TRANSPORT AND COMMUNICATIONS IN ETHIOPIA: A SPATIAL ANALYSIS

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DECLARATION

I declare that the dissertation entitled *"Transport and Communications in Ethiopia:A Spatial Analysis"* submitted by me for the degree of **Master of Philosophy** of Jawaharlal Nehru university is my own work. The dissertation has not been submitted for any degree of this university or any other university.

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CERTIFICATE

We recommend that this dissertation be placed before the examiners for evaluation.

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ACKNOWLEDGEMENT

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I would like to thank the staff members of JNU library, UNO library, Ratan Tata library, DU library, and Embassy of Ethiopia for their generous help in providing study materials.

Language has it's own barriers; hence my words will not be able to express the contribution of my parents, Smt. Savitri Devi and Sri Udai Shankar Pandey my brothers Sri Raj Narayan Pandey and Dev Narayan Pandey and my sister-in-laws Smt. Sandhya Pandey and Smt. Brijlata Pandey who stood by me through thick and thin. The sweet and innocent smiles of my nephews and niece – Satyam, Prakirti, Siddhi, Shivansu, and Sailja were quite stimulating and refreshing, which gave me enormous strength to concentrate on this work.

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For any drawback in this dissertation if any, I alone am responsible for it.

दीपनारायण

Deep Narayan Pandey

Date: 27th July, 2006

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LIST OF ABBREVIATION

AU	African Union
CAA	Civil Aviation Authority
COMESA	Common Market for Eastern and Southern Africa
ERA	Ethiopian Roads authority
ESTC	Ethiopian Science and Technology Commission
ETA	Ethiopian Telecommunication Authority
ETC	Ethiopian Telecommunication Corporation
ETTI	Ethiopian Telecommunications and Training Institute
ICT	Information and Communication Technologies
ICAO	International Civil Aviation Organization
ITCZ	Inter Tropical Convergence Zone
RRAs	Regional Road Authorities
RSDP	Road Sector Development Programme
SNNP	Southern Nations Nationalities and People
MoFED	Ministry of Finance and Economic Development
MoI	Ministry of Infrastructure
UNO	United Nations Organization
UNCTAD	United Nations
EMRDC	Ethiopian Mineral Resources Development Corp.
GDP	Grass Domestic Products
GNP	Grass Net Products

CHAPTER I
INTRODUCTION

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INTRODUCTION

Transport and communications is the lifeline of any politico-economic geographical units. It bridges the distance between the producers and consumers. Its importance is manifold in the present era of globalization that has accepted transport and communication as a parameter to assess or even compares the level of development of any geopolitical unit.

Transport and communications is the basic infrastructure that controls the politics, economics and the social life of a country either directly or indirectly. It is not at all an exaggeration that a well developed system of transport and communication is vital to his establishment of political control, national unity and central administration. It also encourages trade (both internal as well as external) and there by encourages development of agricultural and industry. That, in turn, enhances the nation's external link, which results in the creation of positive environment and image important of the nation.

Apart from political factors like government policy, decision-making, effective planning etc. Transport and Communications is also affected by geographical factors. Geography plays an important role in the development of transport and communications. Geographical factors like plain area, geologically strong region, flood and landslide free zone etc. are favorable to the development of transport and communication while high altitude, high latitude and high slopes acts as hindrance to the development of transport communication not only on account of

climatic factors in term of national susceptibility to geological rights but also due to demographic factors like lesser demand due to lesser population density.

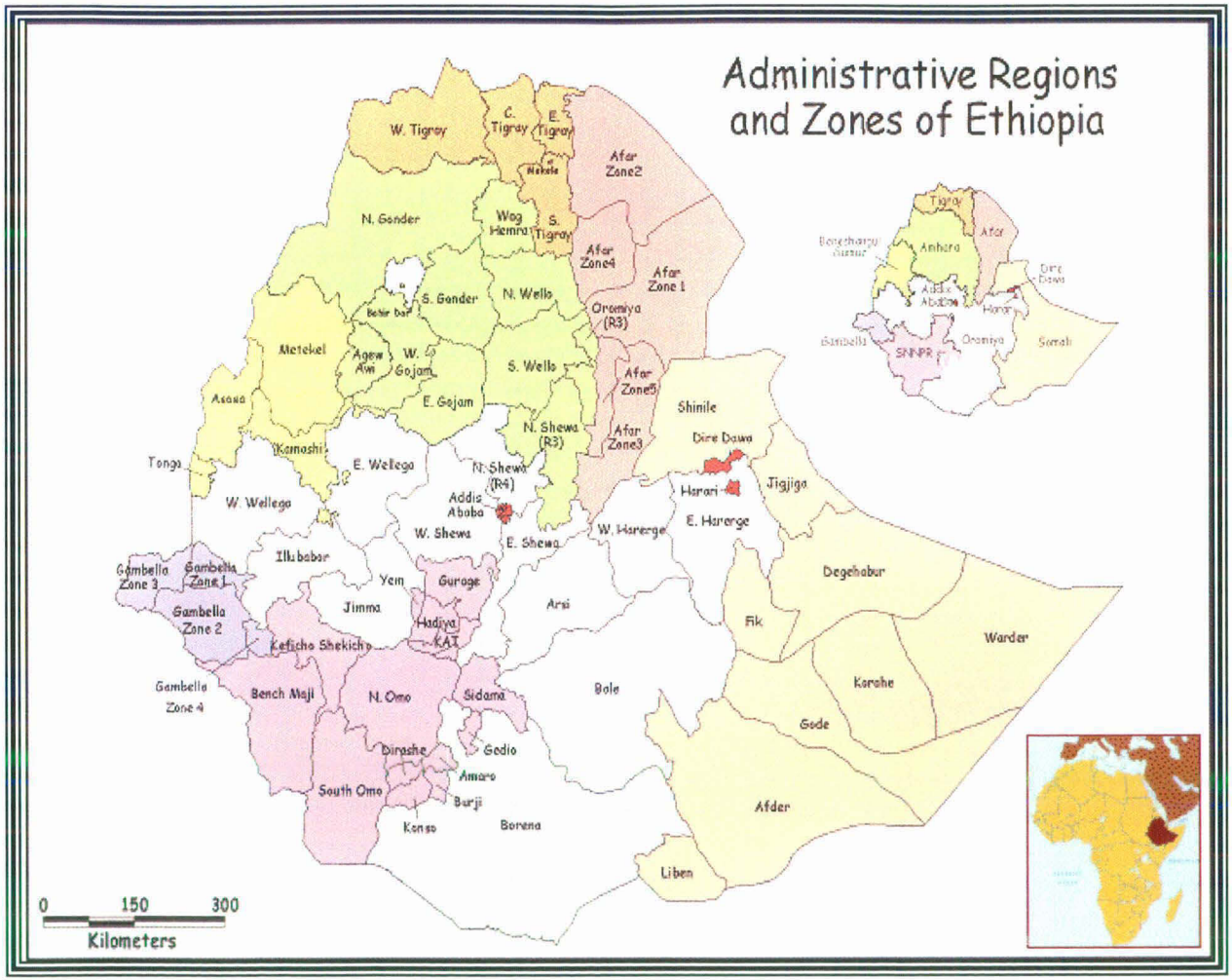
Geographer like Richard Hartshorne and Jean Gottman has given due importance to transport and communication through circulation. Other geographer like Glassener has even taken transport as an element of state. In this way, geographical analysis of transport and communication is not new and this study is an attempt in that direction with an inductive approach through the study of Ethiopian case. This study is an attempt towards understanding the causes of underdevelopment in Ethiopia vis-à-vis transport and communication. This is also an endeavor to find out the possible solution in the form of management strategy and policy changes.

I.1 SCOPE OF THE WORK

Transport and communications plays a very significant role in the development of a country. Ethiopia is among the least developed countries where transport and communication system is poorly developed. It is a good example where the economic and social development of the region has suffered in the absence of proper transport facilities. The existing transportation system of this region represents the interaction of various physical, historical and economic factors. Thus, the transport problems of the region are to be considered in the context of its location and the requirements of its economic development.

Ethiopia is characterized by a variety of landscapes. Large hilly areas alternate with level fertile plains. About one-fourth of its land surface is covered with evergreen forests. These factors point towards a very rich development potential of the region. The physical set up has contributed to a large extent, to the pattern of transportation system evolved in this region over the years. The present study is an

Fig.1.1 Political Map of Ethiopia



Source: http://www.ethemb.se/PICTURES/Ethiopia(Full).gif

attempt to provide an integrated study of transportation and communication with references to Ethiopia.

Given this, a case study of transportation and communication in the Ethiopia will be taken up to get an idea about the spatial feature management strategy.

Ethiopia

The Federal Democratic Republic of Ethiopia is a land-locked country in the horn of Africa, covering an area of 1,133,380 sq km. Ethiopia's western neighbor is Sudan; to the south it has a common border with Kenya; and to the east and south-east lie the Republic of Djibouti and the Somali Democratic Republic. To the north-east lies the state of Eritrea. The national capital is Addis Ababa. Ethiopia is divided into nine states – Afar, Amhara, Benshangul-Gumaz, Tigrai, Gambela Peoples, Harari Peoples, Oromia, Somali and Southern Nations Nationalities and Peoples (SNNP). Besides, Ethiopia has two chartered cities - Dire Dawa and Addis Ababa.

Table 1.1: **Administrative Regions of Ethiopia**

Regions	Area (sq.km)
Ethiopia	1,143,062
Tigary	51,826
Affar	96,848
Amhara	154,798
Oromiya	318,257
Somali	327,068
Benishangul-gumuz	50,010
SNNP	116,723
Gambella	25,891
Harari	63
Addis Ababa	486
Dire Dawa	1,091

Source:www.passlivelihoods.org.uk/site_files%5cfiles%5creports%5cproject_id_167%5cEthiopia

The country of Ethiopia is part of a plateau land. This plateau can be divided it into eastern and western sections. The three major relief regions of the country, which tend to influence climatic conditions, vegetation, human settlement, and drainage, are the Western Highlands, the Eastern Highland and the Rift Valley and Western Lowlands.

Ethiopia is a vast country with long distance and uneven surface. Ethiopia has great diversity in economic, social, cultural and ethnic structure as well as in spatial features. A well-knit transport-communication system is essential to bring about unity in the diversity. Transportation system of Ethiopia is handicapped by terrain.

I.2 OBJECTIVES OF THE STUDY

The general objective of the study is to explore the relationship between transportation-communication and geographical features. The specific objectives are as follows.

1. To examine the existing conditions of transportation and communication in Ethiopia.
2. To study the geo-statistical condition with transport and communication
3. To analyses the traffic flow system of Ethiopia.

I.3 HYPOTHESES

The hypotheses of the present study are following as follows.

1. Spatial factors pose more threat to development than facilitating it.
2. Decentralized and micro level planning is essential for the development of Ethiopian transport and communication system.
3. Transport and communication accessibility influences food security in Ethiopia
4. Improved the human activity with transportation and communication.

I.4 RESARCH METHODOLOGY

The proposed study will adopt the inductive method, falsification and undertake spatial analysis of the case studies. By taking up spatial study of Ethiopia the attempt will be made to develop a comprehensive understanding of different aspects of transportation and communication with reference to highland and difficult terrain system. To serve this purpose, quantitative and statistical tools, maps, charts and diagrams will be deployed.

I.5 CHAPTERISATION

The study is divided in to six chapters.

1. Introduction
2. Geographical features of Ethiopia
3. Transport and Communication Network
4. Factor affecting transport and communication: a geo- statistical neighborhood analysis
5. Transport and communications traffic flow
6. Conclusion- Problems and Prospects

I.6 LITERATURE REVIEW

Bert Van Wee (2002)[1] in his paper *"Land Use and Transport; Research and Policy Challenge"* analyses the relationship between land use and travel behavior *and* argues that there is enough evidence to conclude that land use can influence travel behavior. He also analyses the logical basis of policy implications regarding the land use and transport policy. He presents a conceptual model for passenger transport.

[1] Bert Van Wee (2002). Land Use and Transport: Research and policy Challenges, Journal of Transport Geography Vol. 10:259-271

K.R. Sealy (1965)[2] in his book *"Geography of Air Transport"* holds that the periods of influence exploring or colonizing activity were also periods of advance in other spheres. For him, the importance of place is an essential ingredient in an expanding economy. He argues that air transport is much concerned with the relationships of the landmasses and with the shortest and most direct routes between them. He further discuses the different network of air navigation.

D. Stead (2003)[3] in his article *"Relationship between Land Use, Socio Economic Factor and Travel Patterns in Britain"* carried out research into the impacts of land use on travel behavior. He concludes that socio-economic characteristics explain about half the variation in travel distance per person across different wards.

Meaurs and Haijer (2001)[4] in their paper *"Spatial Structure and Mobility"* carried out research on the impact of dwellings in the direct vicinity on travel behavior and found significant differences. People living in areas with shops and schools near by, where there are high densities and infrastructure supporting walking and cycling use the car much less than those in other areas.

John Preston (2002)[5] in his paper *"Integrating Transports with Socio–Economic Activity–A Resource Agenda for the New Millennium"* argued for the reconsideration of the links between transport and socioeconomic activity. He highlighted the relationships between transport demand, transport investment and GDP. He also reviewed the relationship between transport demand and socio-demographics and

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[2] Kenneth R. Sealy. (1965). "Geography of Air Transport" London. Hutchinson University Press.

[3] Stead Dominic. (2001). "Relationship Between Land Use. Socioeconomic Factors. and Travel Patterns in Britain." Environment and Planning. Vol.28 (4):499 -529.

[4] Meaurs and Haijer (2001). Spatial Structure and Mobility. Transportation Research Vol. 6 (6); pp.426-46

[5] John Preston. (2002). "Integrating Transport with Socio-Economic Activity – A Research Agenda for the New Millennium" Journal of Transport Geography Vol. 9: 13-24.

examined the contribution of models at a variety of geographical scales. He further suggested the need for further research in the area of transport and its impact on - national income, socio-demographic and economic development. He suggested that distinction between traffic intensity and travel intensity should be made.

Svein Brathen (2001)[6] in his paper *"Do Fixed Lines Affect Local Industry? A Norwegian Case Study"* analyses the way transport infrastructure may affect factor that can initiate cumulative economic growth processes at the regional level. He followed a multiple case study approach. Here, he discussed the theoretical framework for the study, starting with a review of Myrdal's theory of cumulative causation. He adopts realism methods in order to study the effects of transport infrastructure investments on local industry.

Alex De Waal (1997)[7] in his book *"Famine Crimes: Politics and the Disaster Relief Industry in Africa"* highlights that famine is preventable by political action; famine is created by political acts including war and the breakdown of the sate machinery. These things are worsened or hastened by global influences such as structural adjustment policies and the rise in poverty. External intervention often weakens further the incipient groups within different famine affected countries, which could become positive forces for change. His list of hard-hitting criticisms is long and has been oft repeated in the past few years. The evidence he presents is compelling and demands a response from the humanitarian aid sector. His fear is that their refusal to openly debate the issues and their resistance to criticism will enable them to ignore the points he has raised and to dismiss his concerns as a lone voice.

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[6] Sevein Brathen, (2001), "Do Fixed Links Affects Local Industry? A Norwegian Case Study", Journal of Transport Geography Vol. 9: 25-38

[7] Alex De Waal (1997) "Famine Crimes: Politics and the Disaster Relief Industry", London, James Currey Publications.

Ram Briksh Singh (1966)[8] in his book *"Transport Geography of Uttar Pradesh"*. It is well balanced analysis of transport system of U.P. The author has analyzed all the available things-geographical features, cartographic technique, and existing transport network on regional and inter regional basis. In this book, he provides the research overview about transport and communication. It has helped as a guidebook of this research work.

Berhanu Abegaz (1994)[9] in his book *"Essays on Ethiopian economic development"* is a welcome contribution to the slowly growing professional literature on the Ethiopian economy. It provides comprehensive information on economic characteristics and recent performance. Also presented are a model that purports to be particularly apt when examining economic experience between 1974 and 1991; analytical consideration of agriculture and industry and their roles in overall development; detailed discussion of the industrial structure and a review of current debates on economic reform. Many farm households in Ethiopia are remote and produce almost entirely for subsistence. Its producers do not accurately know their output to government statisticians, or even, perhaps.

Berhanu Abegaz does try in his opening and concluding essays to place the book in a coherent framework. He is, however, not fully successful. He is too eclectic in blessing equally market-led policies and those of the structuralists. Moreover, his tame conclusion that growth needs long-run supply changes is not given much content.

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[8] Ram Briksh Singh. (1966). Transport Geography of Uttar Pradesh. Varanasi. the National Geographical Society of India BHU.

[9]Berhanu Abegaz. (1994). Essays on Ethiopian economic development. Avebury

Abebe Zegye and Siegfried Pause Wang[10] in their book *"Ethiopia in Change peasantry, Nationalism and Democracy"* attempt to discuss the prospects for change and identify key polices which must be implemented if Ethiopia is to secure stable and democratic government and economic progress. This book contains many articles like environmental degradation, food security, ethnic factors, urban center for rural area and the political processes etc. Urban center for rural area, environmental degradation and ethnic factor are so important for this research work.

Bahru Zewde (2002)[11] in his article *"A History of modern Ethiopia"* is primarily a national account, and reflects the continued growth of internal Ethiopian state sovereignty during the twentieth century. Although dissent, suppression and a poor human rights record are very much part of Ethiopian reality, much of the struggle in Ethiopia is based not so much on a rejection of state sovereignty but rather on a desire on the part of ethnic or regional ethics to be a part of it and gain benefits and recognition from it for the region and peoples that they claim to lead. One of the strengths of the book is the account of the intellectual struggle over the international and external sovereignty of modern Ethiopia.

Boateng [12] in his book *"A Political Geography of Africa"* has dealt with the political geography of Africa. The book seeks a regional approach of Africa. The author analyses the salient political and socio-economic problems and issues facing Africa. The book lays special emphasis on the northern Africa region as one with geo-economic and strategic importance. But, the author has not attempted a full and

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[10] Abebe Zegeye & Siegfried Pausewang, (1994), "Ethiopia in Change Peasantry, Nationalism and Democracy", New York, British Academic Press.

[11] Bahru Zewde, (2002), *A History of Modern Ethiopia 1855-1991*, London, Oxford.

[12] E.A.Boateng(1979),A Political Geography of Africa, Cambridge, Cambridge University Press.

complete coverage but has aimed rather at identifying what he considered to be the essential problems and issues within each region to concentrate his attention on these.

John McIlwaine (1997)[13] in his book *"Maps and Mapping of Africa: A Resource Guide"* writes that Africans need maps but they cannot always easily discover whether the kinds of maps they want exist. If they do exist, where they can be found. John McIlwaine's new guide will certainly make life much easier even if it cannot solve all the problems. The great strength of this work is that it provides in part 3 a regional and country by country guide map catalogues, gazetteers, atlases, and all the relevant writing on map - connected subjects for that region or country. However, it should be stressed that this is much more than a guide to bibliographies and catalogues of maps; the majority of the 3131 items listed are writing on cartography and related matters.

William A. Hance (1964)[14] in his book *"The Geography of modern Africa"* presents the major features of the economy of Africa, where he analyses the handicaps and attributes that affect economic development. He argues that for better assessment of the condition and future prospect of Africa there is need for accuracy in data collection and hence the statistics must be approached with caution. In the case of Ethiopia he posits that the red Taoism in a pre modern society is a major reason for the underdevelopment of the region though, he is optimistic about the gradual development of the region, with expanding the structural, uniform legal system and other democratic modes of the governance.

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[13] John McIlwaine (1997) "Maps and Mapping of Africa: A Resource Guide", London, James Currey Publishers.

[14] William A. Hance (1964) The Geography of Modern Africa New York, Columbia University Press"

Walter Fitzgerald (1968)[15] in his book *"Africa: a Social, Economic, and Political geography"* deals with all major aspects, e.g. physical environment, people-immigrant and native as well as the regional aspects of Africa. In the above-mentioned book he discusses the topography and communication system of Ethiopia. He has among other things, highlighted the relative geographical isolation of the region as the major hindrance for effective communication. He gives also a brief account of the political development in the regions and its relation with the outside world.

[15] Walter Fitzgerald (1968) "Africa: A Social, Economic, and Political Geography" London, Methuen & Co Ltd.

CHAPTER II
GEOGRAPHICAL FEATURES OF ETHIOPIA

CHAPTER II

GEOGRAPHICAL FEATURES OF ETHIOPIA

A spatial analysis demands geographical understanding of the politico-geographic unit. A geographical understanding of the unit will be incomplete without knowing its topography, climate, soil, vegetation, drainage system and human resources. Topography tells us about the geological strength of the units; climate equips a researcher with the understanding of climate susceptibility; soil and vegetation tells us about the most basic natural resources; drainage system which can tells about the adaptability and availability of water transport and economic and human resource tells about the present level of development and quality and the future potential. This chapter is an endeavour towards understanding the geographical feature and their impact on transport and communication and its development in Ethiopia.

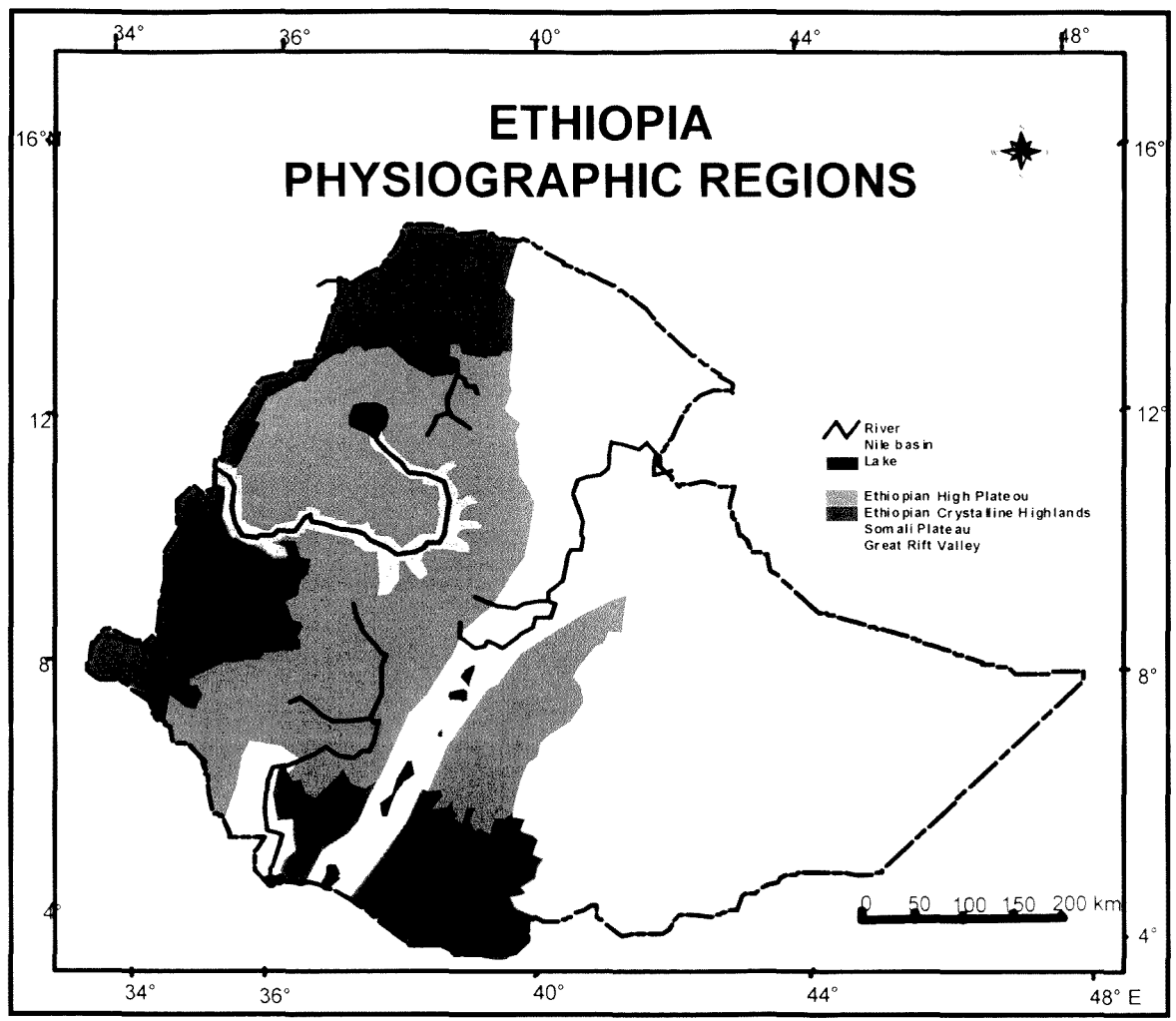
II.1. PHYSICAL INFLUENCE ON TRANSPORTATION

II.1.1 Topography

The topography of Ethiopia consists of a central high plateau bisected by the Ethiopian sector of the Great Rift Valley in its northern and southern flanks and surrounded by lowlands, more wide on the east and southeast than on the south and west. The high lands of Ethiopia form the most extensive upland of the entire African continent[1]. The height of the plateau vary from 1,500 to 3,000 meters above sea level and features mountainous uplands separated by deep gorges and river valleys,

[1] William A. Hance (1964) The Geography of Modern Africa New York, Columbia University Press pp. 354

Fig 2.1 Ethiopia Physiographic Regions



especially in the north. The highest point is Ras Dashen at 4,600 meters in the northern highlands[2]. The Denakil Depression is part of the Rift Valley. It is in places 115 meters below sea level and is one of the hottest places on earth. A chain of lakes lies in the southern Rift Valley. But the largest inland water body is Lake Tana in the northwest. The multiplicity of Ethiopia's terrain determines regional variations in climate, natural vegetation, soil composition, and settlement patterns.

The Ethiopian Rift Valley is extension of the Great East African Rift Valley. It divides the Ethiopian Highlands into two regions. There are a number of lakes along the floor of the Rift Valley. The present land forms of Ethiopia i.e. mountains, plateaus, the Rift Valley, gorges, plains, etc were mainly formed during the Tertiary period of the Cenozoic era. These physical features are a result of a series of orogeny, volcanism, denudation, peneplantation, faulting and deposition over the years. Igneous, sedimentary and metamorphic rocks are all found in the country. Igneous rocks cover most of the Ethiopian Highlands.

There are three major physiographic regions, which could be identified in Ethiopia. These are:

- The North, Central, and Southwestern Highlands and the associated Lowlands;
- The Southeastern Highlands and the associated Lowlands; and
- The Ethiopian Rift Valley.

II.1.1.1 Influence of physical features on Transportation and Communication

The physiographic differences within the Ethiopia have been a major reason for the differences in human activities, mobility and concentration. Not only is that

[2]H.R. Jarrett (1974), The New Certificate Geography Series Advanced Level: Africa, London Macdonald & Evans Ltd. pp. 343.

but even the patterns of land use reflected by relief. Thus, it will be noticed that arable land is mostly concentrated in the low lands while forests are retained mostly on up lands. The differences in relief also show a great impact on the development of transport routes the more conspicuous gaps in the cart track and road net in this region normally coincide with the high hills and steep slopes. Thus, the road net is either thin or absent in Somali plateau and Southern highland. At some places, these hilly ranges have been crossed or through-crossway has been made. The high Somali infringes still form the largest inaccessible region for vehicles. While numerous hills obstruct the alignment of roads, the narrow passes between them act as bottle-necks through which the roads pass. In the rainy season, the transportation system is therefore adversely affected.

II.1.2. Climate

The climate of the country is mainly influenced by the seasonal migration of the Inter Tropical Convergence Zone (ITCZ) following the position of the sun relative to the earth and the associated atmospheric circulation. The complex topography of the country also plays an important role.

The traditional climatic classifications of the country based on altitude and temperature shows the presence of five climatic zones namely[3]: Wurch (cold climate at more than 3000 Mts. altitude), Dega (temperate like climate-highlands with 2500-3000 Mts.), woina dega (warm-1500-2500), *Kola* (hot and arid type, less than 1500m in altitude), and Berha (hot and hyper-arid type) climates. Classification with respect to rainfall regimes shows the presence of monomial, bi-modal and diffused pattern of rainfall climates. Mean annual rainfall ranges from about 2000 mm over some pocket areas in the Southwest to about less than 250 mm over the Afar lowlands in the

[3] William A. Hance (1964) The Geography of Modern Africa New York, Columbia University Press pp. 353

Northeast and Ogaden in the Southeast. Rainfall decreases northwards and eastwards from the high rainfall pocket areas in the Southwest.

Rainfall during the year occurs in different seasons. Unlike most of the tropics where seasons are monomial (one wet season), there are three seasons in Ethiopia, namely, Bega (October-January), a dry season, Belg (February-May), a short rain season, and Kiremt (June-September), a long rain season.

Temperatures are also very much modified by the varied altitude of the country. Mean annual temperature varies from about 10°C over the high table lands over Northwest, Central and Southeast to about 35°C over North-Eastern edges.

Daily maximum temperature varies from more than 37°C over the lowlands of Northeast (Afar Triangle) and Southeast (Ogaden) to about 15°C over the highlands of Central and northern Ethiopia. Generally speaking the months of March through May are the hottest during the year.

Lowest annual minimum temperatures occur over the highlands particularly between Novembers to January. Generally minimum temperatures that reach frost point during the Bega season are not uncommon over the highlands. Also temperatures lower than 5°C occur during high rainfall months (July & August) over the plateau in Northwest, Central and Southeast due to high cloud cover.

II.1.2.1. Influence of climate on Transportation and Communication

That climate exerts great influence upon the activities of man and transportation is no exception. The character of rainfall and temperature has a direct bearing upon the condition and maintenance of transportation route and vehicles. The

variability of rainfall adversely affects the entire system of the transportation in a number of ways. A sudden downpour may cause heavy floods and destroy roads and railways track. Heavy rainfall often causes hindrance in traffic flow in the area. These factors immensely affect the agricultural economy, which in turn affects the transport position.

II.1.3. Soils

The soils are acclaimed to be greatest of all resources. A complete knowledge of these resources is essential for assessing its magnitude and also for effective planning and proper utilization of land because "Soils formed from the plateau are generally young, rich and of excellent structure, and their sizable representation gives Ethiopian soils condition superior to most African countries"[4]. The basalt deposit in much of the high land area is rich in phosphorus and potash. The soils are highly fertile, because they are weathered but not leached. They are however, deficient in calcium. The texture of these soils, mostly of a loam or silt-loam nature, is judged to be excellent. In the rift valley soil phosphorus and potash are also found, but these soils are highly deficient in nitrogen and alkaline in some area. Most fertile soil in Ethiopia is the rich alluvial deposit in the river valley. The extensive valleys of the Blue Nile, Awash, and Ome offer the greatest promise for agriculture, but those of smaller rivers are equally rich.

II.1.3.1. Influence of soil on Transportation and Communication

The soil and climate have made it possible for timber to grow in the forest which are essential for the numerous requirements of man, namely for construction of

[4]William A. Hance (1964) The Geography of Modern Africa New York, Columbia University Press pp. 355.

residences, churches and mosques, ships boats, transport carriages, furniture, etc. the differences in soil fertility from one place to another are reflected in he distribution of crops. A soil with a capacity to grow a large variety of crops will naturally qualify to grow a large variety of crops; will naturally qualify to be grouped in a better class than another soil with lower performance under similar management condition. Due to the availability of rich cotton soil in this region, all the principal crops and cereals etc. are grown which directly or indirectly influences the transportation system.

II.1.4. Vegetation

The two major vegetation regions are the wet and cool high land and the generally drier and hotter lowlands the western high land which are now mostly grassland and farm land with occasional clumps of trees. Forests occupy about seven percent of the total area of the country. The South Western rain forest, found mainly in Kefa and Ilubabon province, are composed of large broad level trees such as Syzygium Guineense and thick undergrowth of ferns and bushes including the coffee bush. The upper limit of trees is about 3000 meters. Above this altitude, only coarse grasses, giant lobelias, and other high latitude vegetation are found.

In low land the most widespread tree is the acacia, which occurs in all its numerous varieties. The exotic eucalyptus is common in inhabited regions. In the rift valley there is rich savanna grassland with numerous trees in addition to the omnipresent acacia. The semi desert and desert areas have scattered dwarf-acacia thorn bushes, some tough grass, and succulent plants.

II.1.5. Principal Rivers and Drainage System

All of Ethiopia's rivers originate in the highlands and drain into the surrounding lowlands. The Abay (Blue Nile), Ethiopia's largest river, the Tekezé, and the Baro flow west into the Nile River in Sudan, the Blue Nile contributing some two-thirds of the Nile's volume below Khartoum. The Awash flows east through the northern Rift Valley and disappears into saline lakes in the Denakil Depression. In the south, the Genale and Shebele flow southeastward into Somalia; the Omo drains the southwest and empties into Lake Turkana on the border with Kenya.

The Western Highlands generally slope towards the Sudan, and drainage is therefore westward. The eastern edge of these highlands constitutes a major watershed draining into the Rift Valley. Similarly, the western edge of the Eastern Highlands constitutes another watershed, with its eastern slopes draining in a southeasterly direction and its steep western face drained by small rivers into the Rift Valley. Since the Western Highlands is an area of high rainfall, the westward drainage is by far the most important, accounting for nearly half the total volume of water drained annually from the country.

II.1.5.1. Influence of drainage system on Transportation Communication

Undulating topography could create problem because financial constraint are major obstacle in bridge construction can deteriorate land transportation. Rivers are most suitable and less expensive in maintaining the mobility of flow of goods and services. Telescopic freight rate of water transport can challenge the land transport system in better way. Land mobility in obstructed by rivers at many locations i.e. Aabay, Ganale. However, river could generate good transportation system in absence of rapids cataracts and fall.

II.2 HUMAN RESOURSES

II.2.1 Population

With a population of about 77.4 million[5], the republic has nine administrative units and two charted cities. The population distribution according to the see units is shown in table. The average population density is 182 people per square mile[6]. Approximately 85% of the population lives in the rural area. The annual population growth rate is about 2.5% and the economically active segment between ages 14 and 60, is about 44% of the total population[7]. Two-third population uses the Amharic, Oromigna and Tigrigna languages. Amharic is the national language of the federal government. English is taught as second languages in the school in the north. Christianity and Islam are the main religions practiced in Ethiopia. Other traditional religions are also practiced by a small section of the population, particularly in south.

II.2.2 Demography

According to the World Population Sheet, 2005 the number of births per 1,000 populations was 41, the number of deaths, 16. The infant mortality rate per 1,000 live births was 100. Life expectancy at birth was 48 years (49 years for females, 47 years for males). According to the World Population Sheet, 2005, Ethiopia's population in 2000 fell into the following age-groups: ages 1–14, 44%; ages 15–64, 53%; and ages

5 Population Reference Bureau. World population data sheet (2005). Washington, D.C

6 Ibid.

7 Ibid.

Table 2.1 **Population distribution (1999)**

Regional States	**Population ('000)**
Tigri	3,593
Afar	1,188
Amhara	15,850
Oromia	21,694
Somali	3,602
Benishangul /gumuz	523
Southern nations, nationalities and peoples	12,132
Gambela	206
Harari	154
Charted Cities	
Dire Dawa	306
Addis Ababa	2,424
Total	**61,672**

Source: Regional Surveys of The World A South of the Sahara 2004.

65 and older, 3%, making Ethiopia a typical sub-Saharan country with a large proportion of its population under 15 years of age and a large proportion of women within the reproductive years of 15–49 years of age.

II.2.3 Ethnic Groups and Languages

Ethnic classification in Ethiopia is difficult because people categorized on the basis of one criterion, such as language, may be divided on the basis of another, such as ethnic identity. Language, however, often is used to classify various groups of peoples. At least 70 languages are spoken as mother tongues, but several predominate.

Most belong to the Semitic, Cushitic, or Osmotic families of the larger Afro-Asiatic super-language family; a small number belong to the Nilo-Saharan family of languages. The largest Semitic speaking groups are the Amhara, who speak Amharic, formerly the official language that is still quite widely used, and who constitute perhaps 25 percent of the population; and the Tigray, who speak Tigrinya and account for perhaps 14 percent of Ethiopia's people. The Amhara occupy the center of the northern highlands, the Tigray, the far north. Both are plough agriculturalists. Smaller groups include the Gurague, Hareri, and Argobba.

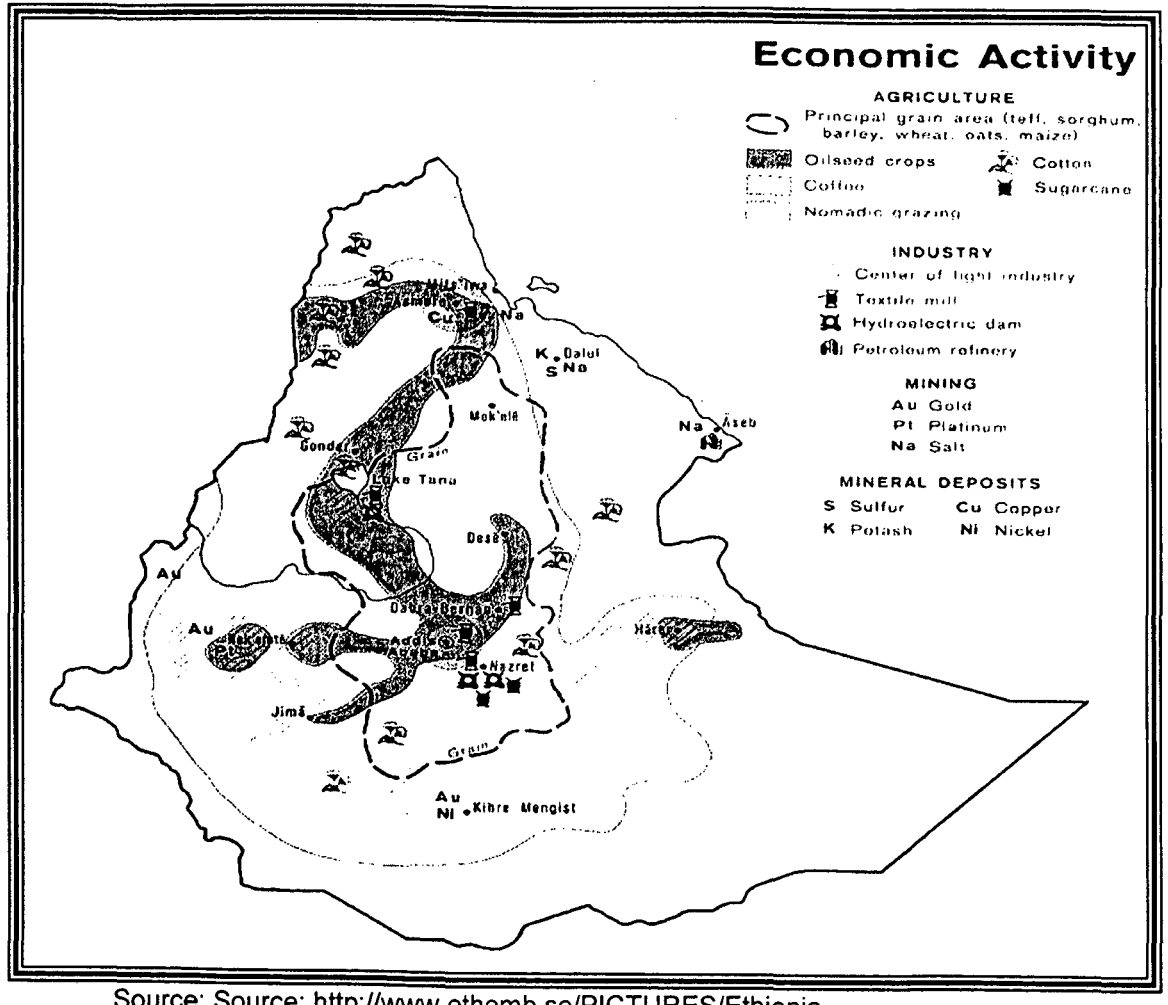
II.2.4 Influence of Human Resources on Transportation and Communication

Quality of life and transport network system are highly correlated because standard of living is highly influenced by human resource development that is technical know, education health services and per capita income. A particular threshold of population is required to support any economic activity. A multiethnic country like Ethiopia have several population borne problems such as high fertility and high mortality rate, low longevity, low urbanization and small scale movement of people from rural to urban places where more than 80% population in engaged with primary activities. Some groups of people are marginalized in the process of socialization, as they are vulnerable section of society and part of vicious circle of poverty. The above-mentioned factors have a determining impact over transport and communication.

II.3 Economic Resources in Ethiopia

Ethiopia is an economically weak country. The economic activity is primarily confined to agricultural, apicultural and mining. The secondary services e.g. industrial

Fig.2.2 **Economic activity in Ethiopia and Eretria**



Source: Source: http://www.ethemb.se/PICTURES/Ethiopia

activities are in preliminary stage. The fig 2.2 depicts the major economics activities of Ethiopia.

II.3.1 Agriculture

Agriculture, which includes crop production, animal husbandry livestock, forestry, fisheries and apiculture, remains by far the most important sector of the country for the following reasons. It directly supports about 85% of the population in terms of employment and livelihood[8]. It is the major source of food for the population of the nation and hence the prime contributing sector to food security. In addition, agriculture is expected to play a key role in generating surplus capital to speed up the overall socio-economic development of the country.

Table: 2.2
Land use Distribution in Ethiopia

Use	U.S. Department of Agriculture(percent)	FAO (percent)
Grazing land	49.8	28.0
Bush and thorn bush		25.0
Cropland	9.5	8.1
Potentially productive, now unused	6.9	
Forests	3.6	6.9
Wasteland	30.2	32.0
Total	**100**	**100**

Source: William A. Hance (1964) The Geography of Modern Africa New York, Columbia University Press pp.356.

Ethiopia is believed to have a considerable land resource for agriculture. About 73.6 million hectare (66%) of the country's land area is estimated to be potentially suitable for agricultural production. It is generally accepted that this land

[8] Regional Surveys of the World, Africa South of the Sahara 2004 page 408

resource can support a large population by providing enough food and other agricultural products required for the development of other sectors. However, the country has remained unable to feed its people for many years due to backward agricultural practices and climate variability.

The farming system in Ethiopia can be classified into five major categories:

1. The highland mixed farming system,
2. The lowland mixed agriculture,
3. The pastoral system,
4. Shifting cultivation and
5. Commercial agriculture.

The highland areas (above 1500 meters) constitute about 45% of the total area and are inhabited by four-fifths of the population. The highland areas also support about 70% of the livestock population. According to Hence[9], crop production is estimated to contribute on an average about 60%, livestock accounts for around 27% and forestry and other sub-sectors around 13% of the total agricultural value. Small-scale farmers who have been adopting low input and low output rain-fed mixed farming with traditional technologies dominate the agriculture sector. The present government of Ethiopia has given top priority to the agricultural sector. It has taken a number of steps to increase productivity in this sector.

The strong dependence of the country on agriculture, which is very sensitive to existing climate variability, is a cause for concern. Then the climate variability would change as a result of the expected climate change.

[9] William A. Hance (1964), The Geography of Modern Africa New York, Columbia University Press pp. 355.

II.3.2 Apiculture

Ethiopia has the largest bee population among African countries. It has around 10 million bee colonies. The annual honey and beeswax production has been estimated at 29000 metric tons[10] and 3,500 tons respectively and this makes Ethiopia one of the eight countries with the highest production in the world. About 10% of the annual honey and beeswax production is exported for world market while the rest is consumed domestically. Bee keeping is mainly carried out by small-holder farmers using traditional hives. The modern beehive production capacity per harvesting season is 15 to 20 kg of honey while the traditional one is about 5 kg per season.

II.3.3 Mining

Mining is of only minor significance in Ethiopia. Gold, salt and platinum are the only minerals produced on an industrial scale.[11] A little platinum is mined in Walaga province and salt is produced in several salines. Other minerals reported to exist include iron ore, near Massawa, copper, tin, lead, cobalt, molybdenum, mica, graphite, and lignite, but intensive examination would be required before any accurate estimate could be made regarding the mineral potential of the country.

The Ministry of Mines and Energy is a responsible body for minerals resource development in Ethiopia. The Ethiopian Institute of Geological Surveys conducted mapping and mineral prospecting. The state-owned Ethiopian Mineral Resources Development Corp. (EMRDC) was involved in development and production of mineral resources.

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[10] Regional Surveys Of The World, A South Of The Sahara 2004

[11] George a Lisky (1962), Ethiopia Its People Its Society Its Culture, New Haven, Hraf Press pp. 262

II.3.4 Industries

The prosperity of nations depends upon its economic activities. It is agriculture industries, trade and commerce that provide a nation wealth, but industry being the lifeblood of the economy of a nation; these activities cannot flourish without adequate transportation facilities

II.3.5 Influence of Economic Resources on Transportation Communication

Transport system plays an important role in linking production with consumption. The production itself is facilitated by the transport system as processing site is linked with the sites of the raw materials. Similarly it is with the help of a developed transport system that goods and services are distributed in the local, national and international markets. It not only ensures the movement of ideas and skills from one region to the other. Christaller, Losch and Von Thunen also proved in their theory the importance of transport and communication.

Table 2.3

Industries present in Ethiopia

Raw material processing	**Places**
Vegetable oil extraction	Dessie, Harar, Debre Maros, Addis Ababa, etc.
Coffee cleaning	20 plants in Addis Ababa, others scattered
Grain milling	Scattered
Vegetable and fruit canning	Awasa
Sugar	Wonji , Shoa
Tanning	Addis Ababa
Ply wood	Addis Ababa
Market oriented industries	
Brewing	Addis Ababa
Distilling	Addis Ababa
Carbonated beverages	Addis Ababa
Modern dairy	Addis Ababa
Confectionery	Wonji
Tobacco	Addis Ababa
Textiles	Addis Ababa
Clothing	Addis Ababa
Shoes	Addis Ababa
Cement	Addis Ababa
Asbestos sheet and tubes	Addis Ababa
Ammunitions	Addis Ababa
Metal bars, rods	Addis Ababa
Printing	Addis Ababa
Tire retreating	Addis Ababa

Sources; William A. Hance (1964) The Geography of Modern Africa New York. Columbia University Press pp. 361.

II.4 TRADE AND COMMERCE PATTERNS: THE RESOURCES CONTEXT

II.4.1 Export

Export of Ethiopia is mainly dependent on primary products, e.g. coffee, pulses, oilseeds, sugar leather and leather products, live animals, and molasses, meat, fruits and vegetables, gold others. The export structure is not a diversified one and is highly dominated by a single crop coffee, generating about 50% of the foreign exchange[12]. Ethiopia's most important markets are in Europe, especially Germany, the United Kingdom, and Italy, and in Japan, all of whom purchase large quantities of coffee. Djibouti and Saudi Arabia are other outlets for Ethiopia's exports.

II.4.1 Import

On the import front, Ethiopia's major imports constitute raw material, semi-finished goods (mainly chemicals, fertilizers, textile materials and others), fuel, and capital goods, as well durable and non-durable consumer goods. Ethiopia imports a large range of consumer and capital goods. In the past, imports came primarily from Europe, especially Italy and Germany, and from India. In more recent years, China has become a major supplier of goods. Saudi Arabia supplies fuel and refined petroleum products, making it by far the largest supplier in terms of percent of total imports. Since about 2001, Sudan has begun to supply small volumes of petroleum.

[12] Regional Survey of the World: Africa South of the Sahara 2004 page 417

II.5 SETTLEMENT

Settlement in any area is intimately related to the habitat, habit and inhabitant. Significant historical events important policy and administrative decisions, efforts for physical improvements often leave imprints on the form and pattern of the settlement. No human settlement can function and thrive independently. A rural settlement expends on agricultural land for subsistence, on a market town for sale of surpluses produce and supply of necessities of life, and on larger urban centers for specialized services, higher education, medical facilities administration, etc. similarly an urban settlement is also dependent on its umlands for supply of agricultural produce and various other purpose. Each human settlement has to be regarded as complementary unit of human activity.

II.5.1 Rural Settlements

The bulk of population of Ethiopia lives in village. The villages are located in the central and southern part of the country. In 1989, the war made it impossible to survey any northern villages. Nevertheless, the villages combine a variety of characteristics, common to rural Ethiopia. Four of the villages are cereal growing villages, one is in a coffee area and one grows mainly Sorghum but has been experiencing rapid expansion of khat.

All but one is not too far from towns, but only half have an all-weather road. Virtually all households are involved in agriculture and have access to land, although with important differences in quality and across villages. About 50 percent of income is derived from crops, the rest from livestock and off-farm activities. Many of the off-farm activities (such as selling home-made drinks or dung cakes) are closely linked to the agricultural activities. Alternatives are collecting firewood, making charcoal and

weaving. The distribution pattern of settlement closely follows the distribution of population as regards the rural settlement in the areas of high population density like the Addis Ababa region. The villages are fairly evenly distributed. They are bigger in size and more compact. Over the Gambella and Benishangul–Gumuz regions the villages are dispersed. Generally, they are of small hamlet type. The hamlet is a concentration of two or more building in one spot.

In case of a large village the physical condition alone does not influences the location and growth of the village. The availability of transport facilities is also an important factor, though this is also indirectly controlled by topography, slope and drainage. For example, the villages located on a main road or railway line or at the junction of a road and railway line have grown rapidly with the advantage of this location factor.

II.5.2 Urban Settlement

An urban settlement or ton is a form dwelling place in which the majority of its residents carry out its work with in the built up area. Urban settlements are great pulsating centers of the economic activities of a region. The towns and cities are expanding rapidly, with more and people living in them than ever before. There are around 57 towns in Ethiopia.

The trend is now towards nucleated settlements or the urban ones. Two types of urban settlements are observed in Ethiopia 1 small towns 2 big towns. In case of small towns they have developed from village usually because of the advantage of favorable communication. People can travel to and from more easily than other

villages and so they develop as market centers. In practice, this is just one of their functions over all conjoined and interdependent.

II .6 CONCLUSION

Geographical features play a vital role in augmenting or restricting the development of transport and communication facilities in any region. A sincere retrospection of Ethiopia reflect that hilly tract pose a barrier in the development of transport and communication in the development of the region. Also, a heavy downpour causes flashflood that hinders traffic flow. It can also be concluded that lesser development of human resources and subsistence agrarian economy provide very little money to invest in transport and communication. The places of tourism importance and of aesthetic beauty just escape the mind of policy makers in the wake of poor infrastructure development.

CHAPTER III
TRANSPORT AND COMMUNICATIONS NETWORK IN ETHIOPIA

CHAPTER III

TRANSPORT AND COMMUNICATION NETWORK

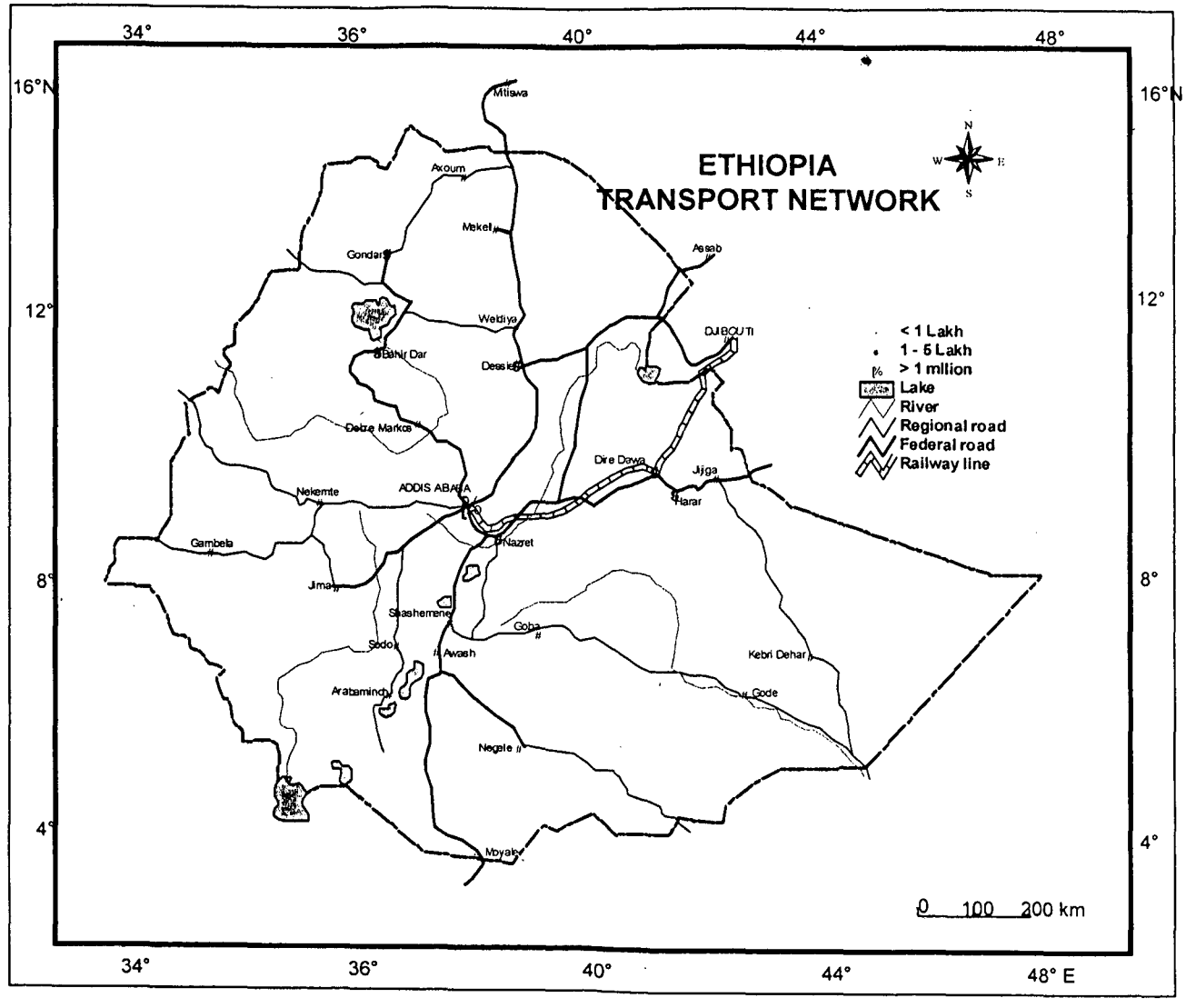
The way people and goods are moved across space are considered to be very important for social and economic development. Nevertheless, transport alone is not the key to progress. Transport has special significance because it plays very important role in facilitating other aspects of development. Transport is a necessary ingredient of nearly every aspect of economic and social development. It plays a key role for bringing land into production, marketing and in making natural resources accessible. It is a significant factor in the development of industry, expansion of trade, conduct of health and education programmes and exchange of ideas. Ethiopia has an inefficient transportation and communications networks. For a country of its size, the transport network is quite limited and needs both upgradation and expansion. The telecommunications system is similarly undeveloped, even by African standards. Service is unreliable and concentrated overwhelmingly in Addis Ababa. A bright spot is Ethiopian Air Lines, which delivers efficient and reliable service domestically and internationally and provides maintenance and training for some other regional carriers

It is needless to say that cheap and efficient system of transportation system boosts the economic development of a region. The railways, roads, inland waterways and airways, all contribute individually and collectively to its advancement. For all-round assessment of economic development, it is important to study the nature and distribution of the transportation arteries and to Asses their qualities and capacities.

In Ethiopia railways and roads are the main arteries for inter-regional and intra-regional flow of traffic. These are the only two means of transportation developed in the region and the entire traffic handled by them. The air transport plays an insignificant role, while inland navigation is negligible. The region being far flung with lots of inaccessible areas in it makes it pertinent for the development of air transport services.

Ethiopia's conventional transport system is comprised of a road network consisting of 23,812 km of classified roads, a single gauge railway line running for a distance of 781 kms from Addis Ababa to Djibouti, two international airports Addis

Fig 3.1 Transport Network



Ababa and Dire Dawa. There are approximately thirty domestic airports in Ethiopia. There are also eleven ships and vessels operating along the routes to Western Europe, the Middle and Far East with gross and net registered tonnage of over 60,000 and 30,000 respectively. Transport ranks first on national development expenditure. It absorbs at least 30% of the resources.

The mode of transport in Ethiopia includes:

- Human portage
- Pack animals
- Road transport
- Rail transport
- Air transport
- Marine transport

Human Portage

This is one of the modes of transport used by the poor in both the urban and rural areas of Ethiopia. Human portage is common in the urban than in the rural due to a lack of alternatives like carts, which the urban poor use. In urban areas porters are used to carry people's luggage and other loads whereas in the rural areas these people who do not have pack animas carry their goods on their back.

Pack Animal

The use of animals for transport in Ethiopia dates back to the historical times. Animal power from cattle, horses, donkey's mules, camels have played an important role in our life by supplying vital power for traction and transport. Equines and camels have played a key role in reducing the transport burden of the poor. They reduce tiresome effort and drudgery for women in particular. The limited development of modernized transport is indicative of the importance of traditional transport modes in Ethiopia. The rugged terrain and high cost of road infrastructure limit expansion of the modern transport sector in the county. Infrastructure, which facilitates animal powered transport, has received little attention. The sector has been dependent on the infrastructure developed to facilitate mechanized transport, causing inconvenience and low efficiency of these high cost infrastructures. Four species of animals are used- horses, donkeys, mules, and camels. Increased utilization of animal

powered transport in Ethiopia would significantly improve the efficiency of portage and reduce drudgery. Horses and mules are used for riding while camels and donkeys for portage. Camels are nicknamed the 'ship of the desert' because of the service they render to human beings in the harsh desert environment. Despite the potential of these animals, there is no government policy on their use. This is unfortunate since they could go along way towards alleviating mobility problems in Ethiopia. Policy planning must integrate the animal power and mechanized transport sector into a nationwide transport policy to improve transportation.

III.1 ROADS

Men have stamped out roads and pathways since the earliest times. They are the most universal form of communication and also the most varied. Roads of one kind or another, ranging from forest paths to the latest motorways has several important features. Firstly, wherever a demand exists for a route from place to place path or road is soon established. Secondly, a very wide range of transport agents can use roads.[1]

Ethiopia has about 33297 kilometers of roadways, of which only 4053 kilometers are paved. Almost all primary roads are gravel roads, including those that connect Addis Ababa with major cities and towns across the country. Some 75 percent of government spending on infrastructure is targeted at improving the road network. the road system of Ethiopia has been elaborately outlined in the figure no.3.2

Spending is concentrated on the five main arteries radiating from Addis Ababa toward Jimma, Ginir, Adama, Dessi, and Dire Dawa.

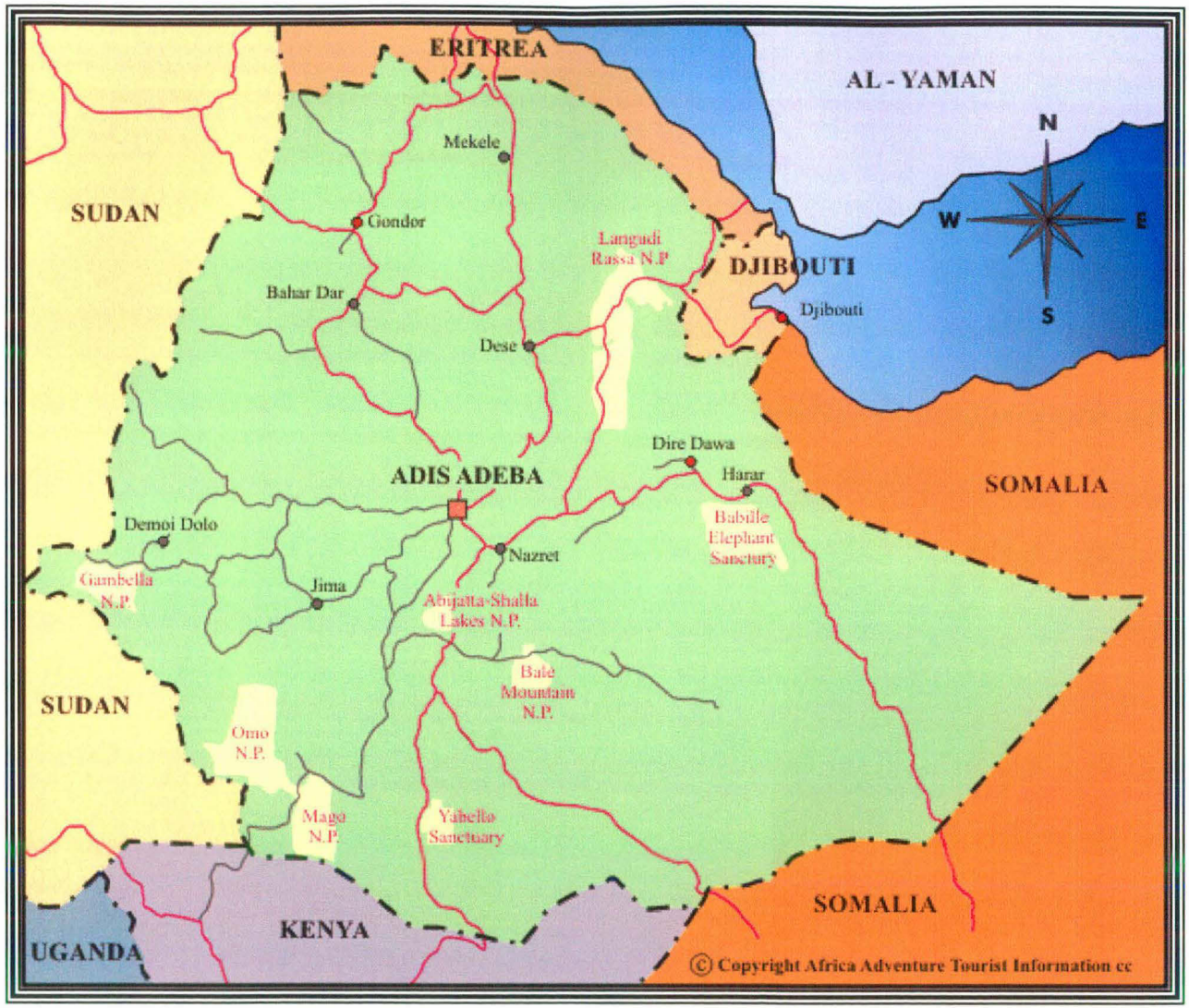
III.1.1 Classification of roads

Ethiopian road system is divided in mainly three types:

1. Federal Roads,
2. Regional Roads, and
3. Community Roads.

[1]Goh Cheng Leong & Gillian C. Morgan (1982) Human and Economic Geography, London, oxford university press, pp. 575

Fig 3.2 Road Net Work in Ethiopia



Source: http://www.africa-adventure.org/1_englis/ethiopia/info/pics/maplarge.gif

III.1.1.2 Federal Roads

Federal roads are those roads, which is built and operated with the help of federal government fund and care. These are the most important roads of Ethiopia. They link up the major cities and provide an artery of Ethiopia.

The six chief high ways in Ethiopia[2]:

1. Addis Ababa to Asmara, via Dessie. (Asmara is the railhead for Massowah. Ethiopia has been guaranteed the free use of the ports of Massowah and Assab)
2. Addis Ababa to Jimma (and forward to Gorei in the dry session).
3. Addis Ababa to Neghelli, via Shashmanna.
4. Addis Ababa to Dire Dawa,via Awash (with an extension to dule in the dry session).
5. Addis Ababa to Assab, via Dessie, and to Lekemti(with an extension to Gimbi in dry weather).
6. Dire Dawa to Britsh Somali land, via Harar and Jigiga.

III.1.1.3 Regional roads

The major regional roads serve to reach agricultural products to the markets. It connects with federal roads. The minor state road connects towns and rural places of production and markets with the districts. These roads are generally all weather roads.

III.1.1.4 Community Roads

Community roads are intended to serve the interior rural areas. They connect villages and groups of villages with district roads and small but important commercial centre. Inspite of their being the most essential means of communication in the countryside they are in most cases, no better than mere tracks and are completely impassable during the rainy season.

[2] Walter Fitzgerald, (1968), Africa a Social, Economic, and Political Geography of Its Major Regions. London, Methuen & Co Ltd, pp. 471

III.1.2 Density of Roads

The road density is an index of the economic prosperity and standard of living of any regions, as it is the measure of the degree of transportation services available in that region. It is also the best means to asses and compares the regional distribution of the roads. Before examining the density of roads in various regions of Ethiopia, it is pertinent to have an idea of its position in comparison to other states of Africa.

The total length of classified Roads in Ethiopia is about 28,000 km with an estimated 30,000 km of unclassified roads; which includes tracks, trails and paths. A road network crude density measure in Ethiopia as indicated on the RSDP is about 4.3 km. of Roads per 10,000 population and 23 km per 1000 square kilometer. The Road density levels in Ethiopia are one of the lowest in the world, which is by far below African average standards

Table: 3.1 **Roads Transport**

Country	**Roads, total net work (1990)** **Thousand of km**	**Roads, total net work (2000)** **Thousand of km**
Eritrea	4	4
Ethiopia	28	32
Kenya	61	64
Sudan	10	12
Tanzania	56	88
Uganda	-	27
Total	1107	1657

Source: UNCTAD, based on the World Bank World Development 2003, http:// publication World Bank. Org /WDI/

Besides, the existing condition of roads in bad shape is estimated to be not less than 80% of the total; i.e. only about 20% are in good condition (RSDPI). This indicates the presence of a huge backlog of road maintenance work, which was left undone in the past requiring huge expenditure for major rehabilitation and re-

construction works. There is much regional disparity with in this region because of various physical and economic differences.

III.1.3 The Road System

In Ethiopia, the road facilities are awfully inadequate for the growing requirement of the region. Although the government, both the centre and the state are directly responsible for the development and maintenance of roads, yet it is the concern of the people to use them purposefully.

Different types of roads intricately weave the general road system of Ethiopia. The road from Addis Ababa to Neghalli, which passes, from central Ethiopia to Southern Ethiopia is main artery in road communication. The other important roads of the region are Addis Ababa to Jimma, Addis Ababa to Neghelli Addis Ababa to Dire Dawa and Addis Ababa to Assab. These roads provide the basic framework for the road network of the region.

III.1.4 Characteristics of Roads

The study in respect of the form and character of roads can be done in two parts (a) the alignment characteristics and (b) the surface condition.

The Alignment Characteristic

Most of the roads of Ethiopia run almost straight with little deflection. However, there are regional variations too. In the high land region where the terrain is rugged, the road curves are considerably greater than in other parts of the area. The longitudinal profiles of typical road sections show the regional variation in the alignment characteristics of roads. The profile of Dire Dawa to Addis Ababa road shows frequent breaks in the gradient caused by course of the rift valley

The Surface Condition

In Ethiopia, five types of road pavement are in use: 1) black topped or bituminous 2) Water bound Macadam 3) Morum boulder 4) Motorable earthen and 5) Unmotorable earthen uncovered roads. All the federal high ways are black topped

except for a few short stretches that come under the water bound Macadam Morum boulder surface is found on some of the major district roads. There is considerable kilometer age of unmetalled roads under the public works department also, but such roads are being gradually improved.

The road width, bridges and embankments are other important elements of road surfaces on which depends the efficient movement of traffic. The road system of Ethiopia suffers from certain other defects too. A large number of bridges or embankments are another important element of the roads surfaces. The capacity of bridges limits the uses of heavy trucks on roads. Along with embankment, they considerably increase the cost of roads construction. Generally, the bridges are so narrow as not to let two vehicles pass at a time and quite often work as bottlenecks. There are, however still many roads, particularly in the interior parts, which cross the riverbeds in the dry season but remain unserviceable during the rainy season.

III.1.5 Regional patterns

Ethiopia as a whole has a general pattern of roads, which are irregular, but these roads form locally radial and tentacular patterns. Addis Ababa, Jimma, and Nazreth are the central points of roads network.

The Radial Patterns

At nodal points in the central and eastern part such as Addis Ababa, Jimma, Dire Dawa and Dessi a radial pattern of road system may be observed. "It is seen that a grid network tends to foster a dispersed pattern of activities, while the center of a radial network acts as an attractor"[3]. Many short distance roads converge from all direction towards the urban centre of regional importance.

Tentacular Pattern

Tentacular pattern reflects the dissected topography, which works as a static barrier. Only a few roads traveled there are to link some important market centers by dead-end roads. In the Ethiopian high lands the roads tend to from tentacular pattern.

[3] Dominique Peters. Jacques-Fancois Thisse and Isabelle Thomas. (1998), "Transport Network and the Location of Human Activities", *Geographical Analysis*, Vol. 30(4) pp.355.

In the southern region, dissected uplands do not permit roads to traverse across these barriers to join regional center.

The landforms water bodies, vegetation, soil all have their effect on the position of roads upon the land. Similarly, features of the cultural milieu, the location of settlement, the system of land survey, the type of location of settlements, the system of land survey, the type of economy and the intangibles like law have equal effect up on the location of the road in any given area. Relief features stand out perhaps more predominantly than any other in controlling road location. The geographical factors exert far greater impact on the development of the road in the area.

III.1.6 Institutional Responsibilities for the Management of Roads

Responsibility for the road network is divided principally between (a) the Ethiopian Roads Authority (ERA), with an executive Board oversight, for federal roads and road sector policy implementation and coordination under the overall guidance of the Ministry of Infrastructure and (b) Regional Roads Authorities for the regional rural roads within their boundaries.

The overall coordination of sub-sector plans for the transport sector is coordinated by the Ministry of Infrastructure (MoI) to which all agencies in the transport sector, including those of road infrastructure, report. The Ethiopian Roads Authority (ERA) is responsible for overall planning, construction, maintenance and management of the federal road network, while giving technical assistance to Regional Road Authorities (RRAs) of the regional state governments. The administration and management of regional rural roads is the responsibility of the respective regional governments, while the municipalities are responsible for urban roads. The Ministry of Finance and Economic Development (MoFED) plays an important role in helping to coordinate transport strategies, providing guidelines for sectoral development plans and setting overall levels of investment for each of the sub-sector plans. Effective coordination exists between the planning offices of MoI, ERA, RRAs and the MoFED.

Ethiopian Roads Authority (ERA)

The Ethiopian Roads Authority is the legally autonomous agency responsible for policy formulation and standard setting of the country's road network. Its responsibilities include overall planning, construction and maintenance of trunk and major link roads. Currently ERA has ten road maintenance district offices throughout the country. In each district there are maintenance sections responsible for maintaining road segments. Each maintenance section is assigned a total road distance of not less than 180 km, with a few exceptions. More autonomy is now given to maintenance districts in the areas of planning, programming, monitoring, personnel administration, financial activities, procurement and equipment management.

Regional Rural Roads Authorities (RRO'S)

The responsibility of maintenance and construction of regional roads has been delegated to the regional governments. They are directly responsible for the planning, management and implementation of the development and maintenance of regional road networks. In each region there are rural roads authorities. They are responsible for overall planning, construction and maintenance of rural roads under their regions. The regional maintenance offices, which are put under zonal level, are responsible for routine maintenance of rural roads under their jurisdiction. The roads at wereda level are under the responsibility of these zonal maintenance sections or offices. ERA's support to the regions has been mainly through overall co-ordination, training and technical assistance on rural road matters.

III.2 RAILWAY

Two railway lines served Ethiopia but after dividing it has only one railway line, it is called Franco-Ethiopian railway. It has 781 kilometer line that connects Addis Ababa with the port of Djibouti. Ethiopia and Djibouti jointly own and operate the line. Franco-Ethiopian line serves chiefly Dire Dawa awash Nazareth and Addis Ababa. Which carries up to 800,000 passengers and 250,000 tons of freight per year. Like the road system, it badly needs rehabilitation, plans for which are underway. In order to reduce its reliance on Djibouti, Ethiopia announced in 2001 that it had reached an agreement with Sudan to build a rail link to Port Sudan.

III.2.1 Characteristics of Railway Lines

The nature of curves and gradients, frequency of tunnels and bridges the bulk of cutting and filling[4] determine the characteristics of railway lines, as these factors have a great bearing on their smooth and efficient working. Because rough tracks, sharp curves and steep gradient are the bane of fast running trains, these features manifest the degree of terrain friction encountered, "which along the distance is a principal element in the cost of transportation and hence in the effectiveness with which communication and interchange with in and among regions can take place"[5]. Most of the railway line running in the rift valley and Ethiopian high lands has these characteristics. The railways being highly sensitive to gradient generally avoid steep gradients and resort to curve cutting and tunnels to surmount the topographical obstacles.

The broken topography of plateau region compels the railway route to frequently changes course and gradient from place to place. Because of undulating topography high power locomotive are needed. The steep gradient necessitates the services of a banking engine at some places as for example near to Addis Ababa to Nazreth. So laying of railway line is there fore an expensive business in the region.

The Franco Ethiopian rail way line I passes through rift valley region. From City Awash to Nazreth, the line runs straight with gentle slope and from Nazreth to Addis Ababa it runs straight with steep slope. In fig no.1, longitudinal profile and curves of Franco-Ethiopian railway lines are given. This profile shows the gradient and curves of the lines in Ethiopian topography. Most of the railways of Ethiopia in highland and hill area are generally winding having scarp curves, numerous cutting and few tunnels whereas in the plain they run straight. This reflects the varying degree of terrain friction in the high land and plateau area. The more rugged the relief of a region, the more persistent is the influence exerted on the transportation routes. The railways being highly sensitive to gradient generally avoid steep gradients and resort to curves cutting and tunnels to surmount the topographical obstacles.

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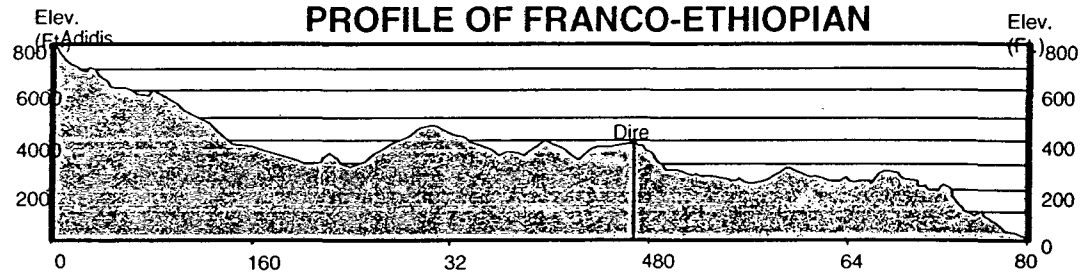
[4] Singh J. (1964), *Transport Geography of South Bihar*, Varansi, page 66.
[5] Ullman, E.I. and Mayer, H., (1954) "*Transportation Geography, American geography*", New York, Syracuse Press.

Figure: 3.3 **Rail Profile**



Source: William A. Hance (1964) The Geography of Modern Africa New York, Columbia University Press

III.3 PIPELINES

Pipe lines are in use where there is need of supply of goods like oil, natural gas etc. "Pipe lines are much more limited in scope than any other form of transport since they only operate point to point in a set route and are capable of carrying only a small range of goods, principally oil natural gas and chemical products"[6]. As Ethiopia is one of the least developed countries where neither do they have Gas nor oil it is natural that pipelines are not in use.

III.4 WATER WAYS

After the separation of Eritrea from it, Ethiopia has become a landlocked country. Being a landlocked country, Ethiopia depends on transit trade. For facilitating its transit trade; Ethiopia has concluded Port Utilization Agreement with Djibouti and Sudan. However, nowadays Ethiopia mainly uses the port of Djibouti. A geographical feature of Ethiopia does not allow inland and marine transport system. Both type of water transport are mentioned below.

Inland Waterways

Ethiopia has no significant navigable waterways, although limited ferry service is available on Lake Tana. The Baro and Awash rivers are navigable only in the rainy season. Because of falls, cataracts and rapids, Abay River is not navigable.

[6] Knowled & Warwing (1996), *Social Economic and Geography*, Culcutta, Rupa & Co. pp. 104.

Low technology and financial constraints is major obstacle to development lock system like St. Lawrence River.

III.5 AIR TRANSPORT

Air transport is one of the modes of passenger and freight transport in Ethiopia .The large size of the country, coupled with its geographically diverse resources and resource potentials encourage extensive use of air craft for speedy, long and medium distance carriage. Ethiopia being a landlocked country, Air Transport is of strategic importance to the nation as it guarantees an alternative gateway to the rest of the world. Air Transport is relatively independent of physical barriers such as mountain ranges, though of course, this dependence to a large extent determines the size and range of the aircraft employed.

As Sealy argues about Ethiopian airways, "air transport is much concerned with the relationship of the land masses and with the shortest and most direct routes between them."[7]But air transport has huge economic cost which limits its intensive development in poor economies viz. Ethiopia.

III.5.1 Civil Aviation and Airports

Airport has not made any significant headway in Ethiopia. At present Ethiopia have two international airports in Addis Ababa and Dire Dawa and some 40 airfields elsewhere. The development of Addis Ababa and Dire Dawa airport was effected mainly because of initiative taken by the rulers of the erstwhile states besides this important airport, in 2000–2001; Ethiopian Airlines carried nearly 1million passengers.

Ethiopia's new and upgraded airports facilitate the transport of goods and encourage investment. There are now two international airports – Addis Ababa and Dire Dawa both have seen an encouraging increase in passenger and freight transport over the last few years. New passenger and cargo terminals have been built at Dire Dawa airport and are now fully operational. Smaller airports such as Bahir Dar have been upgraded. In order to encourage tourism, five major airports–Arba Minch,

[7] Sealy, (1965), "Geography of Air Transport", London, Hutchinson University Press, pp.4.

Lalibela, Mekele, Axum and Gondar have been singled out for upgrading; improvements at the first three airports are already complete. The opening of the new airport at Arba Minch has opened up wide-ranging economic opportunities for the lush south.name of major airport is given in the figure 3.4.

Upgrading works have also been completed at Semera, Robe (Goba) and Jijiga, Asosa, Combolcha (Dessie), Shire, Negelle, Kebri Dar, Shilabo, Humera, Gambella and Shire airfields.

III.5.2 Distribution of Air Ports

III.5.2.1 International Air Port

Ethiopia has only two international airports. They are mentioned below:

Location of Addis Ababa Air port

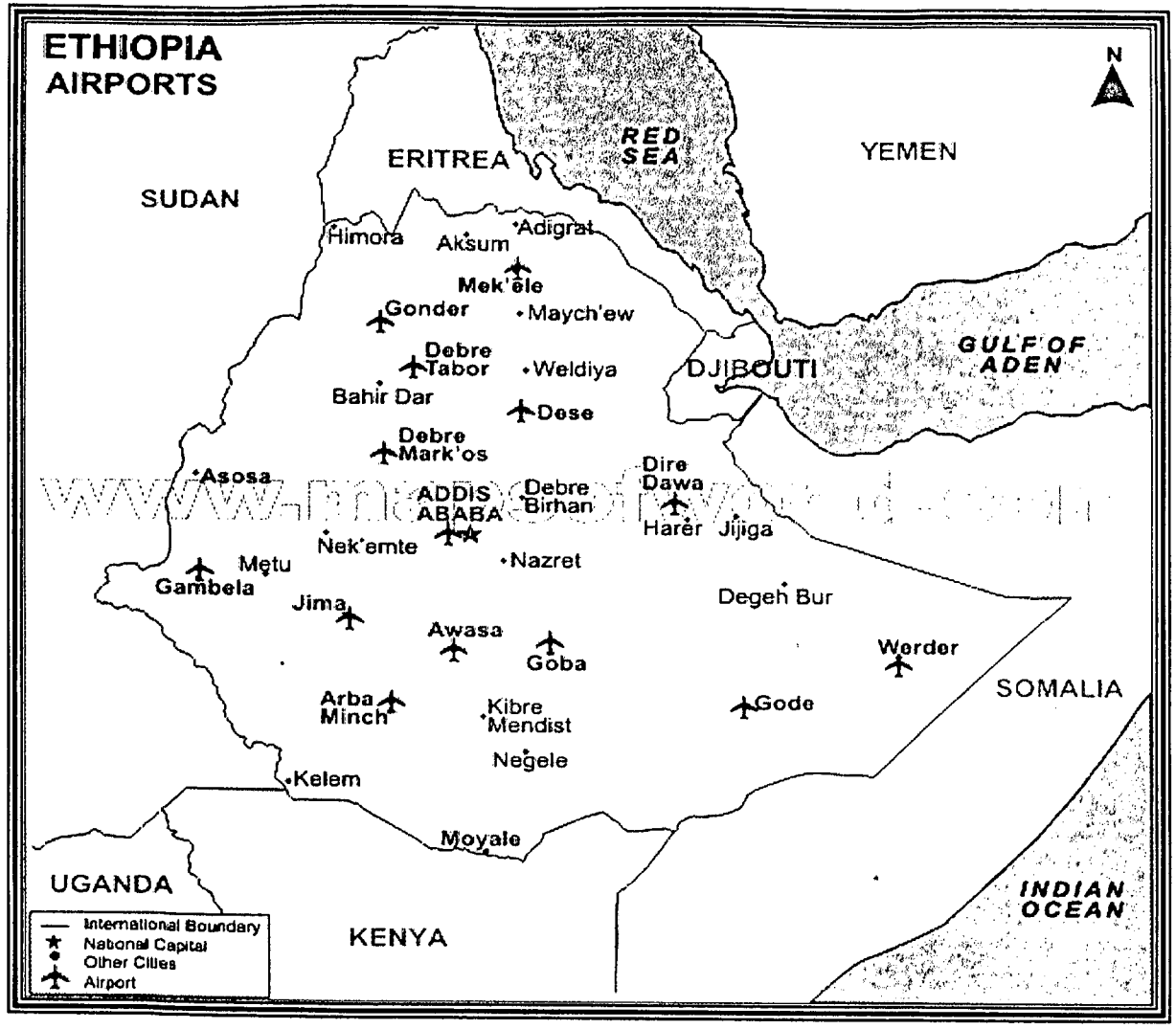
Addis Ababa airport is called Bole International Airport In the light of the aforesaid observation the airport of Addis Ababa shows the best possible location it is situated east of the rift valley. Sufficient space near the present site is available for expansion to meet the future needs of air traffic. This upwind site avoids the smokes of the city, which would have obstructed visibility.

In respect to economic consideration, the site is ideal. It is located in close proximity of the government offices and the main business centre of the city. It has the advantage of the being served by the rail route and roadways. Bole International Airport in Addis Ababa handles 95 percent of all international air traffic and 85 percent of domestic flights of the country. A major renovation and expansion of Bole was completed in 2002.

Location of Dire Dawa Air port

Dire Dawa is situated in Middle East part of Ethiopia. The city receives considerable air traffic, as it is one of the important air stations in the eastern part of the country. Though, it is necessary to ensure adequate space for its growing needs.

Fig.3.4 Ethiopia Airports



Source: http://www.mapsofworld.com/international-airports/africa/ethiopia.jpg

III.2.2 Domestic Airport

Ethiopian's domestic route network spreads all over the country bringing provincial and administrative cities within easy reach of the capital and the regional commercial centers. In addition, there is a daily 'historic route service' for tourists to the country's world famous ancient historic sites of Axum, Bahr Dar, Gondar and Lalibela which feature Obelisks and Churches.

As a way of letting the people of the world share the many wonderful tourist destinations in Ethiopia, Ethiopian airlines has set up a series of special tour programs designed to allow visitors to choose the activities and locations that interest them most, ensuring that everyone makes the most of the time they spend there. But, the domestic airways mainly cater to the need of the foreign tourists coming to the country as the general public uses mainly road transport system an Arba Minch, Dessie, Goba, Jijiga, Dire Dawa, Debre, Tabor, Lalibela and Gambella.

III.5.3 Institutional Responsibilities for the Air Transport

Ethiopia is believed to be one of the first nations in Africa to adopt the air transport technology. Accordingly, the country was one of the founding members of the International Civil Aviation Organization (ICAO) by the year 1944.

It provides the most efficient and quickest transport means to and from the aviation the Civil Aviation Authority (CAA), which was established by the 1991 Civil Aviation Statute, manages industry in Ethiopia. CAA is the government agency charged with the regulation and development of the air transport industry in Ethiopia.

III.6 COMMUNICATIONS

All forms of transport are often referred to as lines of communication but in fact there is clear distinction between transport and communications. "Transport involves the physical carriage of goods or people from place to place, while communication only involves the transmission of words and message."[8]

[8] Goh Cheng Leong & Gillian c. Morgan (1982), "Human And Economic Geography", London, Oxford University Press, pp.610

III.6.1 Telecommunications

The rise of telecommunications is linked with the rise of electrical technology. Telecommunication caused a revolution in communication system because of the speed with which message could be sent.

Table 3.2 **Present Communication facility in Ethiopia**

1.	Telephones - main lines in use:	435,000 (2003)
2.	Telephones - mobile cellular:	97,800 (2003)
3.	Telephone system:	General assessment: adequate for government use domestic: open-wire; microwave radio relay; radio communication in the HF, VHF, and UHF frequencies; two domestic satellites provide the national trunk service international: country code - 251; open-wire to Sudan and Djibouti; microwave radio relay to Kenya and Djibouti; satellite earth stations - 3 Intelsat (1 Atlantic Ocean and 2 Pacific Ocean)
4.	Radio broadcast stations:	AM 8, FM 0, shortwave 1 (2001)
5.	Television broadcast stations:	1 plus 24 repeaters (2002)
6.	Internet country code:	. Et
7.	Internet hosts:	9 (2003)

Source: http://www.cia.gov

III.6.2 Institutional Responsibilities for Communication

Ethiopian Telecommunications Authority (ETA)

Ethiopian Telecommunications Authority (ETA) manages telecommunication in Ethiopia. ETA is the government agency charged with the regulation and development of the telecommunication in Ethiopia. The Ethiopian

Telecommunications Agency is cognizant of ensuring high quality and a diversified range in telecommunication services at affordable prices for the consumers. To this end, ETA sets indicators for key areas of services, and determines standards of performance. Besides regularly monitoring, ETA is planning to commission independent surveys on consumer satisfaction to find out consumers' perceptions and attitudes towards service provision and check if standards set for operator(s) will have been met. ETA has also plan to constantly fine-tuning its standards to make sure services in Ethiopia rank among the best for efficiency and quality.

In short, the objectives of the Ethiopian Telecommunications Agency are to promote the development of high quality, efficient, reliable and affordable Telecommunication Services in the Country.

III.7 CONCLUSION

Transport and Communication networks are still in nascent stage in Ethiopia. The hilly terrain in various regions restricts the growth of railways in highland region. The development of air transport is restricted by poor nature of economy of the region. As we know that the Road density levels in Ethiopia are also one of the lowest in the world, which is far below African average standards. The integrated development of roads, railways and air transport is need of the hour considering the physical terrain and density of population in various regions of the country. For this, effective planning and development of various institutional networks is also very essential to develop forward and backward linkages in the economy of the country.

CHAPTER IV
FACTORS DETERMINING ETHIOPIA'S TRANNSPORT AND COMMUNICATIONS NETWORK

CHAPTER IV

FACTOR DETERMINING ETHIOPIA'S TRANNSPORT AND COMMUNICATION NETWORK

The systematic world model, that is the world as a system is based on the assumption that each element of the system is influenced by other elements and in turn influences other. This very understanding encourages a researcher to go for correlation among variety of factors and also to opt for regression analysis. It is also because a theoretical interpretation most of the time is blamed to be biased. Hence, it is better to go for statistical analyses. Also, that little change in the elements of transportation and communication and non availability of data, in general in the area of study i.e. Ethiopia along with the neighboring countries makes it difficult to come to a general conclusion along with a general trend. The correlation analysis is based on the following aspects given at the end in the appendix no. I. This chapter deals with the correlation among

- Agricultural workers,
- Industrial worker
- GDP per capita
- Oil consumption,
- Literacy,
- Population density,
- Rail density
- Road density,
- Railway availability per thousand population
- Road availability per thousand population,
- Telephone lines per thousand population
- Mobile users per thousand population,
- Television users per thousand population
- P C users per thousand population,
- Internet users per thousand population,
- Radio users per thousand population and

- Export value per thousand population (refer to table no.)

Most of the raw data like number of telephone lines has been processed as telephone lines per thousand populations, because it has meaning only when it is standardized. Otherwise a country with larger population, in general, will have more telephone lines and the correlation will be unexpectedly incorrect.

Appendix no. II shows that the correlation between agricultural workers and industrial workers is very low -0.92 and that also highly significant at 1% significance level. It happens because both of them are part of the whole i.e. 100% and that when one will increase other will have to give way.

The correlation between oil consumption and agricultural laborers' share in total labor force is although positive but not very good. This shows that the agricultural community is not very much oil dependent. Almost same is the case with oil consumption and GDP per capita. This certainly points out towards lesser oil dependency of larger population, which is poor.

The value of correlation between GDP per capita and share of agricultural labourers is quite high (0.53), while it is quite low i.e. –0.66 with GDP per capita and industry. This fact tells that the countries of the region are agricultural-based and by and large subsistence agricultural economy prevails.

The low correlation between literacy and agricultural and GDP per capital can be easily interpreted as that the agricultural community is less literate and also that the GDP per capita has a larger share from illiterate or agricultural community. A relatively good correlation between oil consumption and literacy says that literate population, which is certain to have higher wages, must probably own modern means of transport and hence consumes more oil/energy.

Correlation figure with population density is high with agricultural community mostly on account of high labor pressure on farmland and also due to lesser literacy

among agriculturist that hinders their understanding about negative impacts of higher population growth. The high negative correlation between population density and GDP per capital tells us that the dense areas has lower GDP per capita and thus it has lower share of GDP. The fact that the value of correlation between population density and literacy is positive but relatively small points out the fact that the dense areas are having lesser rate of literacy. The illiteracy can be the most plausible factor for higher density living in the area of lower living standard in least developed countries like the countries of the area under consideration.

The lower or even negative value of correlation between agricultural community and rail/ road density and rail/road availability points towards the fact that railways/ roadways are mostly linking the industrialized town and the agricultural area is lagging way behind.

Telephone lines per thousand population has significantly higher correlation with rail / road density which points towards the fact that there is a great regional disparity in the sense that the areas having better transport connectivity have better communication connectivity and vice versa. This makes the regional disparity worse as the developed regions are developing in a better way at the cost of least or less developed region.

Regression Analysis

Table: 4.1 **Main Result of Regression Analysis 2002**

	Standardized Coefficients Beta	**t**	**Significance level**
Export	0.759	1.493	0.274
Oil consumption	0.257	0.553	0.636
Population density	0.403	0.788	0.513
Adjusted R square	-0.064		

Dependent Variable: Rail Density

Table 4.2 depicts that the regression line for rail density (R) and export per thousand population (e), oil consumption (O) and population density (p) can be written as:

$$R = 0.00745E + 1.82 \times 10^{-10} O + 3.40\ 7\times 10^{-5} P - 3.15 \times 10^{-4}$$

This implies that for unit increase in rail density export increases by 0.00745 units while oil consumption increases and population density increases by 1.82×10^{-5} units and 3.407×10^{-5} respectively.

The study of the area shows that rail density has remained almost same in the area for last many years and taking this fact into consideration the coefficients may further decline in future if the condition remains the same.

The values of standard error are quite low and the value of significance is quite high and hence this whole equation can mathematically as well as statistically be easily accepted under various circumstances.

Table: 4.2 **Main Result of Regression Analysis 2002**

	Standardized coefficients	**t**	**Significance level**
Export	0.865	3.256	0.083
Oil consumption	0.291	1.194	0.355
Population density	-0.072	-0.270	0.812
Adjusted R square	0.709		

Dependent Variable: Rail availability

Taking rail availability per thousand (r) as a dependent variable and export per thousand population (E), oil consumption per day (O) and population density (P) as independent variable, we land up with regression line equation.

$$r = 0.352E + 8.53 \times 10^{-7} O - 2.53 \times 10\text{-}4\ P - 2.093 \times 10^{-2}$$
(0.108) (0.000) (0.001) (0.048)

This implies that rail availability is dependent considerably on export, also which, even if there is no increase in the value of independent variable the value of rail availability is supposed to go up though nominally as the value of constant is positive. Another remarkable fact is that with $2.53x10^{-4}$ decrease in population density, rail availability increases by one unit which implies that rail availability has negative correlation with population density i.e. rail availability is higher in less dense area and vice-versa.

Table: 4.3 **Main Result of Regression Analysis 2002**

	Standardized coefficients	**t**	**Significance level**
Export	0.928	2.298	0.148
Oil consumption	0.103	0.279	0.806
Population density	0.373	0.917	0.456
Adjusted R square	0.328		

Dependent Variable: Road Density

Statistical analysis of road density (road_den) vis-à-vis export value per thousand population (E), daily oil consumption (O) and population density (P) reveals that the coefficient as well as the constant for the regression line taking road density to be a dependent variable and other variables to be independent is all positive. The equation of the required regression line in as follows (refer table):

$$road\_den = 0.203\ E + 1.63\times 10^{-7}\ O + 7.02 \times 10^{-4}\ P + 5.775 \times 10^{-3}$$

The standard error as well as the significance value is quite acceptable and hence the equation is acceptable in variety of circumstances in the region under consideration. The equation tells us that for every 0.203 unit increase in export value per thousand or 1.63×10^{-7} unit increase in oil consumption per day or even 7.02×10^{-4} units increase in population density points towards an increase in unit road density in the area. From this,

it can also be inferred that population density is the most prominent variable among all independent variables.

Table: 4.4 **Main Result of Regression Analysis 2002**

	Standardized Coefficients Beta	**t**	**Significance level**
Industry	0.648	2.678	0.228
Literacy	-0.046	-0.346	0.788
Population density	-0.468	-2.170	0.275
GDP per capita	0.737	2.655	0.229
Adjusted R square	0.928		

Dependent Variable: Telephone per Thousand

A sincere study of table no 4.4 reveals that the equation of regression line between telephone user per thousand population.(telephone) and industrial workers' share (I), literacy (L), population density (p) and GDP per capital (G) is

$$Tel = 2.346\ I - 2.36 \times 10^{-2}\ L - 0.131P + 9.603 \times 10^{-3} G - 8.442$$

Here, we did not take industrial and agricultural workers share in labour market simultaneously because there is a high negative correlation between them and simultaneous acceptance of both as independent variable creates the most rise chance of multicolliniarity

The aforementioned equation tells that rise in industrial workers share in labour market and decreases in literacy and population density promotes the number of telephone users in the region. This points towards under development of the region as in developed region telephone or other communication system has high positive coefficient with population density and literacy.

The analysis of Internet users per thousand populations (in) as dependent communication variable and industrial workers' share (I), population Density (P) and GDP per capita (G) as independent variable for Ethiopia and neighbouring countries,

reveals some interesting facts about the region. The regression line for the aforementioned variable has following equation

$$in = 0.982I + 0.752\ L - 8.752 \times 10^{-2}\ P - 4.08 \times 10^{-4}\ G - 32.51\ O$$

Table: 4.5 **Main Result of Regression Analysis 2002**

	Standardized Coefficients Beta	**t**	**Significance level**
Industry	.159	0.180	0.886
Literacy	.869	1.780	0.326
Population density	-.133	-0.168	0.894
GDP per capita	.018	0.018	0.988
Adjusted R square	.040		

Dependent Variable: Internet users per thousand population,

In this equation, the standard error is very high for constant of equation and quite considerably positive high for industrial workers share, which makes the equation acceptable with statistical limitations.

The equation tells us that internet users are mostly industrial workers, literate persons and the population having high income and that areas having higher population density which is normally agricultural region has low internet penetration. This implies that area under consideration is mostly agricultural.

CONCLUSION:

An in-depth systemic analysis of Ethiopia and surrounding countries takes us to the tragedy of correlation once again to some extent. As in correlation, it is hard to find out which variable is dependent and which variables are independent. Here, our study of the area and the general understanding prompts us to think that systematic approach is the best approach to study this area. A sincere study shows that it is the underdevelopment of transport and communication in the highly dense areas that hampers the development of those area and at the same time the low income group families staying in highly dense areas are not able to pressurize and create sufficient and even efficient demand to develop

the infrastructure in such area and, in this it is hard to say mathematically whether it is the lesser development of infrastructure like that of transport and communication which is causing the underdevelopment of the area or the vice-versa. But, geographically as well as practically one can very safely say that there is a high regional disparity which results in the development of the developed area at the cost of less or least developed areas which normally happen to be agricultural and densely populated areas.

CHAPTER V
TRAFFIC FLOW

CHAPTER V

TRAFFIC FLOW

Traffic is the most important aspect of any transportation system. The flow of traffic reveals the spatial movement of passenger and goods. Hence, traffic is the core element of any circulation system, which reflects the complexities of economic interdependence. The ease of moving things over the Earth is related to the volume of traffic and the arrangement of economic activities of all kinds. Therefore, in order to establish connection between areas and the nature of spatial interchange, it is necessary to find some way of measuring and mapping the flow of traffic including the volume and speed of movement and its origin and destination[1]. The fright and passenger are the two main heads of traffic managed by roads, railways, aviation, and marine transport. In the present chapter these four forms of traffic have been dealt separately as both have quite distinct features on roads railways aviation and marine transport.

Power Driven and Non Power Driven Traffic

Traffic carrying of road is closely related to the modes of traffic in use along various roads. All modes of movement of passenger and gods slow and fast, occupy the same road space. Inter- mixing of various modes of transportation depending on their proportion reduces the traffic-carrying capacity of the roads. Traffic study are, therefore necessary to investigate various modes of traffic and their changing trends according to the energy used in moving the vehicles, transport can be classified in four categories: human energy, animal energy mechanical energy, and air energy. Transport by packed drought animals continues to occupy an important place in more than 75 % of Ethiopia.

[1] Ullman, E.L. and Mayer, H., (1954) "American geography: Inventory and Prospects", New York, R.E. James and Jons Syracuse Press. , pp.312.

V.1 ROAD TRAFFIC FLOW

This is the most important source of transport in the country and it will continue to play a dominant role in the foreseeable future. Road transport handles both freight and passenger in large volume, the road transport is much more important in Ethiopia. There is an inadequacy of accurate data regarding road traffic. Road transport covers 97% and 90.5% of the total domestic passenger and freight service respectively delivered by motorized means of transportation in the country. Road traffic characteristics are more complex than railway in many ways. It has complex structure, highly variable volume and large range of movement, origin and destination.

V.1.1 Passenger Service

Transportation by bus is the most popular mode among the various modes of passenger transport locally used on land. An unofficial estimate is that 97% of the passengers in the country are moved domestically by road. Public commercial vehicles registered to provide public transport services throughout the country are classified into three categories on the basis of their capacity. They are:

- Mini-buses which carry less than 20 people
- Midi- bus that carries 20-44 passengers,
- Maxi buses that carry more than 44 passengers.

The maxi bus is the most popular as it is cheaper than the midi or the mini bus. The maxi bus costs a third of the mini bus fare.

V.1.2 Freight Service

Road traffic can be grouped into two distinct classes i.e. passenger and goods, both having altogether different characteristics. Even in passenger traffic there are

many types of vehicles with varying capacity and range of movement such as bicycles, rickshaws taxi buses and cars. The current of conveyances of various waves – lengths, joining and parting at will. Only bus services the most commonly used conveyance, have some consistency that lends itself to systematic description.

Road is the major form of freight transportation. 90.5% of the freight in the country is transported using road transport. Ninety percent of the freight in the country was transported by road in 1998. There were nearly 10127 vehicles for freight transport. Among these vehicles, the proportion of government owned is very low only about 4%. Private firms own the rest.

In Ethiopia a considerable volume of goods traffic is in the nature of transit traffic. The main items of freight traffic are coffee, cotton food grain, etc. All these commodities together flow on the federal and regional roads. The coffee and food grain is the most important freight movement at present is that of food grains.

V.1.3 City Service

The bus has become a part and parcel of modern city life. It caters to certain demands of city dwellers with its cheapness and frequency of service. The development of colonies away from the places of work and creation and shopping centers makes the establishment of a cheap and efficient system of city transportation imperative.

In Ethiopia urban transport service in the urban areas and is provided by buses, bicycles and carts. Mini bus service is limited to a few areas in the countryside are mostly privately owned. Maxi buses are only available in Addis Ababa and Jimma. All maxi buses owned by the government Carts are mostly used by the urban poor. In cities where there are maxi buses the poor rely on these for Transport. The

city buses are operated by Anbessa city bus enterprise that is owned by the government.

The rise in passenger and freight service was partly achieved by the change in policy made by the government in 1992 to solve the problems concerning transport of persons and goods. Due to this close to 20636 vehicles, for public and freight transport, have been imported.

The price that vehicle owners charge per kilometer and for freight per kilogram was improved after some amendment to the policy. Except maxi-buses, fares are set based on negotiation between vehicle owners and their client after the policy amendments. For maxi-buses it is the Ministry of Transport and Communication that sets fares.

V.1.4 The Factor behind the Road Traffic Flow

Traffic flow is not an isolated element in transport system. It is affected by many factors and in turn affects many others. It is better to find out the factors that affect the traffic flow .the factors that affect the traffic flow can be classified under the following headings:

V.1.4.1 Physical Factor

Normally the slope gradient decreases due to the topographical complicity and diversity which acts as impediment in the smooth transport system. Ethiopia is replete with sloppy topography. Traffic system gets disturbed due to the uneven physical factors. This translates in to accidental. High cost of traveling and longer duration of time, that influences traffic flow. We find a smooth traffic flow in the Abay basin and rift valley region in complexity of topography.

Human actor-

Man and traffic flow both are related to each other, because the economic activities are conducted and controlled by man. Ethiopia inhabits many tribes in the least urbanized areas, which influences the traffic flow. Because of the diversity in the lifestyle and languages people tend to be less attracted to the people of other community. Due to the lack of urbanization these are the deficient secondary and tertiary services in Ethiopia as a result traffic flow is not sufficiently encouraged.

V.1.4.2 Economic Factor

Economic activities accelerate the traffic flow. Same of them are agriculture; mining and industry etc. In the area of agriculture Ethiopia is backward. Products like khats, coffee, and fruits and honey influences the road freight traffic.

V.1.4.3 Vehicles

The different modes of transportation, e.g. Passenger cares, Lorries, vans, Motorcycles, mopeds, Road tractors, Buses and coaches are very less in number in Ethiopia. When we compare it with other neighboring countries ten we find that there are 18 vehicles per one thousand persons in the neighboring country Djibouti's.

VEHICLES OWNER SHIP IN HORN OF AFRICA

Vehicles include all forms of road transportation, except buses. Horn of Africa has very least ownership in Africa.

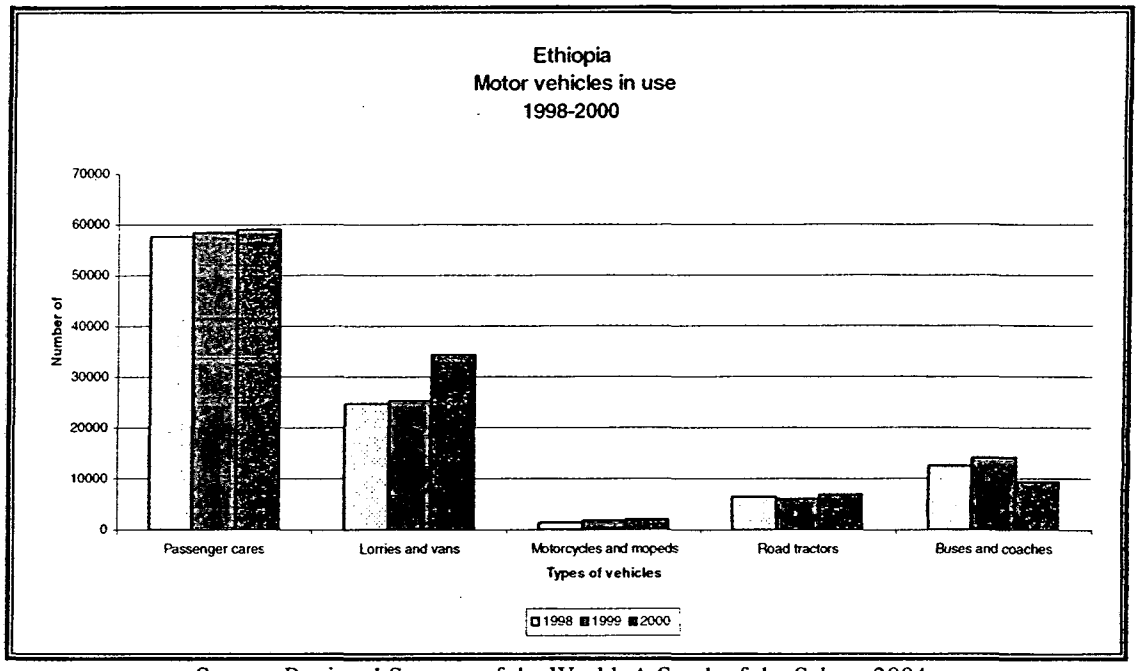
Table: 5.1

Distribution of Vehicles Owner Ship by Horn of Africa

Country	1996 (Unit per 1000 person)	1996 (Unit per 1000 person)
Djibouti	17	18
Eritrea	2	2
Ethiopia	1	1
Somalia	1	1

Source: African Development Indicters. World Bank Africa Data Base (2004) page 255.

Fig 5.1 **Number of Vehicles**



Source: Regional Surveys of the World, A South of the Sahara 2004.

When we analyze the prevalence of vehicles in Ethiopia, then we find that the total number of vesicles in 1998 was 102883. This number increased to 105850 in 1999. When we study the types of vehicles then we find that the number of passenger cares in 1998 was 57666 that became 58528 in 1999 and 59048 in 2000. No off Lories and vans was 24761 in 1998, 25364 in 1999 an 343555 in 20000. Similarly, the no of motorcycles and mopeds in 1999 was and in 2000.

V.1.4.4 Role of Bridges and Tunnel

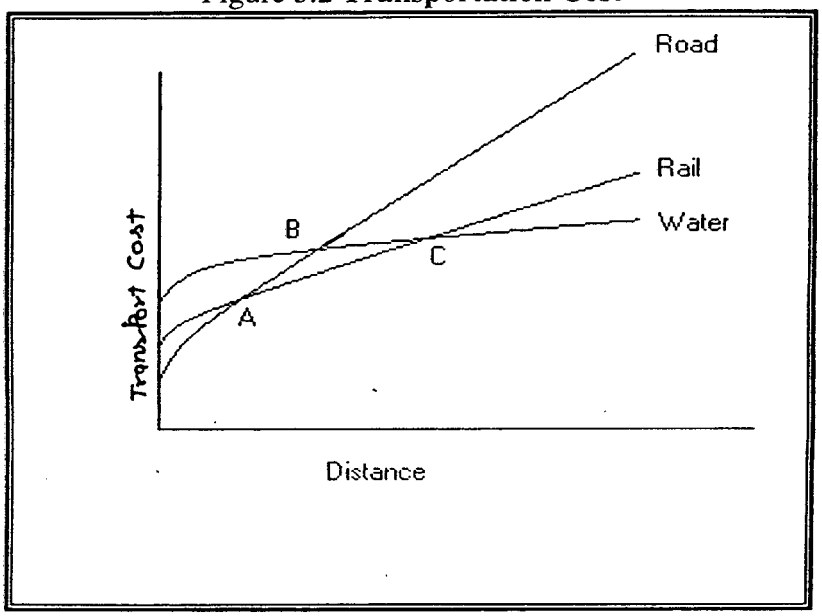
The various roads of the area under study are provided with a number of bridges on river and streams. The rivers perform a dual contradictory function in effecting spatial intra- action. Some serve as regional bonds. But others prove to be great regional barriers. For example, most of the rivers of Ethiopia such as Abay (Blue Nile), Baro, Omo, and Shebele etc. prevent any movement across them unless they are bridged. Thus bridges have assumed a vital importance in the growth of road

transport in the region. The correlation between the construction of bridges and the growth of road traffic clearly brings out their importance.

V.1.4.5 Transportation Cost

In Ethiopia we find greater dependence on road traffic because other means of transport E.G railways, airways and waterways is not much developed here. The following graphs also show the some trend.

Figure 5.2 **Transportation Cost**



Source: Knowled R. and Wareing J., (1996), "Economic and Social Geography", Calcutta, Rupa & Co.

The graphs here present a comparative view of the cost factor with regards to road, rail and waterways. In the graph we find that the cost of transport increases in case of road transport with increases in the distance traveled. Road transport thus is more sided for primary or lesser distance. As Ethiopia is mainly agricultural based economy, so we find that there is greater dependence on road transport as the industrial activities are very limited.

V.2 RAIL TRAFFIC FLOW

Railways traffic is very important for the over all study of traffic flow in Ethiopia. The Franco- Ethiopian railway caters to the need of both passenger and freight transportation. in the given table there is a year wise description of passenger and freight services. Here the growth rates of passenger services were 6.37% and (-) 10.18% in the years 1996/ 1997 and 1997/1998 respectively. Where as the, growth rate of freight services were in 1996/ 1997 and 1997/1998 –15.09% and 28.89% respectively.

Table: 5.2

Railway traffic Addis Ababa – Djibouti

Addis Ababa – Djibouti	**1996/97**	**1997/98**	**1998/99**
Passenger- km (million)	157	167	150
Freight (million net ton _ km)	106	90	116

Source: Regional Surveys of The World a South of the Sahara 2004.

The Franco Ethiopian railway is known for its passenger services. It is mainly due to the high population density in the rift valley region. The study of origin and destination of rail traffic is very important as it provides insight into several aspect of transport as it provides a direction of movement of commodities, length of haul and he nature of inter–regional spatial–interaction. This aspect is of vital importance for studying the problem and planning of future transportation.

There are four major centers in this route. Approximately 90 percent of the total traffic originated at these centers. The important traffic originating centers are Dire Dawa, Addis Abab, Dijibouti. All these important places in the region have satisfactory rail transport facilities. The rate of growth of traffic has been steady through-out the region.

V.2.1 The Factor behind the Rail Traffic Flow

The following are the main factors responsible for the variation in the main factor flow in the region:

V.2.1.1 Relation with Road Transport

As there is only one railway line in Ethiopia, the traffic flow of the Franco Ethiopian railway is influenced by the road transport system. As shown in the fig. no. 3.1 Franco–Ethiopian railway line connects through roads Dire Dawa, Addis Ababa.

V.2.1.2 Agricultural Production

Franco–Ethiopian railway line covers the regions of agro-products like cotton coffee, sugar cane etc. these products are transported to the markets through the railway. The world famous Ethiopian coffee reaches to its consumers through the Franco Ethiopian railway.

V.2.1.3 Relation with the sea

Franco Ethiopia railway line is concerned to the Djibouti port, which accelerates its traffic flow. From here the imported goods reach to the Ethiopian markets e.g. Dire Dawa, Addis Ababa etc.

The absence of other competing means of transport is responsible for the high rail freight density. The high freight density on the railways is mainly due to the absence of any cheap water transport facility for the movement of bulky products in the region.

V.2.1.4Patterns of Traffic Flow

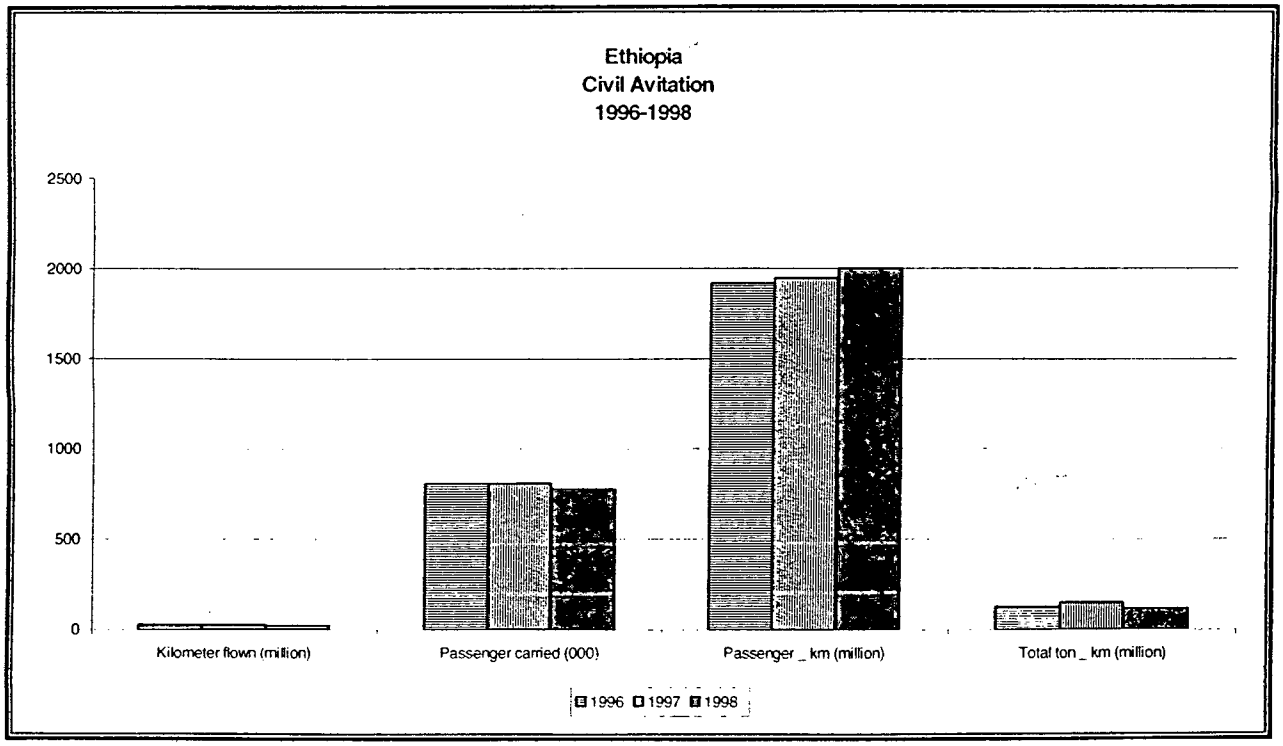
The following analysis of passenger and freight traffic leads to the following conclusions regarding the patterns of rail traffic flow in Ethiopia. The main lines passing through Ethiopia have mostly bridge traffic. Most of the passenger and goods trains pass through the region stopping only at a few important junctions. The railway

is a direct link for the land transport in all direction. Freight traffic is more predominant than the passenger traffic in the area under study. Coffee, limestone forest and agricultural products are the main items of freights traffic. These are exported to the different regions and outside the country.

V.3 AIR TRANSPORT

Ethiopia being a land lock country cannot connect it self to the global activities with out having a good airways. Ethiopia as an important place in terms of air transport in comparison to other African countries as it is evident from the table given below.

Fig no. 5.3 **Passengers and Freight Services**



Source: Regional Surveys of The World a South of the Sahara 2004.

V.3.1 Air Traffic and Tourist Flow

Ethiopia is better placed in terms of tourist flow as compared to othrer African countries. The Ethiopian government also tried to developed domestic ports which

help further in the tourist flow. Jimma, Dessie Dire, Dawa, Addis Ababa are the important air port who interact tourist flow of the Ethiopia

Table: 5.3

Tourist Arrivals

Country	Tourist Arrivals
Djibouti	20000
Eritrea	70335
Ethiopia	135954
Kenya	1036628
Somalia	10000
Sudan	39000

Source: Regional Surveys of the World, A South of the Sahara 2004

The relation between the air traffic and tourism is reciprocal. Air transport promotes tourism; tourism contributes to the economy the air transport through further investment.

V.4 WATER TRANSPORT

As air transport is important for the global connectedness, similarly, water transport is important for the global trade and commerce. Ethiopia is a land lock country, therefore it is not directly connected to the marine transport but it is indirectly connected at Djibouti and Mogadishu ports, which are connected to road and rail transport. After the partition of Eritrea to Ethiopia the marine transport of Ethiopia suffered a great loss.

As it is evident from the table given below-

Table: 5.7
Number of Vessels and Displacement Capacity

COUNTRY	No of vessels	Vessels Displacement
Djibouti	11	2691
Eritrea	12	20686
Ethiopia	9	81933
Kenya	36	19100
Somalia	17	6300
Sudan	17	32287

Source: Regional Surveys of The World a South of the Sahara 2004.

Table: 5.7
Merchant Fleet in Ethiopia

	2000	2001	2002
Number of vessels	12	9	9
Displacement (grt)	92,434	81933	81933

Source: Regional Surveys of The World a South of the Sahara 2004.

No. Of vessels have decreased since 2000, as it is evident from the table. As a consequence of the decrease in the number of vessels we find a corresponding decrease in the displacement.

Table: 5.8

International Sea-Borne Shipping

	1996/97	1997/98	1998/99
Goods loaded	242	201	313
Goods unloaded	777	1,155	947

Source: Regional Surveys of The World a South of the Sahara 2004.

Since 1997 there is continuous increase in the volume of goods loaded but the same is not true for the goods unloaded.

Ethiopia was, however increase its marine recall through better relation with its neighboring countries Sudan Somalia Djibouti Kenya and Ethiopia.

V.4.1The Factor behind the Marine Traffic Flow

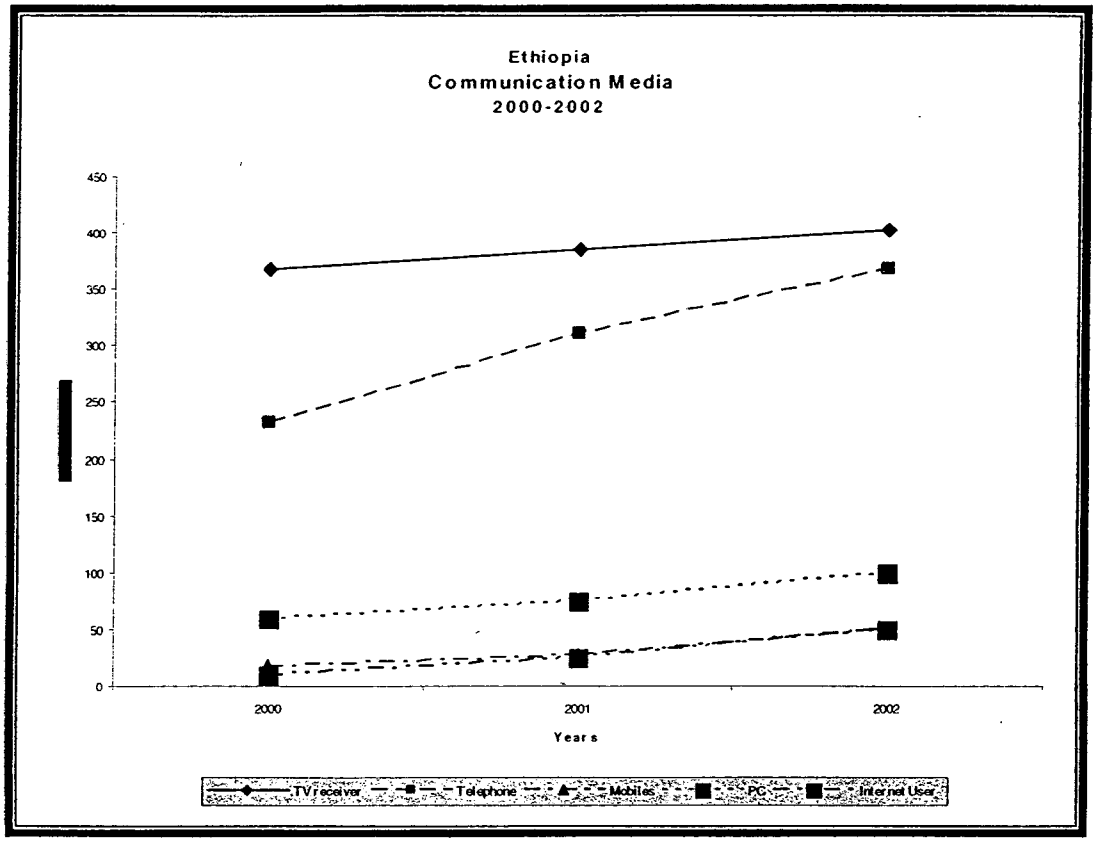
In brief, surface transport-comprising road, rail is the major system in use in Ethiopia. The air transport service is also growing. Surface transport contributed about 99.5% of the total domestic passenger and cargo traffic delivered by motorized means of transportation. Road transport accounts for more than 97% of this total. In line with the agricultural development Led industrialization policy, the transportation sector is recognized as having a crucial role to play in the sustainable development of the country.

Although road transport provides up to 97 % of the total domestic passenger and freight service in Ethiopia. The amount of tarred road is very low. The number of vehicles is also very low averaging two per thousands of population. How ever road transport will continue to dominate for a long time to come.

V.5 COMMUNICATIONS MEDIA

A Temporal Analysis

Fig No 5.4 **Ethiopia Communication Media**



Source: Regional Surveys of The World a South of the Sahara 2004.

When we analyses the prevalence of communication media in Ethiopia, then we find that the total growth rate of TV receiver, telephone, mobiles PC and Internet users between 2000 and 2001 was 4.90%, 33.68%, 54.49%, 25% and 150% respectively. While the corresponding figures for the next year were 4.42, 18.77, 83.27, 33.33 and 100 percent. It means that Ethiopia is increasingly catching up with the global revolution in communication media. The retarded growth in case of basic telephony and traditional T.V. receivers is a proof of this fact. This move is certainly appreciable as the new modes of communication are far more effective and efficient. A deeper study reveals that newer modes of communication has better penetration in educated and well-off class that is in a sense promoting laggers to work in the direction to enhance their status. The following table i.e. Table V.9 is a better visual representation of this fact:

FRIGHT TRAFFIC ORIGINATING

It is very important to find out the origin of the commodities terminating and the destination of those originating in a region as also the routes of their movement. The aspects of transportation by rail and road for the commodities flow in Ethiopia presented through a series of origin and destination centers.

The man center from which goods traffic originated in the region are Dire Dawa Addis Ababa Jimma the demand on railway transport is greatest from the commodities like coffee, cotton and other agricultural forest products, food grains gram and pulses, lime- stone and cement

Ethiopia is one of the largest producer countries in the world. It is believed to be the original home of Arabica coffee.[2] Jimma and Kaffa are the main production centers. They are the origination centres for the traffic of coffee. Ethiopia is also known for production of Khat, a plant that consists of the green to purple leaves. It is chewed for its stimulating properties in East Africa. Wando plane in Ethiopia is famous for fruits and vegetables. Main crops are tomato, canned peas, and beans.

V.6 TRAFFIC OF COMPLEX MOVEMENTS

Although every commodity has a complexity of movement but its intensity widely differs, e.g. coffee, gypsum, salt cotton is imported in huge amount but a little amount is also exported. There are commodities like rice, wheat, Millet etc. oil and oil seeds, which have similar movement both in amount and directions of flow.

[2] William A. Hance. (1964),"*The Geography of Modern Africa*". New York, Columbia University Press, pp..357

V.7 RAIL ROAD AND AIR COORDINATION

Coordination in the field of transport is a relation between two or more transport agencies of similar nature like two or more railways system or dissimilar as a railway system and a bus company. The chief aim of transport coordination is to provide the consumer with services at minimum cost through the elimination of technically inefficient methods. In Ethiopia the question of coordination among air, railways and motor transport is tackled in a very limited sense without any long range perspective. But for the planned economic development the importance of transport coordination is very great because the economic property depends upon on unhampered movement of men and material.

V.8 ECONOMIC ASPECTS OF TRANSPORTATION AND COMMUNICATION

The role of transport as an integral part of the economics system is widely recognized. The cheap and efficient transport is indispensable for economic development of a region. Different modes of transport such as railways, in land waterways and civil aviation all contribute to such development separately as well as collectively. These transport system have their economics, technical and organizational aspects of transportation have been examined.

The transportation routes and traffic patterns are very helpful in determining the economy of the region. Ethiopia has vast forest, power and agricultural resource s. the region has rich fertile black soil as the base and receives adequate rainfall for the production of wheat, jowar coffee cotton. It is also rich in waterpower resource.

A vast increase in road transport services are essential for integrating the large rural sector of the economy with the urban and industrial sectors and for opening up isolated and under developed regions. The inland water transport and air transport

have very little to contribute to the existing transport facilities in the regions. Thus transport in Ethiopia is also to be developed essentially as an economic overhead.

Every means of transport has its own sphere of economic services as also its limitations. There are two other aspects of transportation, e.g. first competition and co- coordination between different media of transport, and second freight rate structures.

V.9 CONCLUSION

As nations grow, there is continuing increase in the need for transport. Modernization of agriculture requires supplying tools, machinery and fertilizer to rural farms and moving food and other products to the consumers. Increasing industrial production means bringing together greater volumes of finished goods to the consumer. Expanding output may be accompanied by an extension of the area from which materials are assembled, as well as the area over which the increasing production is marketed. The number of goods exchanged will multiply with increasing specialization and rising income. Thus the increase in freight movement in freight is faster than the increase in GNP.

Development of new technology and substantial use of conventional mode of transportation are pre-requisite of development of Ethiopia. There is also a need to develop transport infrastructure by renovation and initiating new project despite financial constrain and low technology with undulating topography. Other measures of developments are political stability, FDI with infrastructure improvement to strengthen the economic stability. Infrastructure and transport and communication network system are apparently helpful in economic growth and human development as it is proved upper mentioned paragraph.

The politico-geographic aspects of any country like political, economic and social conditions are influenced by the kind of traffic flow a country has. This influence may be direct or indirect. Traffic system also determines to a certain extent the electoral politics, ethnic relation among different communities aspects related to political geography.

CHAPTER VI
CONCLUSION

CHAPTER VI

CONCLUSION

It has been attempted in this study to identify the spatial factors behind poor transport and communications system of Ethiopia. It is clear from this study that Ethiopia has neither a better transport system than the ones in its neighboring countries, nor is the rate of development of the system very encouraging. It is also clear from the study that the reason behind the dependence on road transport is the complex spatial feature of the country. In this chapter it has been described the problem and possibilities of transportation system in brief.

VI.1 PROBLEM

Ethiopia's physical features together with the political condition are in the root of the backwardness of the country. Being a multi ethnic country, it fails to gain an amicable environment for all the different communities. This creates a further problem for the promotion of transport and communication, as they prepare only amidst the peaceful environment. Ethiopia is a poor country; hence it invests its main energy in the maintenance of its primary needs. It ranks very low even among economically weaker countries.

Another problem is the lack of coordination among different ministries, departments of Ethiopian government, e.g. transport, water, home affairs, regional administration and local government. The following is the description of the problems related to the transport and communication.

VI.1.1 ROAD

Road transport plays important role in a country like Ethiopia, which has otherwise adverse surface features. As road transport has better accessibility in this situation than rail or water transport accessibility. In the present study, the following problems have been identified in the Ethiopian transport systems:

VI.1.1.2 Lack of Bridges and Paved Roads

Paved roads and bridges constitute a fast transportation system. As described in the chapter third about the roads in Ethiopia, there is a lack of paved roads. Due to

adverse surface features there is not good number of bridges; which adversely affects the traffic flow. This aspect has been dealt with in chapter five.

VI.1.1.3 Lower No of Vehicles

Road transport is incomplete without vehicles. The greater the number of vehicles, the greater is the traffic flow. But, due to lack of vehicles the traffic flow and mobility is low.

VI.1.1.4 Co-Existence of Traffic

A variety of conveyance is seen moving on roads simultaneously. The old mode of conveyance i.e. bullock carts, existing with the modern vehicles are responsible for creating obstacles in the smooth flow of traffic. On any stretch of a road, bicycles, bullock carts, taxi, buses and trucks can be seen rivaling for the narrow carriage way, this creates great obstruction to the inter-regional motor vehicles.

VI.1.1.5 Organizational Problem

Efficient administration is very important to clear the impediments from the way of development ERA and RRA are two important agencies for the road development in Ethiopia. The fundamental problems with them are lack of capital, technology technical hands (engineer's and planners etc.) and lack of organizational structure. All these factors adversely affect the maintenance of roads building new bridges safe transportation etc.

VI.1.2 RAIL TRANSPORT

Ethiopia's physical features have mostly influenced the railways transport. In such a large country like this, availability of just a single railway line can be explained only in the reference with acute poverty and lower economic activities, other than its physical features. Even today, Ethiopian railway is run by old engines, which affects its mobility and traffic flow. This way the traffic flow is very low in the Ethiopian railway, as described in the chapter five.

VI.1.3 AIR TRANSPORT

Ethiopia has a population of 77.4 million, but, it has only two airports-international air port Addis Ababa and Dire Dawa. Both the air ports are located in one part of the country. The air fair is very high which directs its users. Like others institutions here, this also suffers from mismanagement. Due to these reasons, Ethiopia

has not been able to attract tourists as compared to other developing courtiers. These aspects have been discoursed in detail in chapter five.

Domestic airport suffers from infrastructural deficiency, which adversely affects it domestic economics activities and tourism. The Ethiopian airport authority has also funding handicap.

VI.1.4 WATER TRANSPORT

Efficient governmental polices together with favorable geographical features and economics activities are the foundation of water transport system. In Ethiopia, Abay river and Lake Tana are only navigable but as it is a land locked country, therefore, it does not have maritime transport. These aspects have been discussed in the present study by dividing the problems in different categories.

The main problem is the high slope with the rivers, which decelerates the navigability of the rivers. There is lack of cargo goods and institutional constrains in the development of rivers transportation.

Apart from being a landlocked country, Ethiopia also suffers from lack of ports and connectivity. These ports which are used for trade and commerce purposes lack efficient management. Ports like Dar-es-Slam and Mombassa are example of lack of proper administration; therefore Ethiopia is more dependent on Djibouti port.

VI.1.5 COMMUNICATION

Communication is a tertiary service, which owes its development to educational and technical development and capital. Ethiopian lacks in all the there named categories. This aspect has been discussed in the chapter four. The multi ethnic structure of the Ethiopian society is also responsible for the backwardness of communication, because from each other the linguistic differences are also problematic and create hurdle for communication.

VI.2 PROSPECTS

Ethiopia is land of possibilities, where properly planned policy can give a boost to development. The existing backwardness of Ethiopia is due to both geographical factor as well as man made.

VI.2.1 ROAD

As discussed in the chapter four, road transport is very essential for the development of all kinds of human activities, e.g. trade, education promotion programs etc. In Ethiopia, road transport is the dominant mode in transport. It can be further development by paying attention to the following factors:

VI.2.1.1Cattle Promotion

Even today, there is a greater reliance on animals for transportation. Therefore, it is important to see that there is a better yield of cattle and there are veternary hospitals for their proper care. Cattle are very useful for transportation purposes in inaccessible regions.

VI.2.1.2 Infrastructure Development

The length of federal, regional and community road should be increased. By making bridges on federal roads, traffic speed can be increased.

VI.2.1.3 Increase in the Number of Vehicles

By increasing the no of vehicles, the cost of transportation can be decreased. It will further promote the economic and commercial activities and it will help in the implementation of UN development programs.

VI.2.2 RAIL

The physical features of Ethiopia are not conducive to the development of railway transport. But, the Ethiopian government can create the following possibilities with the help of proper planning and help from neighboring countries.

VI.2.2.1 Creation of New Railway Lines

Presently, Ethiopia has only one railway line and that too is jointly owned by another country. Ethiopian government can learn from Indian experiment and can promote the private sector involvement to create and own another railway lines like the concern railway in India. In cooperation with Sudan and Somalia, Ethiopia can develop railway lines which would connect the ports Mogadishu, Port Sudan and Mombasa. This will promote the economic activities. The new railway lines can be made along the riverbanks also far example, along Shebeli River, Abay River etc.

VI.2.2.2 Modernization

Ethiopian railway can be made more efficient through incorporating the technological development, e.g. electrification, new locomotives etc.

VI.2.2.3 Road transport system should be promoted along with railway transport, which will jointly make the Ethiopian transport system more efficient.

VI.2.3 AIR TRANSPORT

Air transport is very well suited for a country like Ethiopia, which is land locked and has complex physical features. As a land locked country has no maritime space, and in case of Ethiopia, the geographical feature adds to the complexity of transport system, by making it more time consuming and costly.

In the third chapter-the domestic transport has been dealt. With the development of domestic airports, the economic activities will increase and it will help even the administrative activity.

Air services can play a vital role in the promotion of tourism in the region. The objective of development and profitability would, therefore, have to be carefully reconciled in the context of the wider national interest. The present economic and industrial requirements and future development over next few volume of air traffic needed to facilitate economic operations.

VI.2.4 WATER TRANSPORT

Ethiopia has least developed transport system, which can be bettered through efficient human efforts. For maritime transport Ethiopia has to remain dependent on its neighbors and there fore it should maintain a cordial relationship with its neighboring countries. Thereby it can connect its land role to the sea.

The Ethiopia government should create dry port near the sea routes of its neighboring countries, which will help in its trade and commerce. Ethiopia has little potential in the development of river transport but it can develop lake transport in the rift valley region, which in future will promote its tourism.

The above mentioned possibilities can be realized only with systematic and coordinated efforts on the part of government and its agencies. Government must therefore pay attention to the development of its organizational structure.

VI.2.5 COMMUNICATION

Means of communication, e.g. telephone, interest, TV, radio etc. transcend the boundaries of time and space. These technologies save both our time and money in a country like Ethiopia, which is so less developed; here is a great need of these technologies. The Ethiopian government can do a great service through interest connectivity, there by introducing and promoting e-governance, e–education e-health and therefore can overcome the difficulties of geographical complexity.

Radio, TV and print media etc. can go long way in serving the need of communication among different ethnic groups and in establishing a welfare state.

It is evident from the study that Ethiopia is a land of possibilities. The physical feature has adversely affected its development. But through better human skill and technological intervention desired result can be gained. This will strengthen Ethiopia politically, socially and economically. The development of transport and communications will go a long way in solving many of its long standing politico-geographical problems e.g. low life expectancy, food insecurity regional disparity, ethnic conflicts etc.

BIBLIOGRAPHY

United Nations, Government and Others Publications

- United Nations Conferences on Trade and Commerce on Development, Statistical Profiles of the Least Developed Countries 2001 New York
- Population Reference Bureau, World Population Data Sheet (2005), Washington D.C
- United Nations, African Statistical Year Book 2001 Volume-II
- World Bank Africa Data Base, 2004 African Development Indicators
- Regional Surveys of the World, A South of the Sahara, 2005, London, Europa Publication.

Books

- Abebe Zegeye & Siegfried Pausewang, (1994), *Ethiopia in Change Peasantry, Nationalism and Democracy*, New York, British Academic Press.
- A.M O'Connor, (1967), *An Economics Geography of East Africa* London G.bell &Sons:Ltd
- Agyeman-Duah, (1994), *The United States and Ethiopia: Military Assistance and the quest for Society 1953-1993*. Lanham, MD, University Press of America,
- Calpham, (1988) *Transformation and Continuity in Revolutionary Ethiopia.* Cambridge University.
- Crummy, D. (2001) *Land and Society in the Christian Kingdom of Ethiopia.* Chicago, University of Illinois Press
- Freeman Otis W. And Raup H. F. (1959) *Essential of Geography* New York Mcgraw –Hill Book Company, INC.
- Fukui, K, and Markakis, (1994) J. *Ethnicity and Conflict in the Horn of Africa.* London James Currey.
- Leong Goh Cheng and Gillian C. Morgan, (1986), *Human and Economic Geography*, Oxford University Press.

- Gebissa Ezekiel (2004), *Leaf Of Allah: Khat And Agricultural Transformation In Harerge,* Ethiopia 18-1991, London Oxford.
- Gurdon, C., (1994), *the Horn of Africa*, London University College London Press.
- Hansson, G., (1995), *The Ethiopian economy 1974-94*:London, Routledge,
- H.R. Jarrett, (1974), *Africa,* London, Macdonald& Evans Ltd
- Knowled R. and Wareing J., (1996), *Economic and Social Geography*, Culcutta, Rupa & Co.
- Mahmood Aslam, (1998), *Statistical Methods in Geographical Studies,* New Delhi, Rajesh Publications.
- Ofcansky, T.P., and Berry, L. (1991) *Ethiopia A Country Study.* Washington, DC, USGPO.
- Schwash, Peter, (1984), *Ethiopia: Politics Economics and Society.* London francs Pinter,
- Singh Jagdish (1964*) Transport Geography of South Bihar* Varanasi, Banarsh Hindu University.
- Singh Ram Briksh (1966) *Transport Geography of Uttar Pradesh,* Varanasi, the National Geographical Society of India BHU.
- Thommas M.F. and Whittington (1969) London Methuen & Co Ltd.
- Walter Fitzgerald. (1998) *Africa: a social, economic and political geography of its major regions*. London Methuen& Co Ltd.
- Wubneh, Mulatu. (1998) *Ethiopia: Transition and Development in the Horn of Africa.* Yohannis Abate Westview Press. Boulder.
- Zewde Bahru (2000) *A History of Modern Ethiopia 1855-1991,* London oxford.
- William A. Hance, (1964), *The Geography of Modern Africa,* New York, Columbia University Press.

Articles

- Abbink, J Beiefing, (1998) "The Eritrean-Ethiopian Border Dispute". *African Affairs*, Vol. 97(389): 551-565.

- Ahmed Mohamed M (2002), "Measurement And Sources Of Technical Efficiency Of Land Tenure Contracts In Ethiopia", *Environment And Development Economics*, Vol. (3): 507-527
- Asfaw Getie, (2000), "Food Security Issues in Ethiopia: Its Magnitude and Source of Food Insecurity", *IASSI Quarterly*, Vol.19 (1): 16-28.
- Badiane Ousmane and Shively Gerald E (1998) "Spatial Integration, Transport Costs, and the Response of Local Prices to Policy Change in Ghana". *Journal of Development Economics,* Vol. 56(2): 411- 431.
- Biles Peter, (2000), "Horn of Africa: To Great A Burden". *World today*, vol. 56(7): 5-6
- Brunnee Jutta and Tope Sephen J. (2002), "Changing Nile Basin Regime: Does Law Matter? Harverd" *International Law Journal*, Vol. 43(1): 105-159.
- Calohon, Craigethiopia's, (1999), "Ethiopia's Ethnic Cleansing", *Dissent*, and Vol.1: 47-50.
- Conway, Declan, (2000), *Climate and Hydrology of the Upper Blue Nile River.* Geographal Journal, Vol. 166 pp 49-62.
- Conard Kalus (1997) "Traffic Transportation, Infrastructure and Externalities", *Annals of Regional Science*, Vol. 31(4): 369-389.
- Cho Sungbin (2001), "Integrating Transportation Network And Regional Economic Models To Estimate The Costzs Of A Large Urban Earthquake", *Journal Of Regional Science*, Vol. 41(1): 39-65
- Chaudhury Prosenjit Dey, (2003) "Rail Road in Intercity Transport: Energy and Environmental Impact". *Economic and Political Weekly*, Vol.38 (42): 4423-4425.
- Dercon, Stefan, (1995), "On Market Integration and Liberalization: Method and Application to Ethiopia". *Journal Of Development Studies*, Vol. 32(1),:112-143
- Dercon, Stefan and krishanan Paramila, (2000), "Vulnerability, Seasonality And Poverty In Ethiopia", *Journal Of Development Studies*, Vol. 36(6): 25-53,
- Dobbie Leonie, (1999), "Airlines See Direct Link Between Improved Environmental Performance, Sustainable Growth". *ICAO Journal* Vol. 54(7) 15-17.

- Duranton, Gilles, (1998), "Labour Specialization, Transport Costs, and City Size". *Journal Of Regional Science*, Vol. 38(4) 553- 573
- Ezara Markos And Kiros Gebre-Egziabher, (2001), "Rural Out-Migration In The Drought Prone Areas Of Ethiopia: A Multi Level Analysis", *International Migration Review*, Vol. 35(3): 749-771
- Gupta Barnali (1999), "Strategic Choice of Location and Transport Mode in A Successive Monopoly Model", *Journal Of Regional Sciences* Vol. 39(3): 523-537.
- Hall Derek DR, (1999) "Conceptualizing Tourism Transport: Inequality and Externality Issues", *Journal of Transport Geography*, Vol. 7 (3): 181-188
- Holden Stein, (2001), "Market Imperfections And Land Productivity In The Ethiopian Highlands", *Journal Of Agricultural Economics*, Vol. 52(3): 53-70
- Ivy Russels L, (1995), "Restructuring Of Air Transport Linkages In The New Europe", *Professional Geographer*, Vol. 47(3): 280-288.
- Jayne, Thoms S,(2002) "Targeting Of Food Aid In Rural Ethiopia: Chronic Need Or Inertia?", *Journal Of Development Economics*, Vol. 68(2): 247-288
- Joireman, Sandra Fullerton,(1997) "Opposition Politics And Ethnicity In Ethiopia: We Will All Go Down Together"., *Journal Of Modern African Studies*, Vol. 35(3): 387-408
- Kaplin, Steven, (1999) "Can Ethiopia Change this Skin?" The Beta Israel (Ethiopian Jews) and Racial Discourse". *African Affairs*, Vol. 98(393), 1999: 535-550.
- Kilkenny Maureen, (1998), "Transport Costs and Rural Development". *Journal Of Regional Science*, Vol. 38(2): 293-312
- Lanz Toias J, (1996) "Environmental Degradation and Social Conflict in the Northern High Land of Ethiopia: The Case of the Tigray and Wollo Provinces". *African Today*, Vol. 43(2), 1996: 157-182
- Love Roy, (2001), "Ethiopian Coffe Filiere and Its Institutions: Cui Bono? *Review of African Political Economy*, Vol. 28(88): 225-230.

- Mekonnen Alemu, (2000), "Valuation of Community Forestry in Ethiopia: a Contingent Valuation Study of Rural Households." *Environment Economics*, Vol. 5(3): 289-309
- Mohan Dinesh And Tiwari Geetam, (1999), "Sustainable Transport Systems: Linkages Between Environmental Issues, Public Transport, Non –Motorised Transport And Safe", *Economic And Political Weekly,* Vol. 34(25): 1589-96
- Moriarty Patric and Beed, Clive S, (1989), Transport In Tropical Africa "*Journal Of Modern African Studies*", Vol. 27(1): 125-32
- Mori Tomoya and Nishikimi Koji, (2002), "Economics of Transport Density and Industrial Agglomeration". *Regional Science and Urban Economics,* Vol. 32(2): 167-200.
- Pankhurst Richard, (1999)' "Ethiopia the Aksum Obelisk, and the Return of Africa"s Cultural Heritage". *African Affairs*, Vol. 98(391):.229-239.
- Paul,James C N, (1998), "Human Rights and the Structure Of Security Forces In Constitutional Orders: The Case of Ethiopia", *International Commission of Jurists: The Review,* Vo. 60:135-166.
- Pedesen Poul Ove, (2001), "Freight Transport under Globalization and Its Impact on Africa" *Journal of Transport Geography*, Vol. 9(2) 85-99.
- Peeters Dominique, (1998), "Transportation Network And The Location Of Human Activities" *Geographical Analysis*, Vol. 30(4): 353-371
- Pradhan Bharat Bahadur (2000), "Development of Infrastructure in the Energy, Transport and Communications Sectors." *South Asian survey* Vol. 7(1): 79-89.
- Priemus Hugo, (2001), "Mobility and Spatial Dynamics: An Uneasy Relationship", *Journal of Transport Geography*, Vol. 9(3) 167-171.
- Ranasinghe, K D, (2000), "Improving Energy, Transport and Communication Infrastructure: The Case of Sri Lanka", *South Asian Survey*, Vol. 7(1) 55 -69
- Shiferaw, Bekele and Holden, Stein, (1999) "Soil Erosion and Smallholders Conservation Decisions in the High Land of Ethiopia", *World Development*, Vol.297 (4): 739-752.

- Stage Ole and Rekve Peter,(1998) "Food Security And Self-Sufficiency: The Economic Strategis Of Peseants In Eastern Ethiopia", *European Journal Of Development Research*, Vol. 10(1):189-200
- Stead Dominic, (2003), "Transport and Land-Use Planning Policy: Really Jointed Up?" *International Social Sciences Journal*, Vol.176: 333-47.
- Stuubbs John and Jegde Francis, (1998), "Integration of Rail and Air T4ansport in Britain", *Journal of Transport Geography* Vol. 6(1): 53-67.
- Tekkle Kebrom, (2001), "Natural Regeneration of Degraded Hillslopes in Southern Wello, Ethiopia: A Study Based On Permanent Plots" *Applied Geography*, Vol. 21(3): 275-300.
- Turner, Jeff and Kwakeyedward, (1996), "Transport And Survival Strategies In A Developing Economy: Case Evidence From Accra, Ghana", *Journal Of Transport Geography*, Vol. 4(3): 161-168
- Woube, Mengistu, (1999), "Flooding and Sustainable Land–Water Management in the Lower Baro-Akobo Basin, Ethiopia", *Applied Geography*, Vol.19 (1): 232-251.
- Woldemeskel, Getachew, (1989), "Consequence Of Resettlement In Ethiopia", *African Affairs*, Vol. 88(352): 359-374

Internet sources

- Oxford policy management, (2004), DFID rural and urban development case study – Ethiopia, [Online: Web] accessed 22may 2006 www.passlivelihoods.org.uk/site_files
- Djibouti (2006), The World Fact Book [Online: Web] accessed 20may 2006 URL:https://www.cia.gov/cia/publications/factbook/geos/dj.html
- Eritrea (2006), The World Fact Book [Online: Web] accessed 20may 2006 URL: https://www.cia.gov/cia/publications/factbook/geos/er.html
- Ethiopia (2006), The World Fact Book [Online: Web] accessed 20may 2006 URL:https://www.cia.gov/cia/publications/factbook/geos/et.html
- Kenya (2006), The World Fact Book [Online: Web] accessed 20may 2006 URL https://www.cia.gov/cia/publications/factbook/geos/ke.html

- Somalia (2006), The World Fact Book [Online: Web] accessed 20may 2006 URL: https://www.cia.gov/cia/publications/factbook/geos/so.html
- Sudan (2006), The World Fact Book [Online: Web] accessed 20may 2006 URL: https://www.cia.gov/cia/publications/factbook/geos/su.html

Appendix I

COUNTRY	Sudan	Somalia	Kenya	Ethiopia	Eritrea	Djibouti
Agriculture	80	71	75	80	80	75.17731
Industry	7	12	12	8	7	10.99291
Services	13	17	13	12	13	13.8
GDP per capita	2100	600	100	900	1000	1300
Oil Cons	70000	5000	52000	27000	4600	12000
Export	6989	241	3173	612	33.58	250
Telephone	1028900	200000	299300	435000	39300	11100
Mobile	1.00E+06	500000	3.00E+06	178000	20000	34500
Television	8500000	135000	768000	367000	100000	45000
Personal Computer	100000		150000	60000	6200	10000
Internet user	1140000	89000	1500000	113000	50000	9000
Radio	7550000	470000	6383000	11750000	345000	52000
Literacy	61.1	37.8	85.1	42.7	58.6	67.9
M_Lit	71.8	49.7	90.6	50.3	69.9	78
F_Lit	50.5	25.8	79.7	35.1	47.6	58.4
Railways	5995	0	2778	681	306	100
ROADWAYS	119000	22100	63942	33856	4010	2890
GDP	85.65	4.81	37.15	62.88	40471	0.619
POP	41236378	8863338	34707817	74777981	4786994	486530
Area	2505810	637657	582650	1127127	121320	23000

Source: www.cia.gov.

APPENDIX - II

	AGRICULTURE	INDUSTRY	GDPPER CAPITA	OIL_CONS	LITERACY	POP_DEN	RAIL-DEN	ROAD_DEN	RAIL_AVAIL	ROAD_AVAIL	TEL_P_T	MOB_P_T	TV_P_T	PC_P_T	INU_P_T	RADI_P_T	EXP_P_T
AGRICULTURE	1.00																
INDUSTRY	-0.92**	1.00															
GDPPER CAPITA	0.53	-0.66	1.00														
OIL_CONS	0.34	-0.20	0.32	1.00													
LITERACY	0.05	0.22	-0.15	0.47	1.00												
POP_DEN	0.37	-0.09	-0.54	0.12	0.21	1.00											
RAIL-DEN	0.03	0.23	-0.06	0.31	0.96**	0.12	1.00										
ROAD_DEN	-0.34	0.58	-0.18	0.15	0.79	0.00	0.86*	1.00									
RAIL_AVAIL	0.13	-0.03	0.55	0.28	0.60	-0.40	0.74	0.70	1.00								
ROAD_AVAIL	-0.41	0.41	0.34	-0.05	0.29	-0.64	0.46	0.71	0.81	1.00							
TEL_P_T	-0.39	0.19	0.57	0.11	-0.11	-0.93**	-0.03	0.17	0.51	0.75	1.00						
MOB_P_T	-0.80	0.89*	-0.36	0.05	0.50	-0.28	0.53	0.81	0.38	0.67	0.42	1.00					
TV_P_T	0.30	-0.36	0.86*	0.64	0.22	-0.57	0.23	0.14	0.70	0.48	0.69	0.03	1.00				
PC_P_T	-0.70	0.59	0.11	-0.33	0.33	-0.48	0.60	0.80	0.81	0.93*	0.56	0.70	0.18	1.00			
INU_P_T	-0.17	0.35	-0.14	0.68	0.87*	0.03	0.75	0.64	0.44	0.24	0.12	0.61	0.35	0.10	1.00		
RADI_P_T	0.43	-0.18	0.16	0.90*	0.52	0.45	0.39	0.27	0.26	-0.10	-0.17	0.01	0.41	-0.29	0.58	1.00	
EXP_P_T	-0.17	0.26	0.37	0.00	0.40	-0.42	0.59	0.77	0.89*	0.94**	0.56	0.55	0.47	0.96**	0.23	0.05	1.00

Correlation is significant at the 0.01 level (2-tailed)

Correlation is significant at the 0.05 level (2-tailed)

APPENDEX –III

Road Traffic

(Motor vehicles in use, year ending 7 July)

Type	1998	1999	2000
Passenger cares	57666	58528	59048
Lorries and vans	24761	25364	34355
Motorcycles and mopeds	1432	1743	2055
Road tractors	6421	6010	6809
Buses and coaches	12603	14205	9334
Total	**102883**	**105850**	**109546**

Source: Regional Surveys of the World. A South of the Sahara 2004.

APPENDEX -IV

Table: 5.4

Civil Aviation

	1996	1997	1998
Kilometer flown (million)	28	27	24
Passenger carried (000)	808	807	779
Passenger _ km (million)	1,915	1,944	1,999
Total ton _ km (million)	129	149	115

Source: Regional Surveys of The World a South of the Sahara 2004.

APPENDEX V

Users of Various Communication Media

	2000	2001	2002	Growth rate (2000-2001)	Growth rate (2001-2002)
TV receiver	367	385	402	4.90	4.42
Telephone	231.9	310	368.2	33.68	18.77
Mobiles	17.8	27.5	50.4	54.49	83.27
PC	60	75	100	25.00	33.33
Internet User	10	25	50	150.00	100.00

Source: Regional Surveys of The World a South of the Sahara 2004.