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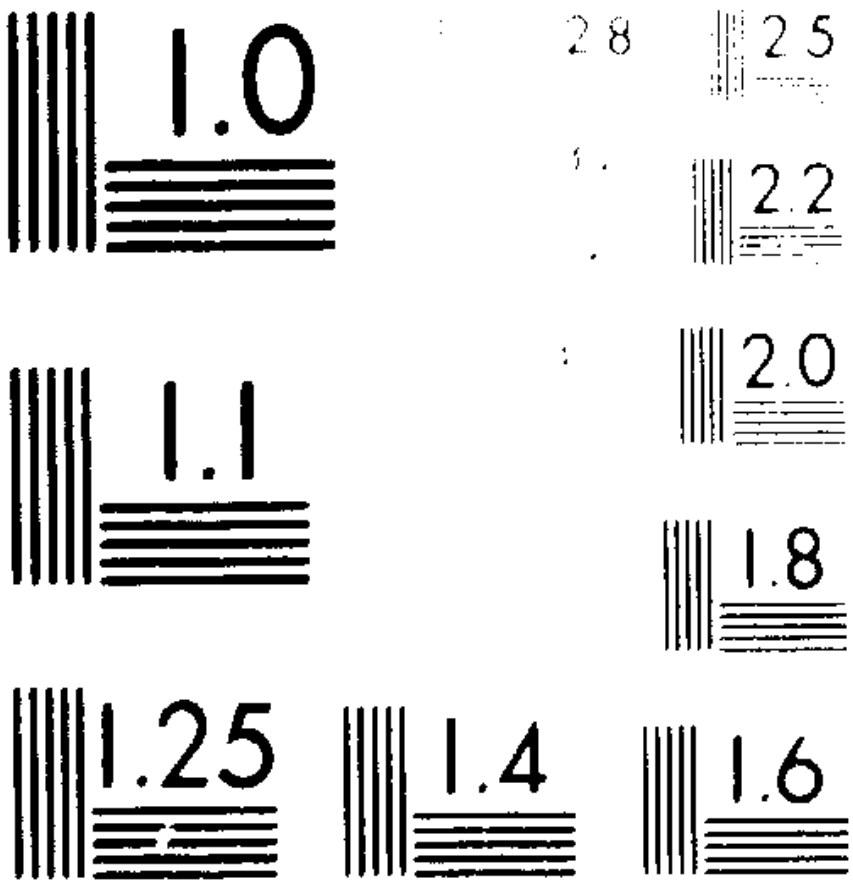
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REPORT ON THE MISSION TO THE REPUBLIC OF IRAQ FROM 27 APRIL TO 5 MAY 1981

concerning

ASSISTANCE TO THE NATIONAL ENTERPRISE FOR EQUIPMENT MARKETING AND MAINTENANCE (NEEMM) - IN REFERENCE TO UNIDO PROJECTS IS/IRQ/75/809 and TF/IRQ/79/002

carried out by

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C O N T E N T S

T A B L E S

A. INTRODUCTION

1. The mission originated at the request of the UNDP Resident Representative, telex communication 0463 of 9 March 1981, stating that "concerned authorities orally expressed their intention implement proposal and wanted UNIDO mission visit Baghdad to reformulate proposal possibly including additional expertise". This was in reference to the ongoing UNIDO Project TF/IRQ/79/002 "Assistance to the National Enterprise for Equipment Marketing and Maintenance", to be extended for another year (under the new project number of TF/IRQ/80/002). For the time being, however, the project will continue under the old project number, providing the services of the Expert in Marketing and Maintenance of Commercial Motor Vehicles and Tractors (Mr. T. Malinowski). The mission was undertaken by the writer from 27 April to 5 May 1981.

2. To start with, a meeting was held with:

Eng. Abdul Tawab Mulla Howaish
President
State Organization for Engineering Industries,
Ministry of Industry and Minerals.

(The National Enterprise for Equipment Marketing and Maintenance (NEEMM) is one of the state enterprises falling under Eng. Abdul Tawab's responsibilities). Following this meeting, several intensive and detailed discussions were held with members of NEEMM's top management, namely:

Eng. Waleed Abdul Wahab
Director General

Eng. Dhia Mohammed Al-Ugaily
Technical Director

Mr. Riad Al-Ubaidy
Commercial Director

The UNIDO expert, Mr. Malinowski, participated in the meetings as well and accompanied the writer on his visit to NEEMM's new Central Complex in Baghdad-Dora.

3. The following chapters describe the writer's observations and analysis regarding NEEMM's operations as well as his recommendations regarding several of its aspects, including UNIDO's eventual future assistance inputs.

4. The writer wishes to express his thanks to all above Government officials and to Mr. A.A.K. Soghaier, UNDP Resident Representative and his staff, whose co-operation and support was essential for accomplishing in such short time the tasks set for the mission.

B. BACKGROUND

5. The Government of the Republic of Iraq has firmly adopted the policy of industrialization in order to lessen dependence on oil revenues and to diversify the country's economic structure. One of the elements of the overall Development Plan is the local production of commercial motor vehicles and of agricultural machinery, particularly of tractors, as an important factor for still largely agricultural basis of the country and for boosting its economy through the resulting savings in foreign exchange. In 1975 the Government established a new, specialized organization the National Enterprise for Equipment Marketing and Maintenance (NEEMM) - which is entrusted with distribution and maintenance of all locally manufactured commercial vehicles, tractors and agricultural machinery as well as supplying spare parts for these. Subsequently, NEEMM has taken over several existing motorvehicle servicing garages and supply stores, but it still lacks adequate and large enough facilities for properly discharging its responsibilities. Consequently, the establishment of a countrywide network of maintenance and repair shops was approved, consisting of the Central Complex in Baghdad-Dora and six regional centres, presently all at various stages of planning and construction.

6. In order to highlight the importance of the future NEEMM Maintenance and Repair System, one has to consider that presently there are approximately 60,000 commercial vehicles and tractors operating in the country, representing a total investment of 500 million Dinars (1.5 billion US Dollars) for which NEEMM has the overall responsibility for providing maintenance and repair services, and the number of vehicles is expected to increase. Once the entire NEEMM System becomes operational, the resulting savings will become proportionately significant, not only in respect of purely financial gains but also in terms of indirect benefits. Savings could go as high as 10 million Iraqi Dinars (US$ 30 million) per year, resulting from

extended service life of vehicles and decreased replacement costs for spare parts through component rebuilding operations (as opposed to all spare parts being imported). But the indirect benefits can be considered just as significant, particularly in the long-range, such as: improved self-reliance in keeping vehicles operational; increased national self-reliance in vehicle maintenance and repair capability; continuously developing and enlarging the national pool of trained automotive maintenance mechanics for the benefit of the country at large; preparing the way to manufacture spare parts locally. Indirect savings will also result from reducing down-time of commercial vehicles, and diminishing losses (e.g. spoilage, production shut-down, etc.) occuring through delayed delivery of goods.

7. The core of the planned NEEMM Maintenance and Repair System will be the Central Complex in Baghdad-Dora. When completed and operational, it will house three major operational entities (in addition to diverse administrative and service units):

   a) Vehicle General Repair Workshop (of which the Vehicle Acceptance and Delivery section is an integral part);

   b) Central Spare Parts Store;

   c) Component Repair Workshop (CRW).

   Of these, the first will carry out maintenance and repair services for local (Baghdad area) vehicles, while the last two will provide essential services to the entire, country-wide System. Therefore it is essential that the latter, namely the Central Spare Parts Store and the Component Repair Workshop are completed and rendered functional as soon as possible, since the entire system will be dependent on them. While the establishment of the Central Spare Parts Store is rather straight forward and is progressing well, the establishment of the Component Repair Workshop is lagging behind, due to a great degree to the complex technologial nature of the processes involved, requiring sophisticated and technologically highly specialized inputs during all stages of the project.

8. NEEMM's management, recognizing early the complexity of the task involved, requested UNIDO for providing the services of an expert for advising them in the planning and establishment mainly of the

Component Repair Workshop, and the expert took up his initial assignment in 1978 under project IS/IRQ/75/809 and, after a seven month interruption- resumed again his duties in 1980 under the Trust Fund Project TF/IRQ/79/902 for one year which is now being extended for another year until March 1982. During this time period the layout and general plant and machinery specifications for the Component Repair Workshop has been prepared, which was put on tender by NEEMM. Thus far only two "turn key" offers were received, neither of which has satisfied the Government. Furthermore, it is the Government's desire to establish this facility under "multiple tender" conditions in order to achieve optimum results as regards cost effectivness and to assure the best possible equipment for specific unit operations.

9. This is then the present status of the overall NEEMM project, whereby the time loss incurred particularly as regards the establishment of the Component Repair Workshop has become critical. NEEMM is keenly aware of this as well as its inability to make available national technical specialists needed particularly for planning and establishing the Component Repair Workshop and to a lesser degree the Regional Centers.

C. COMPARATIVE VALUE ANALYSIS OF THE COUNTRY-WIDE NEEMM VEHICLE MAINTENANCE AND REPAIR SYSTEM

10. Based on the general outline of the planned NEEMM System described in the previous chapter, identifying the key operating components and the various types of benefits which the country could expect, a more detailed analysis of the individual operational components of the Systems as regards their respective contribution to the country's economy and development would be of value. The overall NEEMM Maintenance and Repair System will consist of 3 key operating components:

a) The Central and Regional Vehicle General Repair Workshops - where defective vehicles are repaired and rendered operational with minimum delay.

b) The Central and Regional Spare Parts Supply Stores and Distribution System - providing spare parts and vehicle components for all repair and maintenance work. This operation is a mandatory prerequisite for the efficient operation of the Vehicle General Repair

Workshops (as well as other, smaller repair and maintenance establishments in the country).

c) The Components Repair Workshop - where major, functional components (i.e. engines, transmissions, etc.) of vehicles are rebuilt, to be used as spares in place of imported components.

11. Obviously, the various operational entities will contribute different benefits to the country, and these are summarized in Table 1. The financial projections (lines 1 and 2) are based on some very general assumptions and therefore should be considered only as approximate numbers. Nevertheless these are relevant, since all assumptions made were very conservative. If anything, the financial results should be ultimately better than the projections, assuming optimum operating efficiencies. If operating efficiencies are below rated capacities, the financial results will be commensurately poorer.

12. As regards Table 1 (and explained in the footnote), the value ratings are arbitrary and are intended to indicate the relative contribution of the particular operation in respect to the specific benefit expected. Therefore, the closer the number to 6 (maximum) the greater the contributing effect. The "total value contribution" at the bottom of the table should not be taken as priority indicator (e.g. the Spare Parts System is a low "benefit contributor" but it is a prerequisite for the System to function at all), rather as an "importance indicator" for the country as a whole.

13. With this background in mind, the specific explanations and comments regarding the horizontal columns of Table 1 are as follows:

(1) Extended Service Life of Vehicles: The projected yearly total saving of 2.7 million Dinars per year, attributable to a well functioning Vehicle General Repair Workshop and Spare Parts Distribution System (irrespective of the source of spare parts), was calculated as follows:

a) assumed vehicle fleet (for sake of calculation only): 60,000 units
b) assumed present average vehicle life: 10 years
c) replacement requirements of fleet: 6,000 units/year
d) assumed increased average vehicle life through improved maintenance system: 10%
e) projected vehicle replacement purchase savings per year: 600 units

Table 1

VALUE ANALYSIS OF THE FULLY FUNCTIONAL NEEM VEHICLE MAINTENANCE AND REPAIR SYSTEM

	Sr. No.	BENEFITS TO COUTRY REALIZABLE THROUGH NEEM OPERATION	VALUE RATING OF NEEM SYSTEM OPERATION /a/ Central and Regional Veh. General Repair Workshops	Central and Regional Spare Parts Stores	Components Repair Workshop
DIRECT FINANCIAL	1.	Extended Service Life of Vehicles /Estimated 2.7 mill. IDinars/year	3	3	-
DIRECT FINANCIAL	2.	Lower Cost Spares through Local Rebuilding /Estimated 5 mill. IDinars/year/	-	-	6
INDIRECT FINANCIAL	3.	Reduced Spoilage and Production Losses through more efficient moving of goods /cannot be estimated/	3	3	-
INDIRECT - LONG RANGE	4.	Increased Self-reliance in Vehicle Operational Readiness	2	2	2
INDIRECT - LONG RANGE	5.	Increased Self-reliance in Vehicle Maintenance and Repair Capability	3	-	3
INDIRECT - LONG RANGE	6.	Enlarging Pool of National Automotive Mechanics /for Benefit of Entire Country/	2	-	4
INDIRECT - LONG RANGE	7.	Preparing the Way for Local Manufacture of Spare Parts	-	-	6
		Total Value Contribution	13 /31%/	8 /19%/	21 /50%/

/a/ The numbers express relative value contributions of the particular facility/ies/ to the specific realizable benefit. The highest individual note attainable is 6; and the sum of each horizontal line must be 6.

f) total gross savings per year at average vehicle cost of 9,000 Dinars: 5.4 million Dinars

g) net replacement savings, assuming higher maintenance costs representing 50% of above gross savings: 2.7 million Dinars.

It should be noted that any changes in the above factors could considerably influence realizeable savings, actual results will be likely to be better than those projected. The writer believes the above projection is very much on the conservative side.

2) Lower Cost Spares through Local Rebuilding of Components - the projected savings estimated at about 5 million Dinars per year will result entirely from the operations of the Central Components Repair Workshop. Table 2 details the method of calculation, based on the following assumptions:

a) only a 10% saving was used for Zetor tractor component repairs as compared with costs for importing new components;

b) only a 50% saving was calculated for Scania and Saviem (Salah-Al-Din) components as compared with import costs.

The following re-calculation demonstrates just how conservative the above projections are, considering Scania and Saviem (Salah Al-Din) components only:

(i) the total cost of imported components (as per lines A.1, A.2, B.1, B.2, C.1 and C.2 Column 5 of Table 2) is 9.756 million Dinars or for the sake of simplified calculation 10 million Dinars yearly;

(ii) utilizing 50 expatriate workers at 1 million Dinars per year (20,000 Dinars per worker per year) and 500 local workers at 1 million Dinars per year (2,000 Dinars per worker per year), the total labor cost would run (without overhead) at 2 million Dinars per year.

(iii) assuming 1 million Dinars worth of replacement parts needed for component rebuilding operations.

The total saving is this case at projected production rate would be approximately 7 million Dinars per year. Therefore the 50% rate calculated above should be considered quite safe, even if 100 expatriate workers would have to be utilized.

Table 2. COST EFFECTIVENESS OF THE NEEMM COMPONENT REPAIR WORKSHOP (CRW) OPERATION PER ANNUM

Sr. No.	Description	No. of units overhauled per year	Unit price CIF Baghdad duty paid,1981 Iraqi Dinars	Total cost of new units in quantity as per col. 3 Iraqi Dinars	Annual net savings by operating CRW Iraqi Dinars
1	2	3	4	5	6
	A. ENGINES				
A.1.	Scania	1000	4,500	4,500,000	2,250,000
A.2.	Saviem (Salah Al-Din)	1000	3,500	3,500,000	1,750,000
A.3.	Zetor (Antar)	2000	500	1,000,000	100,000
	Total "A"	4000	-	9,000,000	4,100,000
	B. GEAR BOXES (TRANSMISSIONS)				
B.1.	Scania	325	2,800	910,000	455,000
B.2.	Saviem (Salah Al-Din)	325	1,000	325,000	162,500
B.3.	Zetor (Antar)	500	1,000	500,000	50,000
	Total "B"	1,150	-	1,735,000	667,500
	C. REAR AXLES				
C.1.	Scania	325	1,000	325,000	162,500
C.2.	Saviem (Salah Al-Din),	325	600	195,000	97,500
	Total "C"	650	-	520,000	260,000
	Grand Total "A" + "B" + "C"	-	-	11,255,000	5,027,500

14. As can be seen from the above, the Components Repair Workshop represents an investment with very high return, in excess of 30% per year (i.e. 5 million Dinars minus approximately 1 million Dinars depreciation on 12,5 million Dinars investment, or 4 million Dinars net return per year). But to realise this, there are two basic conditions that must be met: a) the Workshop must operate very efficiently, at rated capacity a precondition of which is that b) the components to be rebuilt (i.e. the "raw materials" for the operation) are readily and without interruption available.

15. As regards the rest of the benefits, Table 1. is self-explanatory. It should only be pointed out that the most "strategic" benefits (i.e. self-reliance, increased number of trained mechanics, etc.) to the country will be derived from the operations of the Components Repair Workshop.

D. COMPARISON OF APPROACHES FOR ESTABLISHING THE COMPONENTS REPAIR WORKSHOP

16. After having established the value of the Components Repair Workshop, both in direct financial terms as well as the resulting long-range benefits, the next question is how to go about its establishment most cost effectively. To get a clear picture, 3 basic approaches are compared in Table 3., and the conclusions can be summarized as follows: a) implementation time can be expected to increase by going from the turn-key approach more and more towards total NEEMM planning and implementation due to various factors, but mainly related to the time required for pre-tendering, planning and tendering activities; b) at the same time and as expected, direct responsibilities for project planning and execution shift more and more to NEEMM, rapidly increasing man power input requirements on part of NEEMM at all stages of project planning and implementation; c) parallel with this, and in view of the shortage of available qualified national manpower, increased inputs from UNIDO (if this will be the chosen approach) will be required. Table 3 is particularly useful for identifying the various institutional units and organizations having "primary" (i.e. direct input) and "secondary" (i.e. advisory, control) functions at each stage of the project.

Table: 3 COMPARISON OF 3 APPROACHES FOR PLANNING AND ERECTING NEEMM COMPONENT REPAIR WORKSHOP

MAIN IMPLEMENTATION STEPS AND SEQUENCE	TURN-KEY APPROACH			ENGINEERING DESIGN/SPECS CONTRACT - NEEMM SLF-IMPL.			FULL NEEMM - UNIDO PLANNING AND EXECUTION		
	time months	imputs/responsibilities primary	secondary	time months	imputs/responsibilities primary	secondary	time months	imputs/responsibilities primary	secondary
1. Engineering design and specif..	3	GC	NE/UN	3	EDC	NE/UN	16 (a)(c)	UN	NE
a) building/utilities - detailed layout of equipm. - work flow		GC	NE/UN	5 (a)	EDC	NE/UN		UN	NE
b) detailed process/equipment/ tooling specifications		GC	NE/UN	5 (a)	EDC	NE/UN		UN	NE
c) organization engineering - detailed manning table - key post experience/ training requirements specified		GC	NE/UN	5 (a)	EDC	NE/UN		UN	NE
2. Preparation of tenders	-	GC	-	2	NE	UN	2 (a)	NE	UN
3. Evaluation of offers/contracting	-	GC	-	2	NE	UN	2 (a)	NE	UN
4. Building & Facilities Erection	23 (a)	GC	NE/UN	18 (b)	NE	UN	18 (b)	NE	UN
a) Detailed bldg design/erection		GC/BC	GC		BC	NE/UN		BC	NE/UN
b) utilities design & installation		GC/UC	GC		BC or UC	NE/UN		BC or UC	NE/UN
c) supervision and control		GC	NE/UN		NE	UN		NE	UN
5. Process Equipment/Tooling	23 (a)	GC	NE/UN	23 (b)	ES	NE/UN	23 (b)	NE	UN
a) process equipment/tooling		GC	ES		UN	NE		UN	NE
b) installation/test run		ES or EIC	GC		ES or EIC	NE/UN		ES or EIC	NE/UN
c) supervision and control		GC	NE/UN		NE	UN		NE	UN
TOTAL ESTIMATED MINIMUM TIME	26			31			39		

Explanation of abbreviations GC - General Contractor, EDC - Engineering Design Contractor, BC - Building Contractor UC - Utilities Installation Contractor, ES - Equipment Supplier, EIC - Equipment Installation Contractor, NE - N.E.E.M.M., UN - UNIDO

(a) and (b) - carried out concurrently, (c) - includes time for recruitment and fielding experts by UNIDO

17. The above 3 approaches are not exhaustive, however, as there are possible modifications on the A and B approaches, which are also incorporated into Table 4. where project costs and implementation times are compared. The A-variation is an engineering contractor approach, similar to a turn-key approach, except that NEEMM would determine the selection of the various suppliers and contractors, based on tendering, with full implementation responsibility still remaining with the engineering contractor. In the B-variation the equipment tendering would be handled through UNIDO's contracting services for submittance to potential suppliers, but evaluation would be carried out by NEEMM. Both variations offer some advantages and disadvantages with the total implementation times and costs involved not much influenced.

18. When comparing projected implementation times with total project costs in Table 4, it must be strongly emphasized that in view of insufficient detailed information, all time and particularly cost data projections can be best described as "intelligent guesses" and must not be taken at face value, with the exception of UNIDO's share in project costs, which are quite accurate. The importance of the time and cost projections lies rather in their relative value to each other, enabling comparison among them. With this in mind, the following conclusions and recommendations seem reasonable.

a) The turn-key approach (A) appears to be the quickest route to implement the project but it is also the most costly solution. In addition, NEEMM would have little say in the selection of the process equipment, considered a negative factor. The turn-key/ engineering contractor approach (A-variation) should take only a little time longer to implement than the full turn-key approach, but it can be expected to cost somewhat less and also enable NEEMM to select the process equipment through tendering. For both approaches the same, lowest level of UNIDO support would be required, consisting of 3 experts, each for 24 m/m.

b) The engineering design/NEEMM self-implementation approaches (B) and (B-variation) would take longer time to implement the project requiring increased UNIDO inputs but also cost less.

c) The last approach of full NEEMM planning and implementation (C) should be disregarded as a viable proposition for several reasons, which include excessive implementation time, no percievable costs savings over previous approaches and, particularly, because it represents the highest

Table 4: COMPARISON OF ESTIMATED TIME AND COST FOR ESTABLISHING THE COMPONENTS WORKSHOP USING DIFFERENT APPROACHES

Implementation Approach	Estim. minim. total compl. time months	Estimated Main UNIDO Inputs	Estimated UNIDO Project Cost Iraqi Dinars	Estimated Direct Costs for Erecting Workshops Iraqi Dinars	Estimated Total Project Cost Iraqi Dinars
A: TURN-KEY/GENERAL CONTRACTOR APPROACH	26	3 Experts, 24 m/m each Total 72 m/m	240,000	12,500,000	12,720,000
A-Var.: TURN-KEY/ENGINEERING CONTRACTOR, with NEEMM TENDERING FOR BUILDING/UTILITIES CONTRACTORS AND EQUIPMENT SUPPLIERS	28	same as above	240,000	12,000,000	12,240,000
B: ENGINEERING DESIGN/SPECIFICATION CONTRACT - NEEMM SELF-IMPLEMENTATION	31	4 Experts, 3x30 m/m and 1x18 m/m, short-term consultants 12 m/m, total 120m/m	390,000	11,500,000	11,890,000
B-var.: ENGINEERING DESIGN/SPECIFICATION CONTRACTING THROUGH UNIDO - NEEMM SELF-IMPLEMENTATION	35	same as above, plus overhead on UNIDO subcontract	420,000	11,300,000	11,720,000
C: FULL NEEMM/UNIDO PLANNING AND IMPLEMENTATION	39	7 Experts, 34 months each, total 252 m/m	720,000	11,000,000	11,720,000

technological risk factor in that possibility of obtaining the highly specialized and sophisticated technology through individualy recruited experts can not be predicted. This approach would also require massive UNIDO inputs as well.

19. Another important aspect of the Components Repair Workshop is the work method and organization for components assembly operations. This issue came up after the Renault tender offer was received. The original concept was based on parallel assembly lines for the various makes (i.e. Scania, Saviem, Zetor), while the Renault approach would use stationary assembly positions where a component (e.g. engine) is put together completely by an "assembly team". The assembly work would be phased therefore consecutively (i.e. batch operation) according to various makes and types of components, each running as long as needed according to prevailing demand. This approach offers several advantages and, in the writer's opinion, should be the preferred operational choice for the following reasons:

(a) it would minimize the possibility of mix-ups because only parts of a single make and model component would be on the shop floor at a given time;

(b) this method would assure full capacity utilization as opposed to running parallel lines, where it might happen that one line would lie idle do to low work demand, while the other could not cope with the work load;

(c) the workers would be involved in completing entire components instead of doing repetitive, single tasks, thus receiving a much broader and overall better training by getting to understand entire vehicle components (e.g. engines, transmissions, etc.).

(d) by completing an entire component thus seing the full results of their work, the workers would be more motivated.

Since the Renault "batch" approach would require only minor changes in the overall Workshop design, its adaption at this stage should pose no major problems or cause delays.

E. INPUTS BY UNIDO FOR THE ESTABLISHMENT OF THE COMPONENTS REPAIR WORKSHOP

20. During the extensive discussions with NEEMM's management, it became evident that the two most important factors regarding UNIDO's continued involvement with the project are:

(a) the urgency on the part of NEEMM to establish the Central Components Repair Workshop; and

(b) the shortage of qualified national staff available for the implementation of the project due to the enormous manpower needs of the Government everywhere as a result of the extensive developments going on simultaneously in all sectors.

The later factor was in fact the main reason that NEEMM has requested UNIDO to provide assistance starting at the early planning stage of NEEMM's projects, which is still continuing, as described earlier. Considerable progress has been made since then: plans for the Central Complex in Dora have been finalized and a number of administrative, technical and service buildings have been erected or are under construction; plans for the R gional Centres have also been finalized and construction has started on several of them. The Components Repair Workshop will be, however, the most complicated undertaking, requiring detailed planning and close supervisory controls during the erection stage, and necessitating specialized expertise. At the same timeplanning and erection of the other workshops and facilities also requires deep involvement on part of NEEMM's management, thus stretching very thin its available manpower resources. Since the entire NEEMM System development has reached a critical and very intensive stage, it is necessary to augment its staff, for which the United Nations System, in this case the United Nations Industrial Development Organization (UNIDO), is particularly appropriate in view of its mandate to serve the needs of the developing countries in an objective, impartial and dedicated manner.

21. Based on the discussions and the assessment of the project to establish the Central Components Repair Workshop (see Chapter D; and particularly Table 4), the following minimum expert inputs from UNIDO are recommended even in case of turn-key or engineering design/supervision

contracts, so as to provide the technical advisory backing to NEEMM's management for the planning, design, supervision and implementation control:

- Project Co-ordinator - Expert in Planning and Establishment of Automotive Maintenance and Components Rebuilding Services — 30 m/m
- Mechanical Engineer - Expert in Automotive Maintenance and Components Rebuilding Operations Organization and Management — 30 m/m
- Civil Engineer - Expert in Industrial Projects and Facilities Planning and Implementation Management — 30 m/m

If only engineering and design inputs are provided by an outside contractor, but project implementation will rest with NEEMM, the following additional expertise should be included:

- Mechanical Engineer - Expert in Automotive Components Processes, Tooling and Assembly Operations — 18 m/m
- Short Term Consultants - various specialists, as required during the implementation of the project — 12 m/m

Such a team of experts should be capable of providing the advisory backing to NEEMM's management for successfully establishing the Components Repair Workshop. The required UNIDO inputs as regards expertise requirements for full NEEMM planning and implementation (Table 4., approach C) are not elaborated here, but would be provided on short notice if this were to be NEEMM's chosen route to implement the project.

21. In addition to expertise, other project inputs are also necessary and are recommended:

(a) it is considered very important that 3 or 4 executives of NEEMM closely associated with the Components Repair Workshop project visit as soon as possible several automotive component rebuilding operations in market economy, centrally planned economy and, if possible, in developing countries. (Note: as the old engineering saying goes: "once seeing is worth more then hundred times reading".) Since UNIDO has the contacts and the organization to arrange said study tours, including these into the project is recommended.

(b) other project inputs are: some equipment (i.e. project car, typewriter, mini-computer/calculator for the project staff); locally hired secretary/typist, working in English; UNIDO Headquarter staff mission to Iraq (for backstopping and review of the project).

22. The total estimated cost, including agency overhead charges, of the project (as per Table 4, approach B) and using all the indicated expertise and inputs, would be in the order of 390,000 Iraqi Dinars, for a project duration of 2 ½ years. (Exact costing, in US dollars, will be included in the project document to be transmitted in about 6 weeks time.) It must be pointed out that this project covers only the inputs needed for the planning and establishment (i.e. erection) of the Components Repair Workshop, and does not include inputs required for start-up and regular production operations, organization and management support. It is recommended that, if additional UNIDO inputs in this respect would be required, these should be handled as and entirely separate project in view of the different expertises involved and activities carried out.

F. COMPONENTS REPAIR WORKSHOP START-UP AND PRODUCTION OPERATIONS

23. The ultimate value of the Components Repair Workshop will depend entirely on how quickly will it reach its planned production levels. Since many of the operations are technologically quite advanced and complex, plans for start-up and continous operations should be made as early as possible and related activites should start as soon as the present plant-erection project is underway. Issues of manning the plant, skilled workers training, work organization, management systems, management development must be dealt with, among others. The system of collecting and bringing vehicle components to be rebuilt to Dora from all over the country must be organized and a sufficiently large stock of these secured for start-up. The various national institutions providing the required support services should be involved from the start. If any inputs from UNIDO would be required, these should be identified very soon in order to get a head start for achieving the objectives on time.

G. THE NEEMM SPARE PARTS DISTRIBUTION SYSTEM

24. The Spare Parts Distribution System is an essential element of and a primary prerequisite for the entire NEEMM Maintenance and Repair System to to function efficiently, because if spare parts are not readily available, no maintenance and repair work can be accomplished. On the other hand, it is a very costly operation in terms of capital tied up in a large inventory. To optimize results (i.e. minimum necessary inventory - availability of spare parts at all times), inventory and stock control operations must be always accurate and up-to-date, a difficult task in view of the large number of spare parts to be handled. To do this with manual operations is not only cumbersome and slow, but it is nearly impossible to generate the data needed for determining "reordering levels" for each spare part in order to minimize inventory, to analyze component weaknesses in each vehicle model, etc. All this can be of course handled with ease by computer. It is therefore recommended that the computerization of the entire Spare Parts Distribution System is accomplished soonest, with direct interlinkeage between the Central Store in Dora and the Regional Stores. How to best achieve this objective, such as with a centrally computerized system serving all NEEMM requirements, or with several smaller, decentrilzed but interlinkeable computers, needs first to be studied as it cannot be answered off-hand. A 3-step approach is recommended:

(a) an expert/consultant to determine the scope of the system analysis, define the terms of reference for the system analysis while estimating the cost of such an exercise to be carried out by a reputable "computer systems house" (i.e. soft-ware consulting company). - Input requirement: 1 Consultant for 3 months.

(b) Carry out systems analysis for NEEMM's computerization needs and define specific computer programmes to be developed and installed.

(c) Install computer hardware and software at NEEMM.

It should be noted that as the first step computerizing the Spare Parts Distribution System might suffice. It might be advisseable to utilize UNIDO's capabilities for steps (a) and particularly (b) for the reason that computer software consulting companies are often highly specialized, relatively small operations, with no representation in Iraq. By tendering through UNIDO, therefore, a much broader exposure to potential suppliers could be achieved, to the benefit of Iraq.

H. CONCLUSIONS AND RECOMMENDATIONS

25. The planned country-wide Vehicle Maintenance and Repair System of NEEMM, when fully operational, will be of great value to the country in terms of direct and indirect financial savings as well as other "strategic" benefits, such as an enlarged national pool of highly trained automotive mechanics and increased self-reliance and capability for vehicle maintenance and repair.

26. The Components Repair Workshop is particularly important as regards financial savings realizeable through rebuilding of major truck and tractor components to be used as replacement and spare parts, which are now being imported.

27. The comparison of the various approaches for establishing the Components Repair Workshop shows that a turn-key contract would most likely be the fastest route but also the most expensive one, while total NEEMM planning and erection responsibility would take the longest time without, however, offering significant cost savings over the "middle-of-the-road" approach of an engineering design and specifications contract coupled with NEEMM implementation.

28. The minimum recommended UNIDO inputs for the planning and erection phase of the Components Repair Workshop irrespective of the appr ach used and having taken into account NEEMM's manpower resources, consist of 3 experts:

    (a) Expert in Planning and Erection of Atuomotive Maintenance and Components Rebuilding Services (Project Co-ordinator);

    (b) Expert in Automotive Maintenance and Components Rebuilding Operations Organization and Management (Mechanical Engineer);

    (c) Expert in Industrial Projects and Facilities Planning and Implementation Management (Civil Engineer).

29. Planning and preparations for the regular operation of the Component Repair Workshop should start as soon as possible, and a separate project is recommended for this purpose in view of the different expertises required.

30. It is also recommended that the computerization of the entire NEEMM Spare Parts Distribution System is implemented as soon as possible in view of the magnitude of the operation and the very large number of spare parts involved.