which are already fairly easy to obtain locally.

E. TRAINING OF PERSONNEL

1°) Training seminaries

Table III on page 33 has laid bare the fact that the lack of qualified personnel was one of the factors having a prejudicial effect on the standard of equipment maintenance and repair.

This shortage obtains at all levels : managerial, foremen and operatives.

However, at managerial level the deficiency is mainly quantitative. Maintenance and repair native managerial personnel is extremely scarce and found wanting in experience. Foremen are found in a slightly greater number but their qualifications are on the low side.

From these facts it emerges that a training programme is to be advised and we suggest this should, in the case of managerial staff and foremen, take the form of training and refresher seminaries. As for operatives, we feel that the action taken by the I.L.O., mentioned under VI.B., is worthy of support and should be pursued.

2°) Seminaries could be organised in co-operation with the Ministry of National Economy and Industry and of the Fédération des Entreprises Congolaises (F.E.C.) by specialised consultants employed on a short-term basis.

The total period of the service provided by these experts could be 3 man/month.

The syllabus should include the following main subjects :

- maintenance and repair service organisation and superintendence
- current and preventive maintenance programme development
- raw material provisionment for spare part manufacture
- spare part provisionment
- maintenance store organisation and supervision.

F. POSSIBLE CONTRIBUTION OF INDUSTRIALISED COUNTRIES AND PARENT COMPANIES

Provisionment control department

At the present time industrialised countries and parent companies do already play an important part in the field of equipment maintenance and repair, either by sending experts on the spot or by assisting in the supply and provisionment of spares or in the training of personnel, etc.

It stands to reason that these lines of action should be promoted. To be effective they should preferably be contemplated before the supply contracts are entered into.

As the rendering of assistance is presently more frequent in private concerns than in State-controlled organisations, we suggest that a Provisionment Control Department be set up in the Ministry of National Economy, with the duty of seeing that all supply contracts contain provisions relating to this short- and long-term assistance.

This department should likewise ascertain that new industries which obtain a licence for establishing themselves in the country, have also provided for an assistance programme. This obligation should further devolve upon importing firms ; these should have on the spot a qualified technical agency and an adequate stock of spares.

Importers of motor car equipment, agricultural machinery and other machines should no longer be authorised to import equipment unless they set up specialised local agencies.

In addition, the said department should take the necessary action so that companies, which have previously supplied important equipment material, provide aid by setting up an agency carrying a stock of spares or by sending experts to help in the maintenance of the implements supplied.

In this connection we suggest assistance in the form of the provision of an expert entrusted with the establishing of the abovementioned provisionment control department.

These services should cover a period of 24 months, with possible extension if need be.

G. TIME LENGTH OF ASSISTANCE PROGRAMMES

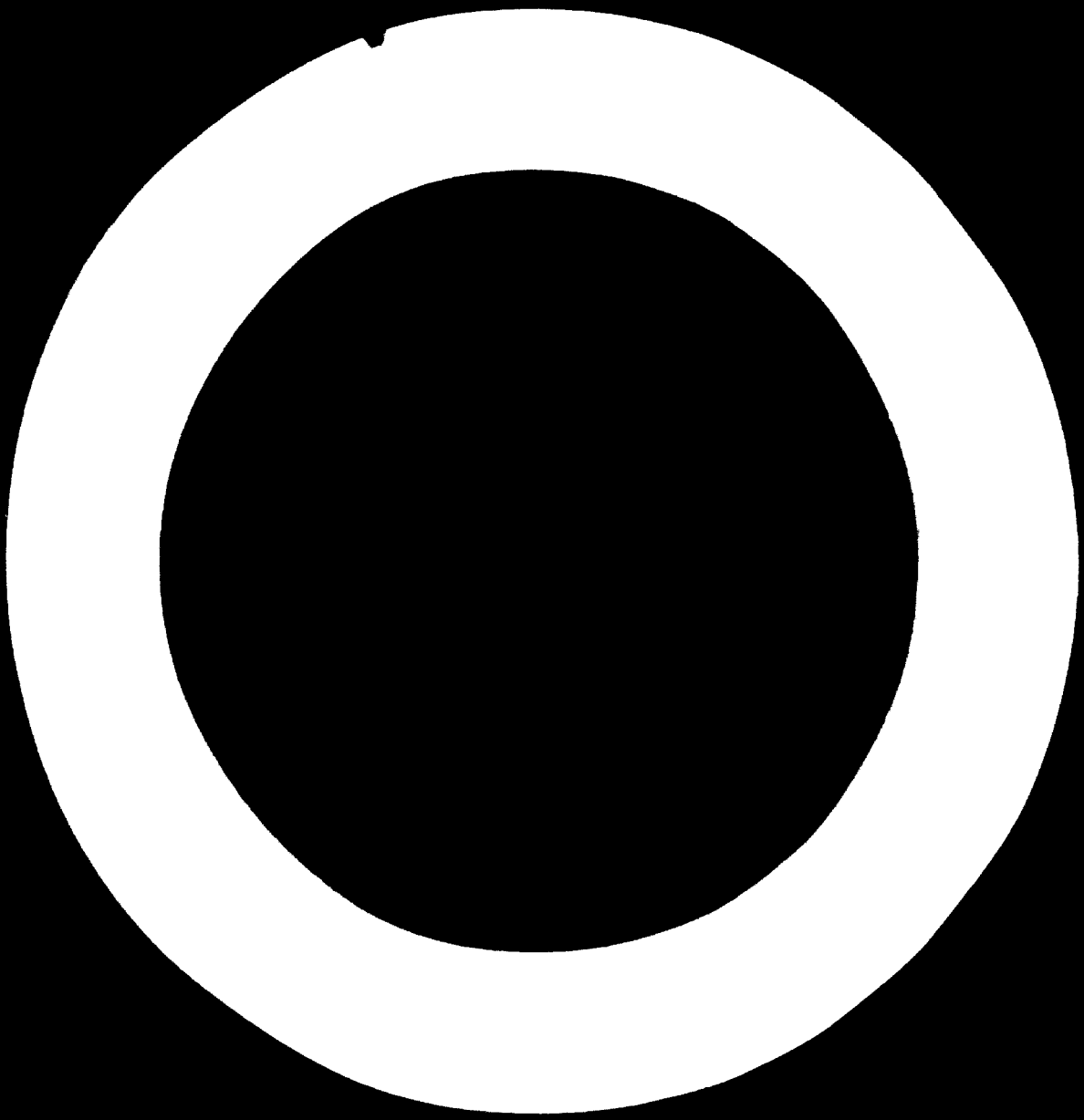
As it appears from what we have said that the qualified personnel factor has a major and adverse influence as regards the standard of equipment maintenance and repair, it is recommended that the time length of assistance programmes, in particular those comprising a correlative personnel training purpose, allows of possible extension as required.

H. SUGGESTED ASSISTANCE PROGRAMMES SCHEDULE AND PRIORITIES

Table IV shows the schedule and priorities of the assistance programme suggested in the previous paragraphs.

TABLE IV : SUGGESTED ASSISTANCE PROGRAMMES SCHEDULE AND PRIORITIES

Assistance	Phase I		Phase II
	1st year	2nd year	
	1 2 3 4 5 6 7 8 9 10 11 12	1 2 3 4 5 6 7 8 9 10 11 12	1 2 3 4 5 6
1. Public works mechanisation (T.P.M.)			
- Experts	———	———	- - - - - -
- Consultants	——		
- Parts for machine tools	——		
- Spare parts	———	———	
- Scholarships		———	
2. Hospitals			
- Expert	———	———	- - - - - -
3. Training seminaries	——		
4. Setting up of provisionment control department	———	——— - - - - -	- - - - - -



1	CTRACO I	Shipyard for river boats (construction, R-M of carce-ning and equipment s.a. Engines)	a.1940	-	River boats, barges tugs, cranes	Comtay's leading shipyard	30 ?	1.000?	G	Good management (E) and shop-foremen (E) (C) labour good, qualified [illegible] assistants for [illegible] work	Many large machine-tools Shortage of tool-steel Needs for Universal milling-machines	Great needs of excessive rate (cylinder-head boat-crew Lack of credit
2	CTRACO II	Construction and R-M of coaches, wagons, R-M of Diesel Electric Locos	a.1940	-	Railway rolling stock (coaches and Diesel Electric shunt - locomotives)	Leading railway Company	10 ?	400?	G	Understaffing - Unsuff. management Good (C) labour - Willing and zealous	Properly equipped shopes. Lack of cutting-tools	Lack of S.P. I Diesel locos
3	TRAVAUX PUBLICS I	Construction and R-M of trailbridges (pontons) R-M of dredges	a.1940	-	Trailbridges Dredges	Vital for road-transport (river crossing)	10 ?	300?	G	Fairly good management Good (C) - welders, all shops active. Work - progra	Complete for all sheet-work, machining. Some machines out of order.	Most spare par available in w
4	TRAVAUX PUBLICS II	R-M of heavy road-equipment incl. trucks, cars, a.s.o.	a.1940	-	Road equipment and trucks, cars, etc..	Vital for good condition roads and road-transport	1 ?	300?	G	No management at all (C) experienced, wants instruction, equipment and S.P	Most equipment lost, dis-convected, disassembled, out of order.	No spare part
5	T.C.C. (Transports en Commun du Congo)	R-M of busses and trailers	1955		200 Busses and trailers. (100/1957 - 100/1965)	Extensive Kinshasa area. Exclusive large Company	25	930	G/P (6/4	All commands in hands of (E) (C) homologues stand by	Perfectly equipped shops for work involved.	Many [illegible] kept stores. Still some ar many breaka credits.
6	BRALIMA	Brewery and lemonade, ice- and yeast-making	1940	Hecto/M 60.000 (Beer)	Process Machinery s.a. tanks, water-treatment, bottle cleaning and filling automatic machines, 100 trucks.	Country's leading brewery	25	900	P	A Manager (E) for each work-shop, garage and planning 40 well-trained (C) labour.	Mech. workshop with standard Garage - no crankshaft reetifying.	Adequate st No local supp bearings, ant bronze castin
7	MARSAVCO	Palm-oil refinery Soap-and Margarine-making	1923 1953	Tons/Y oil 5.000 soap 15.000 marg. 3.000	Process Machinery s.a. heat exchangers, volumetric pumps, tanks, automatic packing machinery, boilers	Country's own crops.	8	980	P	Independent section, (E) workshop and store - Manager good (C) - labour	Workshops with standard equip-ment	Most S.P. avai stores.
8	CONGOFRIGO	Storage and distribution of perishabl food.	1935	10.000m3 120 trucks 2 trains	Refrigerating equipment trucks, handling trucks, cold stores	Country's largest Cy with branches in [illegible]ville, Buna, Matadi, Kitangani	50 ?	2.000	P	20 (E) + 250 (C) - 5 sections R-M and install. new plant. Highly specialised, work-program.	Special tools and testing apparatus (search for leaks, etc)	Good st[illegible] available. Delay of supp
9	UTEXCO	Cotton Mills (spinning, weaving, prin-ting)	1930	-	Looms (1400) and spindles (25.000) (20 years old, some 1963	Congolese cotton, Country's largest mill 20% of products are exported	80	4.000	P	Sectional R-M supervised by (E) Central shop with complete staff	Small workshop in each section Central workshops with foun-dry machine-tools, electric shop, sheet-working, joinery, etc	30 % of need central shop Large stock kept store
10	BATA	Leather making (tannery) shoes (leather, plastic) and fancy-leather manu-factg	1942	-	Process-Machinery (tannery) Vulcanizing presses, sewing and cutting machines, etc	Satisfies 75 % of needs 50 sales-branches all over the country	50	1.250	P	30 (C) - labour - 3 (E) Managers (head, elect., mech.) - Preventive program.	Good workshop with standard equipment and forge Motor-rewinding fac.	Most parts av Rapid overse (6 weeks) if no desire of expensive, l
11	JOCK	Men-Shirt Mfg.	1950?	2000/day	120 Singer sewing machines Steam presses, etc.	Goods of large consumption Example of good-working large congolese shop	1	250	P	R-M in the hands of (C) System works.	No shops, only portable tools Rewinding of motors.	No stock - of machines. Supply by pi
12	SOTEXCO	Men-trousers Mfg.	1963	-	150 Singer sewing - machines Steam boiler, steam-press	idem	1	250	P	2 (a) mech. + 2 aids (C) - electricians good work	No shop - Only tool kit.	Most S.P. avai kept stores. Local parts su Mecanicongo.

SECTION 41

rges tars,	Country's leading shipyard	30 ?	1.000?	G	Good management (E) and shop-foremen (a) (C) labour good qualified [illegible] assistance for [illegible] work	Many large machine-tools Shortage of tool-steel Needs for Universal milling-machines	Great needs of Diesel S.P. excessive rate of wear (cylinder-heads) due to boat-crew Lake of credits.	Boat-engineers should be controlled and trained. Training on sits with I.N.P.P.
stock (locomotives rie shunt -	Leading railway Company	10 ?	400?	G	Understaffing - Unsuff. management Good (C) labour - willing and zealous	Properly equipped shopes. Lack of cutting-tools	Lack of S.P. for 2-engine Diesel locos	No good work if management is poor
	Vital for road-transport (river crossing)	10 ?	300?	G	Fairly good management Good (C) - welders, all shops active. Work - program	Complete for all sheet-work, machining. Some machines out of order.	Most spare parts available in well kept stores	Complain about delay SP - supply (up to 2 years) due to admin. slowness.
d trucks, cars,	Vital for good condition roads and road-transport	1 ?	300?	?	No management at all (C) experienced, wants instruction, equipment and [illegible]	Most equipment lost, disconvected, dimassembled, out of order.	No spare parts of any sort.	No more real R-M since 1960. Needs for standardization, spares, tools, and adequate management.
ailers 965)	Extensive Kinanasa area. Exclusive large Company	25	930	G/P (6/4	All commands in hands of (E) (C) homologues stand by	Perfectly equipped shops for work involved.	Many S.P. (12.000) in well kept stores. Still some are missing : too many breakages, too short credits.	Complaints about excessive SP - consumption and careless (C) driving
s.s. tment, bottle ing automatic cks.	Country's leading brewery	25	900	P	A Manager (E) for each work-shop, garage and planning 40 well-trained (C) labour.	Mech. workshop with standard garages - no crankshaft rectifying.	Adequate stock of SP - No local supply except for bearings, auto-parts and bronze castings.	Complaints on bad (C) - driving - Training abroad is necessary, local staff often lacks training-aptitude.
s.s. volumetric tomatic packing rs	Country's own crops.		960	P	Independent section, (E) workshop and store - Manager good (C) - labour	Workshops with standard equipment	Most S.P. available good stores.	none.
quipment ng trucks,	Country's largest Cy with branches in [illegible]ville, Buna, Matadi, Kisangani	50 ?	2.000	P	20 (E) + 250 (C) - 5 sections R-M and install. new plant. Highly specialized, work-program.	Special tools and testing apparatus (search for leaks, etc)	Good stores, most S.P. available. Delay of supply too long.	Want own work-shop with stand-machine-tools Complaines about (C) - labour : unreliable.
spindles one 1963	Congolese cotton. Country's largest mill 20% of products are exported	80	4.000	P	Sectional R-M supervised by (E) Central shop with complete staff	Small workshop in each section Central workshops with foundry machine-tools, electric shop, sheet-working, joinery, etc	30 % of need supplied by own central shop Large stock of SP in well kept stores	Complaints about delay of supply SP Difficulty in training (C) labour - better to start at 0.
y (tannery) es, sewing ines, etc	Satisfies 75 % of needs 50 sales-branches all over the country	50	1.250	P	30 (C) - labour - 3 (E) Managers (head, electr., mech.) - Preventive program.	Good workshop with standard equipment and forge Motor-rewinding fac.	Most parts available Rapid overseas supply (6 weeks) if part available no desire of local S. too expensive, low quality.	10 % of plan-value invested in S.P. - No stoppage of production lives admissed
machines tc.	Goods of large consumption Example of good-working large congolese shop	1	250	P	R-M in the hands of (C) System works.	No shops, only portable tools Rewinding of motors.	No stock - of S P but spare machines. Supply by plane if necessary	Local supply of S.P. should be attempted
- machines am-press	idem	1	250	P	2 (a) mech. + 2 aids (C) - electricians good work	No shop - Only tool kit.	Most S.P. available in well kept stores. Local parts supplied by CHANIC Mecaniemgo.	Mechanics should be upgraded more theoritical basis.

[illegible]

(DECEMBER 1968)

DEMOCRATIC REPUBLIC OF THE CONGO - INDUSTRIES INVESTIGATED.

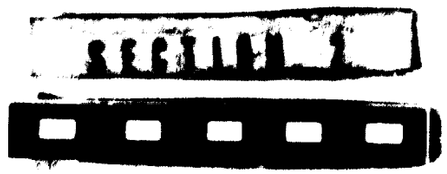
ITEM N°	NAME OF FIRM	IMPORTANCE AND IDENTIFICATION					PERS.		Q	REPAIR AND MAINTENANCE		
		ACTIVITY-DESCRIPTION	YEAR	CAPACITY	EQUIPMENT	ECONOMIC-IMPORTANCE	(E)	(C)	or P	PERSONNEL	EQUIPMENT	SPARE
13	AMATO	Palm-oil refinery and soap-making	1942	4000 T/M (crude oil) 750 (soap)	Crude oil presses, mills, dryers, soaps machines, steam boilers, pumps, etc.	Large export of crude oil	3	300	P	R-M section supervised by head of Mfg. - No fixed R-M program - Repair what is broken	Workshops - make parts exposed to heavy wear (s.a. screw-shafts in presses)	Large stock, (E) - control local SP - to except some C
14	SOCOBELAM	Lumbering, transport by road and river, handling, saws-mills, oans, bage) and of foam-plastic	1959	1200 m3/M	[illegible], bulldozers, scrapers, tractors, river-boats, slipway, rolling cranes, saw-mill, unwinding-mach.	All products are exported	11	490	P	4 sections managed each by qualified (E) with 5 to 8 (C) aids - Aids must be supervised constantly	Good machine-shops. Chanic assistance for big job R-M of trucks	Large S P - 50 % of total plant. Chanic suppl castings.
15	PLASTICA	Mfg. of polyethelyne goods (s.s. bottles, cans, bage) and of foam-plastic	1965	65 T/M	Foam-plastic machine, injection-presses, calanders, printing plant, s.s.e.	Cheap products of large consumption. May be exported.	10	240	P	M. carried out by plant-operators, trained at the maker's.	Small workshop with lathe, drill, miller, shaper, band-saw, capable of making simple moulds.	Complicated Chanic.
16	LAURENS	Cigarette - Mfg.	1962	2,6 million/D	Process-Machinery for tobacco conditioning, cigarette-making and packing	Main plant is situated in Katanga - Together both cover 75 % of needs.	6	90	P	Indep. maint. section 1 (E) + 5 (C), too few. Much work, heavy wear due to tobacco-dust	Small machine-shop. rewinding E - motors at ENTRELCO.	Most S.P. in Local S.P. n low quality.
17	RA/-CONGO	Mfg?. of steel frames and adapted to trucks. All body-repair.	1965	-	Steel sheet working machinery shears, plate-benders, machine, welding equipment, etc.	Could be used as training-center	1	40?	P	1 (E)- Manager with previous experience at ITM (E 1) - Upgradee (6) - labour	All necessary equipment available.	Available
18	CHANIMETAL	A) Spare-part Mfg. :machined or cast. B) Shipyard	s.1940	-	Equipment for foundry, machine-shop and heat-treatment Ship yard equipment	Leading Company - high potentialities second only to GECOMIN central works (Katanga)	20?	250?	P	Good management (E) with well planned program. Labour (6) good qualified.	Work-shop will equipped Foundry 120 T/M with 4 furnaces - Heat treatment of parts.	tocks of S rial (east
19	CHANICO	Import, supply, R-M of various equipment s.a. tractors, road-making machines, air-conditioning plant, lifts.	1950 ?	-	Tractors, bulldozers, etc. Air-conditioning plant Lift-trucks (Hyster) Lifts (Schindler)	Good agency of worldknown plant, important to country's well being.	5 ?	200 ?	P	As above.	Hydraulic press surface grinder, cylinder, boring mach., crankshaft rectifyer, valve rectifyer, test-bench for engins and hydraulic pumps.	More than 40 well stored
20	MECANICONGO	Spare-parts Mfg. Diesel Engine overhand	1952	-	Machine-shop equipment Machines for cylinder-head planning, crankshaft-rectifying injection-pump testing, etc.	Good workshop, easy to work with producing S P of good quality	8	55	P	Good management. Own trained (6) labour (10 years experience)	4 lathes, 2 millers, shears, folding, arc-welding, drop-forging, etc. All equipment for engine overhand.	Raw-materia
21	BOUKIN	Glass bottle Mfg.	1951	120.000 bottles/ day	3 Furnaces oil fired, bottle-blowing, machines air-compressors, transport-belts, etc	Country's only glass bottle Manufactory	14	375	P	Independant R-M with good Manager and (6) labour - Program but not preventive	Well equipped workshop and stores - Kardex - stand by plant installed	Large stock needed to r delays (up Local spare

Legend
10 ? - es
(E) - ma
(C) - es
R-M - re
S.P. - sp
6 - sk
P - pr
a - pr
- - ta

TIC REPUBLIC OF THE CONGO - INDUSTRIES INVESTIGATED.

Appendix 1

ORTANCE AND IDENTIFICATION					REPAIR AND MAINTENANCE FACILITIES			
EQUIPMENT	ECONOMIC-IMPORTANCE	PERS. (E)	PERS. (C)	Gr P	PERSONNEL	EQUIPMENT	SPARE PARTS	COMMENTS
Crude oil presses, mills, dryers, soaps machines, steam boilers, pumps, etc.	Large export of crude oil	3	300	P	R-M section supervised by head of Mfg. - No fixed R-M program - Repair what is broken	Workshops - make parts exposed to heavy wear (s.a. screw-shafts in presses)	Large stock, good storage, (E) - control. No desire for local SP - too expensive - except some Chanic-castings	Better trained (C) - foremen are needed, capable to give orders, make and read drawings, etc.
Dozers, bulldozers, scraper, trucks, river-boats, slipway, rolling cranes, saw-mill, unwinding-mach.	All products are exported	11	490	P	4 sections managed each by qualified (E) with 5 ts o (C) aids - Aids must be supervised constantly	Good machine-shops. Chanic assistance for big job R-M of trucks	Large S P - fasilities, 50 % of total for Caterpillar plant. Chanic supplies gears and castings.	Close cooperation with Caterpillar-agent No local S P - low quality
Foam-plastic machine, injection-presses, calandars, printing plant, a.s.o.	Cheap products of large consumption. May be exported.	10	40	P	M. carried out by plant-operators, trained at the maker's.	Small workshop with lathe, drill, miller, shaper, band-saw capable of making simple moulds.	Complicated moulds made by Chanic.	No problem
Process-Machinery for tobacco conditioning, cigarette-making and packing	Main plant is situated in Katanga - Together both cover 75 % of needs.	6	90	P	Indep. maint. section 1 (E) + 5 (C), too few. Much work, heavy wear due to tobacco-dust	Small machine-shop. rewinding E - motors at ENTRELCO.	Most S.P. in stock. Local S.P. not wanted for low quality.	Machinery with difficult setting - (C) not yet fully trained for such work.
Steel sheet working machinery shears, plate-benders, machine, welding equipment, etc.	Could be used as training-center	1	40?	P	1 (E)- Manager with previous experience at TPM (E 4) - Upgrades (C) - labour	All necessary equipment available.	Available	Kind of work (repetitive, and no precision), carried out easily by (C) - labour.
Equipment for foundry, machine-shop and heat-treatment Ship yard equipment	Leading Company - high potentialities second only to GECOMIN central works (Katanga)	20?	250?	P	Good management (E) with well planned program. Labour (C) good qualified.	Work-shop will equipped Foundry 120 T/M with 4 furnaces - Heat treatment of parts.	Stocks of S P and row material (cast iron, steel, bronze)	No specific problems (plan to install new smelting-furnace)
Tractors, bulldozers, etc. Air-conditioning plant Lift-trucks (Hyster) Lifts (Schindler)	Good agency of worldknown plant, important to country's well being.	5 ?	200 ?	P	As above.	Hydraulic press surface grinder, cylinder, boring mach., crankshaft rectifyer, valve rectifyer, test-bench for engins and hydraulic pumps.	More than 40.000 S.P. well stored - KARDEX	Special tools for disassemble Caterpillar equipment 120 lifts Kept in good order by (C) only.
Machine-shop equipment machines for cylinder-head planning, crankshaft-rectifying injection-pump testing, etc.	Good workshop, easy to work with producing S P of good quality	8	55	P	Good management. Own trained (C) labour (10 years experience)	4 lathes, 2 millers, shears, folding, arc-welding, drop-forging, etc. All equipment for engine overhand.	Raw-materials, available	Needs turned lathes for large series production Weak financial condition.
3 Furnaces oil fired, bottle-blowing, machines air-compressers, transport-belts, etc	Country's only glass bottle Manufactory	14	375	P	Independant R-M with good Manager and (C) labour - Program but not preventive	Well equipped workshop and stores - Kardex - stand by plant installed	Large stock of S.P. needed to face long supply-delays (up to 1 year) Local spares too expensive.	Complaints about low qualification of (C) labour



Legend

10 ?	= estimated
(E)	= non-congolese personnel
(C)	= congolese personnel
R-M	= repair and maintenance
S.P.	= spare parts
G	= government owned
P	= private
a	= previous to
-	= information not obtained.

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