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**STUDY OF THE AUTOMOTIVE  
INDUSTRY IN ETHIOPIA**  
(Draft final Report)

**A REPORT PREPARED FOR THE UNITED NATIONS  
INDUSTRIAL DEVELOPMENT ORGANIZATION**

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**SEPTEMBER 1995  
ADDIS ABABA**

# ACCRONYMS

<b>ADLI</b>	<b>Agricultural Development led Industrialization</b>
<b>AMCE</b>	<b>Automotive Manufacturing Company of Ethiopia</b>
<b>ASPF</b>	<b>Akaki spare parts &amp; hand Tools Factory</b>
<b>BMEI</b>	<b>Basic Metal &amp; Engineering Industries</b>
<b>CKD</b>	<b>Completely Knocked Down</b>
<b>CNC</b>	<b>Computer Numerical Controlled</b>
<b>ISO</b>	<b>International Standards Organization</b>
<b>JIT</b>	<b>Just in Time</b>

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## **INTRODUCTION**

The national strategy declared for economic and social development is the agricultural development led industrialization (ADLI). This means that the surplus from agriculture will be the major source of saving for financing investment projects in the manufacturing, transport, construction and other industries.

Growth in agricultural output, which will constitute the primary basis for the growth of the Ethiopian economy in the foreseeable future, is dependent on the transport system being able to efficiently integrate the rural communities with the urban centers. The transport system will have to facilitate reliable and cost effective transport of export crops from the major collection points to the ports. Mobility of goods, services and people can be eased with the availability of adequate means of road transport.

In general, the success of ADLI will depend on an efficient road transport system.

It is quite well known that the principal mode of transport in Ethiopia is road transport. This is because it has been found to be the most suitable means for the country's terrain. Other modes of transport are very expensive. In view of this, suitability of promoting the automotive sector in the national strategy for industrialization is very crucial.

Presently, the automotive industry in the country is at an infant stage. Most vehicles are imported from different parts of the world. There is one vehicle assembly plant for trucks and buses from completely knocked down (CKD) components with local content not exceeding 20%. A new manufacturing plant for light vehicles has recently obtained an investment license. It won't start manufacturing the vehicles before a couple of years.

The first phase of simple assembly from imported components has been in place for the last twenty years. However, no appreciable qualitative growth has been experienced within these years.

In view of this, the automotive industry has to transform itself whereby it has to increase the local content through an expanded manufacture. There are a number of mechanical engineering industries in the country which are presently under-utilized. Akaki Spare parts and Hand Tools Factory primarily designed to produce spare parts for the manufacturing industries is one of these and has ample capacity which can be diverted for production of components in the automotive sector.

This study supplements the pre-feasibility study made by PROJEKTA Ltd. of Prague in November 1993, on the Regional Development of an Existing Plant, ASPF in Ethiopia for the manufacture of vehicles and components.

## **I. CURRENT STRUCTURE OF THE AUTOMOTIVE INDUSTRY**

The automotive industry in Ethiopia is almost wholly dependent on foreign sources of supply. Vehicles that transport persons and goods as well as the pertinent spare parts, machinery and equipment used for repair and maintenance are acquired from foreign sources. Labour is the sole local input of the one and only plant in the country that assembles a small number of Fiat lorries and buses, all other components being imported. Implied is also technology dependency on external sources.

Acquisition of the vehicles used in the country takes place in the following manner:

- a) Direct purchase and import by private and public enterprises as well as by individuals;
- b) Acquisition through development projects funded by bilateral, multilateral and non-governmental organizations. Of these, the bulk is provided on outright grant basis, while a small portion is financed through soft loans;
- c) Acquisition through relief assistance, again from bilateral, multilateral and non-governmental organizations all of which are provided in the form of grants; and
- d) Direct purchase by embassies and representatives of various organizations that import various types of vehicles, but mainly passenger cars, for their own use.

The major sources of import are Japan, Germany, Italy, Sweden, the Netherlands, USA, South Korea, and the Middle East countries. Saudi Arabia is top in the list for the last group.

According to available data, the details of the types of vehicle fleet that were inspected during the years under consideration are summarized in Table 1:<sup>1</sup> However, these figures leave out a significant number of un inspected vehicles. During the period under consideration, the Derg's war effort involved forced mobilization of both government and privately owned buses and trucks, station wagons and other vehicles with more than five seats. This is to say that some vehicles might have been on the war front while others, particularly the private ones, avoided inspection or even stopped operation for fear of being requisitioned by the Government.

<sup>1</sup> These figures include vehicles that were operating in Eritrea which became an independent state in 1992.

	1986/87	1987/88	1988/89	1989/90	1990/91
Cars	44,973	40,015	40,151	36,431	36,491
Taxis	3,354	3,525	2,640	2,087	3,671
Station Wagons	2,427	5,007	5,359	6,456	6,203
Buses	4,596	3,902	3,958	3,703	5,092
Trucks	3,942	7,428	7,297	6,129	5,226
Truck trailers	1,762	3,479	3,074	2,179	1,970
Others/ including motor cycles	1,516	1,947	1,938	1,869	1,729
Total	62,516	65,303	64,417	58,854	60,382

Source: Rearranged from the data published by the Central Statistical Authority in the Statistical Bulletin No. 21, 1 September 1993, Addis Ababa.

Unavailability of foreign exchange, heavy import duty or outright prohibition of physical imports along with the general lack of confidence in the stability of the country were, in particular, the reasons for the downward trend of car imports, especially during the last two years of the military government when its fall appeared eminent.

As stated earlier, Ethiopia relies on foreign sources for its supply of vehicle fleet, although a very small number of trucks and buses are assembled locally. Therefore, import trends under normal situation are good indicators about the buildup of the vehicle fleet. A comparison of the structure and number of vehicle fleet imported prior to the fall of the military regime in May 1991 and subsequently, following the import liberalization measures introduced by the new government, are shown in Table 2:

Table 2.

Year	Cars	Buses	Lorries & Trucks	Station Wagons	Other	Total
1987	212	39	1717	1096	47	3111
1988	240	186	2116	1199	28	3769
1989	299	31	576	1191	7	2104
1990	2102	236	1080	2806	63	6287
1991	2624	510	1213	2050	135	6532
1992	2198	171	1693	1870	180	6112
1993	1395	161	2132	2188	165	6042
1994	-	-	3795	-	-	8624 <sup>2</sup>

Source: Ministry of Finance and Central Statistical Authority.

As can be observed from the above table, the total vehicle fleet imported more than doubled during the years 1990 to 1993 and almost trebled in 1994. This indicates the restored confidence as a result of the policy of import liberalization as well as the reduction of import duties especially on those vehicles that provide transport for passengers and goods to the public. Availability of foreign exchange to all importers through the public auction system

has also contributed significantly to the rise in vehicle import.

In terms of value, the average unit price for a sedan vehicle which was Birr 25,718 in 1990 has gone up considerably reaching Birr 67,699 in 1993 and Birr 79,283 in 1994. This is attributable to the devaluation of the Ethiopian currency in the fourth quarter of 1992, to price increase abroad and also to the product mix. Another factor has been the decline of the US dollar, the major currency reserve in Ethiopia, vis-a-vis the main convertible currencies of the countries which are the major vehicle suppliers to the Ethiopian market.

As regards ownership, commercial road transport services are provided by both state owned enterprises and by private operators. However, the most recent official data reveal that private operators dominate the automotive industry and the road transport sector. Of the total 7,877 commercial cargo vehicles that existed in the country in 1992, only 13.5 percent were state owned. Similarly of the 3,101 commercial inter-city buses only 5.6 percent were state owned.

It is worth noting that road transport alone accounts for over 97 percent of the total domestic traffic carried by motorized means of transport. For instance, in 1990 the commercial road vehicle fleet carried 62.5 million inter-city passengers and 6.4 million tons of goods in 1990 resulting in 3,397 million passenger Km and 2,725 million ton Km respectively.

In view of the recent favourable upward import trends the automotive industry has shown, the industry faces a number of problems. These problems have been manifesting themselves in rising import prices of vehicles, rising operating costs including fuel and spare parts as well as in inadequate facilities and poor road conditions. Age of the existing vehicles is one area of major concern. Available data on the age structure of the country's vehicle fleet reveal that of the total commercial fleet owned by the private sector, 57 percent of the buses and 73 percent of the trucks have been on the road for over twelve years whereas the average age for state owned fleet is seven years for buses and eight years for trucks. The problem arose due to the general shortage of funds and the absence of encouragement to the private sector in the past. To invest in the automotive industry; i.e. in transport equipment and facilities, the sub-sector is experiencing shortages of reliable, efficient, and cost effective trucks and buses in particular.

In a related development, commercial cargo vehicles are reported to have low load factors, 55 percent on the main import - export corridor, and 70 percent on other routes. This is a reflection of the imbalance of the country's traffic flow of goods. One adverse result is higher freight rates as shippers are forced to pay for empty haulage and dead space.

Other problems relate to weaknesses in the development of managerial skills in general and fleet management in particular, absence of adequate preventive maintenance, results from shortages of spare parts and limited maintenance facilities. Further, lack of incentive mechanisms account for most of the registered vehicles' down time, estimated at 48 percent for state owned commercial trucks and 10 percent for the privately owned ones.

The automotive industry had suffered neglect in the past. If it is to perform adequately and thereby enable the nation to cope up both financially and technically with the fast growing vehicle fleet, new measures have to be taken. Among the major ones, are the introduction and implementation of appropriate regulations in the areas of traffic safety and axle load limits or the up-dating of the regulations that exist and creating the mechanisms for their enforcement. Policies and measures that would encourage and support replacement of old vehicles may also need to be formulated and introduced.



## II COMPETITORS

As has been indicated earlier, the demand for all types of vehicles in the Ethiopian market is met mainly through imports. In general, there are no manufactured products that compete with imports, except tyres, battery, and body works. To some extent the trucks and buses assembled by FIAT/ IVECO can be regarded as competitors to imports.

Currently there are some seven importers of buses, namely Walia Rural Transport Services Enterprise, Anbessa Urban Transport Service Enterprise, Automotive Manufacturing Company of Ethiopia Freexpo, Amropa Motors, National Motors, AMCE, and a newly established private company, Cccaccimali, which also plans to assemble such buses in the future. The first three are government owned while the rest are private.

Importers of trucks include AMCE, Ethio - automotive, Nyala Motors, Mitchell Cotts, Freexpo, Ethiopian Amalgamated, Amropa Motors, Moenco, Orbis, National Motors, and Cccaccimali. Only AMCE is government owned while the rest are private.

These and others such as Moenco for Toyota Motors, Nyala motors for Nissan vehicles, Paul Ries for Pergeot, Ries Engineering, etc... are authorized representatives of vehicles manufacturers located in Italy, Germany, France, Japan, Sweden, and the United Kingdom.

In essence, therefore, the competition to control the automotive industry in Ethiopia, i.e. in terms of supplying vehicles that are used for different purposes together with the relevant spare parts, as well as in the supply of consumable items such as lubricants, the suppliers being Shell, Agip, Mobil and Total, are based on trade marks such as Mercedes, Toyota, Mazda, Nissan, Fiat/ IVECO, Scania, Cccaccimali, and so on.

In general, Japanese made passenger cars dominate the market, while truck vehicles of Japanese, German, and Swedish share the market in different proportions. Prices, and fuel consumption as well as the availability of spare parts, their relative prices, and familiarity with the technology appear to be the main criterion for the preference. In this connection, multilateral, bilateral and non - governmental organizations which donate vehicles of various trade marks do influence the preferences and thereby contribute to competition in trade marks.

However, it should be noted that competition in the automotive industry, whether in the promotion of trade - marks, in attracting potential investors to manufacture vehicles, spare parts, and consumables under license or through indigenous technological development, is a recent phenomenon. There were no incentives, no promotional activities such as advertisement, exhibitions and the like in the past primarily due to the policy environment which was not conducive even to private sector dominated activities such as the automotive industry.

### III VEHICLE ASSEMBLY PLANT (S) (FINAL ASSEMBLY, SUB-ASSEMBLY AND MANUFACTURE)

The development of a country depends to a large extent on the organization and efficiency of its internal means of transport both in terms of roads network and efficiency of transport means. The efficiency of the latter is strictly related to the availability of replacement parts, and standardized servicing facilities which can guarantee smooth operation and long life for the means of transport used.

As far as Ethiopia is concerned, both the old age of vehicles and their heterogeneous origin give rise to serious problems in terms of procurement of the necessary spares to keep the road transport system efficient. Moreover, the poor road conditions in the country aggravate the wear and tear of components, demanding improved quality to withstand the adverse conditions.

Most of the mechanical vehicle spare parts are procured from the international markets, while only a few of them are manufactured locally, in local mechanical workshops and/or in the maintenance workshops of the consumer institutions/ factories.

Owing to the shortage of developed methods and facilities, the local production results in spare parts that are not always reliable. Nevertheless, the demand and use of such spare parts is high. There is no denying the fact that the mechanical engineering industry in Ethiopia has contributed much in maintaining and operating old vehicles, thereby developing high skill in the automotive sector.

Furthermore, the long delivery times of imported spare parts oblige users to keep large stocks in their warehouses to ensure availability. This involves either tying up foreign exchange or long stoppages in the operation system if the procurement is made as and when the need arises. Heavy losses follow from this drawback. The consequences are:-

- . Continuous outlays and tied up capital
- . Severe operation losses due to frequent stoppages
- . Unreliable repairs and long lead times
- . Premature obsolescence of the means of transport
- . Under utilization of available means of transport which could otherwise be employed.

To overcome the above problems, it is essential to conceive a project which can integrate the production of automotive spare parts and mechanical components and parts for local assembling of trucks and buses.

#### Indigenous Manufacture

For local assembly the one to be considered is the medium duty truck for commercial, agricultural and municipal activities. It will serve as a pickup and delivery vehicle in the medium duty or mid range field of trucks.

The main activities involved in the production of vehicles are as follows:

- a) Manufacture of main and precision components
- b) Procurement of bought - out parts
- c) Sub-assembly of main groups such as engines, transmission and suspension parts, steering parts, brakes and wheels, etc .
- d) Final assembly of all sub - assemblies and parts together
- e) Testing and finish painting

Indigenous manufacture of a highly engineered product such as a dry cargo vehicle calls for judicious selection of a product model, with a well proven design and employment of a production technology which would meet the capacity requirement and at the same time provide highly economical method of production processes which have been successfully employed elsewhere.

Towards this end, it is recommended that a technical collaborator is selected right from the feasibility study stage. The collaborator could provide product design, process know-how and technical assistance during initial years of production for the successful establishment of the plant.

In the selection of a technical collaborator, the following main criteria need to be considered:

- . Ability to provide maximum documents and technology for the indigenous production of as many components; sub-assemblies shall be as minimal as possible.
- . Ability to provide technology for trucks with pay load of up to 10 tons and design of the major components for this model.
- . Ability to manufacture the truck in the plant and willingness to provide maximum technical assistance by way of providing training at the plant and also to deploy specialist personnel to provide on - the - job training.

The major activities involved in the manufacture of trucks fall under two groups.

- . Manufacture of engine and transmission system
- . Manufacture of sheet metal parts followed by final assembly, painting and testing.

It is generally accepted that any new venture would require certain time frame to reach the full planned capacity as well as to establish the indigenous manufacture of all parts planned for in - house manufacture and procurement of parts/ sub - assemblies from local sources.

Sheet metal works and forged components could be locally secured within two years. Engines and transmission could be produced within four years. In other words, the plan for complete indigenisation programme (excluding certain continuously imported parts or sub - assemblies) would take four years

#### Make - Buy Considerations

The appraisal whether to manufacture in plant a part or a sub-assembly, or to procure from outside sources would depend on many factors, the major ones being:

- . The economic viable quantity for manufacture,
- . The truck and the manufacturing technology involved,
- . The quality and reliability of parts or sub-assemblies if purchased from outside sources,
- . Cost of in-plant manufacture as compared to outside procurement prices.

The parts or sub-assemblies required for the truck could be grouped, source-wise, as follows:

- . Parts/ sub-assemblies to be manufactured in plant
- . Parts/ sub-assemblies to be procured from local sources
- . Sub-assemblies to be imported from the countries in the sub - regional or from other countries

Engines and gear boxes are the most important sub-assemblies requiring high precision, special manufacturing technology and relatively heavy investment. These can be planned to be manufactured within the plant in four years' time as mentioned earlier

## Procurement of Production materials

The production materials that will be required by the factory are of the following types -

- . Various castings of cast-iron, steel, aluminum, bronze
- . Forged parts,
- . Steel sheets and plates,
- . Steel profile and strips of various sizes,
- . Consumables like electrodes, gasket material, paints, etc
- . Special components not manufactured locally because of the sophisticated technology
- . Proprietary components found in the international market.

Raw materials for the manufacture of these components or sub-assemblies will continuously need to be imported.

Other parts are to be procured from local manufactures/ ancillaries, and bought-outs have to be continuously imported in large quantities.

## Degree of Integration

In the developed countries, in-house manufacture<sup>2</sup> is limited to few critical parts. However, the percentage of in-house manufacture in developing countries is between 50% and 80% depending on the engineering infrastructure.

Such concepts as lean manufacturing, quality assurance and Just In Time (JIT) need to be introduced in a factory of this size.

Lean manufacturing<sup>3</sup> is a practice which encourages team performance rather than individual excellence. Lean manufacturing practices enhance competitive posture by enabling:

- . to improve quality through continuous improvement and to simultaneously reduce costs by minimizing wastes,
- . to be lean and flexible to cope up with fast changes in market situations, and
- . to reduce delivery time and response time significantly.

Therefore, adoption of lean manufacturing practices by Akaki Spare Parts Factory (ASPF) together with its ancillary producers is a pre-requisite for survival and growth.

Nowadays, ISO 9000 series standard on quality management and quality assurance have to be implemented if manufacturers desire to have wide acceptance of their products. Quality management is that aspect of the overall management function that determines and implements the quality policy.

The attainment of desired quality requires the commitment and participation of all members of the organization, whereas the responsibility for quality management belongs to top management.

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<sup>2</sup> Engineering Industry Development Programme for Selected Eastern and Southern African Countries, Model and Feasibility Report, Prepared by HMT Limited, April 1988

<sup>3</sup> Introducing Lean manufacturing to Akaki spare Parts and hand Tools Factory, by Assefa Abraha, MBA thesis at City University Department of Systems Science, UK September 1994.

Quality management<sup>4</sup> includes strategic planning, allocation of resources and other systematic activities for quality, such as quality planning, operations and evaluations.

For example, the "Big Three" US automobile manufacturers<sup>5</sup>, Chrysler, Ford and General Motors, decided in 1994 to include the ISO 9001 quality assurance model in a common scheme for certifying the quality systems of their suppliers, of which there are some 13,000. The advantage for both the automanufacturers and their suppliers is that one internationally recognized quality system standard and one assessment will replace the three sets of requirements and separate audits used in the past to qualify suppliers to do business with the "Big Three".

As the number of ancillary suppliers is limited, it is rather difficult to apply the quality assurance system as well as the JIT system in a factory which is to a large extent with integrated facilities.

However, as the number of outside suppliers grows, it will be necessary to continue applying quality assurance systems and the practice of JIT delivery of components. This will be particularly applicable for suppliers of body work, window and door trimmings, upholstery, rubber products, etc....

By including the ancillary suppliers to be part of the whole system, it will provide confidence to the producer that the supplied items will satisfy the quality requirements, often called "external quality assurance".

Thus it is technically feasible to set up a vehicle assembly plant with a significant local content to-gether with a reputed collaborator.

<sup>4</sup> ISO 9000: 1987 (E), Page 2

<sup>5</sup> ISO Annual Report 1994, Page 5.

#### IV TRUCK COMPONENT MANUFACTURE

The truck selected for indigenous manufacture to meet the sub-regional demand must be of well-proven design, successfully operating in the developed as in well as developing countries.

Some of the technical features which should be considered at the time of selection of the brand and model are:

- . Engine power/ capacity,
- . Haulage capacity,
- . Fuel efficiency,
- . Ease of manufacture,
- . Sturdiness in poor road conditions,
- . General features.

The truck must be fuel efficient and must be adapted to the rough road conditions.

The fundamental criteria to be considered in the realization of a project of this magnitude are:

1. Conformity of the quality of the trucks with the international standards. To this end, standards for vehicles issued by the Ethiopian Road Transport authority are enclosed in the annex for reference.
2. The value added in local currency must be the highest possible. Only components requiring sophisticated technologies must be imported as the low demand will not guarantee return on investment to produce them.
3. The transfer of technologies under local control must happen in a relatively short time.
4. The training of personnel must be at such a level as to allow the autonomous development of the production later on, in terms of improvements or adjustment to local conditions.

#### Production Programme

On the basis of the needs of the market and most of all, considering the process technologies involved, a large number of components can be produced in reasonable quantities at Akaki Spare Parts and Hand Tools Factory, provided a proper expansion of the plant is to be integrated with new specialized machines. Akaki Spare Parts and Hand Tools Factory is a complex engineering plant with foundry, forging, machining, heat treatment and chrome plating and phosphating shops.

A production mix related to the actual requirements of the country and the sub-region can be formulated only after a careful analysis of data is made available regarding the local and sub-regional situation. The production programme will comprise

- . production of automotive castings and forging.
- . Various components for trucks manufacture
- . Various spare parts for the operating fleet.

The basic criterion to be considered to keep a check on costs and to maintain quality is mass production, i.e. choosing the products that may have many common elements even if differentiated. As Peter Drucker in his book *Practice of Management* put it, the essence of genuine mass production is that it can create a greater diversity of products than any other method ever designed by man. It does not rest on uniform products; it rests on uniform parts which can then be mass assembled into a large variety of different products. This new - style mass production is the most immediately useful production concept that we have in our possession today.

An estimate as high as 50% value added can be obtained. This will, however, depend on the adapted technologies and the production level of every single product and its diversification by type

Before discussing the productivity of the various components, it is appropriate to highlight the production capacity of the various shops at Akaki Spare Parts and Hand Tools Factory.

#### Foundry Shop

Cast - iron castings	3125	tons	
Steel castings	1070	tons	
Bronze castings	65	tons	
Aluminum casting	190	tons	
<b>TOTAL.</b>	<b>4450</b>	<b>tons/ year in 2 shifts</b>	

The technologies employed are:

Sand - resin processing (no - bake)

Shell molding

Die casting technology for aluminum pistons

#### Forging shop

About 400 tons forged steel

About 400 tons forged steel balls

About 700 tons hand tools

The forging shop is equipped with different types of forging hammers, trimming presses, furnaces, rolling machines, induction furnace coupled with hot shear machine, manipulator for large work-pieces, vibrating machine and tumblers.

#### Mechanical Workshop

This has been designed to produce over 200,000 mechanical parts per year of about 3600 types differing in shape, dimensions, manufacturing process and product quality.

It is equipped with conventional and general purpose machines like turning, milling, hobbing, grinding, boring, and balancing machines.

It is possible to absorb changes in type and product mix and to increase the total quantity with the introduction of a second shift. Experience, however, indicates that keeping the product mix to a reasonable level will facilitate raw materials acquisition and storage and also improve production planning and control. Major items envisaged for production were those of the textile sector. On account of their small sizes and diverse shapes these are not any more interesting products for ASPF. They may be better handled by small shops with jobbing orders.

The bigger the product mix, the more difficult it becomes to manage the production.

In this case, the components of a truck will be preferred for optimum production to those small items of the textile sector.

#### Heat Treatment

The heat treatment shop is equipped with different types of furnaces for different types of heat treatment processes

Among these are:-

- . sealed quenching furnaces with oil quenching tank
- . sealed pit furnace with oil and water quenching tanks
- . induction hardening equipment for gears and shafts
- . electric bath furnaces
- . endothermic gas generators, for thermo - chemical processes
- . shot blasting and degreasing machines

The main activities of the shop are:-

#### **Thermal treatment**

**This includes activities such as hardening, tempering, annealing, normalizing, stress relieving and induction hardening.**

#### **Thermo - chemical treatment**

**This process includes carburizing, nitriding and carbo - nitriding.**

#### **Surface Treatment Shop**

**This shop consists of chrome plating and phosphating machines. Each performs the job of metal surface treatment for rust prevention as well as decorative plating.**

#### **Tool Room**

**A large number of jigs, fixtures and dies are required for the production machines to be tooled up to machine various components. For this, well equipped and reliable tool facilities are pre-requisites. This is a section to be very well organized as many dies, jigs and fixtures will have to be made to produce uniform truck components.**

**At ASPF, there are machines which are dedicated for die making and die re-conditioning. These consist of electric discharge machines (EDM), copy millers, grinding and turning machines.**

#### **Quality control Service**

**Quality control services comprise of sand, mechanical and metallurgical laboratories, equipped with:**

- . direct reading spectrometer for qualitative and quantitative analysis of chemical composition;
- . hardness testers (Brinell, Rockwell, Vickus, etc...)
- . tensile and compressive strength testers,
- . impact tester,
- . magna flux for internal crack detection
- . muffle furnace (up to 1500) for testing refractoriness of sand.

**As the above facilities in the factory are not fully utilized, these can be geared for the production of automotive components, thereby reducing the investment requirements for trucks components manufacture.**

#### **Process Technologies**

**By enhancing the foundry, forging and machining shops, ASPF can be chosen to produce the various components and spare parts of the main vehicle components. The following can be produced by casting in the foundry shop:**

- . cylinder head
- . camshafts
- . brake drums
- . manifolds
- . differential cover



- crankshafts
- flywheel
- bearing cluster

### Engines and Engine Parts

Machining of the castings produced in the foundry is carried out using the conventional and general purpose machines. Specific and complex machining operations required for the quality of products will have to be carried out on computer numerical controlled (CNC) machines. Obviously, these will have to be added at ASPF.

In the case of crankshaft and camshaft, the plant will have to be equipped with specific machines for their manufacture. Nowadays, it is possible to produce crankshafts by casting from ductile iron, currently produced at ASPF. An additional drop forging press complete with high frequency induction hardening machine will have to be installed.

Pistons can be produced using the die casting equipment in the non-ferrous section.

Pistons, gears, shafts, pins and bushings as well as bought out propriety items like injection pumps, bearings, bolts and nuts, washers, seals, etc. are assembled in sub-assemblies of crankshafts, camshafts, distribution and injection boxes, rockers, connecting rods, cylinders and fly wheels. They are completed by mounting the cylinder and cylinder head, valves, manifold injection pump, starters, etc. and transferred to the engine testing section.

Presently, Akaki produces transmission and suspension parts such as shackle, central support, bushings and U - bolts of suspension system of heavy trucks. Leaf springs are produced by a private company. Shock-absorbing mounting systems for connecting the cab to the chassis will have to be imported.

Gears for transmission may be produced at ASPF as there are many gear hobbing machines for spur, helical and bevel gears. It is essential, however, to supplement these with gear grinding machine and an equipment for spiral hypoid gears. The former is required to finish the gears for smooth and noiseless operation. The present gear shavers which are idle could also be put into operation.

Axles and axle stubs are envisaged to be produced at ASPF including transmission shafts.

### Steering parts

Front wheel spindles, steering parts, steering linkages, universal joint parts are forged steel components. With the addition of the forging press, these can be included in the product mix of ASPF.

### Brakes and Wheels

ASPF has been supplying the Ethio - Djibouti Railway Company with cast brake shoes for the last four years and has acquired the technology of making good castings. The casting for the brake pad of the trucks can be made at ASPF.

Brake drums are cast and machined to specified requirements at ASPF.

Wheels are produced by the stamping operation and later on joined by welding. This requires a different technology to be handled by an ancillary producer.

Friction materials for use on brake linings require an ancillary producer. Friction material for commercial vehicles is produced in large linings and baked individually. Once ready, it is drilled and riveted or bonded to the prepared brake shoes. This has all to be made by an ancillary producer.

#### Body Parts and Glass

There are many private workshops which have developed the skill and know-how for the production of truck bodies and cabs. Maru Tefferra Private Ltd. Co is one of the well-known body makers with up-to-date facilities. He works very closely with AMCE.

Vehicle glass can be either tempered (toughened) or laminated. Tempered glass is made by heating and rapid cooling of float glass. Laminated glass consists of two or more sheets of float glass, interlayered with sheets of PVB (Polyvoynylbutyral).

There is no plant in Ethiopia which produces this. A new plant may have to be established or this will have to continue to be imported.

#### Interior Trim

Rubber trimmings for windows and doors will have to depend on imported weather-strips. There are a number of private companies which do upholstery and there is a local enterprise which produces foam.

It is possible to sub-contract the works of interior trim, comfort and convenience items to local craftsmen.

In brief, many of the components can be manufactured locally, thereby increasing the local content of the manufacture of the trucks and making them competitive.

However, these have to be implemented in phases over a period of five years to complete the indigenization process. For this, the collaboration of a well-known truck manufacturer for technology transfer, technology assimilation and for gradual skill development is a pre-requisite.

## V. GOVERNMENT POLICY

The experience of the industrialized countries, including those that are newly industrialized, reveals that the automotive industry is the domain of private sector activities. On the contrary, the experience of Ethiopia during the last twenty years shows that large-scale activities such as the production of car battery and tyre, engineering plants with the capacity to produce vehicle spare parts, as well as long distance operations of buses and trucks with large carrying capacity were owned by the government. In addition, the government has been the co-owner of the only assembly plant in the country.

Nonetheless, there has been no demonstrated development and growth of the automotive industry in Ethiopia partly due to inefficiency of operation and management on the part of the enterprises concerned, and partly due to lack of policy and strategy on the development of the sub-sector. The exclusion or discouragement of private sector participation, both domestic and foreign, in the development of the sub-sector was a major policy short-coming.

This situation has been reversed by the investment policy currently in place (Proclamation No. 15/1992) which is designed to build up national industrial, entrepreneurial and technological capabilities. Implied in this is the provision of training and the creation of employment opportunities for nationals. The policy combines: liberalization of entry and exit including into and from the automotive industry, flexibility in implementing regulations, emphasis on channeling foreign capital and technology inflows into priority areas, provision of incentives and stipulation of appropriate performance requirements. Other supportive measures for the encouragement and sustainable growth of private investment include tariffs and taxes.

Over-all, the government is committed to encourage industrial enterprises to emerge on the basis of comparative advantage utilizing labour intensive technology and wherever possible, local raw materials. However, the traditional import substitution approach is not the objective of its industrialization strategy particularly in light of the demonstrated failure of the policy in the past.

Accordingly, the government has liberalized imports, has facilitated access to foreign exchange by the private sector which was not the case in the past, has significantly reduced tariff rates from a high of 230 percent to 80 percent and has eliminated the higher sales tax on imports. The automotive industry, which was the primary target of high import duties in the past, is one of the greatest beneficiaries. Further, all export taxes, other than on coffee, have been abolished.

Another most important departure from past policies is that there is no limitation on ownership of investment capital as the share is determined by the concerned parties. In short, a foreign investor can make 100% investment on his own or agree to contribute a percentage acceptable to his counterpart.

In this connection, the government is in the process of reviewing the Commercial Code of Ethiopia. It is also taking steps to further review the tariff structure and rates with a view to work-out an effective rate. Government will also continue to implement the divestiture programme already in place.

As regards areas open to private investors, these are detailed in the new investment code referred to above. As clearly indicated in the proclamation, private investors can invest in any area of investments that are open for private investment individually, in partnership or in joint venture. There are also areas in which private investors can invest in partnership with the Government, but only at the discretion of the Government. These are large scale engineering

and metallurgical industries, capital and technology intensive investments in large scale mining and energy production, large scale pharmaceutical and fertilizer plants and industries which supply strategic raw materials to chemical industries.

Incentives are provided for new and expansion investments. All new investments and expansions are entitled to the incentives indicated in the proclamation. These can be classified under two headings tax exemption and other incentives.

Tax and duty payment exemption privileges embrace the following: capital goods and equipment as well as spare parts up to 15% of the value of import; income tax (three years); expansion (two years); locally produced products and services that are exported; profits and dividends; expenses incurred by an investor on research, and improvement studies or training relating to existing enterprise or expansion.

Other incentives include employing expatriate experts, provided there are no nationals with comparable qualifications. This is subject to replacement through training nationals by the investor within a limited period. It is also possible to procure duty free capital goods and equipment imported to another investor who has similar privileges. Import of raw materials necessary for the production of goods by an investor, enterprise or expansion for the export market benefit from not paying import duties. Further, a foreign investor who reinvests his profits is exempted from income tax payment for up to three years.

Remittance of funds is also addressed by the proclamation. Accordingly, the following remittances out of Ethiopia by a foreign investor in the currency of investment or in another convertible currency at the prevailing rate of exchange is allowed: profits and dividends accruing from investment; principal and interest on a foreign loan; fees and royalties or other payments accruing pursuant to a technology or management agreement relating to the investment such as the proceeds from sales of assets payment from the sale or transfer of shares, and salaries of expatriate experts and other payments accruing from their employment.

Despite the wide ranging measures introduced by the Government to encourage private sector investment, some of the provisions in the investment code have come under criticism, including from the Britons Woods institutions and the developed countries. The main provisions which have been subjected to such criticism are conditions qualifying for incentives which stands at a minimum initial investment of US\$ 500,000 or equivalent convertible currency for a foreign investor and Birr 250,000 for a domestic investor. They regard this as unfair and one that discourages small foreign investment and also believe that it has adverse effects on the promotion of domestic investors seeking joint venture investment with foreign companies. Another provision that the group highlights for review relates to segmenting investments by restructuring areas of operation. The main reason behind these criticisms is that such a provision creates barriers to entry and impedes creation of a competitive domestic market.

The Government is aware of these and other related complaints by both local and foreign investors, having discussed the issues with the interested parties, and having evaluated the performance of the private sector since the issuance of the proclamation. The unofficial reports indicate that a preparatory work that addresses the problems has been completed and that further liberalization of the investment code will be carried out before the end of 1995. This would confirm that the government is pursuing a policy of strengthening competition. While the above are general policy areas that can be applied to the motor vehicle industry, specific policy and strategy pertaining to the automotive industry need to be formulated and implemented. The urgency of such measures is indicated by the fact that Ethiopia with fifteen deaths per 1000 vehicles has one of the highest road accident rates in the world. These

include:

- . Strict follow-up mechanisms to certifying road worthiness of vehicles and driving skills;
- . The inclusion of measures in the regulation to control driving while drunk;
- . Standardization of repair services;
- . The introduction of automotive industry sub-sector policy that encourages investment, promotes research and related studies;
- . The formulation of automotive sub-sector policy on resource mobilization;
- . Enforcement of axle load limits, and
- . The introduction of an appropriate vehicle replacement policy together with the enhancement of awareness of road users and the public at large of safety precautions on a continuous basis.

## VI INSTITUTIONAL INFRASTRUCTURE

The existence of institutional infrastructure that promotes private sector interests and requirements, be it for purposes of introducing new products, production methods and new forms of organization, etc., as well as those of consumers' interest and requirements, assumes the prevalence of a policy environment which encourages and continuously promotes competition between and/or among economic entities.

In the case of Ethiopia, however, private sector participation in the development of the national economy is a phenomenon which is just emerging from the systematic suppression to which it was subjected for over twenty years. This policy reversal started only three years ago.

At present, the private sector in Ethiopia is financially weak, unorganized, and suffers from lack of exposure to international division of labour. Similarly, it suffers from lack of the requisite skills, both in quantity and quality, in managerial and technical know-how. In addition, it also suffers from weak data base not only to solve problems of what, how and for whom to produce but also in the search for new products and new ways of doing things. The automotive industry is no exception.

Further, the situation under the command economy was legally and attitudinally unconducive to the formation of professional associations, trade unions, consumer associations, and the like. Even the functions of the chamber of commerce were bent to serve the interests of the state rather than those of the private sector. Besides, since the economy was characterized by shortages of practically everything, including vehicles, consumer credit and finance were not necessary. In other words, the institutional base for undertaking such activities was not in place as there was no need for their existence. The magnitude of finance made available annually to the private sector investment between the years 1980/81 and 1991/92 (National Bank Bulletin, 1995) by the Government owned Commercial Bank of Ethiopia also never exceeded 1.2 million Birr per annum, equivalent to USD 0.6 million, at the then prevailing rate of exchange.

Another problem which accounts for weakness of the private sector in Ethiopia, including the automotive industry, relates to training. In general, training was geared to serve the bureaucratic machinery of the socialist state. As such, the contents were largely irrelevant to private sector needs as it aimed at uniformity and conformity rather than professionalism. However, this is not to deny that there were no automechanic and autoelectric training centers especially in Addis Ababa, in such training centers like the technical school, the Ethiopian Management Institute, and in some comprehensive high schools. But such training centres used equipment with obsolete technologies. Therefore, trainees were not in a position to learn new ideas or to apply such training to change production methods as they were not generally adequately equipped.

The role of the private sector now is changing faster than anticipated following the reorientation of the economy to a market system of management. Although comprehensive data pertaining to the private sector are not yet available, there are indications that private sector participation in the economic development of the country has increased considerably, and that the list of investment includes one light vehicles assembly plant at an estimated cost of 23.7 million Birr, of which 50% is foreign owned. When the project is realized only 35% of the assembled vehicles will be destined for the domestic market and the rest will be exported.

Privately owned commercial banks and insurance companies have also become operational, which means the creation of new sources of finance for the private sector. In addition, the hitherto hostile commercial bank owned by the Government will be forced to open its door to the private sector for its own survival thus widening opportunities for private sector financial requirements. Further, the Government has restructured and re-organized the former Agricultural and Industrial Development Bank, renamed Development Bank of Ethiopia, with a mandate to finance agricultural and industrial development. The private sector is going to be the major beneficiary of this form of finance and this includes the automotive industry which is expected to benefit from the enhanced investment.

Another favourable new development is the establishment of many private consultancy services during the last three years. The availability of such services is making up for deficiencies in skill shortages in making feasibility studies and in providing advisory services on technical, managerial, organizational and related matters.

It is also worth noting that the formation of professional associations such as those of Mechanical Engineers, Civil Engineers, Medicine, Forestry, custom clearing/ customs brokerage etc., would contribute to the development of the standard and suitability of industrial products, including the automotive industry.

Last but not least, the new education policy announced in April of 1993, aims to increase the relevance of education to Ethiopia's development by developing diversified pattern of training which meet changing labour market needs and emphasize science and technology. There is no question that the automotive industry will be one of the beneficiaries from this approach to education and training.

Associations of private truck operators for dry cargo, liquid cargo as well as passenger vehicles are getting organized to promote their interests, to negotiate on tariffs and to enhance the services that they offer. The free-market economy has deregulated the tariffs for dry cargo but not that of passenger vehicles and liquid cargo, as the latter could affect the price of fuel.

In view of the over-all encouraging policy measures introduced in order to accelerate the development and growth of the national economy, their translation into specific areas such as the automotive industry is an essential measure that needs to be taken.

## VII TRANSFER OF TECHNOLOGY

The manufacture of automotive components calls for various means of manufacture, like casting, forging, machining, sheet metal forming and welding and finally finishing the vehicle (assembly, paint work). These manufacturing processes do exist in the country, although one cannot say that they are fully mastered. Hence, the necessity for the transfer of technology from the developed countries to the sub-region.

In earlier studies on sub-regional report on identification and upgrading existing engineering industries<sup>6</sup>. **Projects for manufacture of commercial vehicles were identified for Kenya, Tanzania, Uganda and Zimbabwe. Industry in the COMESA region still has fairly low levels of self-sufficiency in manufacturing compared with other developing countries. It is because markets of many engineering products in individual member countries are still quite small relative to economic levels of production. In view of these constraint, some of the strategies suggested for adoption were:**

- . **Establishing a technology standards bureau in each country to screen the various technology alternatives in the light of their appropriateness, labour intensiveness, financial implications, project cycle-time, economic and market viability and certify the right technology for a given product**
- . **Correcting lop-sided development of industrialization through development of linkages of local industries with domestic agriculture, transport, mining and construction sectors.**
- . **Standardization of the transport vehicle fleet to only a few makes for facilitating indigenous manufacture of spares.**

**In order to achieve integrated development of the engineering industries, development of the following aspects was called for:**

- . **Institutional support**
- . **Technological development**
- . **management and man-power development**
- . **Integrated priority projects and systematic programming and monitoring of these projects for inter linked development of engineering industries at national, sub-regional and regional levels.**
- . **Greater cooperation among COMESA countries.**

**Transfer of technology starts at the planning stage of the plant and ends-if it is successful with the working and maintenance of this plant, run by indigenous workers under local conditions. The whole process which lies between planning one plant and the operation of the plant can be regarded as transfer of technology.**

**This transfer is a very complicated matter, which depends largely upon the nature and the size of the plant, upon the skills and abilities of the partners, upon the local circumstances, and many other elements.**

**One institutional infrastructure which can play a vital role in the transfer of technology is the Ethiopian Standards Authority. Being a member of the International Standards Organization, it can assist in the provision of international standards related to the automotive industry. It**

<sup>6</sup> Report prepared by HMT (Internation) limited, September, 1985.



is also working towards recognition as an accrediting institution of ISO 9000 Series - Quality management and quality assurance standards. Thus, it can from the outset embark on producing vehicles of acceptable standards and competitive with those made in the developed countries.

Its department of metrology is another important facet that can serve as reference for different instruments and jigs and fixtures and facilitate the production of the vehicles. All instruments in the plant can be maintained and calibrated, thus assuring dependable operation.

Science and Technology Commission provides financial assistance for conducting research. If improvements in the adoption of technology are to be carried out, it is possible to solicit its assistance.

There are institutions which graduate engineers and technicians from university, polytechnic, and technical schools. These obviously impart the basic education to their students. It will be necessary to supplement this with specialized training in the automotive industry. In other words, on-the-job training or training abroad for core production staff will be necessary to ensure mastery in the field.

There are no institutions in Ethiopia which do research and development in the automotive sector. As such, a plant of this kind is at a dis-advantage in that it can not benefit from such an institutional infra-structure. Given this shortcoming, adjustment in product technology is one which will be preferred. If the Ethiopian condition is taken, the vehicles operate in rugged terrain and high altitudes. It is important to reinforce the suspension system in order to allow the vehicles to perform without frequent break-down and this has been executed at Akaki. By making certain modifications on the design, it is possible to adapt the vehicles to local conditions.

It is quite well-known that performance of the vehicles decreases as the altitude increases. In order to maintain haulage capacity of the vehicles, it is expedient to incorporate turbochargers in most of the trucks. How this modification can be brought about is the task of the product design and production engineering group.

## VIII PHYSICAL INFRASTRUCTURE AND NETWORK

The automotive industry in Ethiopia is at a very low level of development whether looked at in terms of indigenous technological development, marketing and marketing structure, availability of standardized equipment for purposes of maintenance and repair, and in terms of the adequacy and quality of roads.

Currently there is one assembly plant with a capacity to produce 2,500 vehicles per annum, mainly trucks and limited number of buses. However, it has been operating at a much lower level due to foreign exchange constraints and the fact that almost all the required components are imported.

In addition there are industrial establishments engaged in coach work for motor vehicles. According to the survey of private industries in Addis Ababa carried out in January of 1993, there were five such establishments, three under individual proprietorship and two under general partnership. The survey also indicated that these industries faced marketing, raw material, machinery, spare parts and finance problems. The root cause of these problems is attributed to foreign exchange availability, partly due to discriminatory allocation.

There also exists an integrated spare parts manufacturing complex namely ASPF that was designed to produce over 3,600 parts. The complex was also suffering from shortages of foreign exchange. Further, a centralized engineering design and tools manufacturing centre has been made operational only since 1993.

Other automotive industry related local products include tyres, batteries, steel tubes and bodies for the trucks assembled by FIAT/ IVECO.

According to the latest available information, an investment license has been issued to a private firm, 50% foreign owned, to establish a light vehicles assembly plant.

In view of the above, the automotive industry is under an increasing pressure from the fast growing demand for vehicles of all types and from the growth of the motor vehicle fleet due to the import liberalization policy measures introduced in 1992 and since then. These can be summarized under three headings:

1. marketing;
2. maintenance and repair; and
3. adequacy and quality of roads.

No organized market of distributors exists. Imports are realized individually and in a disorganized manner. In general there is no marketing system for vehicles that takes into account user interest and is accountable to national policy and national interest.

Similarly, there is no service network with the exception of several trade mark service centres for passenger cars. In addition, there are no standardized maintenance and repair services due to the fact that different models use different equipment for maintenance and repair. This has entailed the inefficient use of existing facilities. Further, the maintenance and repair services that are available are concentrated in Addis Ababa. This also has entailed the inefficient use of vehicles since they had to be brought to Addis for service and then redeployed and also entails unnecessary additional costs.

Road density in Ethiopia is among the lowest in Africa and other developing countries. The average road density for Africa is estimated (1995) at 0.61km per 1000 population and at 50km per 1000 km<sup>2</sup> while that for Ethiopia stands 21km of road per 1000km<sup>2</sup> and 0.43km

per 1000 population. The road network in Ethiopia consists of 23,727km of trunk, major link and regional roads; of these 8,310km is trunk roads 3,478km paved, 4,832km gravel. Only 171km of the total 7374km link roads is paved. These major link roads link trunk roads with the agricultural production areas, processing plants, mining areas, tourist attractions, and generally areas of high economic activity. However, the majority of Ethiopia's population is largely without adequate access to markets and services. This restriction on the mobility and exposure of the peasants has been a major factor limiting the extent of their participation in the development of the county.

In addition to the inadequacy, the continued deterioration of the existing road network has been a major problem. According to the latest official report approximately 50% of the road network is classified as poor, 25% as fair and only 10% as good. Deterioration has intensified as a result of the following combined factors:

1. Age of the road network. Most of the roads were constructed over 15 years ago and have now exceeded their design period of 10 years;
2. Heavy over loading. Most of the trunk roads were designed for maximum axle load limit of 8 tons; on front axle and 10 tons rear axle however most of the vehicles plying them are over the legal axle limit with some of them weighing up to 20 tons per axle.
3. Insufficient maintenance over the years. The monopoly situation created in the past by government policies, together with inadequate financial resources, put a strain on the Ethiopian Road Authority's aged and insufficient equipment and plant resulting in the inability to cope with the maintenance requirements of the existing roads; and
4. The armed conflict which caused considerable physical damage the roads.

The government has taken or is in the process of taking radical measures to correct the weaknesses that contributed to the deterioration of existing roads. It is also in the process of building new roads. This relates to the launching of a 10 year 1995/96 - 2004/2005 Road Sector Development Programme which provides a comprehensive approach to integrating the implantation of key road investments with major policy and institutional arrangements. The Road Sector Development Programme aims at attaining 0.46km /1000 population and 27km /1000 km<sup>2</sup> by the year 2005.

One of the most important measures taken so far relates to institutional rearrangement. Thus maintenance of the rural roads is now the responsibility of the regional administration while the Ethiopian Road Authority continues to be responsible for trunk and link roads. Another new arrangement relates to the encouragement of private sector participation in the road maintenance and construction programme. Accordingly, private contractors are being encouraged to build up their capacity and develop the required human resource to meet the challenge which was hitherto closed to them. The Ethiopian Road Authority, previously responsible for all matters concerning roads, is now responsible for regulating standards, planning, designing and for managing contracts.

## IX TECHNOLOGY (IMPLICATIONS FOR DEVELOPING COUNTRIES)

It will be necessary to conclude an agreement with the firms which are producing various components for the assembly line. Such an agreement has to be worked out on a long term basis as the business is expected to be an on going concern. It should include the interests of all parties, as success can be achieved only with concerted efforts.

One way of acquiring the technology is through a joint venture for technical collaboration. The collaborator should be committed to undertake the following:

- a. Supply to the Project with the following:
  - . product's license and the necessary know-how, where and when required by the client.
  - . complete and detailed engineering of the project.
  - . machinery, plant, equipment, general installation for energy and buildings
  - . erection services
  - . start-up and commissioning
- b. Training of technical personnel both in plant and abroad.
- c. long-term technical assistance-transfer of know-how assuring quality products and machinery productivity.
- d. Long term technical and technological cooperation agreement to guarantee the latest and up to-date technology.

This is to enable client's staff to remain continuously up to date with all the technological innovations in the field both through an exchange of information and documentation and through constant meetings and visits.

- e. Commercial cooperation involving licensee partner to help client place part of the products on COMESA markets and on other markets of mutual interest. The cooperation can take place in one of the following ways:
  - . The partners undertake to market a certain quantity in some areas.
  - . The partners sell shares of their markets in selected African Countries to the new Ethiopian company.
  - . The partners undertake to buy part of the local production.

There are a number of raw materials and propriety components which have to be bought from abroad. As the success of the new plant will depend on economical purchases, it is very important to identify competitive suppliers both in product quality and price. For this, dependable suppliers will have to be found to conclude a long term agreement.

Maximization of value added is intimately connected with the facilities available and with the manufacturing operations carried out.

## X FINANCE

The economic policy of the Government currently in power in Ethiopia and its strategy for implementing this policy, both at the central and regional levels, is to limit its role on matters of making investment to the provision of economic and social infrastructure.

The development and growth of the automotive industry in Ethiopia is one of the areas to which this approach applies. Accordingly, the role of the Government in this area will be limited to financial investment to cover the costs of constructing new roads and of maintaining and repairing those that exist.

On the other hand, investment costs pertaining to the development and growth of the automotive industry, particularly as it relates to the manufacturing of vehicles, spare parts, components, and the equipments required for maintenance and repair as well as the assembly of such products, is to be born by the private sector - domestic, foreign or both investor.

The measures taken by the Government for the realization of the foregoing responsibilities can be summarized as follows:

- . It has completed the preparatory work for launching a ten year Road Sector Development Program, 1995/96 - 2004/2005 that will be implemented in two phases, and
- . It has spelled out issues on private investment matters including sources of tenance, in its investment policy.

In this regard the manufacturing of automotive products, including components and parts is one of the areas of investment opportunities identified for private sector undertaking.

The Road Sector Development program is intended to rehabilitate 2,565km of trunk roads at the cost of Birr 3,418.215 million; upgrading of 4,505km of trunk roads at the cost of Birr 4,706.379 million and upgrading 1,962km of major link roads at the cost of Birr 1,595.903 million. The planned total investment cost to implement the program adds up to Birr 8,124.594 million of which Birr 6,499.675 million is the foreign exchange component.

In addition, a total of about 5,399km of new regional roads will be constructed while a total of about 10,173k of such existing roads will be improved. The total cost involved in the construction of roads falling under the responsibility of the Federal Government and the regional Governments adds up to Birr 13,574.794 million of which 9,769.795 million is required in foreign exchange. The local costs of regional roads is to be covered by the regional Governments and the concerned community. Another local source of finance envisaged by the program is the creation of Road Fund, to be fed from road user charges.

Major external sources of financing the Road Sector Development Program are the world Bank, the African Development Fund, the European Community and Bilateral sources such as Germany and USAID. Non - Governmental Organizations such as munchen fur munchen and KfW both from Germany are also involved in the construction and maintenance of roads. The Government is confident to mobilize adequate external resources to implement the program because of the strong support for its economic policy and the democratization process by donors, including the World Bank, the European Economic Community and Japan. The successful implementation of the Road Sector Development program will enable the attainment of the following road condition targets:

By the year 2000:

- . 78% of paved roads in good and fair condition;
- . 57% of the gravel roads in good and fair condition; and

99% of the regional roads in good and fair condition

The private sector in Ethiopia is just emerging from the suppression and neglect for over twenty years. Consequently historical data on private sector investment as well as data on its future investment is hard to obtain primarily because there is no system of information recording and disseminating on the private sector.

However, recent release of information following the issuance of the Investment Policy in May of 1992 and up to April 1995 indicate that a total of 1,506 projects worth Birr 10.5 billion have been approved by the investment office of Ethiopia. Of the 1506 projects 624 are in the field of manufacturing, including one light vehicles assembly plant, 27 in the area of transport, 5 in the area of banking and insurance and 30 in the field of construction.

The sources of finance for all the projects are equity Birr 4.9 billion and loan Birr 5.6 billion.

However, only 16 projects involved foreign capital. The total cost of these projects is Birr 1.1 billion, of which Birr 0.9 billion is equity and Birr 0.2 billion is loan. Of the 16 projects 4 are 100% foreign owned with the rest being joint investments whose ownership of domestic and foreign, shares vary between 46% and 80%.

The most important point highlighted in the above presentation is the fact that foreign investors can have up to 100% equity ownership in new investments. As a general rule, however, the level of equity ownership and management control, and other fundamental questions have to be negotiated in joint ventures involving foreign capital.

The most relevant issues in this regard are the following:

- New enterprises to be established jointly with foreign capital require the participation of a minimum domestic private equity of 27% which will progressively increase during the life of the enterprise;
- If the joint investment is between the Government and a foreign investor/ company, the Government retains at least 40% of the equity

While the Investment Policy provides these and other incentives, it also provides investment guarantee and protection surreal Ethiopia has ratified the convention establishing the multilateral Investment Guarantee Agency (MIGA), which provides protection against political and non - commercial economic risks such as currency transfer risk, expropriation and nationalization, wars and civil disturbances and breach of contracts. Further, Ethiopia is also a signatory to the International Convention of Settlement of Investment Disputes (ICSIO), which came into force on the 14th of October, 1966 under the auspices of the World Bank.

## XI MARKET

As has been indicated elsewhere in this study, Ethiopia's automotive industry is almost wholly dependent on imports of all types of vehicles and spare parts. So far it has not developed the capacity to exports vehicles, spare parts or components.

Data and time permitting, the assessment of the market for the automotive industry in Ethiopia can be treated under three headings:

- . The situation that prevailed during the two decades up to 1992;
- . The periods between 1992 and 1995, and
- . The periods beyond 1995.

As regards the two decades up to 1992, the economy of Ethiopia, including the operations, development and growth of the automotive industry, was centrally planned and centrally managed. In other words private initiatives and the free play of market forces were suppressed. Although private sector participation in the transport of goods and passengers existed side by side with those that are publicly owned, its operation too was subjected to tight government control through fixing fares that are below commercial rates, assigning routes of operation, and through limiting foreign exchange allocation as well as limiting access to domestic credit. Consequently the private sector, in the automotive industry was unable to either expand or renew its fleets to meet local needs.

Other factors that militated against the development and growth of the automotive industry were: in adequacy political instability and civil war which discouraged mobility, and the deterioration of existing roads. The in adequacy of new investment in the maintenance of existing roads and of new roads construction and heavy import duty on vehicles imports, specifically on buses and heavy - duty trucks, were additional bottle necks.

In general, even if comprehensive data is made available on the automotive industry covering the two decades up to 1992, and detailed analysis is made on that basis, the conclusion's to be arrived at will not be much different from the many negative problems highlighted in the preceding pages. Therefore substantiating the problems here is not considered useful, particularly, given the limited size of the paper. In view of this, however, the critical role of the automotive industry in the development of the Ethiopian economy will remain valid for many years to come.

The periods between 1992 and 1995 can be regarded as periods of re orienting the command economy to one that is market based. First and fore most this involved the restoration of peace and stability in the country followed by the declaration of an economic policy, in November 1992, which created the foundation for the free interaction of market forces which in turn results in the efficient allocation and utilization of resources, both domestic and foreign.

Another major departure from past policies was the creation of autonomous regional Governments thereby decentralizing administrative and economic management, a measure which will have considerable impact on the development of the economy, but which can not take place with-out the parallel development and growth of the automotive industry.

Other measures introduced in the reorientation process and are relevant to the development and growth of the automotive industry, include:

- . Liberalization of trade and the reduction of import duties from 230% to 80% on vehicles imports;

- . Abolishment of all export taxes (except on coffee) which would encourage the domestic production of vehicles, components or spare parts for export;
- . The promulgation of a liberalized investment law for the promotion and encouragement of private investment, including the automotive industry;
- . Provision of management autonomy for government owned industrial and other related establishments, including the Akaki Spare Parts Factory.
- . Adjustment of the exchange rate,
- . The abolishment of assigning routes to private bus and truck operators, and
- . labour law that is appropriate for a market based economy.

Measures to introduce effective tariff rates on imports and commercial rates for urban and inter-urban bus transport are under study. The introduction of the latter measure is regarded very crucial and urgent for operation costs are such that there is no incentive for the private sector to invest in either a new or replacement capacity. Thereby creating safety risks and demand pressure on the industry.

As a whole, the period between 1992 and the present has therefore been characterized by laying down the policy framework, the legal, procedural and institutional mechanisms towards the concretization of a market based economic management system.

Although detailed data is not available and or accessible to assess the impact of the foregoing and other measures on the automotive industry in particular, information released by the investment office of Ethiopia indicate that the response is gradually taking shape. Thus of the 27 transport projects worth Birr 282.9 million to be implemented by the private sector, 5 projects worth Birr 70.3 million are in the operational phase. Five private Banking and Insurance companies have also become operational. The projects under transport include one light vehicles assembly plant worth Birr 23.7 million. Of the 624 private manufacturing of projects worth Birr 4.4 billion 62 projects worth Birr 166.7 million have become operational. Similarly of the 44 private projects in the agricultural sector worth Birr 352.0 million all but one are in the implementation phase.

All the above have implication's on the changing nature, structure; behaviour and performance of the automotive industry which can only be significantly concretized beyond 1995, i.e. in terms of additional carrying capacity of goods, passengers and in the provision of efficient and cost effective services as well as in integrating the newly established regions to each other and to the centre, and the scattered agricultural producing centres to the urban and industrial centres thereby facilitating the over-all development objectives in general and the elaborated industrialization strategy of the Government in particular.

With regard to regional cooperation Ethiopia is one of the signatories of the Treaty that established the Common Market for Eastern and southern Africa (COMESA) which also brings into the picture, another dimension, of the automotive industry, i.e. both obligations and potential benefits, especially in terms of marketing a certain portion of the envisaged auto products in Akaki.

Another area of activity which will influence the nature, structure, behaviour and performance of the automotive industry relates to the planned action of the Government. According to the Financial Program of the Government GDP is forecasted to grow at an average of 7.2 percent during the periods 1996/97 - 1997/98 with the agricultural and industrial sectors growing at 5.6 percent and 12.9 percent, respectively. These require the transportation of more inputs and the expected increase in outputs.

Note must also be taken of the Road Sector Development Program and the targets set and its



influence on the automotive industry.

The foregoing, especially the peace and stability restored and the conducive policy environment, together with the area of the country estimated at approximately 1.1 million sq. kilometer, most of which is still inaccessible by motorized means of transport, also the size of Ethiopia's population estimated at about 54 million and the vast materials resources at the disposal of the economy will no doubt create far reaching potential for the development and growth of the automotive industry.

In view of the above subjective assessment of the market for the automotive industry in Ethiopia, it is felt that an in - depth market study needs to be carried out which would facilitate the formulation and implementation of automotive sub - sector specific policy and strategy that falls in line with the Road Sector Development Program, 1995/96 - 2004/5.

## **XII ENVIRONMENTAL CONSIDERATIONS**

A production plant for vehicles does not have pronounced toxic chemicals. Effluents from the washing plants may require treatment to remove suspended materials such as oil, grease, etc...

To minimize air pollution from the painting chamber, proper filters for cleaning the air have to be installed prior to being exhausted to the atmosphere.

There may be noise from heavy presses and hammers, but these are not factors which prevent the setting up of the complex plant.

There is already a recycling and chemical treatment system for the effluent from the chrome plating and phosphating plant of Akaki. Based on this and that of experience in other plants, it is possible to eliminate pollutants which could adversely affect the soil and water in the area. This is imperative on account of Akaki's location in the midst of a farmland. Extreme precaution to protect the environment from pollution is necessary.

Examples of the many small environment friendly measures<sup>7</sup> which can be implemented at the production stage includes

- . lower electricity consumption,
- . reduced compressed air leakage,
- . heat recovery,
- . fewer component rejects,
- . less waste, and
- . improved tool and machine maintenance.

This is not enough however. The adverse effect of a vehicle on the environment must also be minimal during its actual useful life. And when the time comes to scrap it, most of the materials must be recyclable or the components re - usable.

This approach calls for an environmental management system (a working plan documented in manual form) and organization complete with procedures, instructions, responsibilities and authorities.

Up to now, there are no regulations in place restricting pollution emanating from vehicles operation. As things stand, many old vehicles are not only heavy pollutants, but are also not road - worthy. These are seen running in urban areas with exhaust gases not completely burnt thereby aggravating the pollution of the air.

In the design of the medium trucks, alternative fuels or some type of energy offering less emissions will have to be considered.

The Road Transport Authority should issue regulations which limit the extent of exhaust gas emissions likely to pollute the environment.

Another pre - requisite may be the incorporation of turbo - chargers in medium trucks both for fuel economy and for developing higher horse - power in the highland terrain of the East African region.

<sup>7</sup> The world of Scania. March 1995.

## RECOMMENDATION

### At the national level

- Formulation of automotive sub-sector policy and strategy
- Introduction of an appropriate vehicle replacement policy with due consideration to safety and environmental protection
- enforcement of existing regulations as well as introducing new ones concerning axle loads commensurate with road design and the Treaty governing COMESA sub-region which Ethiopia has ratified.

### At the sub-Regional Level

Countries in the sub-region are allocating considerable amounts of foreign exchange every year for the import of trucks. To justify minimum economic annual production quantity, it is recommended to establish a multi-national manufacturing unit. In order to realize this, it is recommended that:

- detailed feasibility study with emphasis on the market study be carried out,
- well reputed technical collaborators be approached for technology acquisition, transfer and technical assistance,
- governments in the sub-region commit themselves to support the project through encouraging private sector participation in mobilizing resources for investment and in marketing the end products,
- specialized banks and lending institutions be approached as sources of finances for the investment.

Akaki Spare Parts and Hand Tools Factory already possesses the infrastructure for and the experience in running a mechanical engineering establishment. This Factory can be modified to cater for the envisaged sub-regional automotive industry.

# APPENDIX

## 1. UTILITY VEHICLES SPECIFICATIONS

		Gross Vehicle s wt. kg	Engine capacity c.c.	Seating capacity persons	wheel drive	Engine type	Engine performance	Pay load kg
1.1	Motor cycles	250	175	2	-	Gasoline, single cylinder air cooled.	Minimum of 15HP net SAE at 7000 RPM at sea level.	-
1.2	Automobile sedan	1300 (min.)	13,000 (max.)	5	2	Gasoline, single cylinders, air cooled.	Minimum of 60HP net SEA of 5,500 RPM or sea level.	-
1.3	Automotive coravon	1300 (min.)	1300 (max.)	5	2	Gasoline, four cylinder, water cooled	Minimum of 60 HP net SAE of 5,500 RPM at sea level.	
1.4	Pick-up	2500	-	3	2	Gasoline, four cylinders, water cooled.	Minimum of 80 HP net SAE of 5000 RPM of sea level.	1000
1.5	Pick-up	2500	-	5	2	Gasoline, four cylinder water cooled	Minimum of 80 HP net SAE of 5000 RPM at sea level.	500
1.6	Pick-up	2500	-	3	2	Diesel, four cylinder, water cooled	Minimum of 80 HP net SAE of 4000 RPM of sea level.	1000
1.7	Pick-up	2500	-	5	2	Diesel, four cylinder water cooled	Minimum of 80 HP net SAE of 4000 RPM of sea level.	500
1.8	Pick-up	3000	-	3	4	Diesel, six cylinder, water cooled	Minimum of 120 HP net SAE at 3500 RPM at sea level.	
1.9	Pick-up	3000	-	5	4	Diesel, at least four cylinders, water cooled	A minimum of 120 HP net SAE of 3500 RPM at sea level.	500
1.10	Station wagon (Short W.B diesel)	2500 (min.)	-	6	4	Diesel of least four cylinder water cooled	A minimum of 100 HP net SAE of 3500 RPM of sea level.	
1.11	Station - Wagon (long W.B diesel)	2700 (min.)	-	9	4	Diesel, at least four cylinder, water cooled.	A minimum of 120 HP net SAE of 3500 RPM at sea level.	

## 2. TRUCKS SPECIFICATION

ANNEX

		Gross vehicles wt tons	Engine capacity	Seating capacity person	Wheel drive	Engine type	Engine performance	Pay load tons	Gross combination weight
	1	2	3	4	5	6	7	8	9
2.1	Mini - Truck	-	-	-	4 x 2	An in-line, diesel engine preferably turbo charged with replaceable cylinder sleeves water cooled	Deceives 130 HP SAE net at governed RPM of 2500 sea level	4	
2.2	Midi-Truck	12	-	-	4x2	An in line Diesel, engine preferably turbo charged with replaceable cylinder sleeves, water cooled	Deceiver 180 HP SAE net at governed RPM of 2300 of sea level	7	
2.3	Midi-Truck	12	-	-	4x4	An in line diesel engine preferably turbo charged with replaceable cylinder sleeves water cooled	Deceiver 180 HP SAE net at governed R.P.M. of 2300 of sea level	7	
2.4	Heavy Truck	20 (max.)	-	-	4x2	water - cooled in line, six cylinder diesel, Turbo - charged engine with replaceable cylinder sleeves	Deceiver 260 HP SAE net minimum at a governed speed of 2300 RPM of sea level.	11	
2.5	Heavy Truck	24			6x4	Turbo - charged, water - cooled, diesel powered, An on - line, six cylinder engine with replaceable cylinder sleeves	Deceiver 300 HP SAE net at governed RPM of 1900 at sea level.	13-14	45
2.6	Truck Tractor	-	-	-	6x4	Water cooled and turbo - charged, in - line, six - cylinder, diesel engine with replaceable cylinder sleeves	Deliver 300 HP SAE net at governed RPM of 1900 at sea level	30	45
2.7	Rigid - Trailer	20 (min.)			2 Axle	Cargo Body Trailer body shall be constructed of all metal with checkered floor surface.	Axle The trailer shall be equipped with two axles having a wheel base distance 3500 mm <sup>2</sup> tubular section oxles or similar structure as per manufacturers current axle product for the trailer shall be accepted	14 (min.)	
2.8	Semi - Trailer	37.5	-	-	Axle configuration	Body and chassis All parts of the body and chassis shall be heavy duty type to overcome severe conditions of on and off road operations	Axle The trailer shall be supplied with dual tandem axle. The axles shall be heavy duty type with a rated capacity of at least 23 tons/ tandem axle. Square tubular section or similar structure as per manufacturers standard axle product for the trailer under consideration shall be accepted.	30.0	45.0

## ANNEX

## 3. BUSES SPECIFICATIONS

		Gross vehicles wt tons	Engine capacity	Seating capacity perso.	Wheel drive	Engine type	Engine performance	
3.1	Mini- Bus			12		Water cooled and diesel - powered	Deliver 90 HP minimum and 110 H.P. maximum SAE net, at governed R.P.M, at sea level.	
3.2	Midi- Bus	7	-	28		Water - cooled, in line diesel engine with replaceable cylinder sleeves, more preference is given to turbo charged engine	Deliver 1130 H.P. minimum SAE net, at governed R.P.M. at level	
							Deliver 130 H.P. minimum SAE net, at governed R.P.M., at sea level	
3.3	Midi - Bus	12		44		Water - cooled, in line diesel engine with replaceable cylinder sleeves. More preference is given to turbo charged engine.	Deliver 130 H.P. minimum SAE net, at governed R.P.M., at sea level,	
3.4	Expres s - Bus	16	-	60	-	Water - cooled, turbo charged, six cylinder, Diesel engine with replaceable cylinder sleeves	Deliver 205 H.P. minimum SAE net, at governed R.P.M. at sea level.	
3.5	City - bus	16		30 (seating cop) 70 (standee cop)		Water - cooled, turbo charged an in - line, six cylinder, diesel engine with replaceable cylinder sleeves	Deliver 205 H.P. minimum and 220 H.P. maximum SAE net, at governed R.P.M., at sea level.	