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The Spatial Prevalence of Land Uses and its impact on cityscape in Bahir Dar and Hawassa Cities, Ethiopia

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ABSTRACT

The topic under investigation entitled as "Spatial Organization of Urban Services and its Impact on Cityscape: A Comparative Study of ***Bahir Dar*** and ***Hawassa*** cities (***Ethiopia***)'' circles on addressing issues of how the spatial distribution of urban services impacted on the cityscape substantiated by a comparative study of two regional capital cities in Ethiopia. Thus, the aim will be to examine how and in what aspects the spatial organization and order of urban services have put its print on the cityscape. Besides looking it on the basis of existing urban land use models, it will be substantiated with identifying the major forces behind the spatial order of urban services on temporal and spatial analysis basis. To affect the intended result both primary (questionnaire, interviews, focus group discussion) and secondary data shall be utilized. For data analysis the application of GIS (Geographic Information System) and SPSS (Statistical Package for Social Scientists) are employed.

1. Introduction

Cities or urban centers are realities in the space. The manifestation of this reality is expressed in terms of the orderly or disorderly arrangement of urban services across such spatial entities, which in its turn has a definite impact on the cityscape.

Though the spatial organization of urban services resilient and evolve very slowly (Bertaud 2004), it however, influences the shape of the city scape. It seems for this reason different spatial organization possessed by cities across the Globe performs differently, laying the foundations for similarities and dissimilarities among different cities.

This issue at hand is a nexuses point of three disciplines namely urban planning, geography and economics. Pro arguing with this idea McCann (2007: 1) affirmed that all economic phenomena take place within geographical space and at the same time the economic performance of a particular area also depends on the nature and performance of the various markets located within the area. This in fact is without ignoring the role of urban planning in in influencing the distribution of economic activities in urban spaces. The spatial structure of urban center/ city is a product of centripetal forces of attraction and congestion, centrifugal forces of dispersion and decongestion and forces of area differentiation (urban economics) . It is this spatial structure, which in its turn is the basis for the scanty available urban spatial and economic growth models (theories).

Then central to this appear an important question as to whether the spatial organization of urban services is a deliberate outcome or unforeseen consequence? To put this same question in other way round is the spatial distribution of urban services comes to existence based on the principles of urban planning?

In this regard the vast majority of the existing literature depicts although urban spatial structure is shaped by market forces interacting with regulations, primarily infrastructure, investment and taxes, the spatial structures are usually the unintended result of unforeseen consequences of policy and regulations that were designed without any particular spatial concern (Bertaud 2004)

Likewise as a background the direction of this research will follow looking closely the applicability of the existing theoretical and practical land use models on the cities chosen for this comparative study.

To effect this end the comparative analysis will dwell on pinpointing the similarities and differences to make their interpretation and meaning on both cities under consideration. How these can be specified, and then will be critical throughout the course of this research.

1.1 Statement of the problem

In analyzing the existing theoretical and operational models of urban growth of both the developed and developing world origin looking the positions of the spatial organization of urban services and its impact on the cityscape of the two cities namely Bahir Dar and Hawassain these respect will be the prime focus of this dissertation proposal output. From this angle the existing research gap is the non-existence of spatial growth models that can be applicable as a spring board up on which urban growth can evolve and that can help to explain urban growth in the sense of either urban growth or urban decline across Ethiopia's urban centers will become the source of concern for undertaking such a seemingly ambitious topic.From this side the problem seems capable of being investigated or evaluated through the collection and analysis of relevant information and hence is researchable by offering itself to appropriate sources of information that can provide a solution to the problem.

Then follows an important question what if the patterns apparent in Bahir Dar and Hawassaeither does exactly fit or doesn't fit to the existing theoretical and operational models? Which in fact is the other important focus where no or little is done on the area, then will be the core problem where by this research seeks to provide observable and evidence based solution at the end.

On top of this looking closely into the patterns of the spatial organization of urban services and its impact on the city's scape of the two big cities of Ethiopia on the basis of comparative study will be whispered to lead the research finding in identifying the apparent spatial growth models not only applicable for the two cities but also can positively hold for other urban centers in the country.

1.2 Objectives

The general objective of this article is to examine the spatial prevalence of urban land uses and their impact on the cityscape of the two cities. Specifically it addresses:

- What similarities and dissimilarities can be found in the spatial distribution of urban land uses of the two cities?
- How does the distribution of urban land uses impact the cityscape of the two cities?

2. Methods and Materials

Spatial data as obtained from the structure plans / Integrated development plans/ master plans of Bahir Dar and Hawassa cities have been used. These were analyzed and interpreted using GIS and compared with existing theories. Similarly SPSS was used to show the correlation results of variables for the spatial component.

secondary data of spatial nature covering centrality, dispersion (of major land uses from the central business district), built-up area ratio, as well as density and shape (of both cities) were brought into consideration.

3. Centrality

Centrality refers to the quality or state of being central, a central position or tendency (Lorimer and Lechner 1996, p. 160). It expresses indirectly the privileged position of the centre as a quality. 'Centre' indicates the approximate middle part or point of some-thing, occupying a middle position, the place where activity is concentrated, as in the case of a shopping centre (Lorimer and Lechner 1996, p. 159). Essentially, in all cities 'centrality' and 'centre' refer to the central business district (Glaeser and Kahn 2004). Each urban growth model, be it from the developed or developing country, has its own central business district – CBD. Defining the CBD of the cities under the study was a vital first step towards understanding the dynamics of how the growth pattern of urban land uses has occurred and impacted the cityscape. In terms of the major categories of land uses found there, Murphy and Vance (1960) defined the CBD as an area having dominant land use types as business, commercial and industrial. In the context of Ethiopia, based on the compatibility matrix, a center is the area with the most compatible mix of land uses such as commercial, residential, services, administrative, but not manufacturing (MUDC, 2012)

Taking the above into consideration, the CBD of Hawassa is mapped from the Sidama Cultural Hall (Figure 16) which occupies the approximate 'centrality' around which other activities have congregated. This is reinforced by the predominant presence of commercial and service activities. The map shows the variety and location occurrence of mix of land uses.

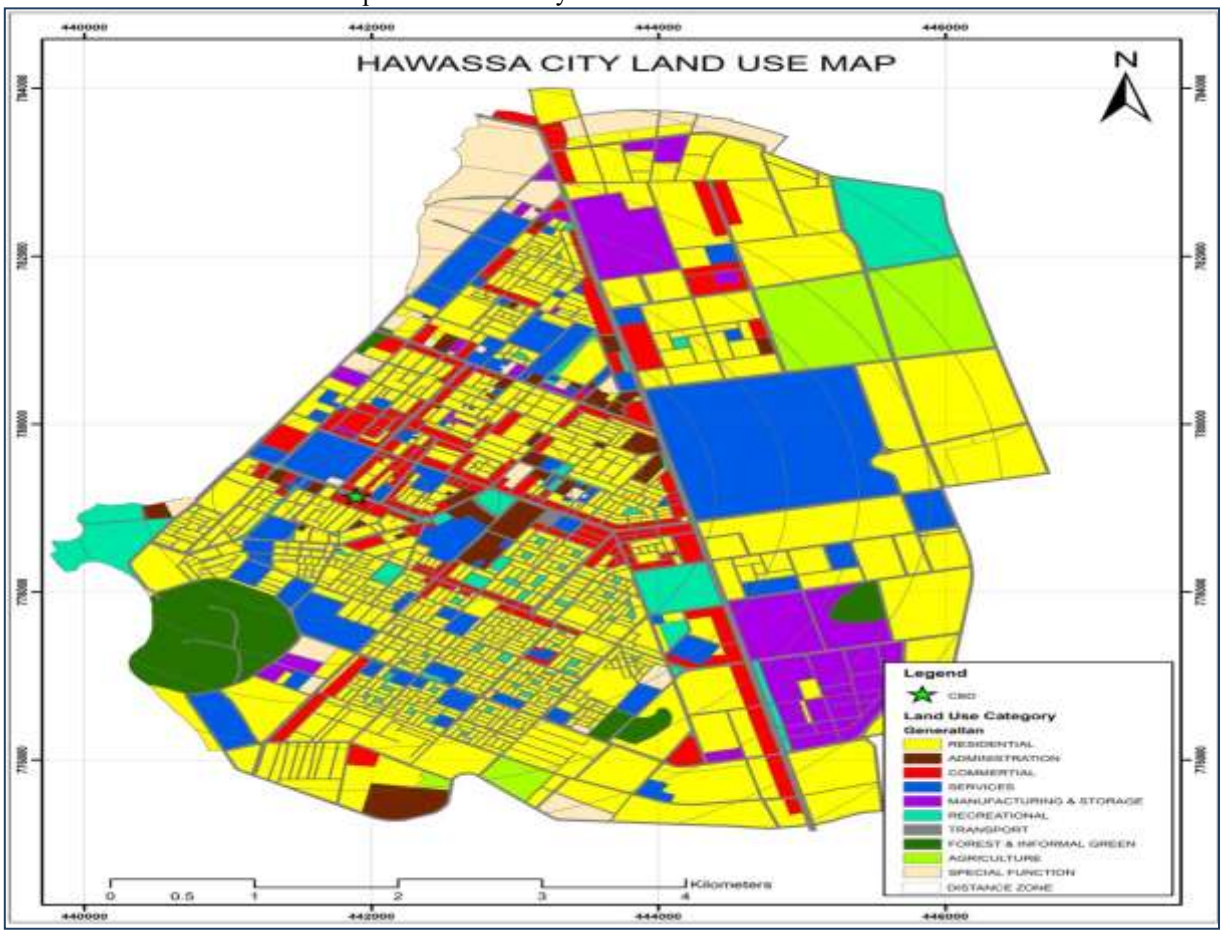

Figure 1 Land Use Map of Hawassa
Source: AIDP (2006

In the same way, the centre of the CBD of Bahir Dar is near the City Bus Terminal (Figure 17) around which dominant commercial and business activities including, the city market, financial institutions, hotels, and offices are found. The map shows the variety and location occurrence/mix of land uses.

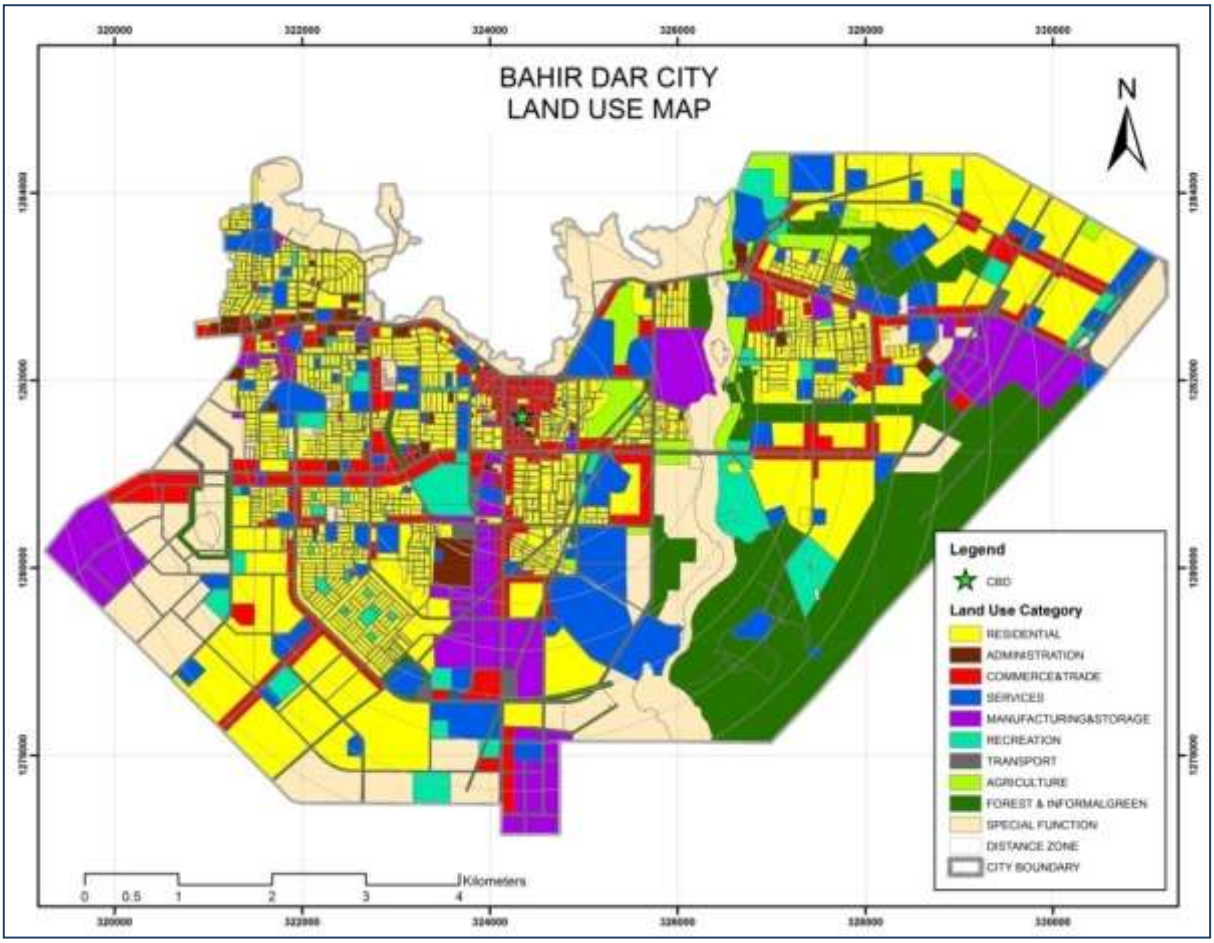

Figure 2 Land use map of Bahir Dar
Source: BDIDP (2006)

4. The Dispersion of Major Land Uses[1]

The current IDPs prepared from the existing land use of the two cities were used as source data and the study indicators are presented to facilitate the comparative review of the two cities. In the analysis of the spatial data both linear trend/regression lines and Pearson correlation were used. The major land uses subjected to the analysis are: Administrative, Trade and Commerce, Manufacturing and Storage, Residential, Service, Forest, Road and Transport, Urban Agriculture, Recreational; and Special Function.

- Administration land use: Figure 18a and 18b show the trend in proportionate occurrence of administrative land use as distance increases from the CBD to the periphery[2] (urban plan boundary) in 0.5km distance intervals, in the two cities.

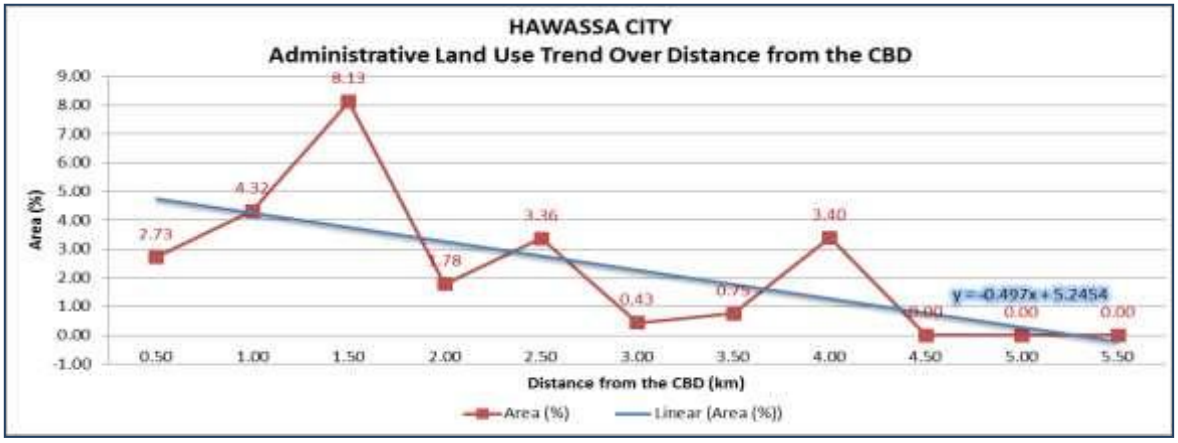

Figure 3 a Trends of Administrative Land use over distance from CBD, Hawassa

[1] The 10 major land use types treated in the Integrated Development Plan (IDP) of the two cities are considered
[2] The city limit in both cities is taken to be the urban plan boundary. The limit for ***Bahir Dar*** is completed at 7km radius from the center, whereas for ***Hawassa*** it was at about 5.5km distance radius from the city center.

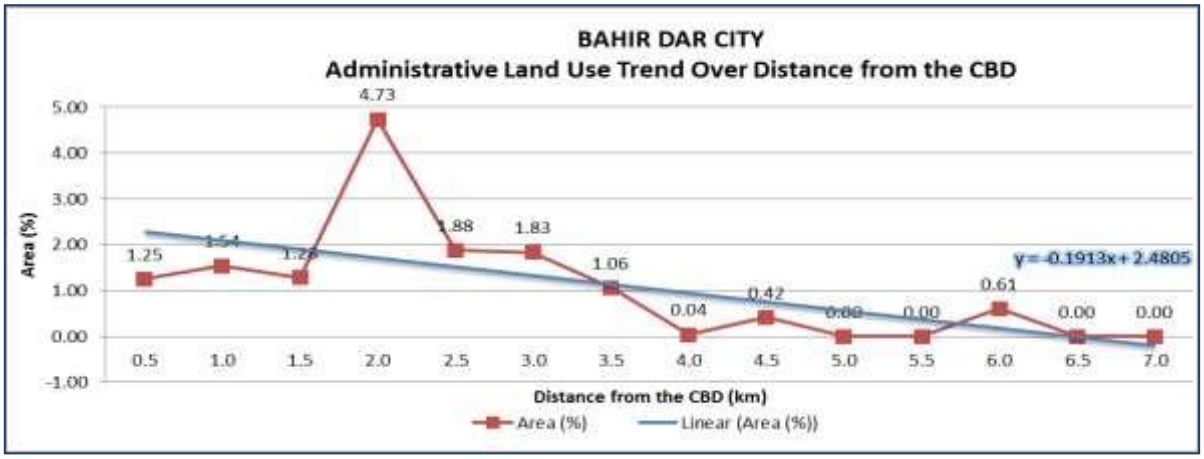

Figure 3 bTrends of Administrative Land use over distance from CBD, Bahir Dar
Source: Author's work, 2014

Linear trend/regression lines in Figures 18a &18b for Hawassa and Bahir Dar have the respective equations; y=-0.5x +5.25 [Hawassa] and y=-0.19x + 2.48 [Bahir Dar]. The negative slope values, -0.19 for Bahir Dar and -0.5 for Hawassa, indicate a general trend of decline in the percentage proportion of the occurrence of administration land use as distance increases from the CBD. The y-intercept, at the CBD was 2.48 percent and 5.25 percent for Bahir Dar and Hawassa, respectively. This means that administration land use presence in Hawassa is greater than Bahir Dar by double-fold within the same distance.

Taking distance from the CBD as independent variable and the proportion of administration land use in each distance interval of 0.5km separately for the two cities as an dependant variable, the resulting Pearson correlation coefficient of -0.63 for Bahir Dar and -0.66 for Hawassa both signify strong negative correlation (Cohn, 1988 cited in Greasley, p, 80, 2008). This means that administration land use declines as distance from the centre increases.

- Trade and commerce: Figure 19a & 19b show the rate of decline of trade and commerce land uses from the CBD towards the periphery of the two cities .The trend line equations for Bahir Dar and Hawassa respectively are y=-1.3x +17.88 and y=-1.622x +17.27, yielding negative slopes. The proportionate occurrence of trade and commerce land use in the CBD of both cities was more than 17 percent.

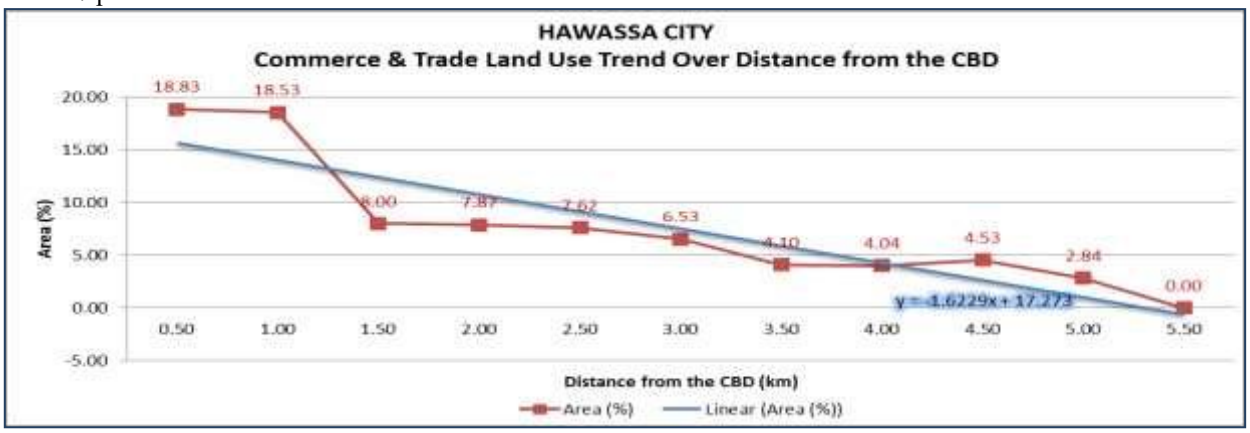

Figure 4a Trends of commerce and trade Land use over distance from CBD for Hawassa

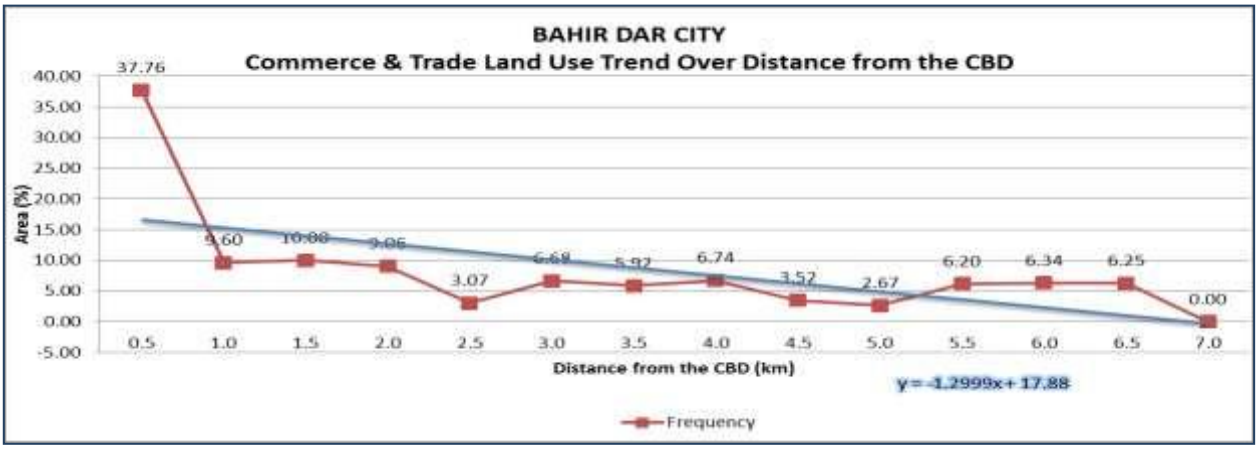

Figure 4b Trends of commerce and trade Land use over distance from CBD for Bahir Dar
Source: Own, 2014

The Pearson correlation coefficient of -0.61 and -0.90 for Bahir Dar and Hawassa respectively show the existence of strong negative correlation, indicating that as distance from the center increases this particular land use declines dramatically in occurrence.

- Manufacturing and storage: The manufacturing and storage land use occurrences show an increasing trend from the CBD to the periphery in both cities, with a regression line equation of y= 0.69x +0.06 and y= 0.48x +0.40 for Hawassa and Bahir Dar respectively.

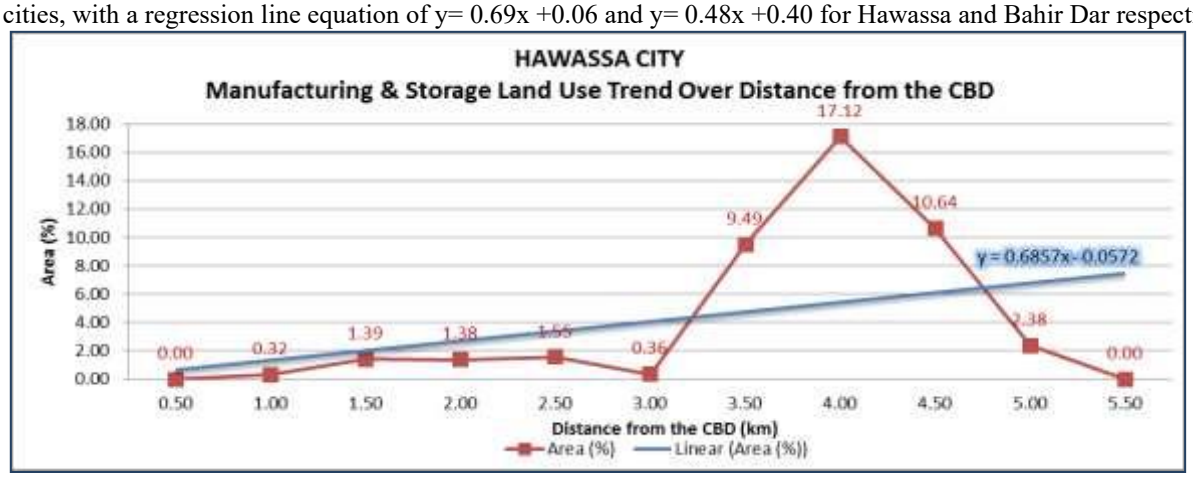

Figure 5 a Trends of manufacturing & storage land use over distance from CBD for Hawassa

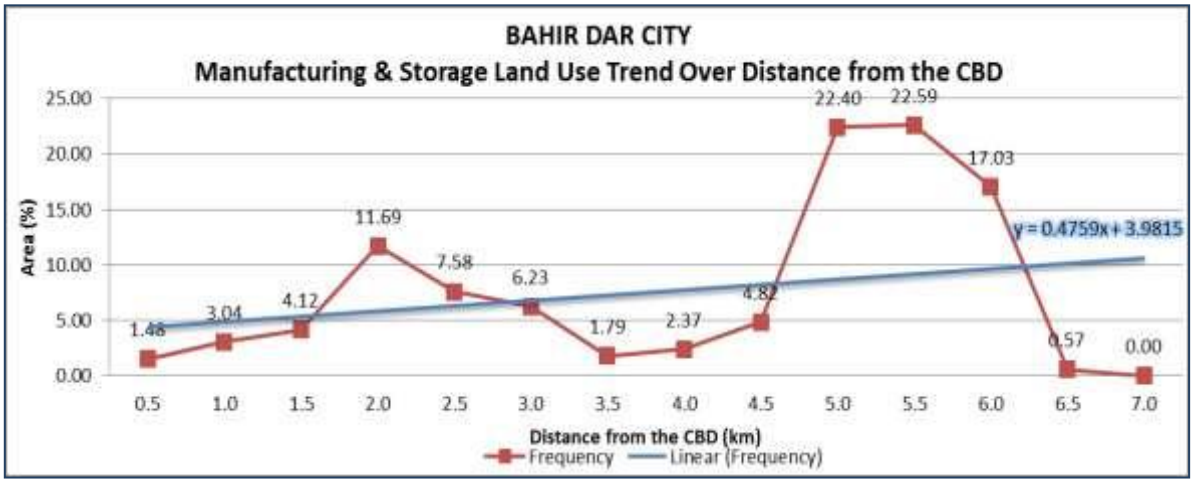

Figure 5b Trends of manufacturing & storage land use over distance from CBD for Bahir Dar

Source: Own, 2014

Again, the Pearson correlation coefficient result for Hawassa and Bahir Dar were 0.4 and 0.25, respectively. In both cases the correlation coefficient figures indicate weak positive correlation.

- Residential Land use: Line graph of the residential land use show a steady gradient from the CBD towards the periphery, indicating a uniform spread of residential occurrences throughout the spatial limits of the cities. The trend line support this fact given the following linear regression equations, y= 0.51x + 35.6 for Hawassa and y= 0.80x +23.7 Bahir Dar. The intercept of the two equations indicate the presence of residential occurrence up to35.6 percent in Bahir Dar CBD and 22.7 percent in Hawassa CBD.

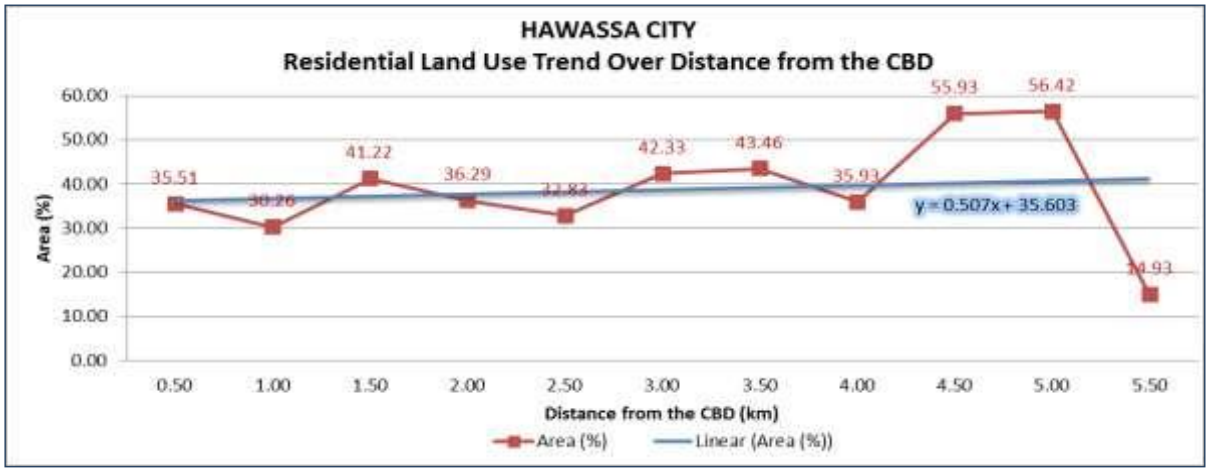

Figure 6a Trends of residential land use over distance from CBD for Hawassa

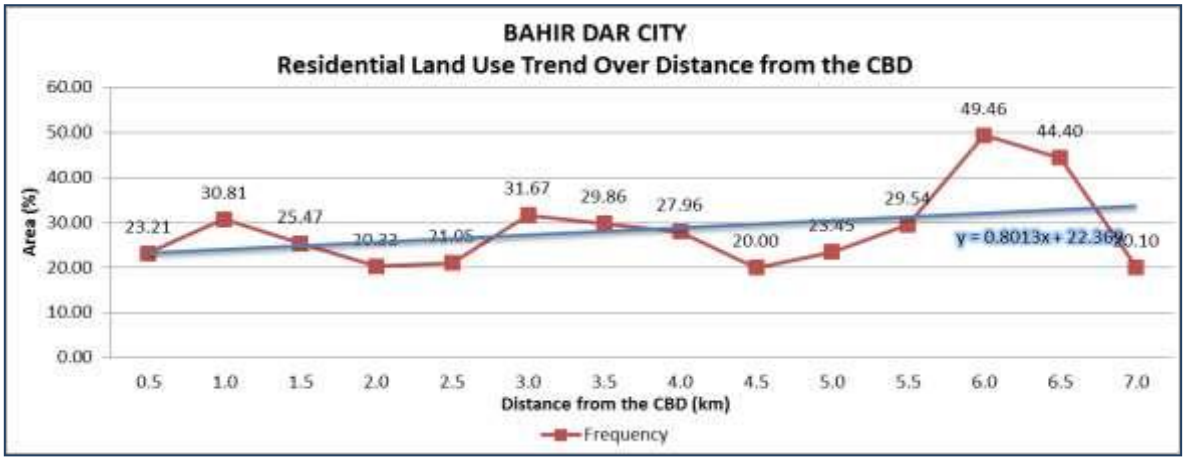

Figure 6b Trends of residential land use over distance from CBD for Bahir Dar
Source: Own, 2014

The Pearson correlations computed for Hawassa 0.15 and for Bahir Dar 0.38, indicate a weak positive correlation. This implies that as one moves from the CBDs of the two cities in any direction there is a weak positive correlation, meaning a steady increase in the proportion of residential land use.

- Service land use: The distribution of service land use across the two cities shows an interesting contrast portrayed in Figure 22a & 22b, whereby the linear regression line equation is negative expressed by y= -1.66x + 21.78 for Hawassa and positive y= 0.05x +9.2 for Bahir Dar. This indicates a decreasing trend with distance from the CBD in Hawassa contrasted by an increasing trend in Bahir Dar.

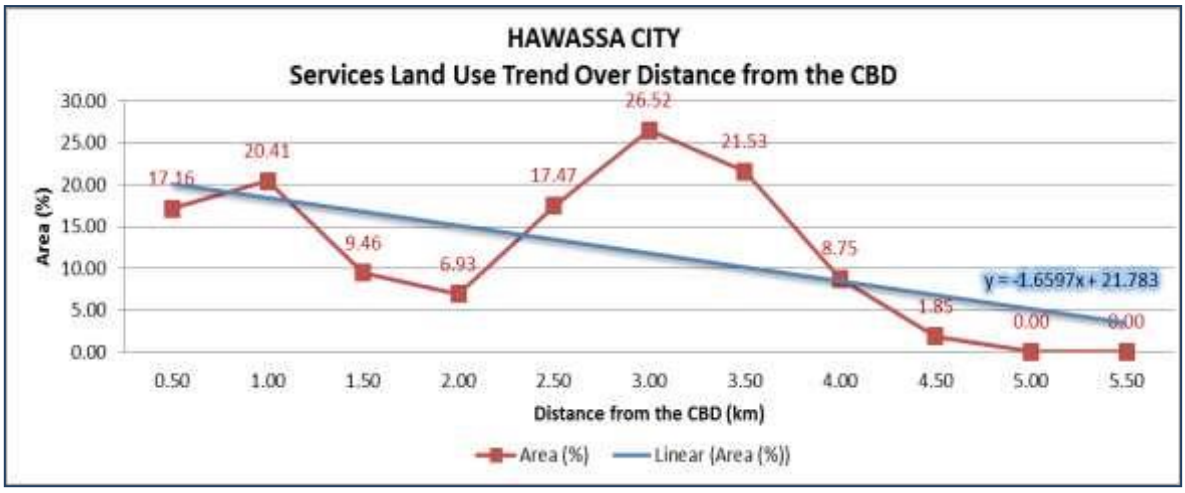

Figure 7a Trends of service land use over distance from CBD for Hawassa

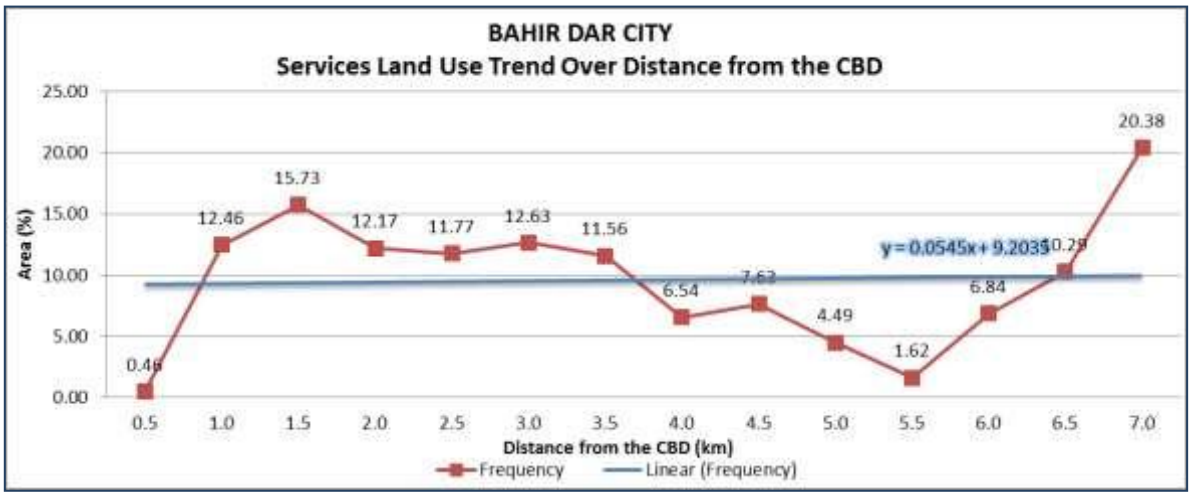

Figure 7b Trends of service land use over distance from CBD for Bahir Dar
Source: Own, 2014

The Pearson correlation for service land use is also found to be r= -0.59 for Hawassa and r= 0.04 for Bahir Dar. Accordingly, the Pearson correlation is strong negative -0.59 for Hawassa and weak positive for Bahir Dar 0.0.

- Forest land use: In Hawassa, the major occurrence of this type of land use in terms of percentage proportion reaches its peak at 2 km distance from the CBD followed by a sharp decline at a distance of 3km , before rising again at 4km distance and then onwards to 0 level at the boundary. In Bahir Dar, the maximum peak occurs at a distance of 4.5km from the CBD, then declines steadily to the outskirt reaching a scanty presence at a distance of 6.5km.

The trend line equation is a negative slope of y= -0.353x + 5.17 for Hawassa and a positive slope of y= 0.10x + 3.88 for Bahir Dar (Figure 23a & 24b).

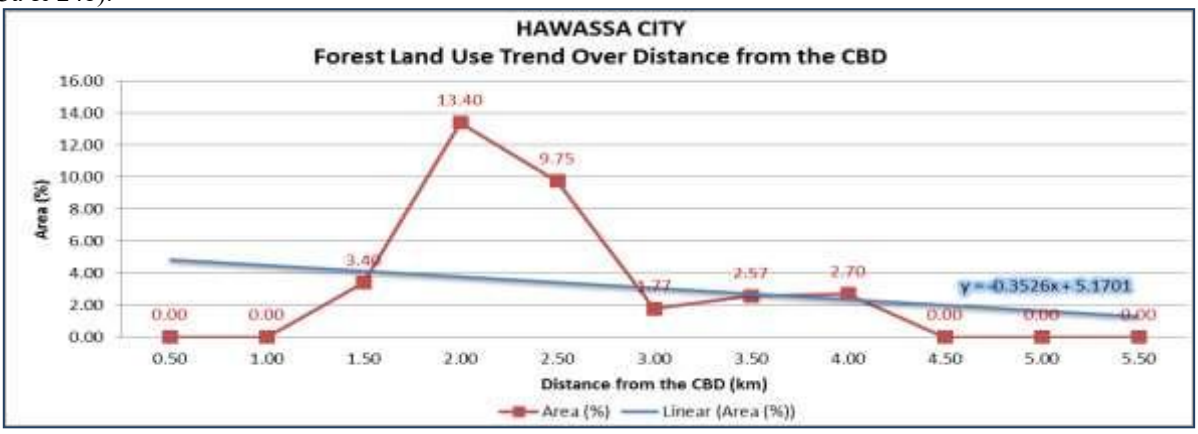

Figure 8a Trends of forest land use over distance from CBD, Hawassa

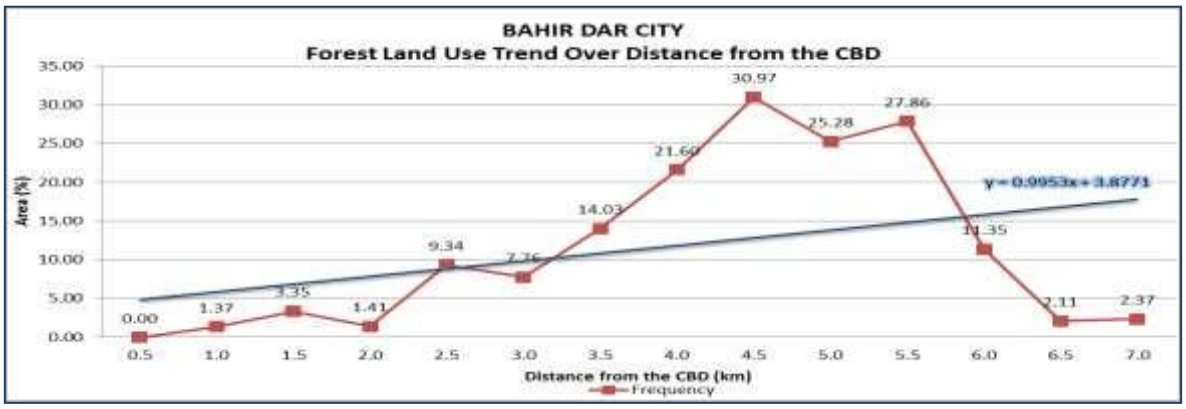

Figure 8b Trends of forest land use over distance from CBD, Bahir Dar
Source: Own, 2014

The Pearson correlation coefficient is a weak negative value of -0.26 for Hawassa and a weak positive value of 0.38 for Bahir Dar. While the correlation coefficient value of Hawassa falls in a weak negative territory, for Bahir Dar the correlation coefficient value falls in a weak positive territory (Cohn, 1988 cited in Greasley, p, 80, 2008).

- Road and Transport Land use: The occurrence of this land use shows a decline with distance in both case cities (Figures 24a & 24b). This result agrees with the general land use theory of reduction in road density as well as traffic volume as distance increases from the center.

Again, the trend line graph equations for Hawassa is y= -1.378x + 24.64 and for Bahir Dar is y= -1.55x + 25.02 implying a decreasing trend in both cities. Taking the intercept as a basis for the percentage proportion of this land use at the CBD, it is almost equal for the two cities.

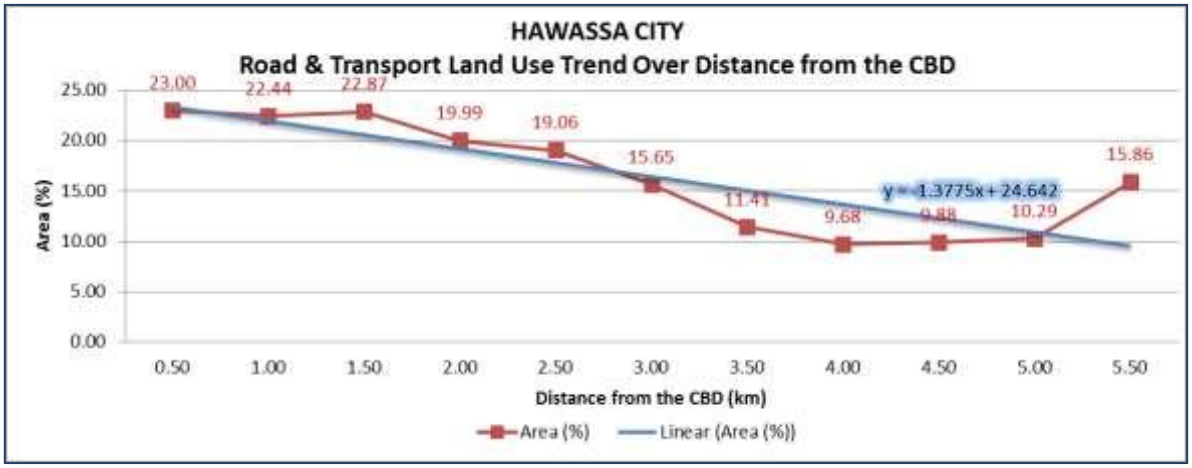

Figure 9a Trends of road and transport land use over distance from CBD, Hawassa

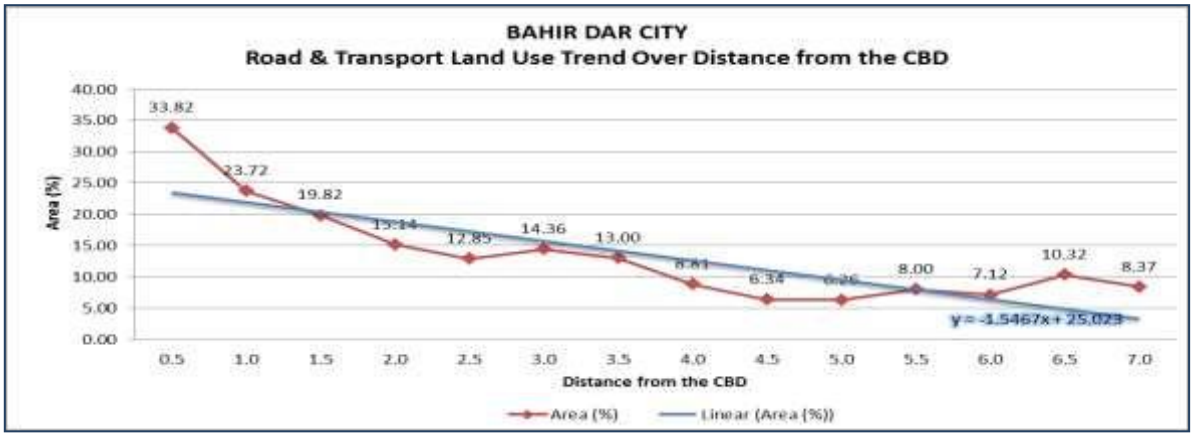

Figure 9b Trends of road and transport land use over distance from CBD, Bahir Dar
Source: Own, 2014

Again, the Pearson correlation coefficient is -0.85 and -0.83 for Hawassa and Bahir Dar respectively. Both are strong negative correlation values (Cohn, 1988 cited in Greasley, p, 80, 2008) confirming a reduction in the network of roads and volume of traffic with distance from the CBD for the two cities.

- Urban Agriculture Land use: The trend line for this land use is indicated in Figures 25a & 25b and expressed by the equations y= 0.13x -2.74 and y= -0.26x + 4.05 for Hawassa and Bahir Dar, respectively. The slope indicates positive for Hawassa and negative for Bahir Dar implying that urban agriculture has an increasing trend in Hawassa, and a declining picture in Bahir Dar.

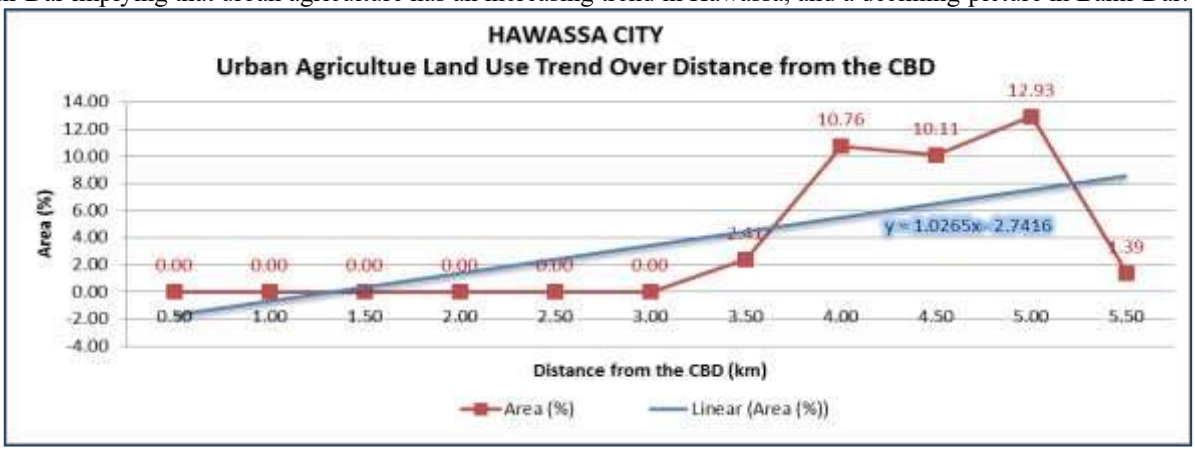

Figure 10a Trends of urban agriculture land use over distance from CBD, Hawassa

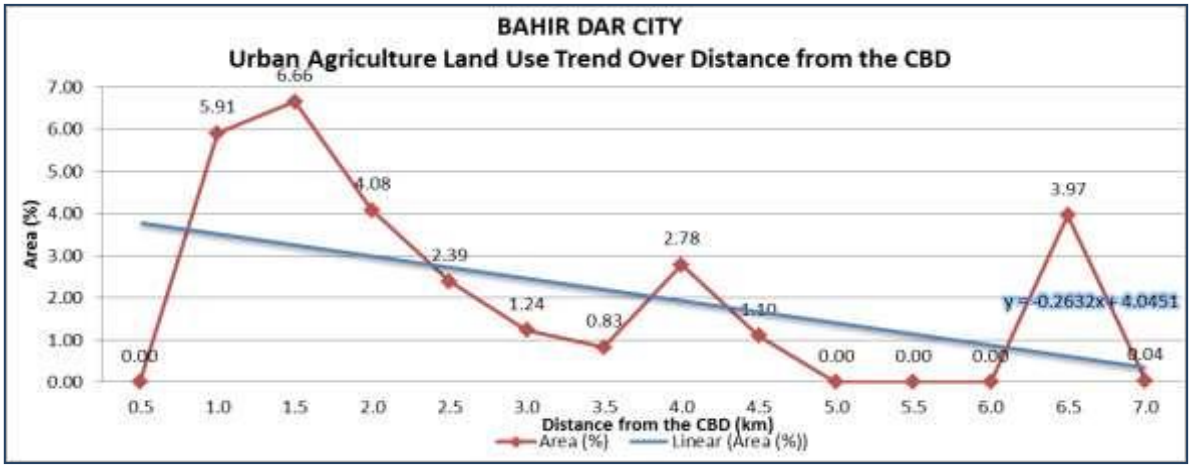

Figure 10b Trends of urban agriculture land use over distance from CBD, Bahir Dar
Source: Own, 2014

The Pearson correlation coefficient is strong positive 0.66 for Hawassa and weak negative -0.48 for Bahir Dar. The strong positive correlation value for Hawassa implies the existence of sufficient increase of this land use proportionate to distance in Hawassa and the reverse for Bahir Dar.

- Recreational Land use: The trend line equations for this land use as indicated in Figures 26a & 26b are y= 2.0x + 4.10 for Hawassa and y= -0.17x + 4.63 for Bahir Dar. The slope is positive for Hawassa and negative for Bahir Dar signifying an increasing pattern of this land use towards the periphery for Hawassa and a declining pattern for Bahir Dar.

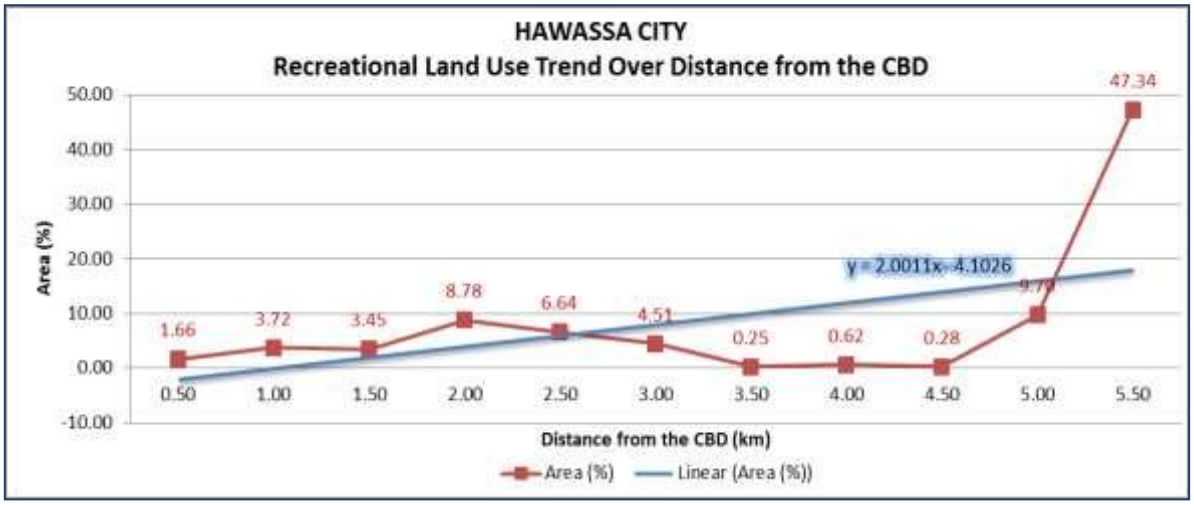

Figure 11a Trends of recreational land use over distance from CBD, Hawassa

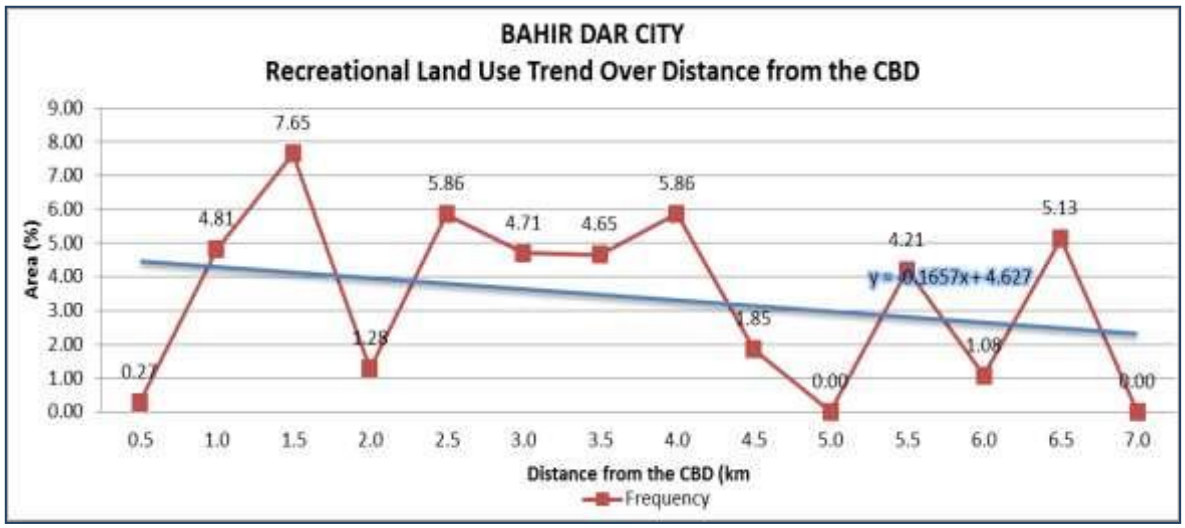

Figure 11b Trends of recreational land use over distance from CBD, Bahir Dar
Source: Own, 2014

The Pearson correlation coefficient is 0.49 and -0.27 for Hawassa and Bahir Dar, respectively, meaning a strong positive correlation for Hawassa and a weak negative correlation for Bahir Dar.

- Special Function Land use: The general pattern of this land use is shown in Figures 27a & 27b with the equations y= 1.29x - 2.2 for Hawassa and y= 1.14x + 6.5 for Bahir Dar. With a positive slope the general pattern of this land use category has an increasing trend with distance in both cases. The Pearson correlation coefficients are 0.76 and 0.37 for Hawassa and Bahir Dar, respectively. The results suggest r value for Hawassa as strong positive correlation, whereas the r value for Bahir Dar indicates a weak positive correlation.

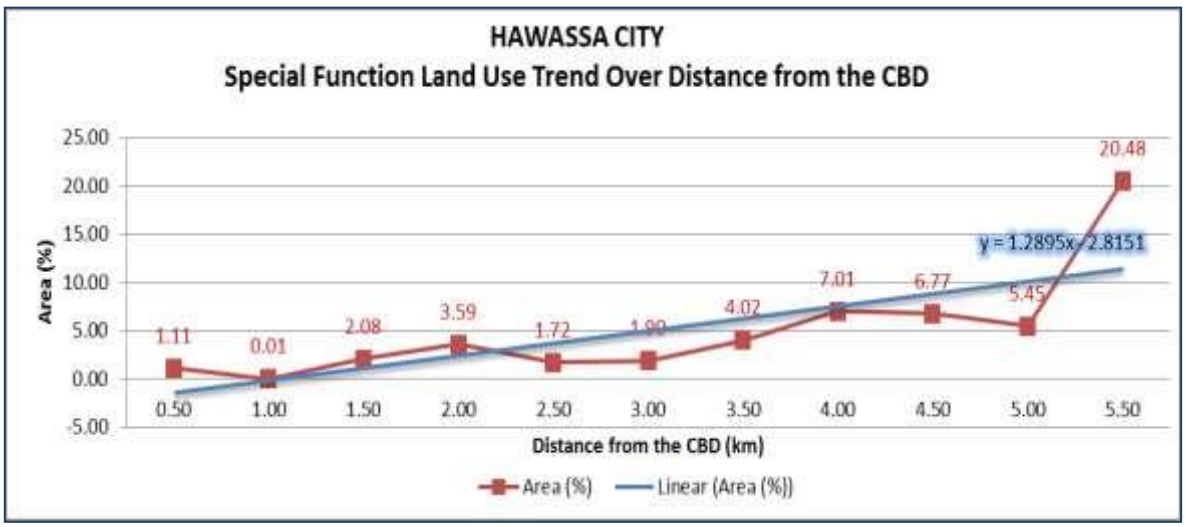

Figure 12a Trends of special function land use over distance from CBD, Hawassa

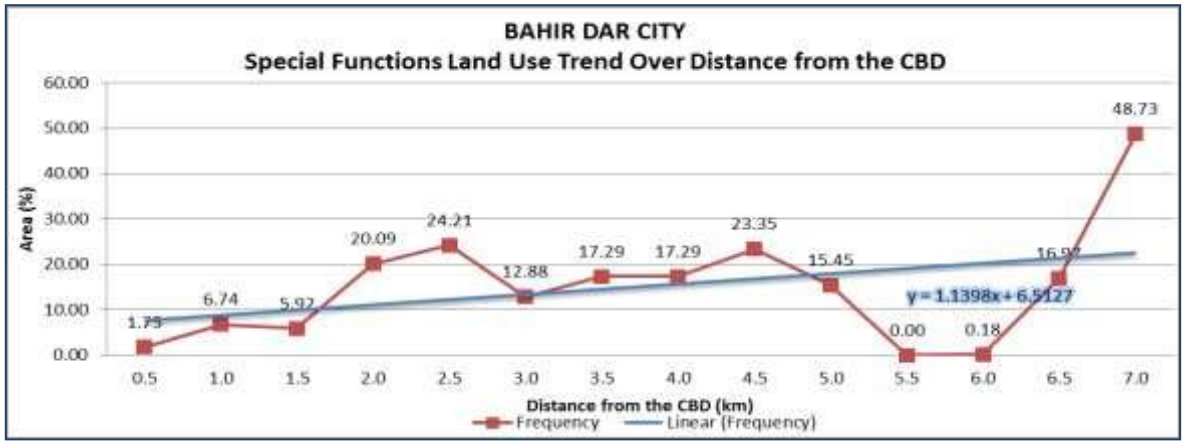

Figure 12b Trends of special function land use over distance from CBD, Bahir Dar
Source: Own, 2014

5. Built-up Area Ratio

Apart from the physical occurrence of the different land uses, the arrangement of buildings and, consequently, the built up area ratio[3] has an effect in the two cities structure. In the words of Angel (2012) exploring densities of such type is vital and wanted to uncover something about the overall shape of urban areas. Thus, in this connection effort is made to depict the built-up area ratio in terms of the percentage proportion within 0.5km intervals and the average built-up area ratio (in each zone) for the two cities. The map below is of Bahir Dar showing 0.5km radius intervals from the CBD, where the highest built up area ratio (BAR) of 90-100 can be found to the urban plan boundary limit with a ratio of 0-10. From the map this pattern reappears at the 3.5km radius after the Blue Nile topographic barrier. The lowest concentration of BAR, with a ratio of 0-10 is found spread across the remaining landscape of the city. This clearly reflects an uneven development of land in Bahir Dar.

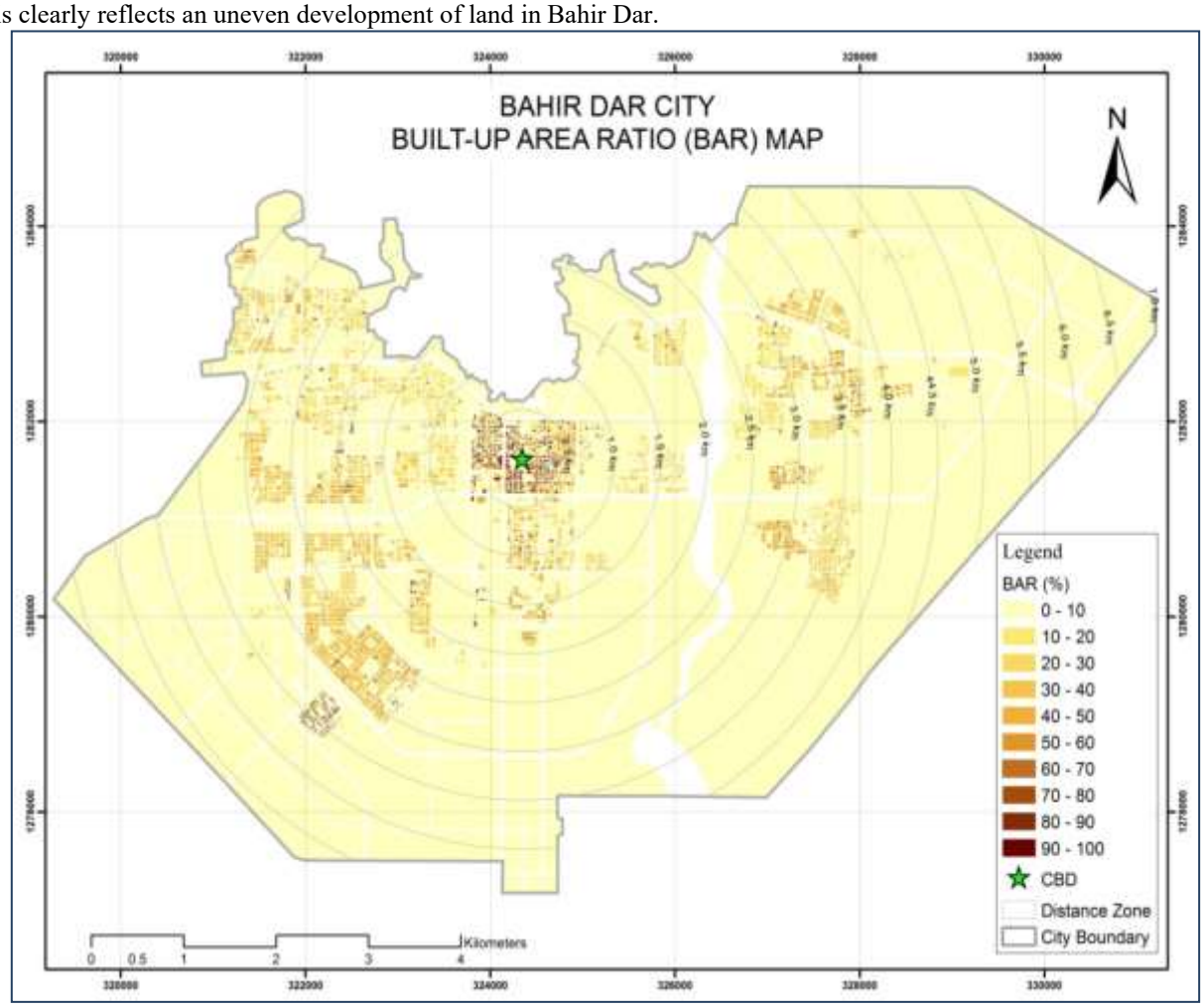

Figure 13 Built-Up Area Ratio Map for Bahir Dar
Source: Researcher's exert in overlaying the buildings on the 2006 IDP, 2014

[3] The Built-up Area Ratio (BAR) is the proportionate relationship between building area and the plot or parcel size.

Again, the map below confirms that Bahir Dar's highest BAR of 50.1 percent is found within the 0.5km radius distance of the CBD and also around the 2.5km radius location from the CBD.

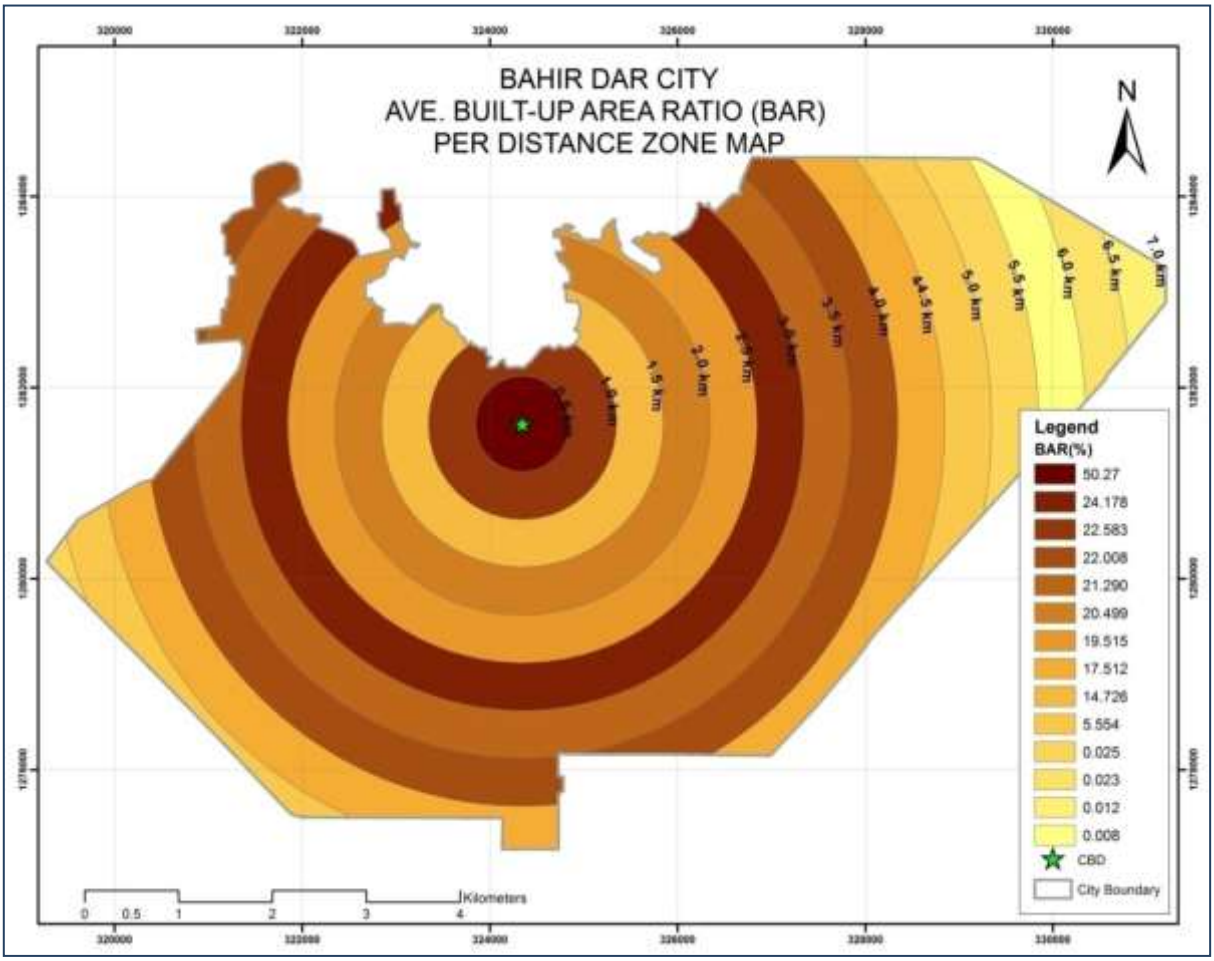

Figure 14 Average Built-Up Area Ratio, Bahir Dar
Source: Own, 2014

The general pattern of the average BAR in Bahir Dar is as portrayed in Figure 30 below showing an apparent decline with distance from the center.

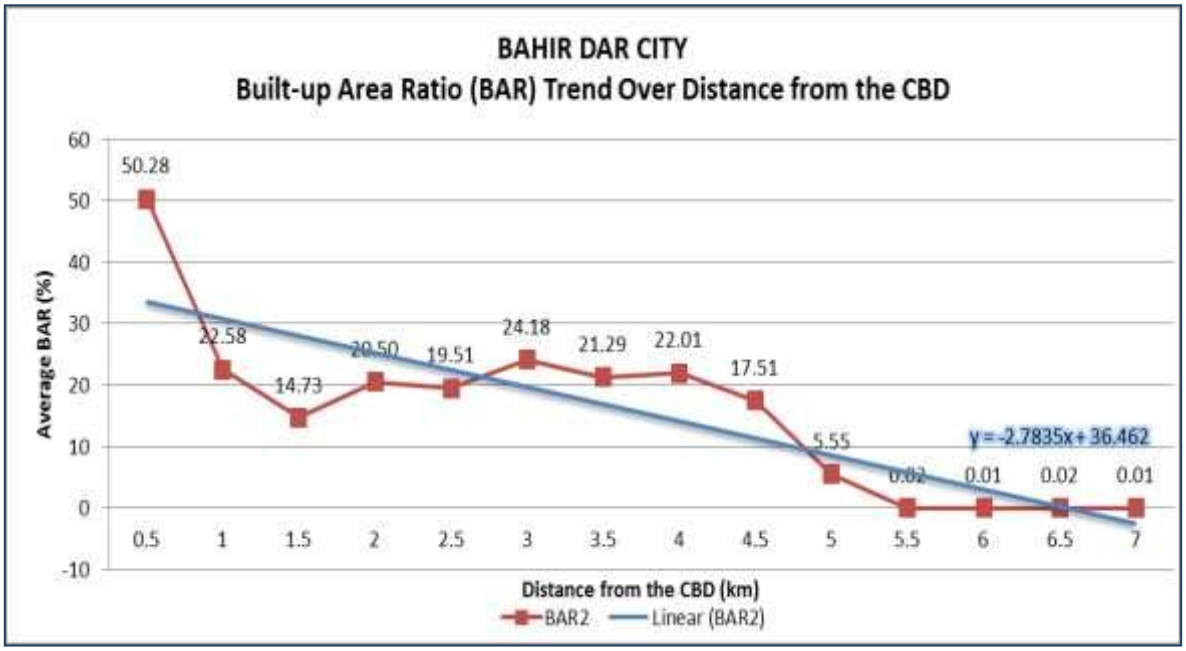

Figure 15 The trend of Average BAR in Bahir Dar
Source: Own, 2014

The map below reflects the highest percentage proportion of BAR in Hawassa to be within 0.5 km radius of the CBD.

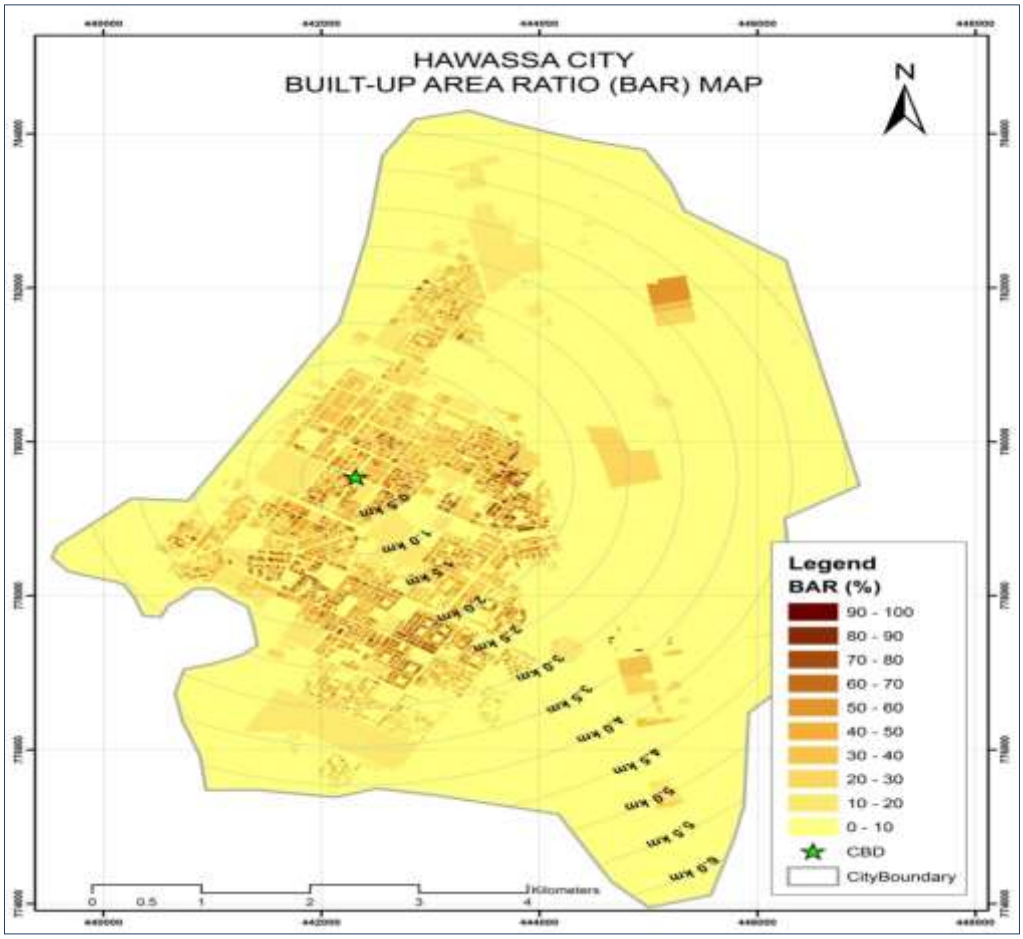

Figure 16 Built-Up Area Ratio Map for Hawassa
Source: Researcher's exert in overlaying the buildings on the 2006 IDP, 2014

The average BAR for Hawassa is shown in the map below which varies from the highest 46% to the lowest 0.4% across the city.

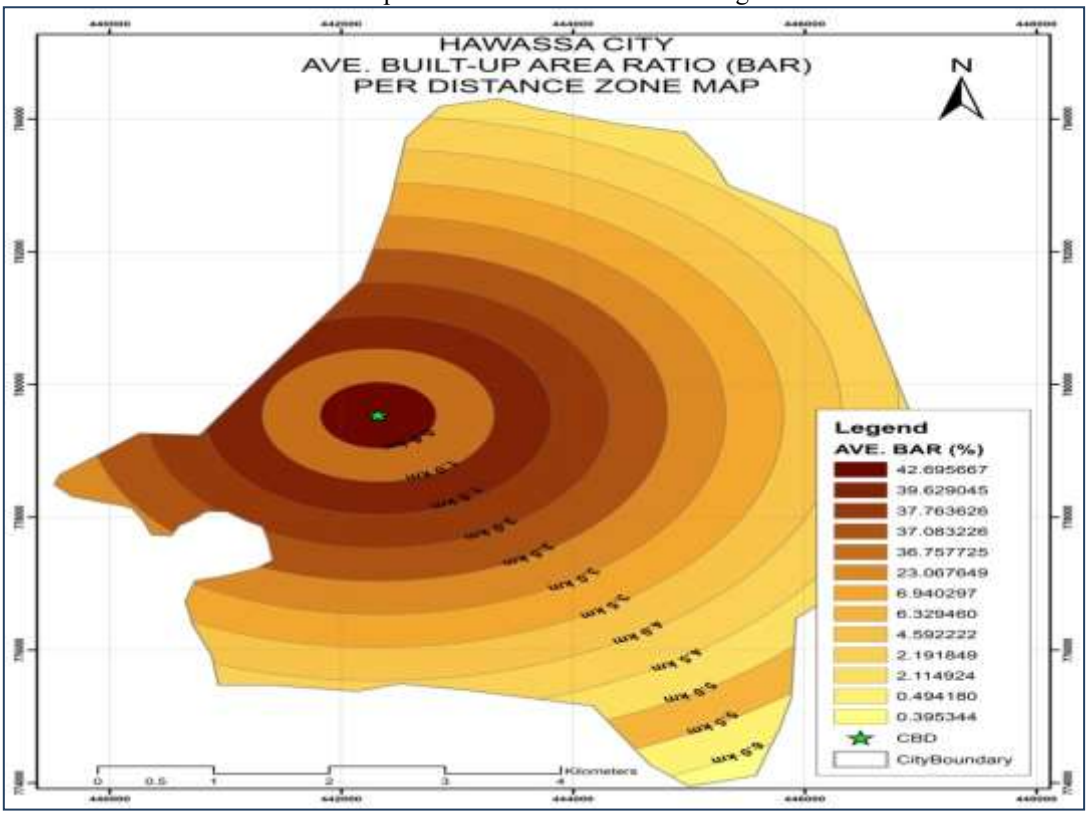

Figure 17Average Built-Up Area Ratio, Hawassa
Source: Researcher's exert in overlaying the buildings on the 2006 IDP, 2014

Similarly, the graph below displays a trend supported by theory with the average BAR for Hawassa indicating a decreasing rate towards the periphery.

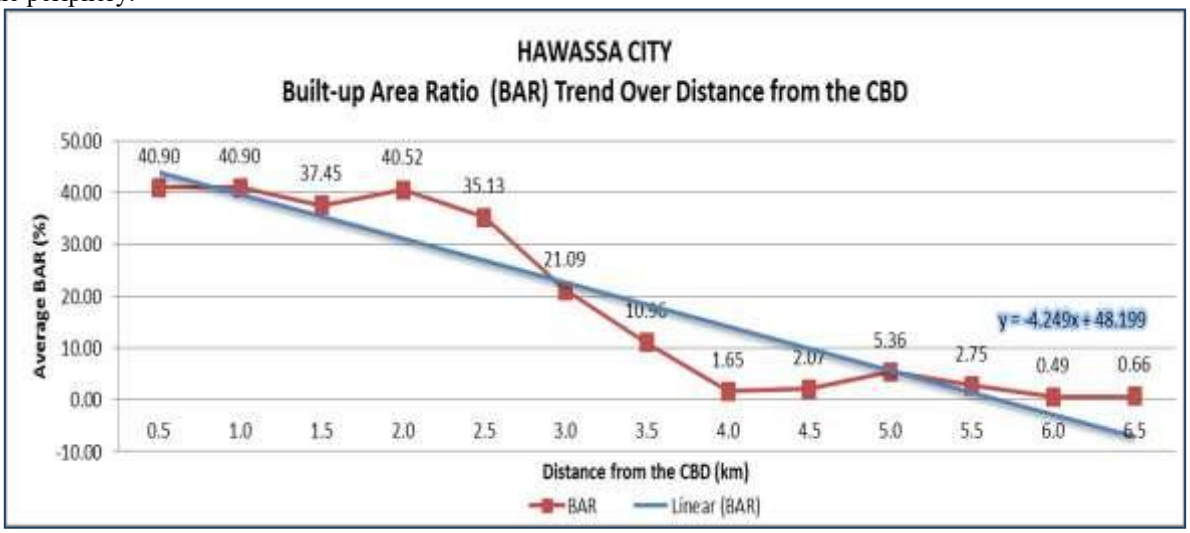

Figure 18The Trend of average BAR in Hawassa
Source: Own, 2014

Based on the intercept of the equation of the line graph, y= -4.29x + 48.199 it is possible to conclude that in the CBD the average BAR for Hawassa is over 48 which is considerably higher as compared to that of Bahir Dar, which is 36 (see Figures 30 & 33 above).

6. Building Density

Building density refers to the number of building units occupying a hectare of land. In this research, the ratio of the number of building units in a hectare of land is computed first for Bahir Dar which presents the majority of lands having a building density within a range of 0-11.3 dispersed across the city. The highest building density in the city is found near the center with ranges of 101.7-113 building units per hectare of given area (see Figure 34). Taking the upper values of the lowest range, 0-11.3 and the highest range, 101.7-113, the average size of a plot is 885m^2 and 89m^2 for the lowest and highest ranges, respectively. The same map also shows that the highest concentration of buildings is found to the North-West and South-West of the city center as compared to the North-East and South-East where there is relatively low concentration.

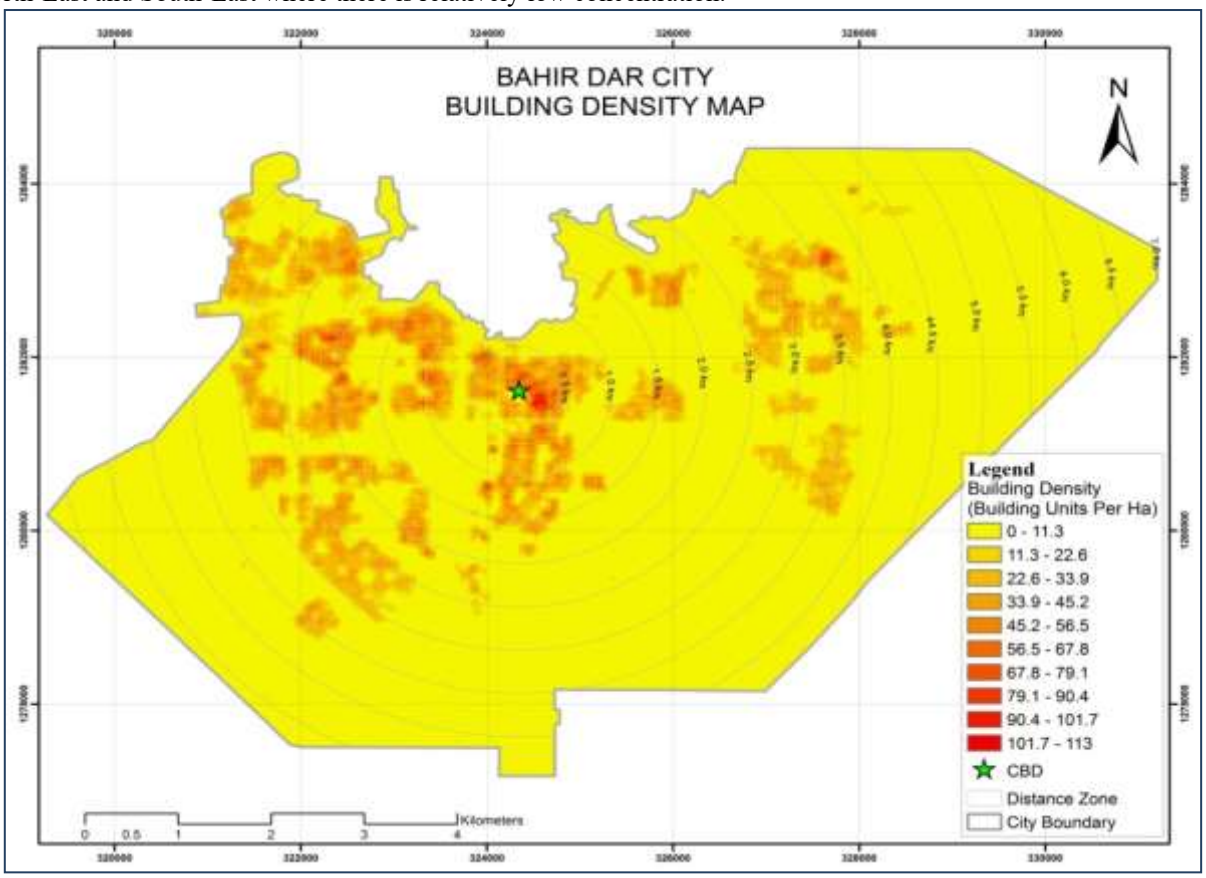

Figure 19 Building density Map of Bahir Dar
Source: Own, 2014

The line Graph below, produced from the average building density map of Bahir Dar depicts the general pattern of decline in building density in the city as one moves from the CBD to the periphery (Figure 20).

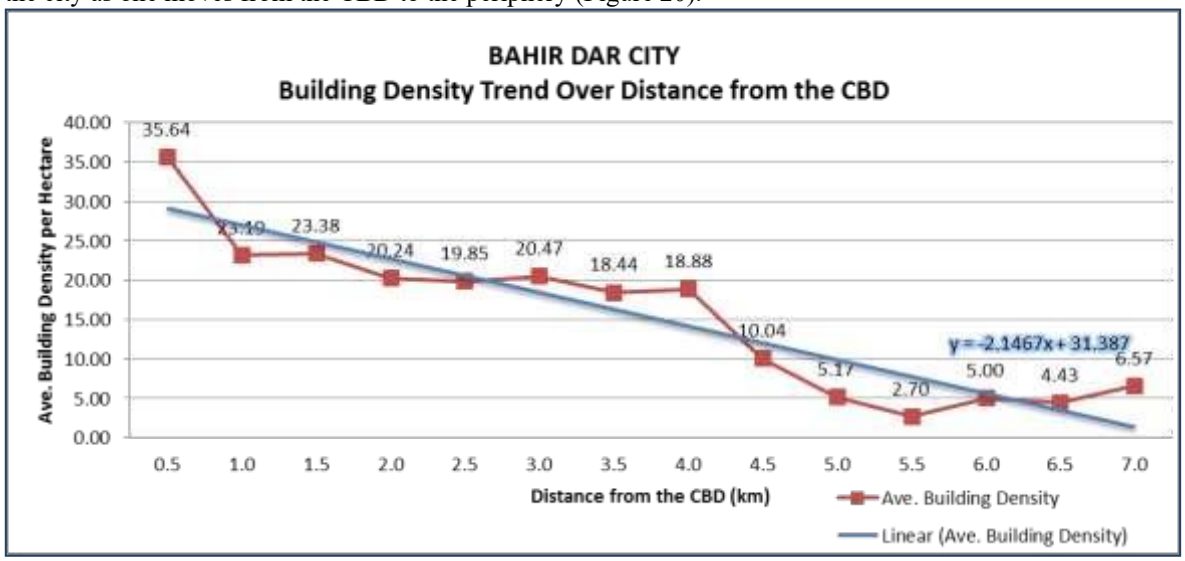

Figure 20 Average Building density over distance in Bahir Dar

For Hawassa, the building density varies in range 0-4 for the lowest sparsely settled to a range of 118-165 for the highest in the city center. In terms of real value Hawassa's lower limit for the highest density (118) is higher than Bahir Dar's highest limit for the highest density (113), which shows the existence of the higher building density in the former case than the latter. The highest occurence of building density is found in the west concentrated around central area in Hawassa (Figure 36). Taking the upper values of the lowest range (0-4) and the highest range (118-165) building densities, the average area of a plot of building unit in Hawassa is 2500m^2 and 65 m^2 for the lowest and highest ranges respectively .

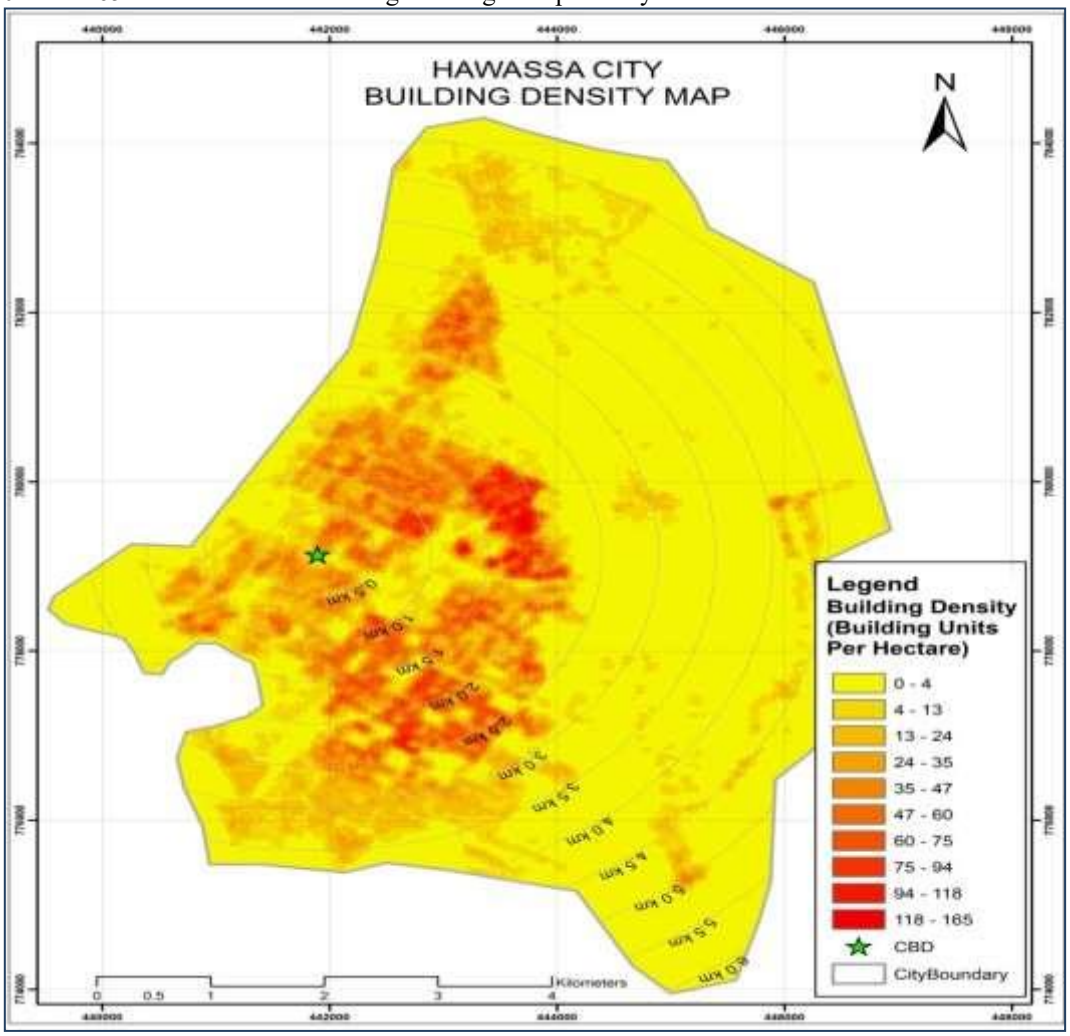

Figure 21 Building density map of Hawassa
Source: Own, 2014

The trend line in average building density in Hawassa also shows a general pattern of decline as distance increases from the CBD (Figure 22).

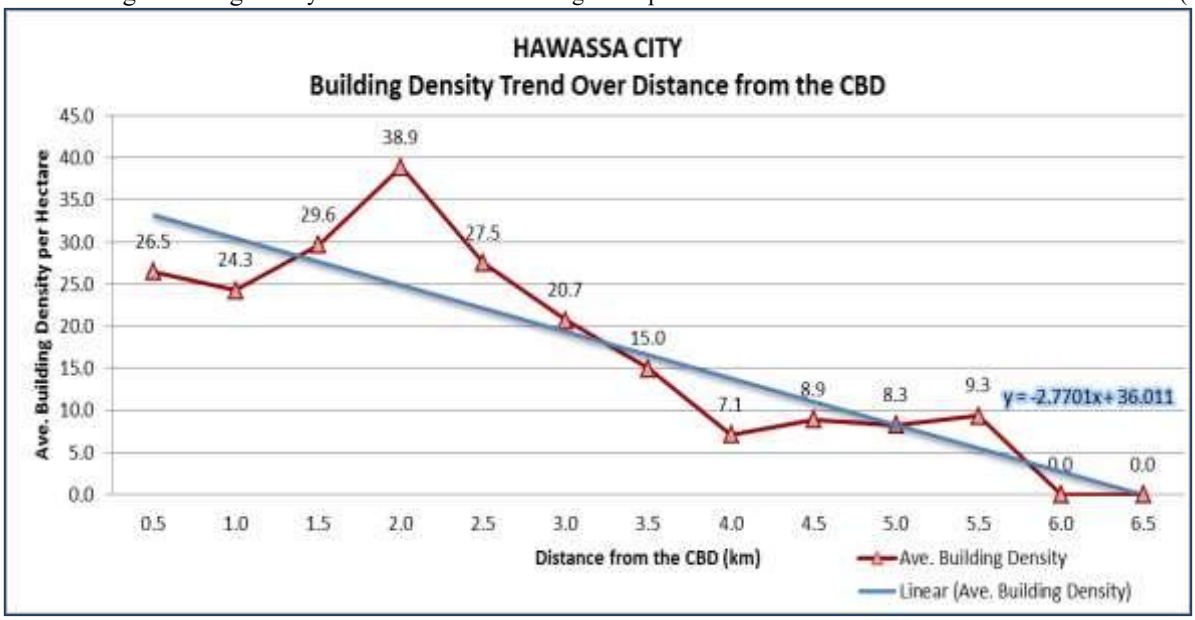

Figure 22 Average Building density over distance in Bahir Dar

7. City form and shape

The quantification of shape of cities has many components which are not easily measured (Hammond and McCullagh, 1978), and compaction is one of the components that can be quantified. The study considers quantification by compaction of the two cities. A compact shape may be defined as one having, for a given area, a short boundary and a short distance between extreme points (ibid). The measure of compaction is defined as the extent to which the overall shape of cities approximated a circle rather than a tentacle –like form or a long , serpentine one (Angel 2012).

The measure of compaction can be made based either on the rough indicator of compaction as a ratio of length-breadth or with a refined measure of compaction index (C.I) which is the ratio of the area of the cell being measured to the area of the smallest inscribing circle(Hammond and McCullagh, 1978).

The shape of the two cities based on the two compaction computation methods is as follows:

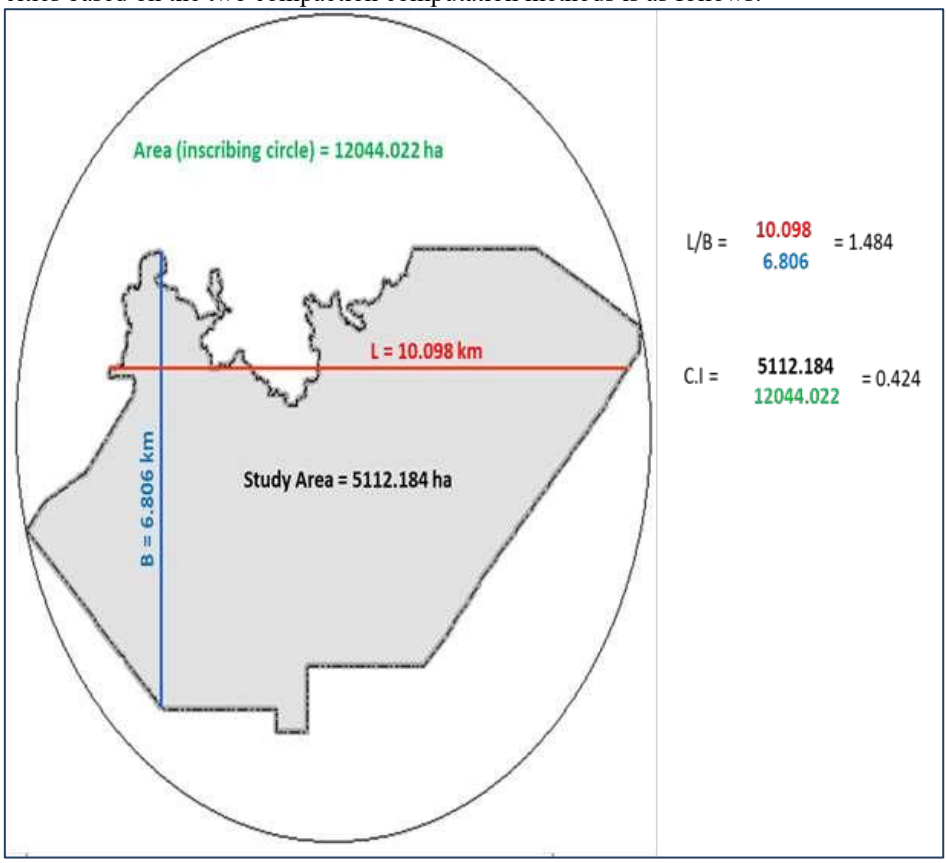

Figure 23 Compaction of Bahir Dar
Source: Own, 2014

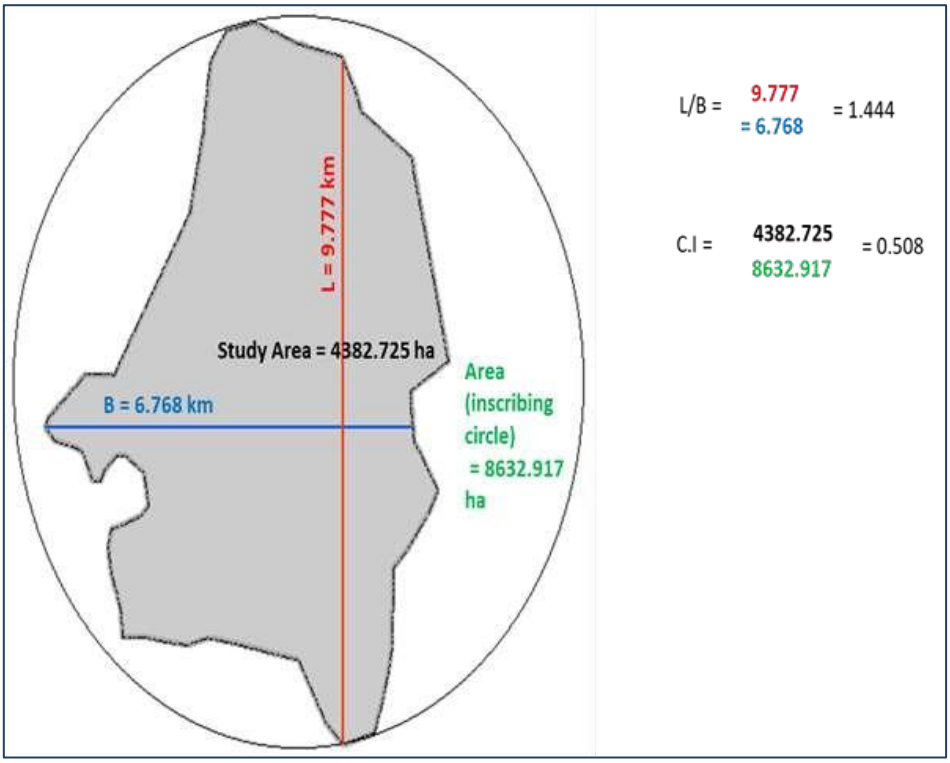

Figure 24 Compaction of Hawassa
Source: Own, 2014

From the two diagrams (Figures 23 & 24) above, the length by breadth ratio result for Bahir Dar (1.484) is more than Hawassa (1.444), indicating Bahir Dar is relatively less compact than Hawassa. Again, the compaction index (C.I) for Bahir Dar (0.424) is less than Hawassa (0.508), which confirms the more compact nature of Hawassa than Bahir Dar. The overall implication of this is that access to different urban service and infrastructure is easier in Hawassa than Bahir Dar.

Apart from compaction, the other technique for quantification of city-shape is the measure of circularity. Gibbs (1960), on the assumption that the boundaries of urban area may resemble a circle and with the knowledge that such a figure has some relatively simple geometrical properties, has devised a method named 'measure of circularity' (MC) to measure the degree to which the shape of a particular city has a circular form. Below is the computation for the two cities measure of circularity;

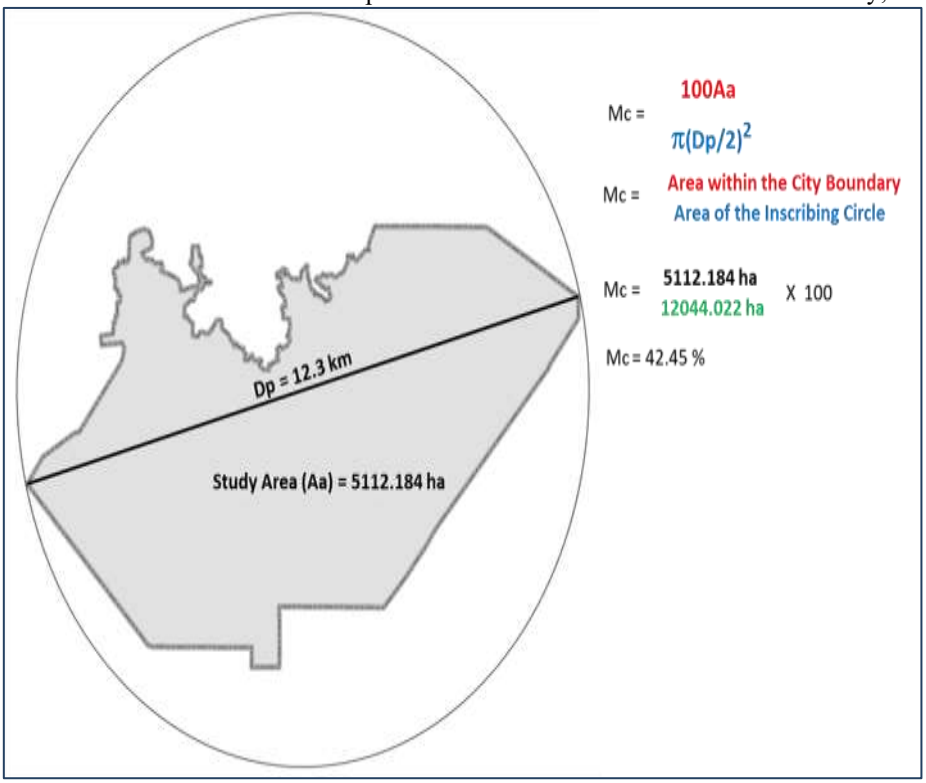

Figure 25 Measures of Circularity (MC) for Bahir Dar
Source: Own, 2014

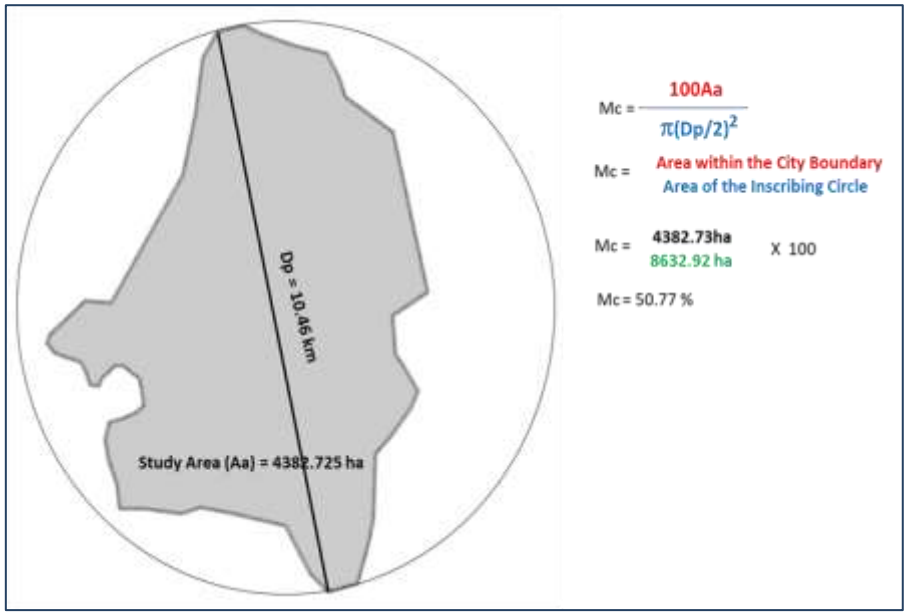

Figure 26 Measures of Circularity (MC) for Hawassa
Source: Own, 2014

Based on the results of the above two diagrams (Figures 25 and 26) it is possible to conclude that the shape of Hawassa, with MC value of 50.77 percent is more near to a circle than the shape of Bahir Dar, with MC value of 42.45 percent . To find the shape closest to both cities it is vital to determine the relationship of the measure of circularity of the two cities with other basic city shapes such as circular, rectangular, star and elongated as indicated in the following table.

Table 1Inspection of Shape of the Two Cities

Basic Types of City Shapes	Hypothetical Mc Values	Calculated Mc Values		Degree of Deviation from the Hypothetical Mc's		Inspected Shape	
		Bahir Dar	Hawassa	Bahir Dar	Hawassa	Bahir Dar	Hawassa
Circular	100	42.45	50.77	57.55	49.23	-	-
Rectangular	62	42.45	50.77	19.55	11.23	-	Rectangular Shape
Star	35	42.45	50.77	-7.45	-15.77	Star Shaped	
Elongated	-	-	-	-	-	-	-

Source: own computation by only taking the hypothetical MC values for circular shape from Gibbs (1960)

As shown in the table above, while the shape of Hawassa resembles more of 'a rectangle' with a minimum deviation value of 11.23, that of Bahir Dar resembles more of 'a star-shaped' structure with a minimum deviation value of 7.45.

8. Conclusion

The comparative study of Bahir Dar and Hawassa reveals that the spatial prevalence of land uses significantly shapes the cityscape of both urban centers. While both cities share common patterns such as the decline of administrative, trade, and transport land uses with increasing distance from the CBD, they also exhibit distinct differences. Hawassa demonstrates stronger centrality, higher building density, and a more compact, rectangular form, which facilitates accessibility and efficient service delivery. Bahir Dar, on the other hand, shows uneven land development, lower building density, and a star-shaped structure, reflecting challenges in spatial organization and infrastructure distribution.

Overall, the findings highlight that Hawassa's spatial organization aligns more closely with theoretical urban growth models, where Overall, the findings highlight that Hawassa's spatial organization aligns more closely with theoretical urban growth models, whereas Bahir Dar's fragmented growth pattern underscores the need for deliberate planning interventions. The study confirms that spatial distribution is not merely a product of planning but also of market forces, infrastructure investment, and unforeseen policy outcomes.

9. Recommendation

Bahir Dar should adopt more compact city planning strategies to reduce fragmentation and improve accessibility, while both cities need updated master plans that integrate spatial growth models tailored to Ethiopian urban realities. Reinforcing the role of CBDs by balancing administrative, commercial, and service land uses is essential to avoid over-concentration or decline, and mixed-use development should be encouraged to sustain vibrancy in central areas. Bahir Dar must prioritize balanced distribution of residential and recreational spaces to counter uneven development, whereas Hawassa should manage its high-density growth to prevent congestion and maintain livability. Urban agriculture and green spaces should be integrated into planning, with Hawassa's positive trend in urban agriculture supported through zoning policies and Bahir Dar revitalizing forest and recreational land uses to enhance sustainability.

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