SPATIAL ASPECTS OF URBANIZATION IN ETHIOPIA (WITH EMPHASIS ON THE PRIMATE PATTERN OF URBAN DEVELOPMENT)

Mekete Belachew*

The history of urbanization in Ethiopia goes back to the pre-twentieth century. In the twentieth century the rate of urbanization was relatively accelerated largely due to the influence of the modern transport system and the Italian Occupation. Small towns dominate the urban scene in Ethiopia. Some noticeable progress has been made towards evening out the spatial distribution of the intermediate towns. Addis Ababa is still the uncontested primate city and an increasing primacy has been noted over time. Considerable regional variations in urban primacy have also been discovered. The distribution of the Ethiopian towns differed significantly from the rank-size distribution of towns. Nevertheless, in the not too-distant future the gap between the distribution of the Ethiopian towns and the rank-size distribution of towns is likely to narrow down.

I. INTRODUCTION

The development process in any country cannot be complete if efforts are concentrated on rural and agricultural development alone. This is because increased productivity within the rural sector can be sustained through simultaneous development in urban and industrial activities. Urban centers, in addition to providing social services for the rural population constitute the location for industrial enterprises engaged in the final stage of processing agricultural raw materials and serve as markets for food crops from the rural areas. Hence, in the development process rural and urban transformation must be seen as two sides of the same coin [15, p. 151].

*Department of Geography, Addis Ababa University.

This kind of urbanization is often designated as *subsistence urbanization*. Subsistence urbanization is one in which the ordinary citizen has only the bare necessities, and sometimes not even those, for survival in the urban environment [3, p. 5]. This is a type of urbanization largely characterized by a very high density. People live under difficult conditions which may even be worse than the rural areas from which they had come.

Modern urbanization in Ethiopia is relatively recent and embryonic. Ethiopia is still predominantly rural. Despite this, rural urban migration is generally believed to be considerable mainly owing to high rural-urban income differentials. There is no documented and conclusive evidence that indicates that the magnitude of rural-urban migration has declined owing to the restrictions on movements brought about by the establishment of Peasant Associations.

The degree of urbanization is quite small. According to the 1984 Census, the degree of urbanization was quite small. It was a mere 11.7 per cent. Moreover, the small urban population was concentrated in very few major towns. Close to 30 per cent of the total urban population was found in the city of Addis Ababa alone. Addis Ababa and the second largest city, Asmera, claimed close to 36 per cent of the total urban population. Nearly 55 per cent of the total urban population resided in the twenty largest towns of the country. This is indeed a clear case of concentration or over concentration.

The current small size of the urban sector in Ethiopia may suggest that the problems associated with it could be manageable at least for the time being. This may be true in principle. But on account of the grave resource constraints even the seemingly minor urban problems are not easily avoidable or solvable. In consequence, the urban sector ought to be researched upon carefully before the incipient problems related to it become deep-rooted.

II. OBJECTIVES

This study intends, therefore, to discuss one major problem of urbanization in Ethiopia which should attract immediately the attention of urban and regional planners. This is the question of urban primacy. More specifically the study attempts to achieve the following objectives:

2.1 to provide a brief historical sketch of urban development in Ethiopia which will serve as a relevant background for the main focus of the study;

2.2 to describe the present urban size hierarchy;

2.3 to examine the nature of urban primacy at national and regional levels and understand its behavior over time; and

2.4 to ascertain objectively the extent to which the urban size - hierarchy in Ethiopia deviates from the rank - size distribution of towns.

III. METHODOLOGY AND NATURE OF DATA

The Rank Size Model and the Index of Primacy constitute the main methods of analysis. The recent data on urban population were drawn from the 1984 Census of Ethiopia as well as from earlier publications of the Central Statistical Office of Ethiopia. The projected town populations were generated by the author using appropriate projecting techniques.

IV. A BRIEF HISTORICAL SKETCH OF URBAN DEVELOPMENT IN ETHIOPIA

Historically, the growth of urbanization in Ethiopia had been associated with the caravan trade. Such towns as Gonder and Adwa, in Northern Ethiopia, were located on important caravan routes. Northern

Ethiopia is thus credited with having a strong and old tradition of urbanization. In fact the roots of urbanization in Northern Ethiopia are believed to go back to the early years of the Christian era when such towns as Adulis and Axum had sizeable urban populations [8]. For instance, half a century ago Northern Ethiopia's urban dominance over other Regions was quite conspicuous. It had a total estimated urban population of 211,000 as opposed to 93,000 for Central Ethiopia, 67,000 for Eastern Ethiopia and 46,000 for Southern and Western Ethiopia [8, p. 26].

In general, in pre-twentieth Ethiopia urbanization was characterized by the existence of a few small urban centers whose development was affected by the then existing feudal system. Such centers rose and fell in response to the rise and fall of the political powers in the different regions. In sum the towns were short-lived royal capitals (military camps or garrison towns), regional administrative centers or places located at caravan routes that served as trading centers.

In twentieth century Ethiopia the process of urbanization is going through a period of drastic transformation. Urbanization has entered a new phase of accelerated development. A number of factors have contributed to this phenomenon. The first of these, which had begun during the last portion of the 19th century, was the expansion of the Shewan hegemony over much of Ethiopia which resulted in the establishment of a series of garrison towns. These performed political and military functions especially in Southern Ethiopia. The most important impetus of urbanization was the building of the Addis Ababa -Djibouti Railroad which reached Addis Ababa in 1917. A number of railroad stations were established which formed the nuclei of many important towns. The other factor or force which accelerated the pace of urbanization was the Italian Occupation during 1936-41 [12, p. 430]. During the Italian Occupation or Period the pace of urbanization was further speeded up and its characteristics were altered considerably. New towns were built and new functions were accorded to the already existing ones thus expanding their economic base. Moreover, the Italians brought about the reorganization of the country's economy which had a significant impact on the development of urbanization. However,

note must be taken of the fact that the Italians were not sincerely interested in promoting urbanization in Ethiopia. As their main objective was to advance their military and political interests the Italians did not create viable urban centers. In consequence, the Italians failed to create cities that were economically able to sustain themselves. Rather they left a legacy whereby a new type of economic oriented urban system was superimposed on the traditional, basically feudalistic urban structure.

Immediately after 1941, which was the Post-Italian or Reconstruction Period, urbanization went through a brief spell of decelerated development owing to the ravages of the war. But starting from the 1950s urbanization entered another important phase of accelerated growth. In 1950 there were only five towns with over 20,000 population each. This figure rose to 12 by 1970. In terms of population, the Ethiopian towns grew at an annual rate of 3.5 per cent between 1950 and 1960. This rate increased to 6.6 per cent between 1960 and 1970. Since 1970 the growth rate of the urban population appears to have gone down. The urban population is projected to grow at the rate of 4 per cent between 1984 and 1995.

Another characteristic feature of the development of urbanization during the period in question was the nature of the spatial distribution of Ethiopian towns. Formerly, Highland Ethiopia, owing to favourable natural environments and cultural factors, was the main center of Ethiopian urbanization. Generally, however, with the passage of time new towns started to emerge particularly in Southern Ethiopia which was noted for its coffee growing areas.

Three major forces or factors have appeared to contribute to this shift in the direction of urban development in this century. Firstly, the development of the modern road transport network has boosted the growth of towns such as Nazareth, Bahir Dar, Shashemene, Ghimbi, and Awassa. Secondly, the growth of coffee as a major cash crop played a significant role in modifying the economic base of most towns in Southern Ethiopia. In consequence cities such as Jimma, Agaro, Ghimbi, Wendo and Gore grew as they developed into major coffee

collecting centers. Thirdly, the policy of the then existing government, which aimed at establishing certain towns as regional administrative towns, has encouraged some small towns to develop into important regional towns. Among these were: Bahir Dar, Arba Minch, Awassa, Metu and Assela [19, pp. 46-47].

In summary, the development of urbanization in Ethiopia has a long history. Despite this, modern urbanization is still in the rudimentary stage. The pace and nature of its development were largely linked to or affected by the political, military, social and economic developments that took place from time to time. Modern urbanization that is prevalent elsewhere in the newly developing countries, particularly those in the continent of Africa.

V. PATTERN OF URBAN-SIZE HIERARCHY IN ETHIOPIA

There are no officially designated urban-size or town-size categories at present in Ethiopia. However, there is a generally accepted practice of dividing urban-size hierarchy into three categories, namely: small towns, medium or intermediate towns and large towns [1, p. 1]. For the purpose of this study the population sizes for these categories are: small towns (500-9,999); medium towns (25,000-29,999); and large towns (30,000-2,000,000).

In 1966 out of the total of 229 towns in the country 207 (90.4 per cent) were small; 16 (7.0 per cent) were intermediate; and 6 (2.6 per cent) were large [5]. According to the 1984 Population and Housing Census of ethiopia the corresponding numbers of towns were 526 (89.3 per cent); 46 (7.6 per cent); and 17 (2.9 per cent) respectively [21]. Between 1966 and 1984 the small towns grew by 154 per cent in terms of population; the intermediate towns by 188 pr cent; and the large towns by 267 per cent indicating that the large towns were the fastest growing ones followed by the intermediate towns. Sixty eight per cent of the intermediate towns were found in the Administrative Regions of Eritrea, Gojjam, Keffa, Shewa, Sidamo and Tigray. All of the large

towns were concentrated in Eritrea, Gonder, Harer, Shewa and Wello. The year 1966 was, therefore, characterized by the preponderance of small towns and a conspicuous shortage of intermediate and large towns.

Table 1 presents the urban hierarchy by size-class and Administrative Region for 1984.

As in 1966, in 1984 too the Ethiopian urban scene was largely characterized by the dominance of small towns. Nevertheless, a significant headway was made towards bringing about some evening out of the spatial distribution of the intermediate towns. There were intermediate towns in all the Administrative Regions except in Arssi and Illubabor. Shewa, with eleven intermediate towns, was the undisputed leader in this respect followed by Tigray which had six. The number of the intermediate towns in each Administrative Region had increased relatively appreciably when compared to the situation in 1966. The spatial distribution and the size of the large towns had also manifested a modest favourable change. All the Administrative Regions, except Bale, Gamo Gofa, Illubabor and Wellega, had large towns. In consequence, the year 1984 marked a stage in the further development of urbanization in Ethiopia.

Table 2 provides the aggregate population in towns by size-class and Administrative Region. The small towns, which numbered 526, accounted for only 30 per cent of the total urban population; the intermediate towns, which numbered 46, for 15.4 per cent; and the large towns, which numbered only 17, for 54.2 per cent.

Table 1

TABLE 1: URBAN SIZE HIERARCHY BY SIZE-CLASS AND ADMINISTRATIVE REGION (1984)

SIZE-CLASS	ADMINISTRATIVE REGION														
	ARSSI	BALE	ERITREA	GAMO GOFA	GOJJAM	GONDER	HARER	ILLUBABOR	KEFFA	SHEWA	SIDAMO	TIGRAY	WELLEGA	WELLO	TOTAL
500-999	4	1	1	8	9	7	10	10	14	28	2	0	7	7	108
1000 - 1999	7	4	1	5	14	13	14	5	12	36	12	2	22	10	157
2000 - 2999	7	2	0	2	7	2	13	4	6	24	12	5	5	3	92
3000 - 3999	2	2	1	1	7	3	10	2	3	14	5	3	1	4	61
4000 - 4999	3	0	2	2	3	2	0	0	1	8	2	2	1	2	33
5000 - 5999	5	0	1	0	3	1	2	2	1	7	0	0	0	3	25
6000 - 6999	0	1	0	0	2	4	3	0	1	4	4	1	0	1	19
7000 - 9999	2	2	3	3	4	4	1	1	0	6	2	0	1	1	31
10000 - 14999	0	1	1	0	2	2	1	0	0	6	1	4	2	4	26
15000 - 19999	0	0	1	0	0	1	0	0	1	4	2	2	0	2	12
20000 - 24999	0	1	0	1	0	0	1	0	0	0	0	0	0	0	5
25000 - 29999	0	0	1	0	0	0	0	0	0	1	0	0	1	0	3
30000 - 34999	0	0	0	0	0	0	0	0	0	1	1	0	0	0	1
35000 - 39999	1	0	0	0	1	0	0	0	0	1	0	0	0	0	4
40000 - 59999	0	0	0	0	1	0	0	0	0	2	0	0	0	0	3
60000 - 79999	0	0	0	0	0	1	1	0	1	1	0	1	0	1	6
80000 - 999999	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
100000 - 2000000	0	0	1	0	0	0	0	0	0	1	0	0	0	0	2
Total	31	14	13	22	53	39	58	26	40	144	45	20	46	38	589

Source: Computed by the author on the basis of [21, various pages].

Table 2

TABLE 2: AGGREGATE POPULATION IN TOWNS BY SIZE-CLASS AND ADMINISTRATIVE REGION

Size - Class	Arssi	Bale	Eritrea	Gamo-Gofa	Gojjam	Gonder	Harrer	Illubabor	Keffa	Shewa	Sidamo	Tigray	Wellega	Wello	TOTAL
500 - 999	3391	732	785	5958	7099	4486	7653	7182	10903	21925	1848	-	4855	5057	81874
1000 - 1999	11682	5927	1863	6733	20907	19102	18365	5927	17797	50992	18208	3352	29872	14209	224836
2000 - 2999	16666	4766	-	4406	16577	5475	31181	9180	15458	57081	29018	12330	10893	8212	221243
3000 - 3999	6983	6559	3328	3411	22420	10478	33799	6468	9397	49910	6957	9850	25882	14260	209702
4000 - 4999	14183	-	8484	8970	13505	9580	-	8951	4224	35431	21350	8703	4159	8829	146369
5000 - 5999	26033	-	5948	-	16288	5531	10829	-	5988	37092	11333	-	-	15406	134448
6000 - 6999	-	6593	-	-	13261	26059	19793	13630	6216	25698	-	6819	-	6859	124928
7000 - 9999	16792	16881	23683	23151	33041	33679	7271	-	-	50986	32335	-	8252	9293	255364
10000 - 14999	-	11293	12184	-	23536	21280	11344	12491	-	73668	26388	53904	27268	47876	321232
15000 - 19999	-	-	15441	-	-	15306	-	-	18764	66409	16003	34015	-	31472	197410
20000 - 24999	-	22963	-	23030	-	-	23183	-	-	-	48528	-	-	-	117704
25000 - 29999	-	-	26149	-	-	-	-	-	-	25753	-	-	28824	-	80726
30000 - 34999	-	-	-	-	-	-	-	-	-	31531	-	-	-	-	31531
35000 - 39999	36720	-	-	-	39808	-	-	-	-	35420	36169	-	-	-	148117
40000 - 59999	-	-	-	-	54800	-	-	-		105289	-	-	-	-	160089
60000 - 79999	-	-	-	-	-	68958	62160	-	60992	76284	-	61583	-	68848	398825
80000 - 99999	-	-	-	-	-		98104	-	-	-	-	-	-	-	98104
100000 - 2000000	-	-	275385	-	-		-	-		1412575	-	-	-	-	1687960
Total	133135	77807	373250	76506	261844	219934	324065	65817	150839	2160913	249178	190556	141764	230321	4640462

Source: Computed by the author on the basis of [21, various pages].

VI. THE NATURE OF URBAN PRIMACY AT NATIONAL AND REGIONAL LEVELS

The notion or concept of urban primacy was first introduced by Mark Jefferson in 1939. He brought attention to the fact that some countries have "disproportionately large" first cities. He coined the term *Primate City* to express this concept. The largest city is pre-eminent and much larger than the second city [13, p. 227]. In most underdeveloped countries, particularly in Africa, this first city is not only the most important industrial center but is often also the capital city and premier port [13, p. 166].

In Ethiopia, the city of Addis Ababa, which is the capital city, is undoubtedly the Primate City or the first city in the country. It is much larger than Asmera, the second largest city located in the Administrative Region of Eritrea.

The magnitude of urban primacy is usually measured by the Index of Primacy (IP). The IP is a ratio of the population of the first city to that of the second third and so on depending on the criteria set by the writer concerned. For the purpose of this study Ginsburg's Index of Primacy has been adopted [10, p. 36]. This Index is provided hereunder.

$$I.P. = \frac{P_1}{P_1 + P_2 + P_3 + P_4} \times 100 \quad \text{-----} \quad (1)$$

Where:

P_1 = Population of the largest town

P_2 = Population of the second town

P_3 = Population of the third town

P_4 = Population of the fourth town

In other words, the IP expresses the population of the largest town or city as a percentage of the total population of the four largest. The indices of Primacy for Addis Ababa for four points in time are computed to be as follows: 67.2 for 1938; 67.4 for 166; 75.9 for 1984; and a projected IP of 78.9 for the year 2000. These indices indicate the increasing primacy of the capital city. This is further attested by the fact that the growth rate of the city of Addis Ababa is much higher than those of the intermediate and small towns. The growth rate of Addis Ababa between 1966 and 1984 was 187 per cent compared to 24 per cent for Nekempt, an intermediate town; and 66 per cent for Bati, a small town.

Compared to some neighbouring African countries Ethiopia's level of urban primacy is quite high. In about 1980 the IP's using only a Two-City-Index, for the following countries were: Tanzania (684); Ethiopia (288); Kenya (209); Zambia (188); Zimbabwe (171); and Kenya (12).

Regional or spatial variations in urban primacy were also examined. Using the previous method, the indices of primacy have been computed for the various Administrative Regions. These indices are presented in Table 3 below.

Table 3 indicates the prevalence of a considerable degree of regional variations in urban primacy. The lowest possible index of primacy would have been 25 per cent in a given Administrative Region had it been assumed that all the four cities had equal population. It is quite obvious this is not the case. In fact the results indicate that, in general, all the Administrative Regions had a high degree of urban primacy. Shewa and Eritrea had the highest indices since they contain

the first and second largest cities in the country respectively. Examine also Table 4 which presents the characteristics of the regional primate cities which existed
in 1984.

Table 3

Indices of Primacy by Administrative Region
(1984)

Administrative Region	Four Largest Towns		
	Towns	Population	Indicies of Primacy
Shewa	Addis Ababa	1,412,575	
	Nazareth	76,284	
	Akaki	54,146	
	Debre Zeit	51,143	88.6
Eritrea	Asmera	275,385	
	Keren	26,149	
	Massawa	15,441	
	Mendefera	12,184	83.7

Table 3 Cont'd.

	Jimma	60,992	
	Agaro	18,764	
Keffa	Bonga	6,216	
	Mizan Teferi	5,988	66.3
	Gonder	68,958	
	Debre Tabor	15,306	
Gonder	Humera	10,469	
	Teda	10,811	63.3
	Assela	36,720	
	Robi	9,303	
Arssi	Abomsa	7,489	
	Bekoji	5,457	62.3
	Dessie	68,848	
	Kombolcha	15,782	
Wello	Woldiya	15,690	
	Alamata	14,030	60.2
	Mekele	61,583	
	Axum	17,753	
Tigray	Adigrat	16,262	
	Maichew	14,190	56.1
	Dire Dawa	98,104	
	Harer	62,160	
Harer	Jijiga	23,183	
	Asbe Teferi	11,344	50.4

Table 3 Cont'd.

Gamo Gofa	Arba Minch	23,030
	Gidole	8,399
	Yelsawla	7,526
	Bulki	7,226
Gojjam	Bahir Dar	54,800
	Debre Markos	39,808
	Mota	12,934
	Dangila	10,602
Bale	Goba	22,963
	Robi	11,293
	Ginnir	8,594
	Dodola	8,287
Wellega	Nekempt	28,824
	Dembi Dollo	14,170
	Ghimbi	13,098
	Shambo	8,252
Illubabor	Metu	12,491
	Bedelle	6,988
	Gore	6,642
	Gambela	4,492
Sidamo	Awassa	36,169
	Soddo	24,592
	Dilla	23,936
	Yirgalem	16,003

Addis Ababa and Asmera as expected, were dominant regional capitals in addition to their being leading primate cities at a national level. Compared to them all the others were miniatures. Note, however, the primate cities of Dire Dawa, Gonder, Dessie, Mekele, Jimma and Bahir Dar showed a greater degree of primacy.

The causes of primacy have not yet been determined clearly. There is no obvious relationship between city-size distributions and levels of either economic development or urbanization. It is now commonly accepted that city-size distributions and urban primacy result from complex influences involving many historical, economic, political and physical factors [14, p. 25].

In the case of Ethiopia also the causes of urban primacy are suspected to be many and varied as it may have been brought about by a whole host of economic, political, cultural and physical factors. Urban primacy in Ethiopia is generally believed to have resulted from: arbitrary historical decisions regarding the location of the capital city; geographical advantages such as central position related to an area of high agricultural potential and political and economic advantages which involved increased governmental functions and the concentration of infrastructural facilities and manufacturing activities. The primacy pattern was intensified by the laissez faire attitude of the pre-1974 regime.

This attitude led to a strong polarization process leaving the rival urban nuclei such as Asmera, Dire Dawa, Jimma and Gonder behind in their development. This is due to the growth of industry and increasing government functions in the capital city; the undue concentration of health and educational facilities; and the absence of alternative places of attraction. In consequence, Addis Ababa continued to grow and remained unrivaled in economic performance and a wide range of activities [12, p. 54]. As many writers have confirmed urban primacy once achieved has a tendency not only to perpetuate itself but even to become more conspicuous and solidified.

Table 4

Characteristics of Regional Primate Cities
(1984)

Administrative Region	Primate City	Population	Per cent of Regional Urban Population
Arssi	Assela	36,720	0.79
Bale	Goba	22,963	0.49
Eritrea	Asmera	275,385	5.93
Gamo Gofa	Arba Minch	23,030	0.50
Gojjam	Bahir Dar	54,800	1.18
Gonder	Gonder	68,958	1.49
Harer	Dire Dawa	98,104	2.11
Illubabor	Metu	12,491	0.27
Keffa	Jimma	60,992	1.30
Shewa	Addis Ababa	1,412,575	30.44
Sidamo	Awassa	36,169	0.78
Tigray	Mekele	61,583	1.33
Wellega	Nekempt	28,824	0.62
Wello	Dessie	68,848	1.48

Source: [21].

Urban primacy has its own inherent problems. It leads to: increasing concentration of lumped urbanites; the mushrooming of slum and squatter settlements; and the accompanying social and economic problems that result from unplanned spontaneous development of urban areas. On the other hand, rural areas and small cities are deprived of their young, educated and vigorous group thus impairing their prospects for economic development [22, pp. 54-55].

In recent years important changes have been taking place in Ethiopia concerning the rearrangement of the rural settlement pattern. Notable among these is the Villagization Program which was pursued vigorously by the Government for a few years. According to this Program villages are regrouped at sites selected for their suitability for the provision of infrastructural facilities which in turn could expedite the development of the villages or rural areas. Moreover, much effort had been made to promote agricultural producers' cooperatives. Although such endeavors have been met with limited success, the extent of their impact on the settlement pattern of rural Ethiopia, in particular, ought to be investigated closely in the future.

VII. URBAN-SIZE HIERARCHY IN RELATION TO THE RANK-SIZE MODEL

In this part of the study the nature of the Ethiopian urban system is examined using the rank-size model or rule as a tool of analysis. The emphasis is on understanding the distribution of the various urban centers in relation to the rank-size distribution of cities which is commonly accepted as a normal or regular pattern of urban development.

Stated in its simplest form the rank-size model depicts a harmonic progression of cities within the urban hierarchy such that if the population of the largest city is known the population of all other cities can be derived from the rank of their size. For instance, if the largest city has 1,000,000 inhabitants, the tenth city will have one-tenth as many or 100,000 [9, p. 441]. This relationship is expressed as:

$$P_i = \frac{L_c}{R_i} \quad \text{----------} \quad (2)$$

Where:

P_i = Population of a given city

R_i = Rank of the size of the city

L_c = Population of the largest city

There are several methods for expressing the rank-size distribution of towns or cities and deviations or departures from it. The method adopted in this study is the one proposed by H.L. Browning and I.P. Gibbs [8, pp. 441-451]. This method has been selected since it is widely used in this kind of study. Moreover, the method is readily applicable to studies that depend on the availability of limited urban data. On the basis of this method the expected or theoretical number of towns and populations for various size classes can be computed in accordance with the rank-size model. In this case only the expected populations of the towns under consideration have been computed. The expected populations are then compared with the actual populations.

Using this method the extent to which the urban-size-hierarchy in Ethiopia, which is characterized by primate distribution, deviates from the rank-size distribution has been objectively ascertained. The deviations from the rank-size distribution have been obtained for four points in time, namely: 1938, 1966, 1984 and 2000.

Table 5 presents the urban-size hierarchy of Ethiopian towns in relation to the rank-size model for 1938. It is evident in this Table that the actual populations deviate considerably from the expected populations.

TABLE 5: URBAN-SIZE HIERARCHY IN RELATION TO THE RANK-SIZE MODEL (1938)

Col. 1 Towns	Col.2 Rank (R)	Col. 3 Reciprocals of Rank (RR)	Col. 4 Actual Population Size (AP)	Col. 5 Expected Population Size (EP)	Col. 6 Differences Between Expected and Actual Populations (DEAP)	Col. 7 Difference as Per Cent of Actual Population (DAP)	Col. 8 Difference as Per Cent of Expected Population (DEP)
Addis Ababa	1	1.00000	300000	184671	- 115329	- 38.4	- 62.5
Asmera	2	0.50000	98000	92336	- 5664	5.8	- 6.1
Harer	3	0.33333	45000	61557	16557	36.8	26.9
Dessie	4	0.25000	36000	46168	10168	28.2	22.0
Dire Dawa	5	0.20000	20000	36934	16934	84.7	45.8
Massawa	6	0.16667	15216	30779	15563	102.3	50.6
Jimma (1937)	7	0.14268	15000	26382	11382	75.9	43.1
Gonder	8	0.12500	14000	23084	9084	64.9	39.4
Dekemehare	9	0.11111	12800	20519	7719	60.3	37.6
Mekele	10	0.10000	12000	18467	6467	53.9	35.0
Debre Markos	11	0.09091	10000	16788	6788	67.9	40.4
Axum	11	0.09091	10000	16788	6788	67.9	40.4
Nekemt (1937)	11	0.09091	10000	16788	6788	67.9	40.4
Asseb	11	0.09091	10000	16788	6788	67.9	40.4
		ΣRR = 3.29243	ΣAP = 608016	ΣEP = 608049	$\Sigma/DEAP/$ = 242019	$\Sigma/DAP/$ = 822.8	$\Sigma/DEP/$ = 530.6
			$\frac{\Sigma AP}{N}$ = 43430	$\frac{\Sigma EP}{N}$ = 43432	$\frac{\Sigma 'DEAP}{N}$ = 17287	$\frac{\Sigma DAP}{N}$ = 58.8	$\frac{\Sigma DEP}{N}$ = 37.9

The expected populations of the towns indicated in Column 5 have been produced using the following formulae:

$$EPT_1 = \frac{\Sigma AP}{\Sigma RR} \quad \text{----------} \quad (3)$$

Where:

EPT_1 = Expected population of the first and largest town

ΣAP = Sum of actual populations of all towns

ΣRR = Sum of the reciprocals of rank

Expected populations of the other towns have been obtained as follows:

$$EPT_R = \frac{EPT_1}{R_T} \quad \text{----------} \quad (4)$$

Where:

EPT_R = Expected population of a given town (T) with certain rank (R)

EPT_1 = Expected population of the first town

R_T = Rank of the given town

As it is obvious in Table 5 above the actual and expected populations of the towns are not the same. In order to express the degree of correspondence between the actual and expected distributions on overall index has been formulated. The formula for this index is given below.

$$IOD = \frac{\Sigma DEAP/2}{\Sigma AP} \times 100 \quad \text{----------} \quad (5)$$

Where:

IOD = An overall index of deviation from the rank-size model

ΣDEAP = Sum of differences between expected and actual populations

ΣAP = Sum of actual populations

The IOD represents the per cent of the urban residents who would have to move from one town to another one to bring about a perfect correspondence between the urban hierarchy and the rank-size model. In 1938 the IOD for Ethiopia was 19.9. The greater the per cent the less the conformity. However, the IOD suffers from the fact that it may be influenced a great deal by only one or two of the large towns. For example Addis Ababa alone accounted for 49.3 per cent of the total estimated urban population in 1938.

In consequence, an average index of deviation has been devised. The formulae is as follows:

$$AID = \frac{\Sigma DAP}{N} \quad \text{----------} \quad (6)$$

Where:

AID = Average index of deviation which is the degree that a town would have to increase or decrease (in percentage terms) to fit the rank-size model

N = Number of towns under consideration

The AID in Ethiopia for 1938 was computed to be 58.8.

Another method for measuring the correspondence between urban hierarchy and the rank-size model is by using the figures in Column 8 of Table 5. These figures indicate the per cent error in predicting the population of a town on the basis of the rank-size model. The error is obtained thus:

$$APE = \frac{\Sigma DEP}{N} \quad \text{----------} \quad (7)$$

Where:

APE = Average per cent error in predicting the population on the population on the basis of the rank-size model

N = Number of towns under consideration

The APE in Ethiopia for 1938 was computed to be 37.9.

All the three indices discussed above indicate the fact that in 1938 Ethiopia's urban hierarchy deviated greatly from that predicted on the basis of the rank-size model.

These three indices have also been computed for the years 1966, 1984 and 2000 based on the data and towns provided in Tables 6, 7 and 8. The years 1966 and 1984 were selected owing to the availability of data. The populations of the towns for the year 2000 have been projected using the geometric method [15, pp. 321-324] which is given hereunder.

$$P_n = P_o (1 + r)^n \text{ - - - - - - - - - - - - - - - - - } (8)$$

Where:

P_n = the initial population

P_o = population at the end of the period

r = a constant rate of change

n = time in years

Table 6

Behavior of the Indices Over Time

	Y E A R S			
Indices	1938	1966	1984	2000
IOD	19.9	18.8	22.4	24.7
AID	58.8	33.2	28.0	43.7
APE	37.9	24.9	21.0	30.4

Table 6 describes the behavior of the three indices until the end of this century. In general there is a noticeable decline in the sizes of the indices indicating a probable narrowing down of the gap between the overall distribution of Ethiopia's urban hierarchy and the rank-size distribution of towns. Note that the AID and APE, which are important measures of the deviation in question, will go down relatively significantly by the year 2000. The AID will decrease by over 26 per cent and the APE by nearly 20 per cent.

VIII. CONCLUSION

In pre-twentieth century Ethiopia urbanization was largely associated with the caravan trade which led to the creation of a few but important urban centers. In twentieth century Ethiopia urbanization entered a new phase characterized by an accelerated development. The Addis Ababa -Djibouti Railroad and the Italian Occupation were generally believed to have contributed greatly to the relatively rapid urban expansion. In more recent years other factors have boosted further the growth of urbanization in this country. Among these were: the development of the modern transport network; the growth of coffee as a major cash crop; and the policy of the past regime which aimed at establishing certain towns as regional administrative centers.

The pattern of urban hierarchy in Ethiopia in 1984 revealed the fact that the small towns still dominated the urban scene. Nevertheless, a significant headway was made towards bringing about some evening out of the spatial distribution of the intermediate towns. The spatial distribution of the size of the large towns had also manifested a favourable change in terms of population size: the small towns, which were the largest in number, accounted for only 30 per cent of the total urban population; the intermediate towns, which were second in number, for 15.4 per cent; and the large towns, which were the fewest of all, for 54.2 per cent.

As concerns urban primacy, Addis Ababa, the capital city, was and still is the uncontested primate or leading city. An increasing primacy has also been noted with the passage of time. There also existed a considerable degree of regional variations in urban primacy in 1984. All the Administrative Regions of the country had a high degree of urban primacy. This phenomenon is largely attributed to economic, social, political, cultural and physical factors.

The available evidences point to the fact that Ethiopia's town distribution differed markedly from the rank-size distribution of towns. Although the primacy of the capital city indicates an upward trend until the year 2000 it is quite probable that the gap between the overall distribution of the Ethiopian towns and the rank-size distribution of towns will narrow down.

The results of this study imply that the process of the primate pattern of urbanization need to be curbed in order to bring about a fairly normal pattern of urban development. This, therefore, ought to be the urgent concern of the urban policy makers of the country. If this is not achieved there is a possibility that there will be a few parasitic large towns which will continue to thrive at the expense of the small and intermediate towns. Likewise a center-periphery relationship will persist between the large towns and the rural areas. Inconsequence the rural areas, whose resources are sapped by the large urban areas, will be forced to remain the backwater.

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Annex I

ANNEX I

URBAN-SIZE HIERARCHY IN RELATION TO THE RANK-SIZE MODEL (1966)

Col. 1 Towns	Col. 2 Rank (R)	Col. 3 Reciprocals (RR)	Col. 4 Actual Population Size (AP)	Col. 5 Expected Population Size (EP)	Col. 6 Differences Between Expected and Actual Populations (DEAP)	Col. 7 Difference as Per Cent of Actual Population (DAP)	Col. 8 Difference as Per Cent of Expected Population (DEP)
Addis Ababa	1	1.00000	489400	267767	- 221633	- 45.3	- 82.8
Asmera	2	0.50000	145600	133884	- 11716	- 8.0	- 8.8
Dire Dawa	3	0.33333	49689	89256	39567	79.6	44.3
Harer	4	0.25000	41891	66942	25051	59.8	37.4
Dessie	5	0.20000	39783	53553	13770	34.6	25.7
Gonder	6	0.16667	30102	44628	14526	48.3	32.5
Jimma	7	0.14286	29950	38252	8302	27.7	21.7
Nazret	8	0.12500	27240	33471	6231	22.9	18.6
Debre Zeit	9	0.11111	21602	29752	8150	37.7	27.4
Debre Markos	10	0.10000	21093	26777	5684	26.9	21.2
Massawa	11	0.09091	15170	24342	9172	60.5	37.7
Axum	12	0.08333	13620	22314	8694	63.8	39.0
Assela	13	0.07692	13600	20597	6997	51.4	34.0
Adwa	14	0.07143	12674	19126	6452	50.9	33.8
Nekemt	15	0.06667	12430	17851	5421	43.6	30.4
Bahir Dar	16	0.06250	12106	16735	4629	38.2	27.7
Mekele	17	0.05882	12000	15751	3751	31.3	23.8
Dilla	18	0.05556	11055	14876	3821	34.6	25.7

Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6	Col. 7	Col. 8
Akaki	19	0.05263	10699	14093	3394	31.7	24.1
Soddo	20	0.05000	10618	13388	2770	26.1	20.7
Virga Alem	21	0.04762	10506	12751	2245	21.4	17.6
Debre Berhan	22	0.04545	8999	12171	3172	35.2	26.1
Agaro	23	0.04348	8810	11642	2832	32.1	24.3
Ghion	24	0.04167	8450	11157	2707	32.0	24.3
Woldiya	25	0.04000	8330	10711	2381	28.6	22.2
Maichew	26	0.03846	8170	10299	2129	26.1	20.7
Hagere Hiwot	27	0.03704	8012	9917	1905	23.8	19.2
Adi Grat	28	0.03571	7770	9563	1799	23.2	18.8
Shashemene	29	0.03448	7676	9233	1557	20.3	16.9
Asbeteferi	30	0.03333	7208	8926	1718	23.8	19.2
Goba	31	0.03226	7154	8638	1484	20.7	17.2
Ghimbi	32	0.03125	7085	8368	1283	18.1	15.3
Endaselassie	33	0.03030	7050	8114	1064	15.1	13.1
Debre Tabor	34	0.02941	6799	7876	1077	15.8	13.7
Kobo	35	0.02857	6720	7650	930	13.8	12.2

Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6	Col. 7	Col. 8
Hossaina	36	0.02778	6498	7438	940	14.5	12.6
Kibre Mengist	37	0.02703	6460	7237	777	12.0	10.7
Fiche	38	0.02632	6350	7047	697	11.0	9.9
Genet	39	0.02564	6340	6866	526	8.3	7.7
Bati	40	0.02500	6020	6694	674	11.2	10.1
Dembi Dollo	41	0.02439	5936	6531	595	10.0	9.1
Wukiro	42	0.02381	5840	6375	535	9.2	8.4
Awassa	43	0.02326	5460	6227	767	14.0	12.3
Butajira	44	0.02273	4830	6086	1256	26.0	20.6
Metu	45	0.02222	4762	5950	1188	24.9	20.0
Negelle (Sidamo)	46	0.02174	4278	5821	1543	36.1	26.5
Alamata	47	0.02128	4200	5697	1497	35.6	26.3
Mojo	48	0.02083	4020	5578	1558	38.8	27.9
Jijiga	49	0.02041	3948	5465	1517	38.4	27.8
Dangila	50	0.02000	3870	5355	1485	38.4	27.7
Kembolcha	51	0.01961	3840	5250	1410	36.7	26.9
Robi	52	0.01923	3560	5149	1589	44.6	30.9
Negelle (Shewa)	53	0.01887	3460	5052	1592	46.0	31.5
Mehi	54	0.01852	2930	4959	2029	69.2	40.9
Sebeta	54	0.01852	2930	4959	2029	69.2	40.9

Annex I Con't

Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6	Col. 7	Col. 8
Arba Minch	55	0.01818	2830	4868	2038	72.0	41.9
Mota	56	0.01786	2337	4782	2445	51.1	51.1
		$\Sigma RR =$ 4.63	$\Sigma AP =$ 1239760	$\Sigma EP =$ 1239757	$\Sigma/DEAP =$ 466701	$\Sigma/DAP/ =$ 1890.1	$\Sigma/DEP/ =$ 1419.8
			$\frac{\Sigma AP}{N} =$ 21750	$\frac{\Sigma EP}{N} =$ 21750	$\frac{\Sigma DEAP}{N} =$ 8188	$\frac{\Sigma DAP}{N} =$ 33.?	$\frac{\Sigma DEP}{N} =$ 24.9

ANNEX II

URBAN-SIZE HIERARCHY IN RELATION TO THE RANK-SIZE MODEL (1984)

Col. 1 Towns	Col. 2 Rank (R)	Col. 3 Reciprocals	Col. 4 Actual Population Size (A)	Col. 5 Expected Population Size (EP)	Col. 6 Differences Between Expected and Actual Populations (DEAP)	Col. 7 Difference as Per Cent of Actual Population (DAP)	Col. 8 Difference as Per Cent of Expected Population (DEP)
Addis Ababa	1	1.00000	1412575	685600	-726975	- 51.5	- 106.0
Asmera	2	0.50000	275385	342800	67415	24.5	19.7
Dire Dawa	3	0.33333	98104	228533	130429	132.9	57.1
Nazret	4	0.25000	76284	171400	95116	124.7	55.5
Gonder	5	0.20000	68958	137120	68162	98.8	49.7
Dessie	6	0.16667	68848	114267	45419	66.0	39.7
Harer	7	0.14286	62160	97943	35783	57.6	36.5
Mekele	8	0.12500	61583	85700	24117	39.2	28.1
Jimma	9	0.11111	60992	76178	15186	24.9	19.9
Bahir Dar	10	0.10000	54800	68560	13760	25.1	20.1
Akaki	11	0.09091	54146	62327	8181	15.1	13.1
Debre Zeit	12	0.08333	51143	57133	5990	11.7	10.5
Debre Markos	13	0.07692	39808	52738	12930	32.5	24.5
Assela	14	0.07143	36720	48971	12251	33.4	25.0
Awassa	15	0.06667	36169	45707	9538	26.4	20.9
Wonji Gefersa	16	0.06250	35420	42850	7430	21.0	17.3
Shashemene	17	0.05882	31531	40329	8798	27.9	21.8
Nekemt	18	0.05556	28824	38089	9265	32.1	24.3

Annex II Con't

Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6	Col. 7	Col. 8
Keren	19	0.05263	26149	36084	9935	38.0	27.5
Debre Berhan	20	0.05000	25753	34280	8527	33.1	24.9
Soddo	21	0.04762	24592	32648	8056	32.8	24.7
Dilla	22	0.04545	23936	31164	7228	30.2	23.2
Jijiga	23	0.04348	23183	29809	6626	28.6	22.2
Arba Minch	24	0.04167	23030	28567	5537	24.0	19.4
Goba	25	0.04000	22963	27424	4461	19.4	16.3
Agaro	26	0.03846	18764	26369	7605	40.5	28.8
Axum	27	0.03704	17753	25393	7640	43.0	30.1
Hagere Hiwot	28	0.03571	17328	24486	7158	41.3	29.2
Fiche	29	0.03448	17106	23641	6535	38.2	27.6
Ghion	30	0.03333	16811	22853	6042	35.9	26.4
Adi Grat	31	0.03226	16262	22116	5854	36.0	26.5
Yirga Alem	32	0.03125	16003	21425	5422	33.9	25.3
Kembolcha	33	0.03030	15782	20776	4994	31.6	24.0
Woldiya	34	0.02941	15690	20165	4475	28.5	22.2
Massawa	35	0.02857	15441	19589	4148	26.9	21.2
Debre Tabor	36	0.02778	15306	19044	3738	24.4	19.6

Annex II Con't

Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6	Col. 7	Col. 8
Hossaina	37	0.02703	15167	18530	3363	22.2	18.1
Kibre Mengist	38	0.02632	14391	18042	3651	25.4	20.2
Maichew	39	0.02564	15190	17579	3389	23.9	19.3
Dembidollo	40	0.02500	14170	17140	2970	21.0	17.3
Alamata	41	0.02439	14030	16722	2692	19.2	16.1
Mojo	42	0.02381	13945	16324	2379	17.1	14.6
Adwa	43	0.02326	13823	15944	2121	15.3	13.3
Butajira	44	0.02273	13688	15582	1894	13.8	12.2
Kobo	45	0.02222	13542	15236	1694	12.5	11.1
Ghimbi	46	0.02174	13098	14904	1806	13.8	12.1
Negelle (Shewa)	47	0.02128	13096	14587	1491	11.4	10.2
Wukiro	48	0.02083	13045	14283	1238	9.5	8.7
Mota	49	0.02041	12934	13992	1058	8.2	7.6
Endaselassie	50	0.02000	12846	13712	866	6.7	6.3
Metu	51	0.01961	12491	13443	952	7.6	7.1
Mendefera	52	0.01923	12184	13185	1001	8.2	7.6
Negelle (Sidamo)	53	0.01887	11997	12936	939	7.8	7.3
Genet	54	0.01852	11741	12696	955	8.1	7.5

Annex II Con't

Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6	Col. 7	Col. 8
Asbe Teferi	55	0.01818	11344	12465	1121	9.9	9.0
Robi	56	0.01786	11293	12243	950	8.4	7.8
Meki	57	0.01754	11168	12028	860	7.7	7.1
Teda	58	0.01724	10811	11821	1010	9.3	8.5
Dangila	59	0.01695	10602	11620	1018	9.6	8.8
Humera	60	0.01667	10469	11427	958	9.2	8.4
Dubti	61	0.01639	10295	11239	944	9.2	8.4
Sebeta	62	0.01613	10030	11058	1028	10.2	9.3
Bati	63	0.01587	10009	10883	874	8.7	8.0
		$\Sigma RR=$	$\Sigma AP=$	$\Sigma EP=$	$\Sigma/DEAP/=$	$\Sigma/DAP/=$	$\Sigma/DEP/=$
		4.72827	3241701	3241699	1453948	1765.5	1320.7
			$\frac{\Sigma AP}{N}=$	$\frac{\Sigma EP}{N}=$	$\frac{\Sigma DEAP}{N}=$	$\frac{\Sigma DAP}{N}=$ 28.0	$\frac{\Sigma DEP}{N}=$
			51456	51456	23079		21.0

ANNEX III

URBAN-SIZE HIERARCHY IN RELATION TO THE RANK-SIZE MODEL (2000)

Col. 1 Towns	Col. 2 Rank (R)	Col. 3 Reciprocals (RR)	Col. 4 Actual Population Size (AP)	Col. 5 Expected Population Size (EP)	Col. 6 Differences Between Expected and Actual Populations (DEAP)	Col. 7 Difference as Per Cent of Actual Population (DAP)	Col. 8 Difference as Per Cent of Expected Population (DEP)
Addis Ababa	1	1:00000	3,640,927	1,687,865	-1,953,062	-53.6	- 115.7
Asmera	2	0:50000	484,949	843,933	358,984	74.0	42.5
Mekele	3	0.33333	263,079	562,622	299,543	113.9	53.2
Akaki	4	0.25000	227,952	421,966	194,014	85.1	46.0
Bahir Dar	5	0.20000	211272	337,573	126,301	59.8	37.4
Awassa	6	0.16667	194877	281311	86,434	44.4	30.7
Nazaret	7	0.14286	190883	241124	50,241	26.3	20.8
Dire Dawa	8	0.12500	180940	210983	30043	16.6	14.2
Arba Minch	9	0.11111	149470	187541	38071	25.5	20.3
Gonder	10	0.10000	143791	168787	24996	17.4	14.8
Jimma	11	0.09091	114237	153442	39205	25.6	25.6
Jijiga	12	0.08333	112270	140655	28385	25.3	20.2
Shashemene	13	0.07692	112269	129836	17567	15.6	13.5
Dessie	14	0.07143	112210	120562	8352	7.4	6.9
Debre Zeit	15	0.06667	109950	112524	2574	2.3	2.3
Harer	16	0.06250	88049	105492	17443	19.8	16.5
Assela	17	0.05882	87806	99286	11480	13.1	11.6
Debre Markos	18	0.05556	69026	93770	24744	35.8	26.4
Debre Berhan	19	0.05263	65422	88835	23413	35.8	26.4
Goba	20	0.05000	64813	84393	1958	3.0	2.3

Annex III Con't

Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6	Col. 7	Col. 8
Nekemt	21	0.04762	60104	80375	20271	33.7	25.2
Mota	22	0.04545	59431	76721	17290	29.1	22.5
Adwa	23	0.04348	55693	73385	17692	31.8	24.1
Kembolcha	23	0.04348	55693	73385	17692	31.8	24.1
Soddo	24	0.04167	52068	70328	18260	35.1	26.0
Dilla	25	0.04000	47672	67515	19843	41.6	29.4
Negelle (Shewa)	26	0.03846	42913	64918	22005	51.3	33.9
Mojjo	27	0.03704	42417	62514	20097	47.4	32.1
Fiche	28	0.03571	41529	60281	18752	45.2	31.1
Alamata	29	0.03448	41419	58202	16783	40.5	28.8
Agaro	30	0.03333	36802	56262	19460	52.9	34.6
Meki	31	0.03226	36595	54447	17852	48.8	32.8
Butajira	32	0.03125	34772	52746	17974	51.7	34.1
Hagere Hiwot	33	0.03030	34511	51147	16636	48.2	32.5
Hossaina	34	0.02941	32113	49643	17530	54.6	35.3
Debre Tabor	35	0.02857	31432	48225	16793	53.4	34.8
Adigrat	36	0.02778	31409	46885	15476	49.3	33.0
Robi	37	0.02703	31400	45618	13412	45.3	31.2
Ghion	38	0.02632	31006	44418	13412	43.3	30.2
Dembi Dollo	39	0.02564	30931	43279	12348	39.9	28.5

Annex III Con't

Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6	Col. 7	Col. 8
Sebeta	40	0.02500	30056	42197	12141	40.4	28.7
Negelle (Sidamo)	41	0.02439	30020	41167	11147	37.1	27.1
Kibre Mengist	42	0.02381	29553	40187	10634	36.0	26.5
Metu	43	0.02326	29420	39253	9833	33.4	25.1
Woldiya	44	0.02273	28060	38361	10301	36.7	26.9
Wukiro	45	0.02222	26789	37508	10719	40.0	28.6
Dangila	46	0.02174	26131	36649	10518	40.3	28.7
Kobo	47	0.02128	25364	35912	10548	41.6	29.4
Axum	48	0.02083	23618	35164	11546	48.9	32.8
Yirgalem	49	0.02041	23026	34446	11420	49.6	33.2
Ghimbi	50	0.02000	22712	33757	11045	48.6	32.7
Endaselassie	51	0.01961	21933	33095	11162	50.9	33.7
Genet	52	0.01923	20359	32459	12100	59.4	37.3
Maichew	53	0.01887	17174	31847	14673	85.4	46.1
Asbeteferi	54	0.01852	17105	31257	14152	82.7	45.3
Bati	55	0.01818	15814	30688	14874	94.1	48.5
Massawa	56	0.01786	15690	30140	14450	92.1	47.9

$\Sigma RR = 465495$ $\Sigma AP = 7856926$ $\Sigma EP = 7856881$ $\Sigma DEAP = 3888457$ $\Sigma DAP = 2492.4$ $\Sigma DEP = 1730$

$$\frac{\Sigma DAP}{N} = \frac{2492.4}{57}$$

$$\frac{\Sigma DEP}{N} = \frac{1730}{57} = 30.4$$