THE ROLE OF THE TRANSPORT SECTOR IN ETHIOPIA'S ECONOMIC DEVELOPMENT *

Temesgen Aklilu**

Translated by Yonas Admassu

I. Introduction

This paper has been prepared at the solicitation of the Ethiopian Economic Association, and it aims at exploring the performance of Ethiopia's transport sector. The paper has five main chapters. The first chapter introduces the paper. The second chapter focuses on the general concept of transportation. Chapters three and four describe the development of our country's modern transportation system and the objective conditions characterizing the sector. The last chapter constitutes the visions the author has regarding the future development of the country's transport sector.

II. The Transport Sector: Some Concepts

2.1 Classification of Transport Modes

Five transport modes have been witnessed so far in the history of humanity's technological development: namely, road transport, water transport, rail transport, air transport, and continuous flow system.

Road transport consists of several types or modes, which are divided into two main sub-categories: motorized and non-motorized. Under the non-motorized category are included pedestrians, animal- or human-drawn or driven carts, wheel barrows, bicycles and tricycles, draught animals (horses, donkeys, camels, mules, elephants, etc.) and other hand drawn vehicles.

The motorized vehicles are divided into freight transport and human transport vehicles. Freight transport vehicles include pickups and trucks, or lories, with a load capacity of up to 500 quintals. Human transport includes the whole range of vehicles beginning with bicycles and small cars and extending all the way up to cross-country buses and urban buses.

Water transport is divided into local and international (marine) transport modes. Local transport mode includes river, lake, and canal transportation as well transportation on huge dams. Marine transport includes both cargo and human transport across seas or oceans between the ports of the different countries.

Rail transport, which started about the time of the Industrial Revolution after the 1810s and 1820s, has been serving the world for nearly 200 years. There are many types of rail transportation. The first phase featured a kind of train drawn by horses, followed by steam-powered train, followed by the street car. Next came the different types of rail transport modes: the regular surface railway, metro or sub-way, monorail, guided bus, trolley bus, etc. The rail transport system is classified as Light Rail Transit (LRT) and Heavy Rail Transit (HRT).

The other transportation mode, fairly recent in appearance and modern in its constitution, is air transport. The appearance on the scene of air transport is historically linked to the use of balloons for navigational purposes. But the basis for the development of the world's fastest transportation system is the series of experiments undertaken by the Wright Brothers. Like the other transport modes described above, air transport is divided into domestic and international, on the one hand, and human and freight transportation on the other. Presently the world uses airplanes ranging from the smallest, accommodating only one person (the pilot), to the largest, accommodating 350 people and traversing long distances across lands and oceans to connect the different parts of the globe.

Finally, the other transport mode is what is known as continuous flow system, under which are subsumed water or petroleum pipe, belt conveyor, and slurry pipe, which is specially used in mines to transport soil and minerals mixed with water.

---

* A talk prepared for the Vision 2020 Ethiopia Forum held on August 11, 2006 at Hilton Hotel.

** Ato Temesgen Aklilu obtained his BA degree in Economics from Asmara University in 1987 and MA degree in Regional Development from the Addis Ababa University in 2001. He worked in various institutions such as Addis Ababa Transport and Communication Bureau as department head of Transport system. Currently, Ato Temesgen is a lecturer in Civil Service College.

2.2 The Contribution of Transportation to Socio-Economic Development

Among the modes of transportation that played a big role in the history of humankind, road and water transport figure prominent [are in the forefront]. Although the expansion of the transport sector is of tremendous economic, social and political benefit, there are nevertheless some negative aspects to it. The fact that its energy consumption is high (16-35%), that it is foremost among the factors that contribute to environmental pollution, that it has been classified among the world's killer diseases with regard to traffic accidents, and that it has become a source of anxiety in terms of congestion constitute the negative side of the transport sector.

The contribution of transportation to a country's development is high. Its share of contribution to the GDP of a country is incontrovertible, though the nature and extent of the contribution varies from country to country. (See Table 1 in the Amharic version)

Transportation plays a big role in what is known in both national and international trade as invisible trade. It has been confirmed that its share in this respect in many developed countries is as high as 26%.

The role of transportation in the investment sector varies between the developed and the developing countries. Because a good part of infrastructure development has been taken care of in the developed countries, most of the investment there focuses on automotive equipment, whereas the investment in the developing countries focuses on infrastructure development. Of the total investment expenditure of developing countries, 30-35% goes to infrastructure development, whereas in the developed countries the share of expenditure for same is only 15-20%.

In terms of creating job opportunities, the share of the transportation sector in the developing countries is only 2-4% due to the low-level performance of the economy, while in the developed countries, the figure stands at 4-8%. And the job creating role of the sector does not include the labor force deployed in the building of infrastructure.

When the living condition of a country's population improves, the population's transport demand increases accordingly. While the per capita transport demand in the developing countries covers a travel distance ranging between 500 and 200 Km, that of the developed countries lies between 7000 and 10,000 Km. But, Americans are known to travel between 17,000 and 20,000 Km annually. Next to America are, in the order of their appearance, Norway, Holland, New Zealand, France and England.

The most salient feature observed in the transport sector in relation to growth in income is the increase in the motorization of the public. When we translate this in terms of ranking, we find that, in the 1980s, the car-people ratio was 550-600 to every 1000 people. In this respect, the United States of America is in the lead, followed by France, Australia, Austria and England, respectively. The same feature manifests itself in urban centers as well. When people's income increase in urban centers, the tendency towards owning cars grows at the expense of using public transportation.

To look at but one example, in the United States the share of transportation in commuting stands at 92%, that for cargo has a share only of 25%. In the case of rail transport, the share of commuters is a mere 1%, while cargo transportation has a whopping 43%. In India, to take another example, road transport has a share of 48 and 35 per cent, respectively, of cargo and commuters, while rail transport has a share of 50 and 65 per cent, respectively, of commuters and cargo.

When we sum it all up, other than the roles pointed out above, transportation plays other important roles as well: it helps countries in maintaining a balance in the export market and generating foreign currency; it serves as a source of income generation both for governments and the public; highly contributes to the maintaining of a country's peace, political well being and stability; plays the role of linking rural areas and rural products to urban centers; helps in increasing and interconnecting market outlets; it helps shorten travel time; has the capacity to transport huge numbers of people and big volumes of cargo; makes big contribution to the development of tourism, entertainment, sports and peaceful relationship among people. In short, the world has become one global village through the use of transportation and communication. The five continents, which are home to the human race, are now able to communicate among themselves in a matter just of minutes and hours.

III. A Brief History of the Development of Modern Transportation in Ethiopia

3.1 From Menelik to the End of the Dergue Period

When we speak of modern transportation in the Ethiopian context, the reign of Emperor Menelik holds a cardinal place. According to some writers, the idea of road construction started with the reign of Emperor Tewodros, when he used manual labor for clearing land for a pathway across which to haul his canon, the Sebastopol, to Mekdela. Since, however, the purpose of the roadway had nothing to do with serving the public, let us limit our observation to the fact alone and pass on to the reign of Menelik.

Using his close relationship with the government of Austria, Emperor Menelik imported the roller, one of the technological products of the time, circa 1885-1887, Gregorian Calendar. But the building of the roadway itself on which this roller was operated carried out by clearing the forest and leveling the land with a labor force drawn both from the governments army and the public. Documents reveal that the first bridge to be built was that across the Awash, which took place in 1886/87. According to the records, after the roller was transported to Addis Ababa, Menelik had a 45-Kilometer stretch of road built through the combined labor of the military and the civilian population, while the roller was simultaneously put to work on this same road, but it did not take long for the machine to break down and be abandoned, never, it appears, to function ever after. Different historical sources also point out that the first automobile came to Ethiopia in 1907/08, Gregorian Calendar, following which other cars with different models were imported from England and Germany. The sources also point out that in 1908, Gregorian Calendar, several trucks were operating in Dire Dawa during the dry season.

Given the cultural disposition of the society at the time, those who were able to operate cars seemed to have satisfied themselves with the idea of just driving the respective vehicles they owned, traffic laws and regulations being alien to them until the years between 1915 and 1917. Gradually, however, oral directives and orders were given both to vehicle operators and pedestrians.

Although the Italian invasion of 1935-41 had inflicted damage on the country, it nevertheless had its own contribution to the expansion of modern transportation. It has been reported that public transportation, but especially taxi and bus services, started in Ethiopia during the Italian invasion.

Although, according to historical records, the first motor vehicle operator was Emperor Menelik himself, the first operator with a legal driver's license was *Negadras* Tesemma Eshete, who learned the skill while he was in Germany.

Regarding the promulgation of transportation codes, the laws promulgated in 1934 and 1935 (Ethiopian Calendar) are considered the first written laws. At the level of government offices, however, the first institution in charge of transportation was the Road Transport Administration Bureau, which was established in 1960. Prior to that, the administration of most of transportation activities was the responsibility of a board and some share companies under the jurisdiction of the Ministry of Transport and Communications.

Regarding the administration of other transportation systems, we find that rail transport administration came into being along with the beginning of rail transportation in the 1910s. As for air transport, Captain Mekonnen Beri tells us, in his book, "*Aviation in Ethiopia*" that the first airplane came to Ethiopia in 1921. Following that, towards the end of the 1930s (more specifically in 1938), Ethiopian Airlines was legally established. Regarding water transport, the Ethiopian Merchant Navy was established during the reign of Emperor Haile Selassie, towards the end of the 1950s and the beginning of the 1960s, alongside which seaport and maritime transport offices as well as maritime transport authority were mandated to administer the country's international water transport system.

The 1950s and '60s constitute that period in the history of the development of our country's transportation sector in which much was accomplished. The period was one during which many agencies and companies were created and competitions among them to provide better services and attract passengers and clients flourished. Consequently several laws and regulations related to the administration of transportation were issued. After 1967/68, however, many things changed, especially changes that brought the development of transportation to a virtual standstill. Several transport companies were nationalized and brought under the jurisdiction of Freight Transport Agency and Public Transport Corporation. Everything pertaining to transportation was administered through zonal structures.

During the Dergue period, the role of private transportation was restricted, because of which there was a high shortage of public transportation. The building and administration of transportation infrastructure was completely under the jurisdiction of the Highway Authority. This centralized transportation service, as well as infrastructure development and administration, continued until 1984/85, a situation that is still fresh in our memory.

3.2 Profile of the Country's Transportation System from 1984-1997

Structural adjustment in many government institutions was first initiated in 1984. Accordingly, while in 1984 the country's road transportation service became de-centralized, the other branches of the sector have continued to-date with their previous structures intact.

Beginning in Miazia 1983, and particularly since the moment when our country lost the port of Assab, the state of the water transport branch of the transportation sector deteriorated. Locally, however, water transport on Tana and the Baro River in the south still run minor operations under the jurisdiction of the respective Regional States.

Rail transport has been providing service since the 1910s without any interruption, granted that there is only one railway line. In the last 15 years, however, the rail transport branch has been facing serious problems. And recently, there have been situations when rail transport services had come to a halt. Ethiopia and Djibouti got together and decided to turn the railway into a private venture and invited international bidders. They are now waiting give the contract to South Africa, which won the bid. The agency has had several problems, including: security along the railway line, the deterioration of and backwardness of the available locomotives, lack quality and capacity on the part of the management, internal problems within the ranks of the agency's employees, and financial shortage.

Regarding road transportation, the branch has, over the past 13 years, managed to recuperate from the shortage in vehicles that it suffered in the previous years, with the result that many vehicles, both new and second-hand, were imported and deployed in the provision of better services to the public. Beginning in 1984/85, different proclamations, regulations and directives were issued, with the view to improving the transport sector. Especially notable is as a favorable measure is the incentives given to individuals and organizations that were intent upon importing new buses and trucks.

Moreover, while the freight transport service has been totally privatized, following the free-market principle, heavy-duty trucks with a high load-capacity have proliferated, providing sustained services along the Ethio-Djibouti line. Similarly, moderate-weight trucks with a load-capacity of 30 to 100 quintals have been imported and are now running both short- and medium-range distances, providing services in the various regions of the country. When droughts and war occur in our country, many heavy-duty trucks become beneficiaries of the transport market, especially along the Ethio-Djibouti line, while the service coverage of the lighter trucks expands locally when agricultural production is on the increase. However, because the volume of freight highly decreases during the four months between *Hamle* and *Tiqimt*, there are occasions when truck owners are forced to ground their vehicles (remain idle}. One visible problem those in the freight transport business face is the pressure that individual brokers in the business exert on them. Because the capacity of vehicle operators, be they companies or individuals, in terms of looking for freight is limited and the culture of "selling themselves" in the market has not developed in our country, they fall under the pressure of the brokers, who are adept at selling information and determining the cost paid by both the operators and their clients for the brokerage services they get. Another aspect of the freight transport sector is that the number of old truck, especially those that have been running for 15-40 years, is high.

A rather curious aspect of the public transport sector is the equal deployment of buses that are over 30 years old and technically ill-equipped along with new buses. With regard to both major and medium-capacity public transportation, the equal deployment of new and old vehicles has created problems in the services the sector provides. The attempt on the part of operators with old model buses to get acceptance in the transport service sector by giving their vehicles new appearance through paint jobs, without any engine overhaul, and competing with the modern 'CaciaMale' and Isuzu models, thereby hoodwinking the public, is a rather surprising phenomenon. Among the problems we observed over the past 15 years in the public transport sector, to mention but a few, are: lack or absence of safety with regard to handling people's luggage; the abandonment of the tag-system; the proliferation of brokers and porters at bus depots; charging clients the same high price for both small and large suitcases; absence of a clearly organized system of weight check for all to use equally; lack of fully equipped information and other types of services at depots; unclean window panes, window curtains, seats and aisles characterizing the buses; the disorderly manner with which services inside the buses are provided, such as, for example, music, advertisement and picture displays. Another problem is that many of the buses are so old that they break down before they have even left the perimeters of Addis Ababa, in the wake of which the scuttling and scampering to replace them with other operable buses has become a matter of routine.

IV. The Current Situation of the Ethiopian Transport Sector

4.1 The Situation of Transport Services

The transportation branches for which data are available in Ethiopia are road transport, air transport, rail transport and water transport. Of these four types, the biggest service provider is the road transport branch. Accordingly, 90% of freight transportation both in the import and export sectors and 95% of the public transportation services are provided by the road transport branch. Whereas the majority of the urban population covers short- and medium-range distances on foot, in the urban areas people for the most part travel on foot, save for those limited instances where they use draught animals. It has been noted that the size of the population with access to modern transportation in Ethiopia does not exceed 20% (Federal Transport Authority, Megabit 1998). When we look at the overall situation in the transport sector, we observe instability of operation and, in some cases, deterioration.

When we look at the total manpower employed by the government, the share of the labor force employed by government institutions in the transport sector, namely, Transport Authority, Ethiopian Road Authority, Road Fund Administration, is 46.7%. This figure does not include the manpower employed by the regional transport institutions. Following in second place, the air transport sector's share of manpower is 39.3%. At the moment, of all the branches of the transport sector, these two branches have the best performance records.

4.1.1 Profile of the country's road transport

The road transport sub-sector can be examined under two headings: namely, infrastructure development and services. With regard to infrastructure development, although at the present moment we see more activities, according to the data obtained from the Ministry of Transport and Communications for the years before 1995, the total mileage covered by roads built was only 33,876 Km. Of this total, the total distance covered by paved (asphalt) roads was only 13% (or 4362 Km.), while 36% (or 12,360 Km) was constituted by all weather and dry-weather gravel roads. The remaining 50% was covered by rural gravel roads. According the data so far examined, the annual growth rate of road infrastructure development has been 1.7%.

According to data obtained from the Federal Transport Authority, the annual rate of increase in the number of vehicles was 10%, with only 166,310 vehicles for 1997. The past 12 years from 1985-1997 constitute a period during which the increase in the number of vehicles in the country was high. The details are given in Table 2 (see in the Amharic script).

In connection with this, while 59,785 new driver's licenses have been issued annually, the growth rate stands at 0.8%.

Compared to the other African countries, the number of motor vehicles in Ethiopia is very low. When it comes to loading capacity in terms both of freight and passengers, the number of vehicles with low and mid-level capacities is very limited. A large share of the country's motor vehicles goes to private (domestic) cars with over 37% of the total. While the share of public transport vehicles stands at 70%, the remaining 30% goes to freight transport.

The state of newly imported and registered cars

Regarding vehicles imported and registered, the data as of 1982, but especially that for the years 1983 to 1988/89, shows that the number had increased by much, while it tended to decrease for the years 1990 to 1993, only to rise again in 1994. It can be easily observed that the decline registered for the years 1990 to 1993 was due to the closing of the port of Assab and the Ethio-Eritrean war.

According to the available data, over three-fourths of the vehicles imported into our country are used for public transportation, and of these, private (domestic) cars constitute over 51%. This is significant because the vehicles in this category represent the increase in motorization in our country. With regard to public transport vehicles, those with a load-capacity of 6 to 30 people have a high rate of import. With regard to vehicles for transportation of goods, those with less than 70 quintals load-capacity have the highest share with 79% of the total. This means that, because our economy still is in its beginning stage, the Isuzu brand trucks with a load-capacity of 30-70 quintals are the more convenient to serve the purpose.
The importation of freight (both dry and liquid) transport vehicles has shown a high increase after 1984. The details are shown in Table 3 (see the Amharic script).

As we can see from Table 3, the importation of freight transport vehicles had an annual growth rate of 38% for the 16 years between 1980 and 1995. The growth rate was for the years after 1984 alone was 21%. One can see the effect of the war and the economy on the import rate for the years between 1989 and 1991.

The volume of people and goods transported

Due to the transport sector's peculiar characteristic and the backwardness of the record-keeping systems of our country, it is difficult to the exact volume of people and goods transported over the years. However, there are different organizations and government offices collect data especially concerning the Federal Transport Authority for different reasons. Using these organizations and offices as sources, an attempt has been made to look into the nature of the activities in the transport sector as they relate to the number of people and the volume of goods transported over the specified years.

As we can see from Table 4 (see in the Amharic version), in the past 13 years between 1985 and 1997, the number of commuters has shown a growth rate of 10-13%, while that of dry goods transportation has shown a growth rate of 6-7%. In the case of liquid freight the growth rate was 5%. Generally speaking, then, in both public transport and freight transport, but especially in the case of the former, we see an enormous growth. Looking at the different types of transport services, the biggest share goes to the services provided by those vehicles and organizations in the private sector, in terms both of transporting people and goods. However, because of shortage of data, it has been difficult to find out the extent of the services provided by the transport sector as a whole. Since,

however, the performance of and the services provided by government organizations could provide us with some information, it would be useful to have a look into them. We shall now, therefore, look at the nature of the services provided by those government agencies, such as *Anbessa* and *Waliya* Transport enterprises.

As we can see from Table 5 (see in the Amharic script), the services provided by inter-urban public transport has been deteriorating at a high level, while in the case of intra-urban public transport, especially in Addis Ababa, one observes improvement both in the volume of commuters and distances covered. However, the growth rate of the service had shown a very significant decrease, particularly in the three years between 1986 and 1989. In the period specified, the number of buses available in 1984 was only 145, while this number had increased to 343 in 1995. The public transport service in Jimma has shown the most deterioration. The number of buses available in the town wavered between 4 and 6. Besides, because the available buses had served for a long period of time, the level of the quality of service shows a high level of deterioration.

Road Transport Vehicles-Population Ratio

When considered in terms both of numbers and vehicle-population ration the state of road transport in Ethiopia figures much lower than that of the other Sub-Saharan African countries. Table 6 shows how Ethiopia fares in this respect.

As Table 6 indicates (see in the Amharic version), compared to the size of Ethiopia's population, the number of vehicles available is very low. Not only that, the fact that about 80% of the vehicles operating in the sector are more than 10-15 years old (on the average) is another aspect of the situation. Given this, it is not difficult to see that the contribution the vehicles make to the all-round social and economic development of the country is very much limited.

Our Country's Transport Service and Traffic Safety

The question of safety is something that one needs to give priority consideration in any area of production and service provision. In this respect, it has now been clear for quite a while that, among the social and economic sectors, the road transport economic sector can be singled out as the most riddled with safety problems. In the past 20 years, in particular, the incidence of traffic accidents in our country is disproportionately high compared to the low number of vehicles.

As can be seen from Table 7 (see the Amharic script) the incidence of traffic accidents has been on the increase, especially since 1994. Even more notable is the fact that the incidence of death has been increasing with a rate (12%) not less than the incidence of minor and serious damages. It has now been many years since our country has been in the forefront in violation of traffic safety among African and other developing countries. According to data garnered from the Internet, Ethiopia is preceded only by the Central African Republic in terms of the occurrence rate of serious traffic accidents.

According to this Internet data, the problem of traffic safety in our country is quite a serious one, and compared to our neighbors, such as Kenya (see Table 8 in the Amharic script), for instance, the problem is indeed critical. Although it is difficult for us to quantify the negative impact the problem of traffic safety has on the country's economic and social development, the damage it causes in this respect is something that anybody can imagine. For example in Kenya, the proportion of the people dying from traffic accidents is 64.3 in every 10,000 people. Compared with the number of deaths caused by traffic accidents in our country, the figure for Kenya stands at less than one-third. Even then, it has been confirmed that Kenya loses from 1.2 to 2% of its Gross Domestic Product (GDP). When we compare our situation with that of Kenya, it means that we lose at least nothing less than 5% of our GDP every year.

4.1.2 Water Transport

In the area of water transport in our country, except for the 13 to 18 maritime merchant vessels that operate on international waters transporting goods, and which are either bought or rented, all the country has is the few boats operating on Lake Tana and the Baro River. Since it became landlocked in 1983, Ethiopia has been using the ports of neighboring countries. While the bulk both of export and import goods were being handled by the Port of Assab until the breakout of the Ethio-Eritrean war, over 90% of Ethiopia's import-export trade is currently being handled by the port at Djibouti. The other alternatives are Port Sudan and the port of Hargessa (Somaliland). In connection with this, the creation of Maritime transit services provided by private agencies is a big change for the better. With regard to freight service operations, while the situation for the 12 years between 1981 to 1992 was such that activities either remained constant or showed some decrease, the years between 1993 and 1995, on the other hand, represented a period of high growth in the country's maritime activities.

Of the total volume of transport of goods by sea, 80% was taken by imports. Due to the drought, famine and war in the years up to 1993, the bulk of the import was constituted by relief goods and fuel. After 1993, however, the situation changed, such that the bulk of imports constituted capital goods. The number of ships the

country owned until 1995 was only 9, and the total load capacity of the ships totaled to only 101,288 DWT.

4.1.3 Air Transport

Our air transport sector can be described as Ethiopia's ambassador at large serving to link Ethiopia with the rest of the world. Its status both within Africa and around the world has been increasing from time to time, and it has assumed a special status among African countries as the airline to be relied upon, as has been expressed at various forums. However, the local service the airline provides is not as reputable as its international flights. Although there have emerged some private aviation companies operating of late, the range of the services they provide is very much limited. According to some experts, among the reasons for the limited domestic services both the Ethiopian airlines and the private operators provide are: the small number of planes; the low buying power of the people; the relative shortness of the runways at the available airports. But of late, some of the domestic airports have been upgraded, the major ones in this regard being the airports at Dire Dawa, Bahir Dar, Makele, Lalibela, Axum, Arba Minch and Gambella. The others, such as Jimma airport, for instance, are in bad shape.

While Ethiopian airlines caters to 45 destination ports internationally, its local destinations are limited to 34. The airline currently has 45 planes and two international airports, the other being that of Dire Dawa. The other airports are equipped enough only for domestic services: namely, Arba Minch, Asossa, Axum, Hamer-Bakko, Bahir Dar, Beka, Debre Markos, Debre Tabor, Dembidollo, Dessie, Gambella, Gobba, Gode, Gondar, Jijiga, Jimma, Kebridahar, Lalibela, Mekane Selam, Mekele, Mizan Teferi, Negelle, Shelabo, Shire, Teppi, etc.
The recently completed Addis Ababa airport at Bole has the capacity to cater to 11 huge, modern aircrafts at any one time. The terminal has parking lots enough to accommodate 1300 cars at any one time, modern facilities, restaurants, banks, telecommunication services, customs services and various booths.

Although the private sector proclamation allows for aircrafts with a seating capacity of 20 passengers and cargo planes with unlimited loading capacity, the number of enterprises so far registered is three. And among these three, only Abyssinia Air has managed to operate successfully. Neighboring Kenya boasts over 400 private air service companies.

While passenger services have shown increase in both international and domestic flights, domestic cargo services have shown an annual decrease of 3%. International services have shown an annual increase of 6.12% in both passenger and cargo transportation.

4.1.4 Rail Transport

The Ethio-Djibouti railway line is the only rail transport the country has. While the total distance covered by the line is 781 Km, the 681 Km-stretch lies within Ethiopian territory. When we look at the profile of the services provided by the railway, we find that it has been in constant decrease.

Over the years passengers on the Ethio-Djibouti railway line has been decreasing at an annual rate of 7%, while the volume of cargo has been decreasing at an annual rate of 1% and currently it appears the railway line ceased its operation.

Now that we have looked at the profile of the different transportation types, the next logical question to address would inevitably be if Ethiopia has a transport policy on the basis of which to administer its transport sector. The answer, in short, is a resounding No! However, all the different branches of the transport sector have, at one time or another, designed various proclamations, regulations and directives by which they administered and guided their respective responsibilities.

4.2 The Structural Profile of the Transport Sector

The administrative structure of the government that was put in place after the change of regimes in 1983 based on the principles of federalism, for which reason, therefore it is by and large decentralized. This means that a good portion of government responsibilities and activities are shared by the federal government and the different regional states. However, such government services as telecommunications, electric light and postal services still remain within the jurisdiction of the federal structure.

The transport sector is one of those economic sectors whose administration is shared between the federal government and the regional states. Of the different branches of the transport sector, while the administration of road transport is shared between the federal and regional government structures, the whole maritime transport branch is under the jurisdiction of the Federal Ministry of Transport and Communications and the Federal Transport Authority. The domestic water transport branch has been placed under the jurisdiction of the transport bureaus of the respective regional states.

With regard to the building of transport infrastructure, a look into the details of the structure reveals that there is only one agency at the federal level; namely, the Ethiopian Road Authority. In addition to providing support to regions for purposes of capacity building, the main duties and responsibilities of the Authority are building and maintaining roads and highways that link the various regions

as well as supervising other related activities. In this respect, efforts have been made in the past four to five years to build these highways in keeping with international standards. However, because the newly opened highways have not been given due attention with respect to maintenance, one sees most of them furrowed and damaged by rain water during the rainy season. The change that took place in Addis Ababa over the past three years is a good example of the achievement made with regard to the building of road infrastructure. The activities undertaken in the areas of enlarging, upgrading and building new feeder roads in the different sections of the city represent an improvement over the previous years.

One glaring shortcoming of the roads built in Addis Ababa as well as in the other cities and towns is that their construction has not taken the social and economic status of the communities into consideration. To mention but one example, while most of the people in the cities are pedestrians, or use non-motorized vehicles, such as bicycles, focus has been given only to the needs of motor vehicles, at the expense of the community's needs. This is tantamount to say that expending a lot of money without targeting users or beneficiaries. The ring road built recently may make sense from the point of view of keeping up with international standards. But if we look around our respective neighborhoods through which the ring road passes, we see that overpasses meant for pedestrian crossing are at least a kilometer apart, which means that the elderly, the weak and children have to walk a total of two kilometers to cross over from one side of the road to the other. The alternative, it has been observed, has become for the pedestrians to act illegally by jumping over the railings or, worse, pulling them down altogether to make way for shortcuts. We have observed the occurrence of several traffic accidents involving death as a result of this kind of illegal crossing. When we look at the situation in the other cities and towns, because of the level nature of the topography, the communities either use non0motorized vehicles, such as bicycles, or simply walk. The fact that no consideration has been given to this aspect of the people's life and keeping only the needs of motorized vehicles in mind reminds one of the Amharic saying *fiyyel wedih qizimzim wediya* [literally, 'the goat runs one way while the rod flies another way], which, freely translated spells incongruity at its best.

Road Transport Administration

Looking at the administrative structure of the road transport sector, we find, as the main actors, the Ministry of Transport and Communications, the Federal Transport Authority, the Road Fund Secretariat**,** the National Committee for Traffic Safety, and the Traffic Safety Department under the jurisdiction of the Federal Police. These government agencies have as their main responsibility the designing of policy and strategy, overseeing the sector's administration and facilitating the availability of financial resources.

What we have in this respect at the regional level are the respective regional transport bureaus, offices and other low-level departments.

Among the government agencies in the transport sector, the topmost institution is the Ministry of Transport and Communications. In the years following 1983, this ministry has undergone several name changes and structural adjustments. Especially at the time when the ministry was named the Ministry of Infrastructure, of the two branches of the transport sector, the service management and administration branch appeared to have been of lesser importance and rather marginalized. At present, however, things seem to have assumed their former status.

In the case the Federal Transport Authority, it had been known as Road Transport Authority beginning with 1969 until 1977. The institution's responsibilities included the administration and control of motorized transport services. Since a year ago, however, the institution has been named the Federal Transport Authority and restructured to include regulating and licensing rail and water transport as part of its duties and responsibilities.

While its main mandate is issuing transport-related laws, proclamations, regulations and directives relating both to international and domestic road transport services, it also has the responsibility of conducting strategic research and issuing directives and ensuring that they are implemented. There are situations, however, in which the institution finds itself burdened with the administrative routine of implementing the laws and the regulations. In addition to such problems, there is a duplication of activities between the federal structure and those of the regions as well as misunderstandings with respect to the monitoring and follow-up of implementation activities. One fundamental reason for the atrophying of the country's transport sector is the total absence of institutions of higher education that cater to the development of transport planning and management.

Another problem that one has to mention in relation to the structural dimension of the transport sector is the fact that the country does not have a national transport policy and strategy, which makes the sector different from the other sectors. This absence of a general policy and strategy impels us to raise one unavoidable question: "What is the problem with the sector?" Beginning a few years back, the National Committee for Traffic Safety has opened an office under the jurisdiction of the Federal Transport Authority and is working towards

alleviating the problem of traffic accidents. The measures taken in this respect include: running a traffic-week program; broadcasting educational programs on the radio and television; a weekly program running every Thursday morning on FM 97.1 featuring discussions on traffic issues as well as education demonstrations; and different programs in the form of news and using other suitable methods, all of which must be acknowledged as good beginnings. The training and deployment of student traffic police undertaken in collaboration with traffic police departments in Addis Ababa as well as in some of the other cities is something that must be maintained on an even broader scale.

There are various offices in the different regions, with different nomenclatures, whose responsibilities are the administration and control of transportation services. The attention given to the transport sector in Oromiya and the Southern Regions is very low and disorganized. Most of them are subsidiaries of one or another bureau and performing at the level of departments or sections. This may only serve to exacerbate the problem rather than alleviating it. Other problems include: proliferation of regionalism; absence of coordination or uniformity in the issuing of plates; absence of the culture of information exchange; and the arbitrary and uncontrolled licensing of operators at zonal levels.

4.3 The State of Transport Services in Urban Centers and in Rural Ethiopia

It is an established fact that 85% of our country's population live in rural areas. This constitutes one of the indicators for the low level of our development. Other than the fact that the rural population earns its livelihood through agriculture, a large majority of the people lead a hand-to-mouth life. This situation is in turn reflected in the low-level performance of the country's transport sector, because the level of a country's economic development and that of its transport sector are inseparably linked. Our country's urban centers are highly desiccated, while their levels of development are uneven in many respects. This has contributed to the loose and rather weak link existing between urban centers and rural areas, which manifests itself in the performance of the country's transport sector.

When we look at the situation now, one phenomenon we observe is an uneven development of urban centers, in which a few towns, but especially one city (namely, Addis Ababa) is bloating out at the expense of others. Such expansion of one city into a lone primate city will result in an unbalanced regional growth. The current federal arrangement, though expected to effect a balance in the growth of regional towns, the reality we see on the ground does not warrant any such conclusion. The expansion of infrastructure development in the transport sector and the growth of modern transport services contribute greatly to the social and economic development of the rural population. There is, therefore, a need for building rural feeder roads, both paved and gravel, to link major cities and intermediate towns with small rural towns.

Alongside this, we need to expand, as is often observed in many of the African and Asian countries, intermediate transport services, or non-motorized vehicles and technologies in the country's rural areas.

Rural communities in Ethiopia still use, as of the days of their communal days, donkeys, horses, mules, camels and no less than these, their feet to commute between their rural habitats to the urban centers. This state of affairs has become a stumbling block to the kind of rural-urban interaction and the expansion of exchange in production inputs, increasing productivity, and the proliferation of market outlets.

The building of feeder roads in rural areas, which has resulted in the deployment of low-capacity Isuzu trucks during the dry season to transport the farmers' surplus products to the market, is something that must be encouraged.

When we look at the state of urban transportation, except for Addis Ababa and Dire Dawa and a few regional and zonal towns, we find that the growth and development of urbanization is very slow. Many of these small towns are characterized by conglomerations of dwellings with worn out corrugated iron roofs and wooden walls. On the other hand, however, we observe a certain degree of urbanization and urban growth in some productive *woreda*s.

The case of Addis Ababa is as unique as it is complex. Addis Ababa is at once the capital city of the country and the seat of Oromiya Regional Government. It is also home to African and other international organization and embassies. Yet we see a considerable imbalance in the area of transportation infrastructure, transport services, as well as supply and demand. The burden of serving the city's population, which is estimated to be over four million, has fallen squarely on *Anbessa* buses not exceeding four-hundred in number, and on taxis (minibuses) that are said to be actively in service and whose number is not more than 10000. Of the total population of the city, those with their own private cars number 50000, at most. All this adds up to the disproportionately high imbalance between the demand-and-supply ration in the city's transport system, especially leading to traffic congestion during the morning and evening rush

hours, which is by and large insufferable.

The one branch of the road transport sector that is hoped to alleviate the problem of transportation both in the rural areas, as well as in the urban centers, is the interurban transport system. Except, perhaps, for those towns in the proximity of Addis Ababa, especially Adama and Bishoftu, which are served with transportation at intervals of minutes, the services provided in between other intermediate and small towns is limited to a couple or so buses only. This kind of service delivery, as well as the quality and capacity of the buses, requires a radical change.

4.4 The Strong Points of the Transport Sector

While the modern transport system in our country is about a hundred years old, it has not developed as it should have. Of the different modes of transportation, rail and water transport especially have been on a path of regression, with the former faring even worse to reach a stage of total closure.

With regard to showing improvement and growth, the level of the changes registered in our air transport system makes it the one area in which we should take pride. Although this branch of the transport sector is only 60 years old, the level of development it has currently attained is one that gives it pride of place both in Africa and around the world. Notable among its strong points is its capacity to maintain a steady and sustainable growth, with no trace of vacillating. Among the strong points observable in the area of air transport, one finds the following:

1. The high level of its application and use of the results of modern technology, in terms both of carriers and their accessories;
2. The fact that its maintenance tradition, knowledge and capacity has become a model for both African and Middle-Eastern countries;
3. Its ability to create among the country's population a Good-Company Image, thereby being regarded as the country's ambassador to the world at large;
4. The great contribution it has made in terms of producing skilled and professional manpower;
5. And a host of other virtues including: its capacity to generate foreign exchange; its capacity to transform itself into a strong competitor; its ability to create job opportunities for Ethiopians; its ability to link Ethiopia both with Africa and the rest of the world; its ability to register a steady and sustainable growth in terms of providing public and freight transport services; its contribution to the transportation of such foreign exchange-generating export items as flowers, gold, etc.; the big role it played in publicizing Ethiopia's tourism, culture, sport, art; the reliability of the sector's traffic safety.

When we turn our attention to the country's twin institutions of Aviation Authority and Airport Administration, we can easily see the contributions made by these institutions to the growth and improvement of the country's airline in terms of issuing and implementing policies, strategic proclamations, regulations and directives, which all have served as a basis for the airline's growth and development. Among the strong points of the Ethiopian Aviation Administration, we find the following:

1. Both air transport and aviation are new technological developments both in our country and the world at large. Yet the sustained efforts of the Aviation Administration in making this new technology beneficial to our country are highly regarded;
2. The efforts it made in the area of traffic-management and control to ensure the safety and reliability of the country's air-space have been highly commendable;
3. It has particularly demonstrated high capability in creating strong links and entering into agreements with other country's, especially with the superpower United States of America, and strong European countries, such as Germany, France and Italy, in the process creating favorable conditions for the development of our airline;
4. The opening up of country's air transport enterprise for private operators.

On the other hand, although it has only been three or four years since the Ethiopian Airport Administration took over from the Aviation Authority, the efforts it made in the administration, building and expanding the country's airports is encouraging. Especially notable, however, is the achievements made in the area of equipping the capital's Bole International Airport with the technologies used by the developed countries and making use of their experiences, another achievement that is a source of pride for our country.

One can assert that road transport is everything to Ethiopia. The reason simply is that there is no other transport branch that is as close home to the hearts of the people than this branch in terms of providing services for transporting passengers as well as goods. In this regard, among the strong points of the country's road transport, we find the following:

1. It has the lion's share (90-95%) when it comes to transporting passengers and goods within the country;

2. The effort made in the area of building new roads and upgrading and expanding the existing ones is highly significant;
3. The ability of the sector to create jobs for many Ethiopians;
4. The high role it plays in bringing producers and consumers together;
5. The improvement shown in the level of our use of modern vehicles for transporting goods and passengers;
6. The initiatives taken, relative to the previous regime, to extend administrative structures to the lowest possible level, thereby effecting the principle of decentralization.

4.5 The Weak Points of the Transport Sector

In poor countries, such as ours, any social and economic activity is confronted with many problems and constraints both internally created and caused by external pressures. These problems can be taken care of through structural changes in systems as well as minor adjustment measure. This being the case, it is easy to realized that there is a high level problem of capacity limitation and lack of proper management initiative in poor countries, such as Ethiopia. With respect to this, when we turn our attention to our countries transport sector, but especially to road, rail and water transport, we find that the sector suffers from many serious weaknesses, among which we find the following:

1. The country does not have any transport policy and strategy;
2. Adopting issuing to fire fighting laws, proclamations, regulations and directives; Problems of traffic safety in the road transport sector;
3. Unlimited and uncontrolled selling of driving licenses in our regions;
4. Absence of limits on the producing year of motor vehicles imported into the country;
5. Absence of strategic systems of functioning transport service sectors and agencies;
6. The prevalence of measures that are detrimental to our natural environment resources;
7. The withering out of our rail transport services;
8. Lack of proper attention and attitude toward non-motorized vehicles;
9. The uneven distribution of transport vehicles throughout the country, one result of which is high traffic congestion in few cities;
10. The relative expensiveness of transport unit cost per passenger/freight tonne; lack of knowledge on the part of many operators about their running costs, except for a few modern transport companies;
11. Problems of service operation allotment that does not discriminate between new and old buses;
12. Lack of effort in expanding urban transport;
13. Denying rural transport the attention due to it;
14. The limited nature of the country's strategy with respect to withstanding the pressures from countries with sea ports.

4.6 Suggestions for Solving the Problems and Constraints of the Transport Sector

1. There must be both a joint and separate transport policy and strategy by which the various transport modes manage and guide their activities; there must also be a mechanism by which the policies and strategies are assured implementation;
2. In order to bring the desired change in the sector, it is necessary to bring change both in the management of and attitude towards the sector;
3. Create a system of coordination among the different transport agencies as well as the various modes of transport;
4. In order to alleviate the problems of traffic safety, the main agency responsible for the task should bring about changes in attitude; should be able to use the results and knowledge of modern technology; change the procedures pertaining to the issuance of driving licenses and improve the laws affecting same; intensify the awareness-creating campaigns;
5. Give greater attention to rail and public transport;
6. The government, the people and the private sector must give attention to the protection and care of our natural environment; equip transport vehicles with modern anti-pollution gadgets;
7. Use our domestic bodies of water (our major rivers and lakes) properly;
8. Make changes in the low attention given to regional transport offices;
9. Give proper attention to non-motorized transport vehicles both in the rural areas and urban centers;
10. Give awareness-raising training to operators with regard to keeping books for monitoring their costs;
11. Follow procedures to ensure balanced regional growth with respect to transport services;
12. Create an effective and transparent system of operation between regional and federal transport agencies;
13. Since our country is landlocked, care must be taken to ensure that the agreements our country makes with neighboring countries are strategic enough to guarantee that they would not undermine our country's interests in the long-run.

V. Projections on the Transport Sector in 2020

5.1 Overview

Unless one is equipped with special natural ability to predict the future, it is very difficult, in this changing world of ours, to say with any degree of certainty what turns things that are good or bad at present would take tomorrow. This notwithstanding, in order to live on this earth, one ought to have a vision of some kind and work and live with some degree of faith and hope. Because of the changing nature of developments, it has been observed over the years when goals envisioned at one time in a given present changed either for the better or for the worse at another moment ahead. Similarly, in our attempt to project what could possibly become of our transport sector in the future, we have to recognize that the state of affairs in the other social and economic sectors of our country plays a crucial role. Because, the fate of the transport sector, more than any other sector of the economy, is determined by what takes place in the other sectors.

To the same extent there is a high rate of economic growth, the growth in the transport sector increases with a high speed, because the backward and forward linkage between the different sectors will increase. Conversely, the growth of the transport sector will in turn contribute highly to country's economic growth. To cite but one example by way of corroborating this claim, the one sector that made a significant contribution to the economic growth of the United States of America is the special increase made in the transport sector, especially in the area of road infrastructure development, following the policies of John F. Kennedy. This much we are told by many scholars. Because the linkage between the general economy and the transport sector would result in mutual support, in which the one contributes to the other, the envisioned change and growth will take place in line with the projections made.

5.2 Vision 2020

Thinking of doing something with positive attitude and optimistically results in a spark of hope in the mind of the individual as well as in the minds of others. And as long as hope does not change into mere wish, it could enable one to achieve results. "Accordingly, the vision I have of the country's transport sector is as follows: the transport sector will enjoy a fully equipped infrastructure and safety mechanisms; the country's citizens will enjoy maximum mobility in all the four corners of the country and become beneficiaries of the results of modern technology. Our country's transport sector will provide all these benefits and become a supporting pillar in the social, economic and political development and, indeed, move beyond that to serve as the core of the transportation network for our Eastern Africa neighbors.

5.2.1 What kind of transport sector would Ethiopia have in 2020 if the present situation continues to show the same pattern of development?

It can be generally said of our country that we find it difficult to abandon the things, thinking and practices that we got used to yesteryear. We attempt, on the contrary, to change them into forms of our culture. Such tendency has contributed to our backwardness in many respects. What impelled me to raise this particular point is the fact that both private operators and government agencies in the transport sector have been sticking to the same trend of operation and functioning for the last forty or fifty years. Let me give you a good example. We are still using the same operator-licensing laws that were issued in 1960/61. In the past 38 years, however, we have seen three regimes, each highly different from the others. To give you one more example, the public transport services sector have not shown any change even after 45 years in terms of allocation and zoning. For reasons that are not clear, buses that have served for 30 and 40 years, and whose defects and deficiencies are well known and which, for that reason, are unreliable, are still in the market alongside new buses, which are products of modern technology and on the purchase of which millions of birr have been expended. The society today does not want to be supplied with products covered with dust, socked by rain or soiled with mud, whether from the agricultural or industrial sector. Yet, there still are deficiencies to reckon with on the part of transport service providers as well as government agencies. Workers or individuals who forward innovative ideas are often held at bay for ulterior motives. The problem is still prevalent. Let me use these observations, then, to venture some predictions:

1. If our country continues the same trend of operation in the absence of any meaningful transport policy and strategy as it is wont to do now, we will fall under the pressure of the globalization that we see all around us and find ourselves at the tail-end of the rest of the world. If we continue along the same line without changing our thinking and pattern of operation, we will fail to stand up to the challenges of the global market, and what awaits us will be nothing other than a debilitating collapse.
2. The access we get to the sea ports of our neighbors could continue with no guarantee of being reliable.
3. If the backward mode of operation in the area of road transport (especially among private operators and regional transport bureaus, as also in federal agencies) continues along the same line without any improvement and without the necessary changes in our thinking, over and above being the dumping ground for second hand vehicles

from the developed countries, the future, I am afraid, will be one in which the country will face a serious problem in the area of traffic safety. However, if the current trend in infrastructure development and investment continues, I see the future Ethiopia as one with a better network of road transport. If, on the other hand, our neglect of the country's natural environment resources continues as it does today, our fate, I am afraid, will be the misfortune of seeing an Addis Ababa suffocating in a mass of polluted air.

4. If nothing is done about rail and water transport, what the future has in store for us is a situation in which we will simply daydream about fast train services and luxury passenger boats in a country that has no alternative transport modes other than the road transport we have, telling to ourselves stories of what could have otherwise happened if . . . .
5. If Ethiopian airlines continues to operate with minimum government interference and maintaining the reputation, fame and activities it enjoys at present, it could achieve the status of ambassador not only of Ethiopia but also ambassador and symbol for the rest of Africa and all black people of the world.
6. If things are left to chance, the problem of traffic safety that we now witness in the road transport sector will get even worse, confirming the slight "Do not drive in Ethiopia," which was pronounced some seven years ago by a reputed European journalist.

5.2.2 If measures are taken to change the current dismal situation

The opportunity for achieving good results through making meaningful efforts is still there. If everybody acts sincerely and with a clear mind, there is no reason why we cannot see our country having made advances in every sector of its development.

Accordingly, then,

1. If the transport sector is given due attention and transport policies and strategies are designed both at the national and regional levels, Ethiopia will be transformed into a country with significant improvement in many respects, a country in which the transport sector will be free from traffic accidents and contribute to the social and economic development of the nation.
2. If we could implement the international transport management and planning, the government's transport institutional structures both at the federal and regional levels, as well as transport vehicle operators, will operate and function fully cognizant of their rights, duties and responsibilities.
3. If our urban centers could apply the transport management and planning schemes in accordance with the modern land use plan, we could manage to provide reliable urban transport services to the public both in terms of quantity and quality. The worries of both pedestrians and bicycle users about traffic accidents will diminish and gradually disappear.
4. If the environmental pollution caused by motor vehicles could be managed through the use of modern technology and supported by environmental protection laws, there will be a situation in which the air, water, soil, plants and animals will be free from pollution and human beings will enjoy a clean and fresh air.
5. If we can manage to inculcate the concept of modern transport management in the society and individual operators, the injustice we suffer due to the high cost of operation will be reduced.
6. If we can manage to build transport infrastructure and provide transport services to all the regions equitably and in a balanced manner, the 85 or so nationalities will better develop their sense of Ethiopian-ness and, in the process, be able to collectively develop our country.
7. If we can give special attention to our maritime transport and manage to get reliable access to sea ports, we will have better alternatives, and if we, at the same time, manage to change our attitude towards rail transport and the sector is improved in a way that is beneficial to the country, we will then be able to avail ourselves of 3-5 lines instead of the usual one.
8. If give due attention to the expansion of non-motorized and public transport services, it would mean that better opportunities will be created for the poor to have a share in the social and economic benefits the country provides.
9. If the necessary attention is given to the development of rural transport, our agricultural sector, rather than being the usual subsidiary sector, will be transformed into one capable of aiding and supporting the country's economy as a whole.

◊♦◊♦◊♦◊♦◊♦◊♦◊♦◊♦◊♦◊♦◊♦◊♦

References

Agores, L. 1986. *Transportation and Traffic Engineering Handbook.* USA.

The Federal Transport Authority. Megabit 1998. *The 1998-2002 Strategic Plan* (Amharic Text).

Grava, Sigurd. 2003. *Urban Transportation Systems*. USA: McGraw-Hill.

Kadiyali, L. R. 2004. *Traffic Engineering and Transport Planning.* Delhi, India: Khanna Publishers.

Ministry of (Infrastructure) Transport and Communication. February 2004. *Annual Statistical Bulletin*. Addis Ababa, Ethiopia.

Papacostas, G.C. and P.D. Prevedouros. 2001. *Transportation Engineering and Planning, 3rd Edition*. USA.

Rallis, Tom. 1987. *Intercity Transport*. Great Britain: Unwin Brothers, Ltd.

ROAD AND DEVELOPMENT IN ETHIOPIA

Bekele Negussie*

I. Background

There can be no doubt about the current gross inadequacy of Ethiopia's road network, whether this is measured in terms of its density or quality.

Road transport is the dominant mode and accounts for more than 95 percent of motorized inter-urban freight and passenger movements. Yet, Ethiopia has to its size and population a very limited road network, hampering economic development especially in the rural areas. With only about 37,018 km of roads (2005) available for motorized vehicles, about 70 percent of the population has to travel for nearly six hours to reach a road. The overall condition of the classified network is also poor; currently only 39 percent of the whole network is identified to be in good condition.

If one assumes that a motorist travels at a constant speed of 80 km/h without stopping to rest, it would take him about 20 days to traverse the existing Ethiopian network. Whereas it would take the same motorist about 470 weeks (3290 days) to traverse the American road network.

In theory, improved road infrastructure can assist with promoting economic growth in the following ways:

- Road transport provides physical access to resources and markets,
- It widens the market and increases efficiency in exchange/trade,
- Efficient road transport services reduce the price of domestic products and promote competitiveness in local and international markets,
- Expansion of road network contributes to economic diversification, enabling exploitation of economies of scope and reducing country's vulnerability to shocks.

The Situation in Rural Ethiopia

A community without roads does not have a way out.
A poor man,
Juncal, Ecuador

The Village Level Travel and Transport Study findings which form an integral part of the Road Sector Development Program were launched in 1998, and are being implemented by ERA. Its finding was used to develop an understanding of village level travel and transport problems which in turn was used to formulate a pilot rural infrastructure project designed to demonstrate workable solution to the rural transport problems.

To achieve this, the study has focused on three districts in different areas of the country namely Bako District in south central highland zone, Boset District in the central rift valley and Tehuledre District in the northern highland zone.

Summary of Findings of the Study

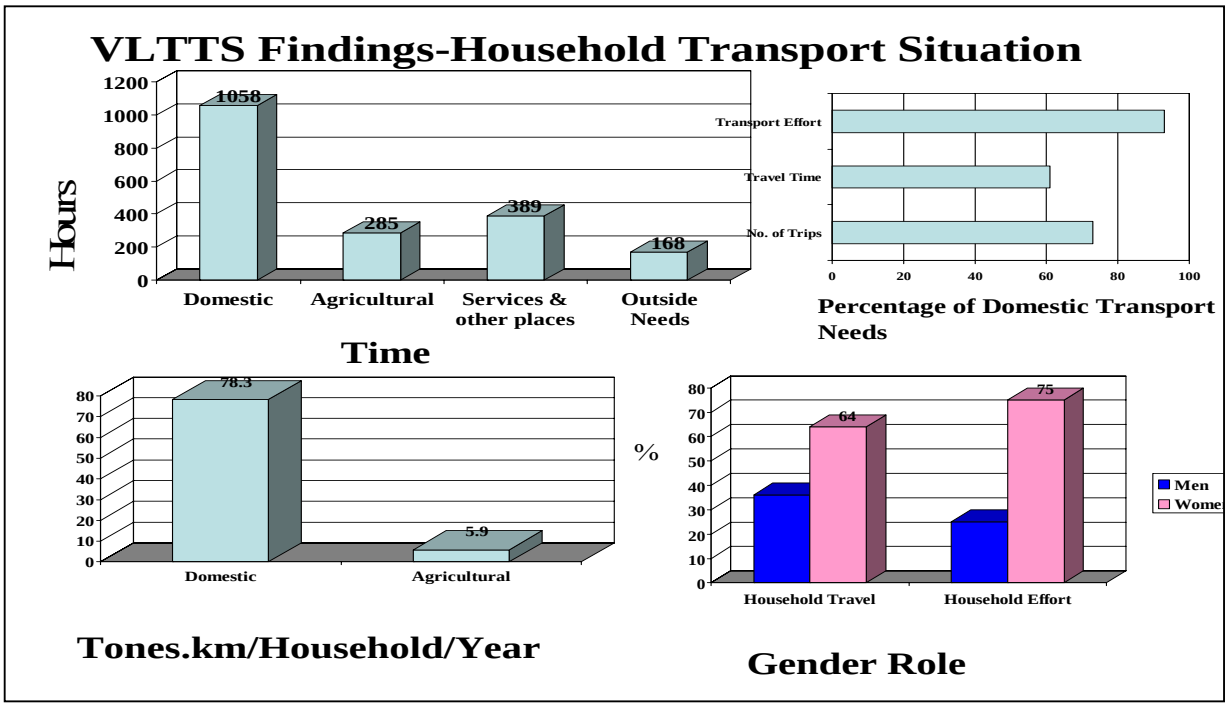
Domestic Transport

Domestic Transport i.e. collection of fuel, water, food etc. in order to meet the households needs account for 73% of trips, 61% of travel time and 93% of transport effort in the three study areas.

The two most important components of this type of transport are collecting water and fuel which together account for more than 89% of domestic travel and transport time and effort in three study areas. Domestic transport usually involves each household making from 792 to 1,735 short distance walk trips which involves 1058 hours.

Women are largely responsible for transporting the domestic water, fuel and other needs and this is usually achieved by carrying loads of up to 25 kg on their back and, apart from Boset district, there is little use of donkeys. It is estimated that domestic transport takes between 20% and 25% of the adult women's working time and comprises more than 80% of her transport burden. Only in Boset, where there is a regular seasonal water crisis, do men and donkey assist and substitute for women in domestic transport. (see chart below)

*Ato Bekele Negussie obtained his BA degree in Economics from Addis Ababa University in 1979 and his MSc degree in Transport Engineering in 1992 from Netherlands. He also participated in various short-term trainings. He has worked in the Ethiopian Road and Transport Authoriuty in various positions and now working as Planning and Programming Division Manager. In addition, he has conducted many research papers concerning transport, and in particular directely participated in the tenth-year research plan program of the transport sector.



Agricultural Transport

Agricultural transport usually involves a smaller number of trips, ranging from 87 in Tehuledere to more than 200 in Bako and most of these are over a short distance to the fields particularly during the cultivation period. They, therefore, take up the least amount of household time, an average of, 285 hours per year.

Travel to services, facilities, and other places

This type of travel reflects the household's need to use social services and maintain its social network. It tends to be burden free, involving, a small number of journeys over a longer distance. Much of this travel is to destinations outside the kebele usually on foot and when motorized public service vehicles are used it is for destination outside the woreda. Travel to social services takes up on an average 389 hours per year. As such, this type of travel tends to be the second most important user of travel time while annual cash expenditure is low averaging 8% of annual income across the study areas. This compare with a 10% estimated annual travel budget in Zimbabwe for instance. (*Village Level Travel and Transport in Ethiopia, September 1999*)

This evidence and situation throughout the country call for an integrated systematic approach in tackling the road sector problem in Ethiopia.

II. The Road Sector Development Program

The Government, in recognition of the crucial role the road sector plays for the economic development of the country; has set out a Road Sector Development Program (RSDP) to speed up the improvement and expansion of the road network. The program provides a comprehensive approach of integrating the implementation of key road investments with major policy and institutional reforms.

RSDP is scheduled over a period of ten years (1997 - 2007) and is divided into two phases (RSDP I and II). The first phase of the RSDP ended in June 2002. The on-going RSDP II stretches over the period 2002 - 2007.

Various donors including the World Bank, European Union, ADB, NDF, BADEA, OPEC Fund, Governments of Japan, Germany, U.K., Ireland, Sweden, the Road Fund and the Government of Ethiopia have been committed to the Program implementation through provision of the required funding. During RSDP II, an important partner, the Saudi Fund for Development has also joined in financing the RSDP.

RSDP Objectives

To restore and expand Ethiopia's road network, which has become an obstacle and major impediment to sustainability of the economic development program.

- To improve the management of the road network.
- To develop the capacity of domestic construction Industry.
- Overall: to contribute to poverty reduction effort.

RSDP Target

The physical target in terms of road condition is to have, by 2007, 45% of the roads in good condition (from 18% in 1997). Also the Program aims at selectively constructing new roads to have 36 km/1000 km^2 including lower class road and to install regular maintenance on much of the Ethiopian network. In addition the road network in terms of density per 1000 population is expected to be 0.50 km/1000 population in 2007.

Status of Implementation of RSDP

Eight years have passed since the commencement of RSDP implementation, which was officially launched in September 1997. The Program involves a number of components including civil works, capacity building, and policy issues with a view to bring about changes in the prevailing poor state of road network and improve the efficiency of the transport system in order to support the economy.

Investment priority criterion for selection of projects to be included in the RSDP had been clearly pre-determined during program preparation and has been strictly followed during implementation. Consistent to this criterion, both Government and donor-funded projects have been under implementation since the launch of RSDP. Several main trunk roads have been and still some are being upgraded/rehabilitated and new link roads constructed to open up potential areas in line with the country's Agricultural Development Led Industrialization strategy (ADLI).

During the eight years period, i.e. until end of June 2005, a total of 14,536 km of roads were constructed, upgraded/rehabilitated and maintained of which 6,848 km are federal roads and 7,687 km were newly constructed regional roads. In addition to these, regular routine maintenance on all types of roads were undertaken, maintenance equipment and steel bridges were procured, various studies including institutional capacity building, policy support projects and detailed design/design review studies, feasibility and EIA studies have been undertaken for a number of projects. The total cost of projects planned for execution during the same period amounted to Birr 15.1 billion (US$ 1.776 billion), while the total sum of money disbursed in the same period amounted to Birr 15.0 billion (US$ 1.741 billion); which is 99% of the planned target (See detail in Table 1).

In terms of funding of RSDP during the eight years period, by category of financiers, a little more than 50% has come from internal sources (the Government and the Road Fund) while the remaining substantial amount of funds (46%) has been pooled from the international community. Specifically, the share of the Government of Ethiopia is the highest (40%), followed by IDA (25%), the Road Fund (14%), EU (9%) and other donors 12% (government of Japan, UK, Germany, Ireland, ADB and OPEC. See the Chart below for detail contribution by financiers.

Table 1: Physical accomplishment and Disbursement by Type of intervention (8 Years)
ሠንጠረዥ 1፡ የተከናወኑ ሥራዎችና የገንዘብ ወጪያቸው

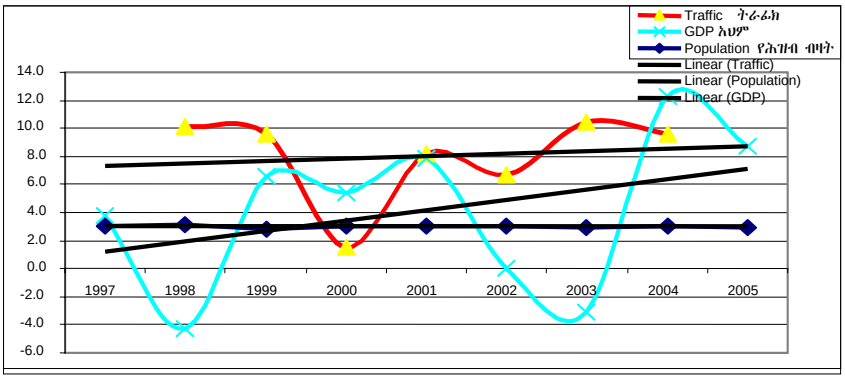
	Acc. (km) የተከናወኑ (በኪ.ሜ.)	Average acc./year አማካይ የዓመት ክንውን	% Target ክንውን በመቶኛ	Disb. (mill ETB) ወጪ (በሚሊዮን ብር)	Average disb./year አማካይ የዓመት ወጪ	% Target ክንውን በመቶኛ
FEDERAL ROADS /የፌዴራል መንገዶች	**6848**		**102.5**	**12190.4**		**107.8**
Rehabilitation of Trunk Roads የአውራ መንገዶች መልሶ ግንባታ	1590	199	83.8	4664.7	583.1	109.3
Upgrading of Trunk and Link Roads የአውራና የአገናኝ መንገዶች ደረጃ ማሳደግ	1505	188	97.7	3389.8	423.7	113.8
Construction of New Link Roads የአዳዲስ አገናኝ መንገዶች ግንባታ	1136	142	114.6	1467.3	183.4	104.4
Federal Roads Heavy Maintenance የፌደራል መንገዶች ከባድ ጥገና	2617	327	124.1	789.6	98.7	102.4
Routine Maintenance የእለት ተእለት ጥገና				1121.8	140.2	110.7
Others (including Institutional Support) ሌሎች (ተቋማዊ እገዛዎችን ጨምሮ)				757.2	94.7	86.8
REGIONAL ROADS የክልል መንገዶች	**7687**		**122.8**	**2606.5**	**325.8**	**68.6**
Construction, Maintenance & Others ግንባታ፣ ጥገናና ሌሎች	7687	961	122.8	2606.5	325.8	68.6
COMMUNITY ROADS (ERTTP) የማኅበረሰብ?? መንገዶች				**24.9**	**5.0**	**19.1**
Start up activities አዳዲስ ተግባራት				24.9	5.0	19.1
URBAN ROADS የከተማ መንገዶች				**173.1**	**21.6**	**362.9**
Routine maintenance የእለት ተእለት ጥገና				173.1	21.6	362.9
TOTAL / ድምር	**14536**		**112.3**	**14,995.0**	**1,874.4**	**99.4**

III. Road Investment Impact

On Mobility

When implementation of RSDP started in 1997, traffic movement on the road network was very low due to poor condition of the network. When the condition of some road sections improved in the course of implementation RSDP, traffic movement also increased at higher rate. An assessment of traffic along main roads has revealed rapid increase in volume of traffic. Traffic growth along the roads has increased and the growth rate is 8.4 per annum on average, even though improvement works have not been completed yet for all roads under the program.

The following chart shows the trend in population, GDP and traffic growth during the RSDP period (1997-2005). It can be seen that traffic growth is mostly higher than the growth in population and GDP. Over the last 8 years, traffic has been growing at 8%/year on average compared with a population growth rate of 3% and GDP growth rate of close to 5%.

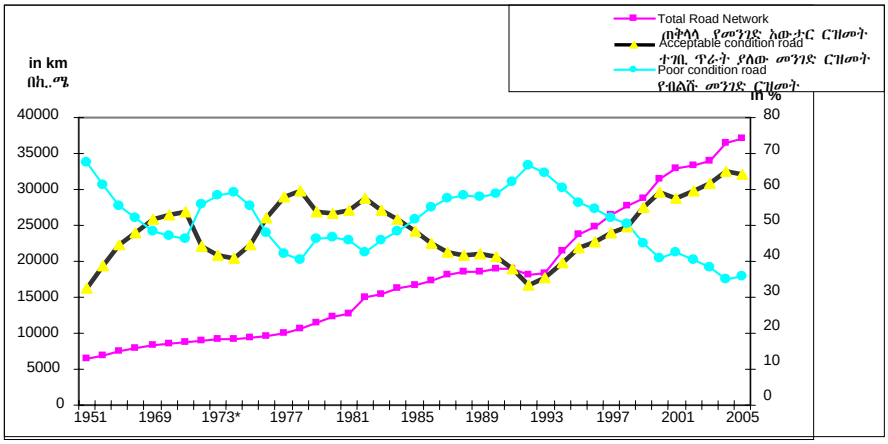


On Road Expansion & Quality

The total road network of the country at the beginning of RSDP was about 26,550km with a road density of 0.46 and 24.14 per thousands population and per thousand square km respectively. Due to the construction of new gravel and regional roads during 8 years of RSDP, the total road network has increased to 37,018km in the year 2005. With a total land area of 1.1 million sq. km and a road network of 37,018km, the current road density is 33.6km per 1000 sq. km and 0.51 km per 1000 population, indicating an increment of about 9.5 km and 0.05km with respect to area and population respectively. Overall, the road network in Ethiopia has been increasing on the average by 2.05% between 1951 and 1973, by 6.2% between 1974 and 1991 and by about 8.1% between 1992 and 2005.

On the other hand, the improvement of the road network in the country is changing the condition of the network slowly. In the first year of RSDP, 52% of the road network was found to be in poor condition and only 22% was in reasonably good condition. Owing to on-going rehabilitation, upgrading and maintenance intervention under the Program, the proportion of the road network in acceptable condition has increased to 65 percent and the road in poor condition has declined to 35%.

As can be seen from the chart below, from 1990s onwards, the road network has been consistently increasing, while the roads in poor condition were consistently decreasing. This implies that investment on rehabilitation and maintenance works in addition to opening up new areas has played a crucial role in improving the network.



Other indicators of accessibility: A random road network model[1] was also used to determine the extent of accessibility. A random road network can be described as infinitely long straight roads randomly scattered over an area. For a random road network, the mean distance to the nearest road is:

$$\text{Mean distance (m)} = \frac{\text{Area}}{\text{Road length}} \times \tfrac{1}{2}$$

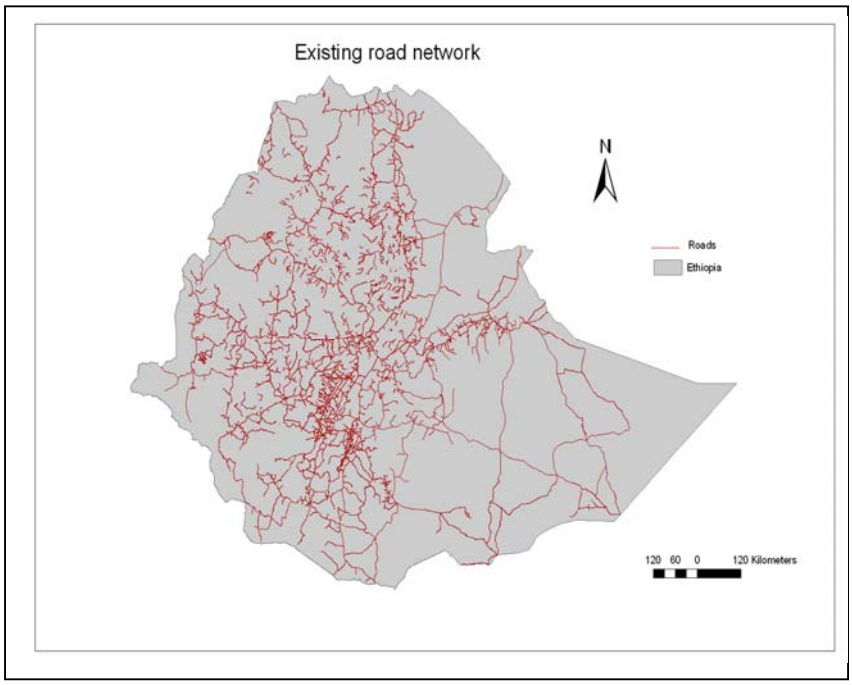
For a random road network, the proportion of the area farther than a given distance (d) to the network is given by:

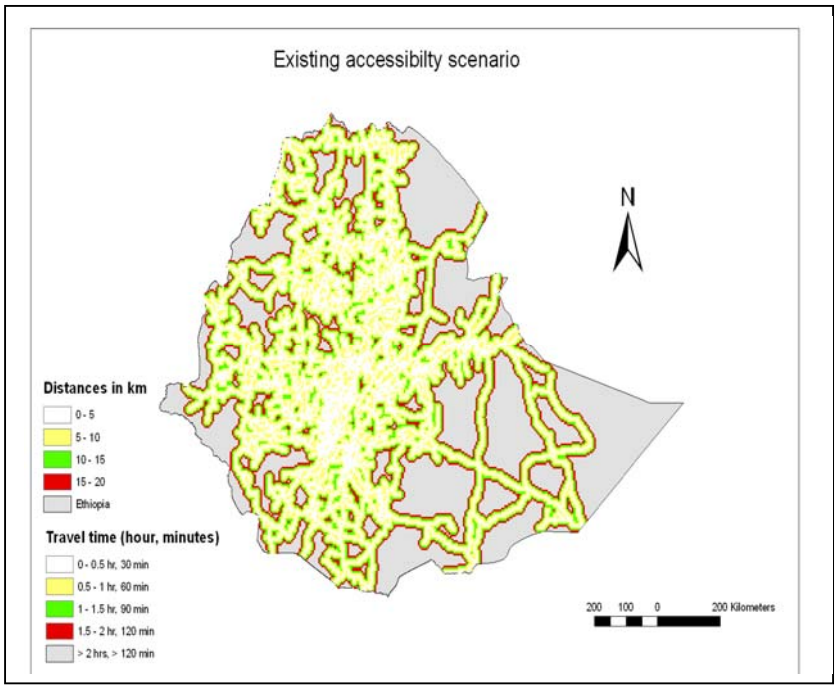
$$e^{-d/m}$$

where m is the calculated mean distance to the network.

Accessibility measured in terms of average distance from the road network and proportion of area farther than 5 km from an all weather road show that substantial progress has been made in expanding the road network. Specifically, the average distance from a road has been reduced from 21km in 1997 to 16 km in 2005 due to the construction of new roads. On the other hand, the proportion of area farther than 5 km from an all weather road which was 79% in 1997 has been reduced to 73% in 2005.

The above result of accessibility has been tested by generating buffer zones on the existing network, in a map using GIS environment. Accordingly, buffers were generated at different kilometre distances (e.g. 5, 10 and 20 km). Upon this analysis, it was possible to estimate how much of land were within the specified kilometre distances from the existing road network. (See maps)





Taking the total area of the country, the result from the map confirms that about 27% of the country's area is within 5 km from the road network (which validates the above result).

The table below shows a comparison of the percentage share of population residing within 2km from an all-weather road, in selected sub-Sahara African countries. Being a big country in size, Ethiopia registers a very small proportion of population residing within 2km of an all weather road.

[1] 'Some limitations to the opportunities for road investment to promote rural development' by JL Hine, International conference on Roads and Development, Paris, May 1984.

Table 2: Comparison of accessibility between SSA countries
ሠንጠረዥ 2፡ ከሰሀራ በታች ባሉ ሀገሮች ለመንገድ ያለው የበታዎች ቅርበት ንጽጽር

Benin ቤኒን	32%
Burkina Faso ቡርኪና ፋሶ	19%
Burundi ቡሩንዲ	19%
Cameron ካሜሩን	20%
Chad ቻድ	25%
Ethiopia ኢትዮጵያ	**12%**
Ghana ጋና	44%
Kenya ኬኒያ	44%
Madagascar ማዳጋስካር	67%
Malawi ማላዊ	38%
Mali ማሊ	51%
Niger ኒጀር	52%
Nigeria (eight states) ናይጀሪያ (8 ግዛቶች)	47%
Tanzania ታንዛኒያ	38%
Zambia ዛምቢያ	51%

Impact of Road Quality on Tariffs

Road transportation cost is heavily dependent on the quality (condition) of roads in the country. When the condition of a particular road deteriorate transport tariff per ton/km automatically doubles and triples depending on the level of deterioration. On the other hand transport tariff per ton/km would dramatically decline when the condition of the road improves.

As can be seen from Table 3, the cost of transportation in the improved roads is much cheaper than those roads with no intervention. The freight rate on rough road is almost double when compared with the newly rehabilitated road. Likewise, if we compare the Addis Ababa - Djibouti corridor to Uganda and Rwanda (both land locked countries using the port of Mombassa as the gateway to the sea), the transportation cost from Mombassa to Kampala road is US $ 0.080 per ton km, and from Mombassa to Kigali the price is US $ 0.098 per ton km, whereas the price from Djibouti to Addis Ababa is US $ 0.049 per ton km. Thus one can infer that Ethiopia's cost in Ethio-Djibouti corridor is quite competitive. The reconstruction effort in Ethiopia aimed at giving attention to Import-Export Corridor has resulted in massive improvement thereby reducing the freight rate & travel time, mainly along these routes.

Analysis of impact of road quality on animal transport was also made from the data collected in different studies carried out for different road projects in the country. According to results of the analysis improved road surfaces will lead to faster and easier walking of both people and animals.

Transport tariff analysis derived from regression analysis showed that when main roads gets rough transport of goods by animals is cheaper for short distance than vehicle transport. However, for fairly long and long trips even on rough main road transport of goods by trucks is cheaper than animal transport. When main roads are in good condition transporting of goods by trucks is cheaper not only for long distance but also for short distance trips.

For a 50 km movement one may expect the following freight transport charges:

a) Main road: 8.55 Birr/quintal
b) Rough road: 19.35 Birr/quintal
c) Animal Transport: 35.15 Birr/quintal

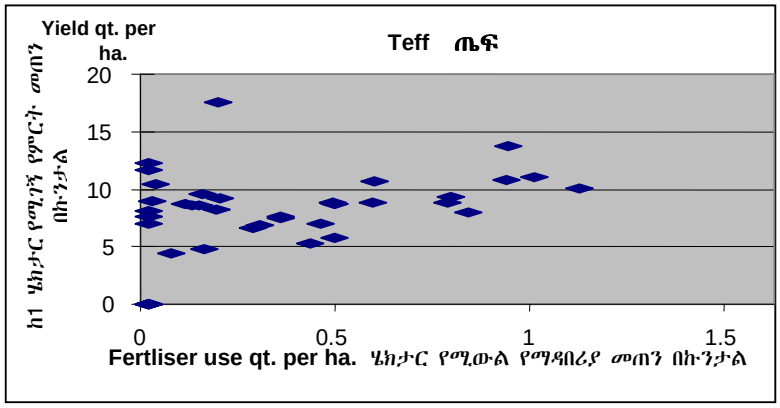
The difference in transport charges between main and rough roads is half and cost of animal transport is more than four times expensive than improved main road

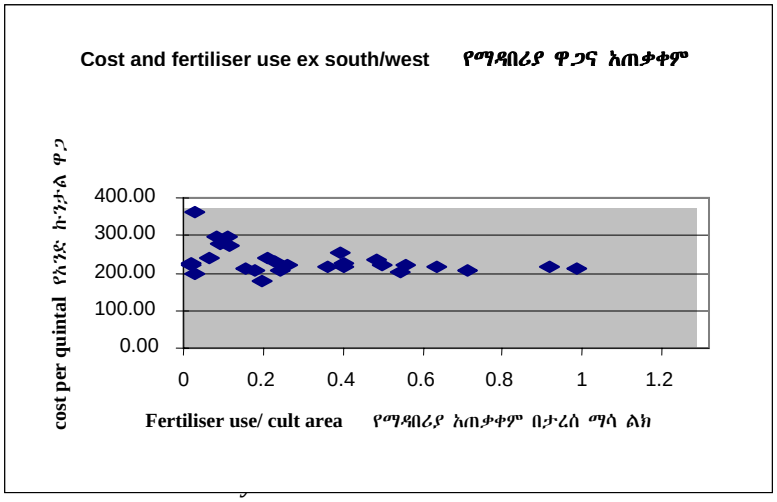
Table 3: Domestic Transport Cost from Djibouti Port
ሠንጠረዥ 3፡ የሀገር ውስጥ የትራንስፖርት ዋጋ ከጂቡቲ ወደብ

Route መንገድ	Road Condition የመንገዱ ይዞታ	Cost per ton km (in $) ዋጋ ለአንድ ቶን በኪ.ሜ. (በአሜሪካ ዶላር)	% change in cost from rehab. Road የመልሶ ግንባታ ከተኪያዜደባቸው መንገዶች የክፍያው ልዩነት በ%
Djibouti - Mekele ጂቡቲ - መቀሌ	Partly improved	0.076	+55%
Djibouti – Woreta ጂቡቲ - ወረታ	Partly improved	0.073	+49%
Djibouti – Shashemene ጂቡቲ - ሻሸመኔ	Rehabilitated	0.049	---
Djibouti – Addis Ababa ጂቡቲ - አዲስ አበባ	Rehabilitated	0.049	---
Djibouti – Kombolcha ጂቡቲ - ኮምቦልቻ	Partly improved	0.061	+25%
Djibouti - Shinnille ጂቡቲ - ሽኒሌ	Rough road	0.094	+92%

Transport Costs, Fertilizer use and Effects

High transport costs would have an effect on the selling price of fertilizer to the farmer and thus discourage its use, which in turn suppresses yields. Analysis of fertilizer distribution in Ethiopia showed that South and North Wollo have the lowest fertilizer application rates in the country. They also are recorded to have some of the highest fertilizer price (which is partly due to high transportation cost).
Fertilizer use clearly increase yield of crops and there is positive relationship between yield and fertilizer use (See charts below). A case can be established that the price of fertilizer is less and consequently the usage is high in areas where road network is developed.





Generally transport service is not provided to rural areas because roads in these areas are only low quality access roads and would result in high transportation cost. Thus upgrading the earth road to gravel road has tremendous impact on agricultural and social development of rural areas. Farmers need to produce enough to feed their families and have some left to sell. Thus availability of roads makes it possible for them to bring in the fertilizer and seed that will improve productivity. And roads make it possible for them to take their crops to market.

A case in point is the construction of the Chida-Sodo road with high gravel standard during the first Road Sector Development Program.

Before the construction the road did exist as earth road but no transportation service was provided to the peoples in the influence areas because of hilly, rolling, mountain-ous terrain combined with the impact of dust on vehicles. But after the construction of the Chida-Sodo road with high gravel standard transport services started to be given to the rural peoples in the influence area.

Ex-post evaluation was carried out by the African Development Bank in 2000 after one and half year since the road opened to traffic has showed that the construction of the road has lead to increase of yields by more than 100% for many crop types (see table).

To help those most in need (particularly in times of drought) there is a comprehensive food distribution system run by the DPPC in place in Ethiopia. However distribution posts are naturally centred on roads with good all year round access. Where there are no roads those most in need have to walk (sometimes for up to four days each month) to collect their allocation and carry it back home. Weak and infirm people will often have to pay others to collect their allocation. - A better road network can enable distribution posts to be located much nearer those in need.

Table 4: Comparison of Yield (qut/ha)
ሠንጠረዥ 4፡ የምርት መጠን ንፅፅር (ኩንታል በሄክታር)

Crop Type የአዝመራ ዐይነት	Before road construction መንገዱ ከመሠራቱ በፊት የነበረው	project (Assumed) በፕሮጀክቱ ጊዜ (ግምት)	Actual መንገዱ ከተሠራ በኋላ በእውን የተመረተው
Teff ጤፍ	5	12	12
Maize በቆሎ	15	30	60
Wheat ስንዴ	7	14	24

Effect on Emergency Food Distribution

> If we get the road, we could get everything else; community center, employment, post office, water, telephones.
>
> A young woman,
> Little bay, Jamaica

IV. Future Plans in the Road Sector

The road sector's vision & mission is illustrated in the following:

Vision: ERA's vision is to assure the provision of adequate and high quality road network to Ethiopians and open up all potential development areas in all parts of the country.

Mission: Provide safe, comfortable and adequate road infrastructure to

support the socio-economic develop-ment of the nation and satisfy road users by:

- improving the condition of roads and
- expanding the network.

The investment on road to-date through the program at hand (RSDP) has brought a significant improvement on the size and quality of the network. However, there is clear indication that successful implementation of other develop-ment programs have been proved to be difficult and often failed to reach the poorer parts of the rural population, due to lack of access. Hence, there is a need to scale up the current trend in order to arrive at the most favorable accessibility/ connectivity level countrywide.

A number of possible approaches or models may be employed to identify the optimum national network of the country considering how accessible areas are and/or analyzing how connected or linked the system is.

Using different methods of particularly that of graphic theory indicate that a total road length of 167,115 km (including community roads) is taken as a target for E.F.Y. 2020 on the assumption that it will give a reasonably good accessibility. The vision of the Ethiopian road sector by E.F.Y 2020 should, therefore, be 'to have about 170,000 km of roads'.

Table 6: Existing and Projected Characteristics of the Ethiopian Road Network.
ሠንጠረዥ 6፡- አሁን ያለውና ወደፊት መኖር ያለበት የኢትዮጵያ የመንገድ መረብ ገፅታ

	Current Situation (2005) አሁን ያለንበት ሁኔታ (2005)					Projected Situation for E.F.Y. 2020 በኢትዮጵያ አቆጣጠር በ2020 ይሆናል ተብሎ የተገመተው				
	Vertices (v) መገናኛ ነጥቦች (ጉምብራ ምች) (V)	Edges (e) የመገና ኛ ጠርዞች (e)	Beta Index (e/v) β መጠቁም e/ v	Maximum Possible Edges 3(v-2) ከፍተኛ የመገናኛ ጠርዞች ብዛት [3(V-2)]	Gamma Index (e/3(v-2)) γ መጠቁም e/3(V-2)	Vertices (v) መገናኛ ነጥቦች (ጉምብራምች) (V)	Edges (e) የመገና ኛ ጠርዞች (e)	Beta Index (e/v) β መጠቁም e/ v	Maximum Possible Edges 3(v-2) ከፍተኛ የመገናኛ ጠርዞች ብዛት [3(V-2)]	Gamma Index (e/3(v-2)) γ መጠቁም e/3(V-2
Ethiopia ኢትዮጵያ	1039	971	0.93	3111	0.31	1463	3498	2.39	4384	0.80

የተገመተው የመንገድ አውታር መጠን = 167115 ኪ.ሜ. ነው።። Projected road network=167,115 km

V. Vision for 2020

In 2005, the Ethiopian Government committed itself to the formulation of a five year 'Plan for Accelerated and Sustainable Development to End Poverty' –PASDEP- which runs from 2006-2010 (it is also in line with RSDP). The road sector is one of the key sectors identified by the Government to reduce poverty in rural areas, and expenditure allocation for this sector has been increasing overtime. The PASDEP has also provided the operational framework for scaling up efforts at the country level to achieve MDGs targets. The vision for the E.F.Y. 2020 is consistent with these two plans and would maintain the scaling up. That means the current trend of road development will result in 75,000 km of classified road whilst the difference can be supplemented by the lower class roads whose plan is remarkably high even up to the year 2010.

The PASDEP roads component is planned to cost Birr 43.2 billion (USD 4.9 billion) which has been approved by the Government. Out of the total cost, federal planned expenditure is Birr 31.5 billion (USD 3.6 billion) while that of regions, community and urban roads is expected to be in the amount of Birr 11.7 billion (USD 1.3 billion).

The planned expenditure up to 2015 is about Birr 52.0 billion (USD 5.9 billion) - at 2005 price. Whereas planned cost up to 2028 is estimated to reach a crude amount of Birr 90.0 billion (USD 10.0 billion).

The following are a set of indicators showing targets at the end of 5, 10 and 23 year- plans (PASDEP, MDGs and Year 2028 respectively).

Specifically the physical target by 2028 is to:

- Reduce the inhabited land area farther than 5 km from all weather roads to 50 percent by the end of 2028- from the current 73 percent.
- Reduce average distance from all weather roads to 7 km by the end of 2028- from the current 16 km.
- Increase the total road network (excluding community roads) to 80,000 km by the end of 2028 from the current 37,018 km.
- Increase the road density to 73-km/1000 km^2 and 0.62-km/1000 people by the end of 2028 (excluding community roads) - from the current 33.6-km/1000km^2 and 0.51 km/1000 people.
- Increase the rate of good condition roads to 75% for all road types by the end of 2028- from the current 39%.

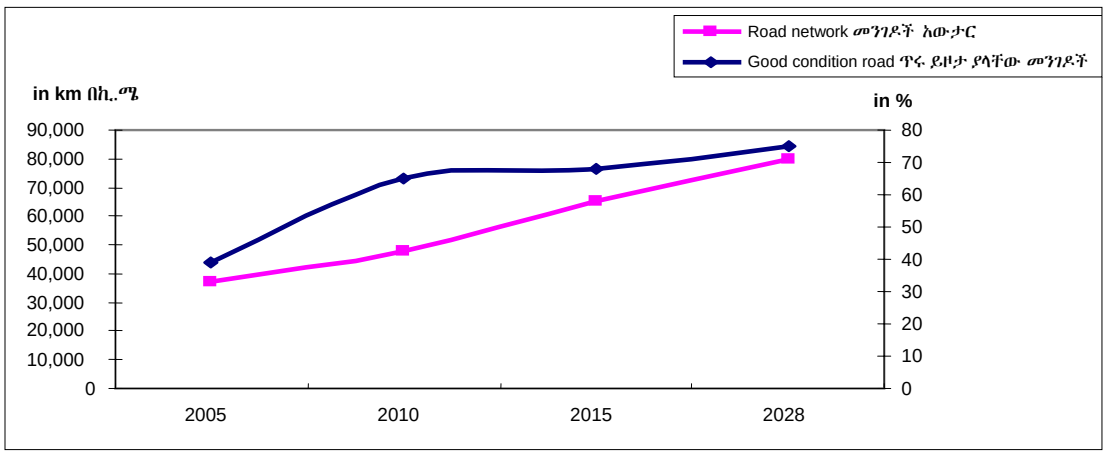
In effect, classified road network is expected to increase by more than twofold by the year 2028. For instance if we look at the average network increase per year for the past 54 years, (i.e. since the establishment of ERA) one can see that about 686 km of road (all types of classified roads) per year on average was added on the network. In contrast it is planned to construct/add about 1870 km of road per year to reach the target of 2028 (Vision E.F.Y. 2020). It is to be noted that community roads are excluded from the analysis as these are not included in the list of classified road network.

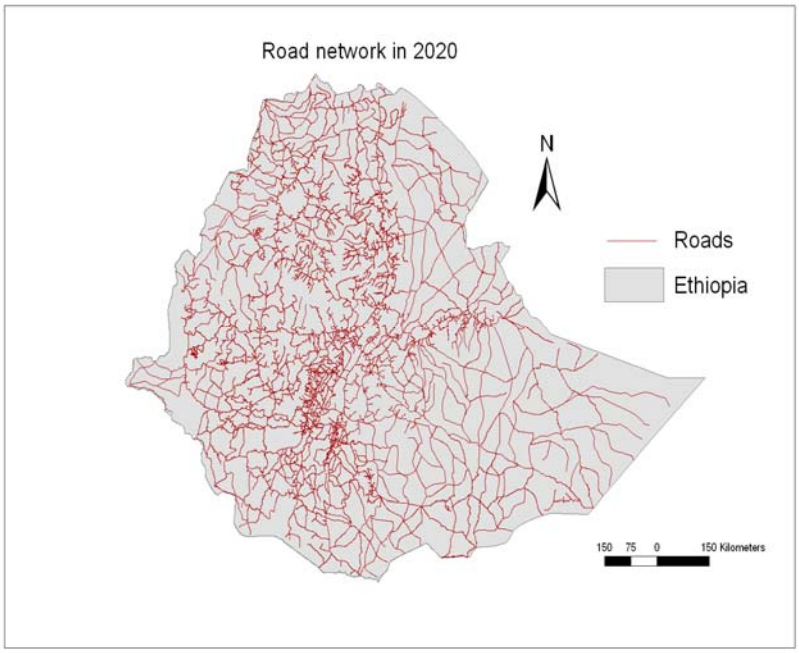
The projected level of accessibility was also estimated using the GIS. The map below depicts the accessibility level in E.F.Y. 2020 i.e. assuming that existing towns would be connected to each other -which shows a highly improved accessibility compared with the existing accessibility level (about 50% are within 5km from a road)-. Whereas 60, 70, 77, 82, 87 and 97% of the country's area is expected to be within 10, 20, 30, 40, 50 and 60km from a road.

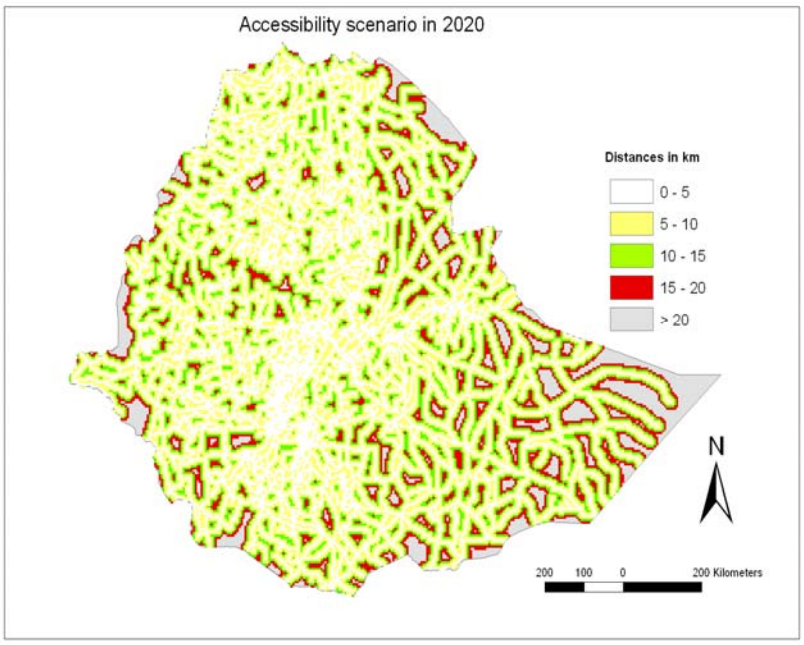
Most importantly, the quality of roads Ethiopia will have could be regarded as the best measured by any terms

Table 7: Target to E.F.Y. 2020
ሠንጠረዥ 7: የኢትዮጵያ ፊስካል ዓመት 2020 ግቦች

Policy Objective የፖሊሲ ዓላማ	Indicator ጠቋሚዎች	2005 (Base Year) 2005 (መነሻ ዓመት)	2010 (PASDEP) 2010 (ድህነትን ለማጥፋት ፈጣንና ዘላቂ ልማት ስትራቴጂ)	2015 (MDGs) 2015 (የሚሊኒየሙ የልማት ግቦች)	Vision 2020 (E.F.Y.) ርዕይ 2020 (የኢትዮጵያ የበጀት ዓመት)
Expand overall road network አጠቃላይ የመንገዶች አውታሩን ማሳፋፋት	Road network (km)-excluding community roads የመንገድ አውታር በኪ.ሜ. (የማኅበረሰብ መንገድን ሳይጨምር)	37,018	48,000	65,000	**80,000**
	Road network (km)-including community roads የመንገድ መረብ በኪ.ሜ. (የማኅበረሰብ መንገድን ጨምሮ)		133,000	140,000	**170,000**
Improve accessibility የአካባቢዎችን ትስስር ማሻሻል	% of land area further than 5km from all-weather roads በበጋም በክረምትም ከሚያገለግሉ መንገዶች ከ5 ኪ.ሜ. በላይ የሚርቁ ቦታዎች በመቶኛ	73	65	56	**50**
	Average distance to all-weather roads (km) በበጋም በክረምትም ከሚያገለግሉ መንገዶች ያለው አማካይ ርቀት	16.0	12.0	8.7	**7.0**
	Time taken to an all weather road (hrs.) በበጋም በክረምትም እሚያገለግሉ መንገዶች ላይ ለመድረስ የሚፈጀው ጊዜ በሰዓት	5.3	4.0	2.9	**2.4**
Improve density የመንገዶችን ዴንሲቲ መጨመር	km per 1000 sq.km (excluding community roads) በ1000 ስኳር ኪ.ሜ. የሚገኝ መንገድ (የማኅበረሰብ መንገዶችን አይጨምርም)	33.6	43.7	59.1	**72.7**
	km per 1000 population (excluding community roads) ለ1000 ሰዎች ያለው የመንገድ ርዝመት (የማኅበረሰብ መንገዶችን አይጨምርም)	0.51	0.58	0.70	**0.62**
	km per 1000 sq.km (including community roads) በ1000 ስኳር ኪ.ሜ. የሚገኝ መንገድ (የማኅበረሰብ መንገዶችን ጨምሮ)		120.9	127.3	**154.5**
	km per 1000 population (including community roads) ለ1000 ሰዎች ያለው የመንገድ ርዝመት (የማኅበረሰብ መንገዶችን ጨምሮ)		1.61	1.50	**1.32**
Improve condition የመንገዶችን ይዞታ ማሻሻል	Increase the rate of roads in good condition (%) በጥሩ ይዞታ ላይ የሚገኙ መንገዶችን መጨመር (በመቶኛ)	39	65	68	**75**







Challenges ahead

While planning in such a large scale, concern is often raised about the ability of the sector to absorb large amounts of public spending due to insufficient structural and institutional capacity (assuming that all required financing will be secured in the short term).

Technical and Managerial Constraints

Human capital is a key component in the course of generating road development. The availability of skilled manpower is crucial in the delivery of services; provision of adequate road being one. Thus capacity building effort needs to be

Institutional Constraints

More institutional capacity is needed to generate credible strategies, policies and programmes to transform higher expenditure levels into positive road development outcomes. The degree of decentralization of resources and responsibilities, mechanisms to define accountability systems are but a few examples of institutional factors that can determine sector's performance in generating positive development outcomes.

On the other hand, improving the business climate is also an issue at hand. Looking at the worldwide construction market, recently, the Gulf area is taking the lion's share due to the consistent rise in oil prices which in turn has inflated construction costs. In this regard the lack of performing contractors and financial constraint due to the high price increase in construction cost could be a major challenge for Ethiopia.

Thus the Vision 2020 plan should also include an approach to identify the most binding human and institutional constraints, and develop sequenced plans for alleviating them.

TRANSPORT AND ENERGY: PRICE ESCALATION OF FUELS AND MITIGATING MEASURES

Bekele Bayissa*

Abstract

Energy is the driving force of all forms of transport: land, water and air. This shows that there is no transport if there is no energy. The Ethiopian transport, except the traditional system, generates its power from one type of energy source, which is oil (petroleum fuels). As no oil resource has been found yet in the country, and as no biofuels or any other energy resources such as electricity and CNG are used, the Ethiopian modern transport sector is 100% dependent on imported oil. Moreover, with the escalating oil prices, the small foreign exchange the country earns mainly through exporting agricultural products has almost become unable to finance the purchase of petroleum fuels. This has sharply increased the trade deficit of the country much more than the past years and indicates a serious problem to come if the price escalation continues and no mitigating measures are taken.

Noting this worrying situation, the paper presents some proven energy technologies and other measures for the transport sector extending to the development of available energy resources for mitigating the effect of the problem.

The proposed mitigating measures are grouped into three. Energy efficiency and conservation measures are proposed as the prime measures followed by use of available local resources, and developing alternative resources/fuels. It is argued that if the proposed measures are implemented, especially, if country-wide biofuels programme is started and well developed like in Brazil, our dependence on foreign oil could be completely altered and eventually the country could become a biofuel exporting country. The measures could also help in the effort of poverty reduction through the creation of millions of jobs, generation of income in billions of Birr, and development of the rural infrastructure.

1 Introduction – 100% Dependence of the Transport Sector on Imported Fuels

Energy is the driving force of all forms of transport, land, water and air; or all means of transport be it human, animal or motor driven systems. Human beings require food, and animals need feed to move themselves or other things from place to place. Motor driven systems call for some type of source of energy, usually fuel, to generate the power required to drive their wheels or rotate their propellers or provide thrusting force. This implies that if there no energy there is no transport.

The Ethiopian transport system; except the traditional one that employs pack animals such as donkeys, mules and horses; generates its power from one type of energy source, which is oil (petroleum fuels). The surface transport (land and rail transport) employs engines that consume diesel fuel and gasoline. The air and sea transport obviously requires jet fuel (kerosene) and diesel fuel, respectively. There are no electric trains, trams, metros or trolley buses that could be run by electricity generated from our hydro-electric power plants. Local resource based alternative fuels such as CNG (compressed natural gas), ethanol or biodiesel have not been put into use yet. Thus, the Ethiopian modern transport system is 100% dependent on imported petroleum fuels. Moreover, the effort being made to change this scenario is not so big and as the result no major changes are foreseen in the near future. These, obviously, make the Ethiopian transport sector less energy secure and less sustainable.

2 Growing Oil Imports and High Expenditures

Ethiopia imports all petroleum fuels it consumes. The import volume has been increasing over the past seven years at an average rate of 6.4% per year and the total increase was 44%. The increase in terms of value, however, has been in many folds with an average growth rate of 28% per year and total increase of about 296% (i.e. three folds) during the same period (see Table 1).

*Bekele Bayissa is the current Board Chairman of the Ethiopian Network for Sustainable Energy Development (ENSED), which was established two years ago. He graduated from Addis Ababa University in 1981 with a B.Sc. degree in Mechanical Engineering, and got his Post Graduate Diploma in Chemical Engineering from the University of Leeds, U. K., in 1993. He has worked in Matahara Sugar Factory, the former Ministry of Industry and East African Investment Securities Pvt. Ltd. Co. for 23 years. Currently, he is serving as the General Manager of Nigat Mechanical Engineering, S. C. His contact address is: Tel. (Mobile) 0911 45 68 98 or (Fixed) 0116 63 94 76; P.O. Box 1552 Code 1250, Addis Ababa, Ethiopia; E-mail: <bekeleb@yahoo.com> or <ensedmail@yahoo.com>.

Table 1 Quantity and Value of Petroleum Fuel Imported to Ethiopia During 199/00 to 2005/06

Year	Quantity (in MT)	Growth in Quantity	Value (in '000 Birr)	Growth in Value
1999/00	1,023,605		1,876,760	
2000/01	1,096,429	7.1%	2,373,768	26.5%
2001/02	1,122,223	2.4%	2,066,113	-13.0%
2002/03	1,232,380	9.8%	2,536,765	22.8%
2003/04	1,248,092	1.3%	3,217,205	26.8%
2004/05	1,406,898	12.7%	5,288,832	64.4%
2005/06	1,475,122	4.8%	7,430,410	40.5%
Average		**6.4%**		**28.0%**

Source: [1].

This high jump in value of imports of petroleum fuels is obviously due to price hike. This is very clearly shown in Figure 1 below.

As shown in Table 1, the value of imports of petroleum fuels has reached over 7.4 billion Birr (USD 0.86 billion) in 2005/06. With the recent price of 60 to 70 USD per barrel of oil, the import value would be close to one billion USD, which is the maximum export earning Ethiopia could achieve in 2005/06 [2]. This implies that export earnings would not be enough to import fuel alone if the price continues increasing. Thus danger is foreseen and eventual crisis looks eminent unless proper mitigating measures are taken.

3 What Needs to Be Done?

The major sectors that consume petroleum fuels in large quantities are the transport, household and industry. This is graphically shown in Figure 2. Among the three major sectors, the transport sector has the highest share (51%) of the consumption of petroleum fuels in the country [3]. In fact all other sectors put together consume less petroleum fuels than the transport sector.

Considering that the intermittent oil exploration that has been going on in Ethiopia for many years has not yet resulted in the discovery of oil, one may be inclined to conclude that there is no option rather than continue importing petroleum fuels, even by diverting some of the development assistance the country gets from friendly countries.

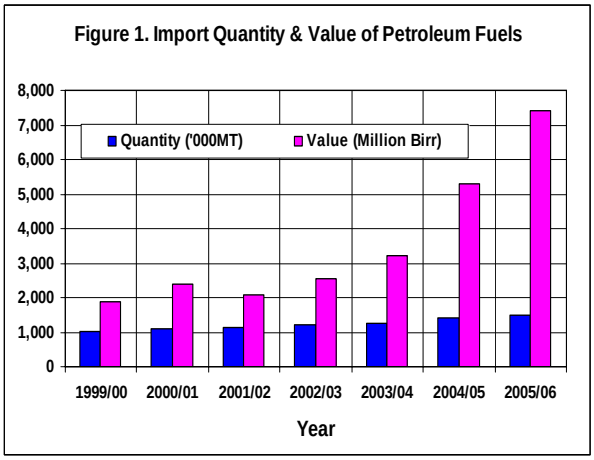
However, there are a number of options ranging from a simple conservation and efficiency measures to a complex and time-taking measures of developing alternative resources/fuels. Focusing on the transport sector, which requires the highest priority, the available options may be put into the following three major groups. These are:

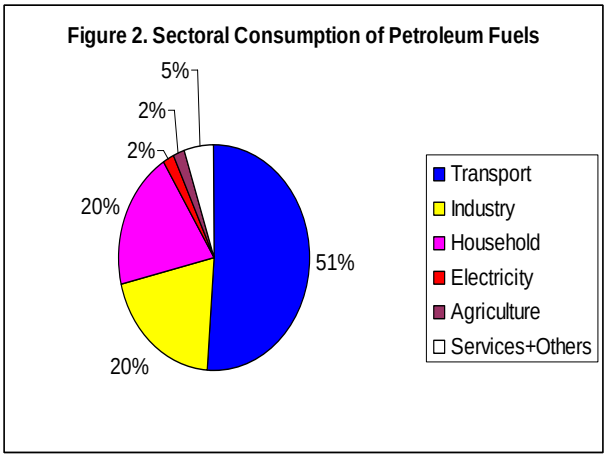
- Efficiency and conservation measures;
- Using available local resources; and
- Developing alternative resources/fuels.

Each of these measures has a number of options to consider. Therefore, it is found important to discuss each of them as presented below.

4 Efficiency and Conservation Measures

In the Ethiopian context, efficiency and conservation measures or technologies may not appear very productive for some people. However, they are in most cases the simplest and the most cost effective solutions to be taken within a short period of time for mitigating energy problems. Depending on the sector/sub-sector





and the technologies applied, energy savings of many folds could be achieved. Some of the more relevant and appropriate technologies for the transport sector are discussed here below.

4.1 Taking Inefficient (Fuel Wasting) Vehicles off the Road

Inefficient vehicles waste fuel considerably. Thus, prohibiting such vehicles from operation would force the unconscious or negligent owner to maintain or overhaul his vehicle. This measure could bring about a significant fuel saving leaving out its important impact on reducing the problem of city air pollution and improving the health of dwellers. It has to be noted that a car having a fuel consumption of 10 km/litre when in good condition could easily go down to 7 or 6 km/litre when in poor condition. This means by up keeping, maintaining and or overhauling the engine, it is possible to achieve fuel savings of 30% to 40%, which are huge amount considering large number of old and little maintained/ overhauled vehicles in the country.

Applying this measure may look difficult for it requires observing the condition of each and every vehicle. However, it can be easily applied by using exhaust gas analyzers and visual observation during the annual exam of vehicles. Vehicles with poor engine performance usually emit dark, cloudy and polluting smoke. They can be easily identified with the help of gas analyzers and prohibited from operating on the road or elsewhere until they are maintained and achieve the required level of performance, which may change from time to time depending on the condition of the vehicle population in the country.
This measure may look designed with the intention of avoiding all old cars from the road. Consequently, it may also sound to be class discriminatory. However, the intention here is simply to attain less fuel consumption by controlling fuel wastage. It has to be noted here that neither all old vehicles are too bad nor all new ones are too good. *Hummer* SUV, a luxurious station wagon which is also one of the most fuel inefficient vehicles of its kind, is a case in point. The standard set for the exam will also take the objective condition of the vehicle population in the country into consideration. Thus, only very inefficient vehicles are taken off the road by applying this measure.

4.2 Changing the Mode of Transport

The current common mode of transport in Ethiopia is road transport where minibus taxis are used for intercity transport, and trucks for inland transport. These are very inefficient systems. Firstly, road transport is very inefficient compared to rail transport. On the basis of tonne-km, a standard rail moves about 30 times more tonnage per unit quantity of fuel compared to a standard truck (road transport). That is a ratio of 1:30, which shows how much more efficient is a rail transport. Secondly, small vehicles (taxis) are less efficient compared to big vehicles (city buses) on passenger-km basis. Thus, there should be a policy that promotes the change of mode of transport from road to rail (at least from seaport to inland) and from small to big vehicles. Moreover, in line with this, the project intended to rehabilitate and expand the Ethio-Djibouti Railway and another private project intended to build a high speed railway from Addis Ababa to Adama (Nazareth) have to be strongly supported in order to be implemented soon.

4.3 Discouraging Import of Fuel Inefficient Vehicles

As mentioned earlier, all new vehicles are not fuel efficient. Vehicles such as *Hummer* SUV even as new are fuel guzzlers (very high consumers of fuel). Unlike many other sport and utility vehicles (SUVs) which have a fuel consumption rate of 8 km/litre or more, the *Hummer* is the least fuel efficient SUV on the market [4] and has a fuel consumption rate of about 4 km/litre (10 mpg). Currently, the country has no policy that discourages the import of such type of vehicles. The existing import duty tax only makes a small differentiation between big and small car engine sizes, which is also a good measure to be continued. However, this is not enough for it doesn't take fuel efficiency into consideration. Therefore, there is a need for putting in place a policy that heavily discourages the import of fuel inefficient vehicles.

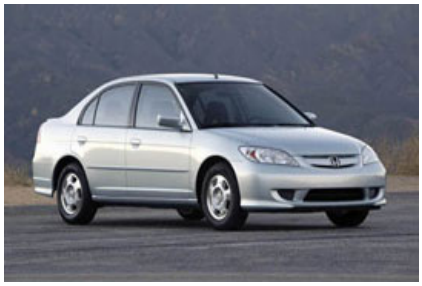
4.4 Promoting Fuel Efficient Vehicles

In addition to heavily discouraging the import (and also local manufacture in the future) of fuel inefficient vehicles, there should be a policy such as tax reduction that promotes the import (and manufacture) of fuel efficient vehicles. Hybrid electric vehicles, a new generation of vehicles that have an electric motor coupled with a gasoline (or diesel engine) have high fuel efficiency; more than 25 km/litre for medium size cars (see the photographs of *Toyota Prius 2006* and *Honda Civic Hybrid 2006* in Figures 5a and 5b). Some new designs of small and light cars have a significantly reduced consumption of about 5 to 6 litres in 100 kilometres (20 to 17 km/litre). These vehicles are highly fuel efficient next to the hybrids and should also be promoted.

Currently, all auto manufacturers world wide manufacture at least one model of small and light cars that are fuel efficient.

Figure 5a. Hybrid car, *Toyota Prius 2006*

Figure 5b. *Honda Civic Hybrid 2006*



Also there are vehicles that operate on gasoline blended with up to 85% ethanol (E85) or methanol, called flexible fuel vehicles. These vehicles can operate on any blend of E85 and gasoline and extend the use of gasoline. Currently, Ethiopia has no policy that encourages the import of such vehicles by the way of lessening import duty and other taxes or other means of providing incentives.

5 Using Readily Available (Developed) Local Resources

There are a number of readily available (developed) energy resources that can be employed to mitigate the current price hike of petroleum fuels and become energy secure in the future. Significant readily available local resources regarding the transport sector are bioethanol (or simply ethanol) and the surplus electric power to be made available from the hydro power plants under construction. Measures to be taken in this regard may include using the following.

5.1 Ethanol of Sugar Factories (Bioethanol) for Blending with Gasoline

Ethanol is being used as gasoline extender in many countries all over the five continents of the world. The leading countries in this regard are Brazil and the USA. Brazil has been using ethanol widely since 1975 for gasoline vehicles and for vehicles especially made to use neat ethanol [5]. This shows that there is a well developed technology and long years of experience in using ethanol for transport from which Ethiopia can learn and use the ethanol readily available in the country.

Currently, the Finchaa Ethanol Plant is the only fuel grade (i.e. high purity) ethanol plant in Ethiopia. The Finchaa Ethanol Plant has an annual production capacity of 8 to12 million litres. The raw material for the Finchaa Plant is molasses, a by-product of sugar production. Although Finchaa has been in operation since 1998, it couldn't sell its product in a significant amount, until recently when it started exporting to Europe, because of marketing problems to the local market. The planned initial end use was for vehicles after blending it with gasoline to a level of about 10% (called E10 fuel). In fact, the Government issued the Directive of Council of Ministers of the year 2000 in order to implement the plan [6]. However, the directive couldn't be implemented yet because of the reluctance of both the oil companies and the concerned Government organs.

The current annual ethanol production capacity of Finchaa is only 8 million litres, which is only a third of the total existing potential in the country. All existing sugar factories have a plan to expand and establish ethanol distilleries annexed to the sugar mills. If all of them process their molasses into ethanol, they would have an annual capacity to produce about 20,000 tonnes of ethanol or 25 million litres. With the current gasoline import of less than 150,000 tonnes, the total existing potential would be about 13%. However, when the planned expansion of the existing sugar factories materializes, presumably after 2010, the ethanol production could reach over 100,000 tonnes. Compared to the projected gasoline demand of 200,000 tonnes for the year 2010, the planned ethanol production would be about 50%, which is quite a high proportion.

5.2 Trolley Buses for City Transport

Trolleybuses are the same as their counterpart diesel buses except for the drive electric motor and a small carriage or troller for gathering power from overhead wires that supply electric power. They have the same type of rubber tyres, a steering wheel, passenger seats and body structure (see Figure 8 below). Trolleybuses do not require a special track such as rail. Conventional motor roads are sufficient. The only extra infrastructure required is overhead electric cable lined along the route.
Municipalities of the major towns should, therefore, consider employing trolleybuses for public transport. Addis Ababa City Administration should be a pioneer in this regard. Using trolleybuses for the Addis Ababa City transport could save tens of thousands of tonnes of diesel fuel that would be needed to run the diesel buses.

5.3 Electric Trains for Transporting to and from the Seaport

Electric trains are similar to diesel trains except that they are electric driven (see Figure 9 below). Currently, there is only one railway, operated by the Ethio-Djibouti Railways Company, in Ethiopia. The existing railway transports goods from and to the Port of Djibouti and only covers about 7% of the total freight [7]. There is an ongoing project intended to expand and modernize the existing railway. It is expected that the project would use modern electric driven coaches and wagons instead of the diesel driven old types. The switch over to the electric driven trains would save a large amount of fuel.

Moreover, companies such as Mugher Cement Enterprise, which transports more than a million of tonnes of cement and clinker to Addis Ababa, should consider employing an electric rail system in order to reduce the cost of distribution and save the foreign exchange the country expends on imports of fuel and spare parts of hundreds of trucks.

Figure 8. Trolley bus for city transport

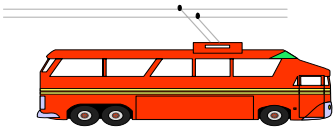
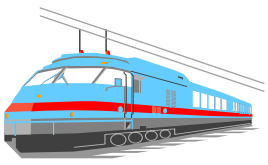


Figure 9. Electric train for inland transport



6 Developing Alternative Energy Resources/Fuels

Ethiopia has a number of energy resources that could be used for replacing the imported petroleum fuels if sufficient development efforts are made. As agriculture is the basis of the economy, one big resource could be energy crops from the agriculture. Sugar crops such as sugarcane for ethanol; oil crops such as jatropha, canola, rape, mustard, sunflower, castor-oil plant and others for bio-diesel; and other biomasses such as switch grass or elephant grass for synthetic-like diesel could be alternatives to petroleum fuels.

On the fossil fuels side, the country has good proven deposits of natural gas and coal. The prospect for petroleum is also promising although no proven deposits are found yet. Thus, the following measures are suggested to be taken for the development of alternative fuels.

- ***Support investment / co-invest in bio-fuels (biodiesel and ethanol) and fossil fuels***

  Ethiopia, being an agricultural country and having a lot of suitable land and climate for growing sugarcane, corn, millet or any other crop suitable for ethanol production, the potential for producing ethanol is very huge. Similarly, the potential for producing oil bearing crops and, thus, biodiesel, is also very large. In fact, with the current low level of economic development and proportional low level of fuel consumption, i.e. compared to other countries, Ethiopia can satisfy all its petroleum fuel demands from bio-fuels by allocating a small proportion of its farm land and land that is not used for food crop production. For instance, the total diesel fuel demand can be met by growing oil crops on less than a million hectares (100km x 100km) of mustard or rape farm in one season per year. Irrigation can reduce this farm land demand to one half or a third by increasing the harvest season to two or three, respectively.

  In view of this, although the cost of production could be an area to be seen in depth, designing a national[2] bio-fuels programme could benefit the country by creating millions of jobs and reducing poverty significantly in addition to saving billions of Birr in foreign exchange. In effect, it could be much more beneficial than the flower industry which is currently booming in the country (see Figure 10).

- ***Develop the Calub and Hilala Gas Fields and use CNG, wet products and synthetic diesel for vehicles, industry and households; and***
- ***Develop the Yayu, Dilbi and Moye coal and use the coal for cement plants and others.***

Figure 10. Biodiesel in bottles.

[2] "National" means "nation-wide or country-wide" here; it is not meant to refer to "Regional State".

7 Conclusions

As discussed above, energy is the driving force of all forms of transport. If there is no energy there is no transport. There are a number of options for mitigating the current price hike of petroleum fuels and become energy secure in the future. These options could be categorized into three groups - efficiency and conservation measures, using available local resources, and developing alternative resources/fuels. If properly implemented, the suggested measures could make a tremendous change and make the country much less dependent on imported oil.

Energy efficiency and conservation measures may look to make little impact in the first instance. However, as discussed earlier, little changes and upkeep such as maintenance of engines and use of efficient vehicles could result in large reductions (30% to 50% or even more). Efficiency and conservation measures are technically the simplest and the most straight foreword solutions that could bring a significant change within short period of time. Consequently, energy efficiency and conservation measures are proposed as the prime measures. The next measures are use of available local resources, and developing alternative fuels.

Use of available local resources could enable to switch to alternative fuels or energy sources and make the country less dependent on imported oil and more energy secure. The currently available or developed major local resources indicated in the paper were bio-ethanol (ethanol), and hydro-electricity. These resources could be easily used mainly for the transport sector, the single major consumer of petroleum fuels.

The recommendation regarding developing alternative resources/fuels is mainly a medium and long-term solution that could bring about a profound change to our energy system. Developing alternative fuels such as biofuels (ethanol, biodiesel, etc.) could make our transport system sustainable and completely alter our dependence on foreign oil and even eventually make the country a biofuel exporting country if well done like in Brazil. It could also help in the effort of poverty reduction through the creation of millions of jobs, generation of income in billions of Birr, and development of the rural infrastructure.

In conclusion, it is, therefore, required to make further studies, design policies, plans and programmes to implement the above suggested measures. Therefore, the Government and other concerned bodies should review existing policies, plans and programmes together with implementing institutions that would help to mitigate the problem of fuel price escalation, and create a fuel secure or even fuel exporting country with sustainable development of the transport sector.

♦◊♦◊♦◊♦◊♦◊♦◊♦◊♦

References

[1] Ethiopian Petroleum Enterprise, Statistics Department, Addis Ababa, 2006.

[2] Mekonen Kassa: *Notes on National Energy Supply and Consumption, 1995/96,* Ethiopian Rural Energy Development and Promotion Centre.

[3] Tamirat G. Giorgis: "Reaching a Milestone, Ethiopia Hits $1 Billion in Exports", *Fortune Newspaper*, Vol. 7 No. 327 August 6, 2006, Addis Ababa, Ethiopia.

[4] Wikipedia, the free encyclopaedia, 2006: "Hummer", in http://en.wikipedia.org/wiki.

[5] IDRC (International Development Centre, Ottawa) and United Nations University, Tokyo, 1990, Ashok V. Desai, Editor: *Alternative Liquid Fuels*, Willey Eastern Limited, 1990.

[6] Council of Ministers, 2000: *Council of Ministers Directive on the Production, Distribution and Control of Ethanol-Gasoline Blended Fuel,* Addis Ababa, April 2000.

[7] Bekele Bayissa, 2002: "The Prevailing Fuel Crisis and Mitigating Measures" in Desta Mebratu and Mulugeta Tamire (Editors), *Proceedings of Energy Conference 2002,* Addis Ababa, 21-22 March 2002, organized by Professional Associations Joint Secretariat.

THE TRAVELLER

It was on a cool and starry night
As I lay back upon the dark grass
That a thought passed through my mind.

Amidst the blaze of the heavenly stars
I felt at a loss,
The loss of a traveler in a strange land.

A sudden fear flashed across my heart,
A thought of things long-gone and things to come
And my weary body shook and froze

For I knew the world was no man's land,
Strange, unexplored, and always young.

I thought at once of the distance I had gone
And the distance yet to come,
And with the sigh of a tried traveler
I let these words go forth:

"I am a traveler in a very strange land.
"A traveler without a guide;
"A land without a path."

Eshetu Chole, Something: The Literary Magazine of the University College. 1(1962):72