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Implementation Challenges of Proposed City Plan in Ethiopia: A Critical Evaluation of Transportation Oriented Land Use Changes in Hawassa City

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Abstract
Changes in transportation keep on reflecting on changes in land use in Hawassa City. These changes, in most cases are unplanned. Usually the changes are manifestations of different interrelated components. Among others, inability of the proposed plan to capture future dynamism of the city, uncoordinated development between land use systems and transportation systems, less coordination among concerned line institutions and low institutional capacity in the city are major reasons contributing for the changes. Changes in transportation have been and still are modifying and shaping spatial pattern of Hawassa City. Reciprocity between transport and urban land use pressurized changes in the urban land use pattern of the city. Spatial structure of the city has persistently been kept on modifying along asphalt roads where demand of mobility was better satisfied. This research paper illuminates the degree of transportation oriented land use changes in Hawassa city. The investigation was attempted to make clear how and why uncoordinated development between transport and land use development is taking place. Apart from comparing proposed city plan and actual implementation scenario of land use system, household survey is conducted and the data is analyzed using descriptive and inferential statistical techniques.
Keywords: Transportation, Land Use Changes, Land Use Models, Spatial Pattern

1. Introduction

Hawassa is the political center for Southern Nations, Nationalities and People's Regional State of Ethiopia. It is 275kms away from Addis Ababa, capital city of Ethiopia towards southern direction. The city is one of rapidly growing secondary cities of Ethiopia with population size of 301514 (2014 projection) and is divided into seven administrative sub cities. Hawassa was developed based on master plan that had been designed before the inhabitants were settled. Integrated Development Plan (IDP: 2006) for Hawassa tells us that German and Italian engineers were involved in preparation of Hawassa City plan during 1958 -1959. Moreover, according to sources from Ministry of Urban Development and Construction, the then Municipality Department of Interior Ministry prepared the first master plan for Hawassa which guided the city's development until 1988. National Urban Planning Institute prepared the second master plan in 1994 to guide its development for 20 years. However implementation of this plan was impaired because of weaknesses of the master plan itself and low institutional capacity.

This research is inspired to investigate the degree of coordination and integration between transport and land use systems in Hawassa City. Lack of coordination between these two inseparably linked components is responsible for unplanned land use changes, inaccessibility of public utility services and facilities, and declining trends in the use of non-motorized modes of transportation in the city. Due to uncoordinated development of road transport and land use, it was found that the land use along the sample asphalt roads was changed from completely residential to partially or completely commercial irrespective of city master plan proposal. This situation resulted in development of conflicting land uses and in decreased walking and bicycling. Total transport system has become inefficient and ineffective due to isolated development of different land uses in the city. Transport oriented land use changes are taking place following creation of new roads contradictive to originally proposed plan. Certain activities were experiencing being pulled in and others were being pushed out in unplanned manner. Incapability of the plan to forecast city dynamics greatly modified spatial pattern of public utility services and facilities regardless of originally proposed city plan. Reciprocity in spatial relationship between transport and land use is because spatial components of transport such as location of transport routes, terminals, and exchange points pressurize changes in the urban land use pattern.

2. Road Transportation and Land Use Dynamics

In developed countries a number of land use models were developed including deterministic concentric ring model, sector model (Homer Hoyt:1939), multiple nuclei model (Harris and Ullman). These models tried to show that organization of land use in those cities confirm to certain general patterns.

> *"The organization of land use within the CBD tends to be dominated by a high-density core that contains the retail, office, entertainment, and civic zones and a lower-density frame that contains zones of ware-housing, educational facilities, hotels, and medical*

services (Paul and Linda: 2012:71) "

According to Sector Model, the important factor is not distance from CBD as in the concentric zone model, but direction away CBD. Thus, land use follows older radial transport lines and as a result some urban land uses are oriented along major transport axis/sectors and high rent sector will move along fastest transportation route witnessing the strength of transportation as spatial organizer of urban services and facilities. From such relations between transport and land use it can be inferred that integrating transport and land use both in planning and management phase are not only essential but necessary. In this regard Philip highlighted that managing land use change is not simply preparing and adopting an 'end state' master plan and expecting it to be built out at the end of a twenty-year period (Philip, 2006:36). Central to this concept is that land use and transportation are inseparably and continuously linked one conditioning the other. Zhengdong reiterated in such a way that "The characteristics of the transport system determine the level of accessibility, which in turn affects the location of activities (land uses including public utility services and facilities). The location of activities in space influences daily activity patterns, which bring about the need for travel (Zhengdong: 2003)". For John transportation-land use relation is similar with chicken and an egg analogy. "Land use shapes the demand for transportation … the provision of roads changes land values and thus alters the intensity with which land is used, and, with that outcome, alters the entire pattern of land use (John, 2011:239)". Transport-land use coordination function is to treat them together so as to maximize efficiency and effectiveness of both.

This is important because otherwise uncoordinated transport and land use development gives rise to increased need for transportation due to separation of homes from work places. "Appropriate coordination needs to be envisaged in the planning process, because the most effective and cost-efficient programs frequently require attention to several normally separated areas (Michael: 1995)". The goals of plans include an orderly and attractive pattern of land use (avoiding the juxtaposition of incompatible land uses, for example, manufacturing activities in a residential area). Many evidences show that urban land use structures are the function of transport on one hand and the kind of land use affect the transportation system on the other. Availability and volume of transport infrastructures and services are the basic criteria to make location decisions, hence they influence the level of accessibility for activities and these activities in turn condition the kind of transport system required.

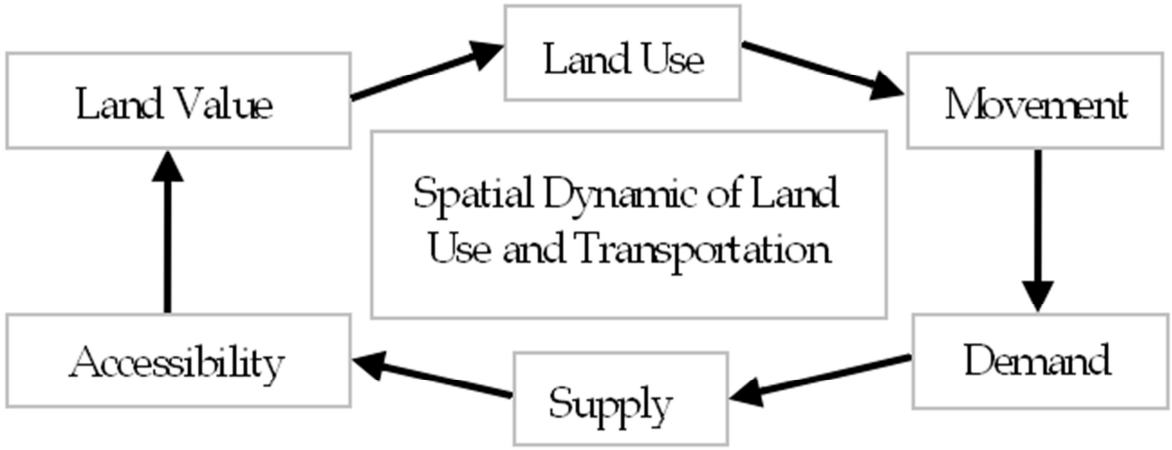

Figure 1: Spatial Dynamic of Land Use and Transportation

Source: Ávila http://www.intechopen.com/sources/pdfs/11002/inTech-A... Viewed at February 1st, 2012

Avila rightly illustrated inseparable link between spatial dynamic of land use and transportation in the above figure. From the figure it can be concluded that the changes in land use will create new patterns of movements that will demand new transportation systems, changing the land value, and so on. Jean-Paul also concluded that both transport and space shape each other.

"The fragmentation of production and consumption, the locational specificities of resources, labor and markets generate a wide array of flows of people, goods and information. The structure of these flows in terms of origin, destination and routing is closely related to spatial organization. Space shapes transport as much as transport shapes space, which is a salient example of the reciprocity of transport and its geography" (Jean-Paul: 2009).

Hickman and Banister uncovered that conclusions from different research about land use and transport interactions are different. Though agreed on existence of interactions, the results have shown little agreement on extent of influence and causality (2005:117). As to United Nations Commission for Human Settlement Report, the value of spatial organization was dependent, to a large extent, on the capacity to facilitate interactions, by arranging effective patterns of physical development and by providing for the efficient movement of goods and people (2001:2). Scholars like Haggett, Christaller, and Weber emphasized the operation of spatial variables

such as distance and travel costs in reference to patterns observable in the landscape; settlement distributions, for example, and shopping centers within cities. Haggett introduced ideal spatial structures having six major components of spatial systems as illustrated in the figure below.

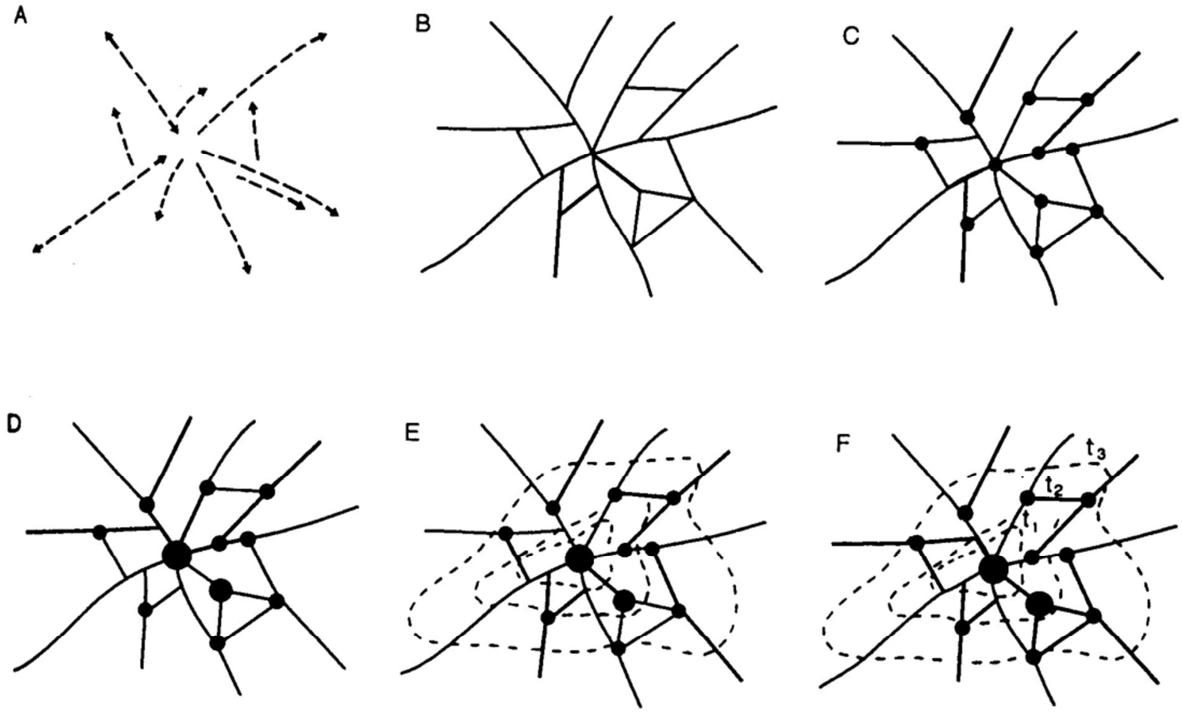

Figure 2: Haggett's Representation of the Six Core Components of a Spatial System
A -flows; B – channels; C – nodes; D – hierarchies; E – surfaces; F – diffusions.
Source: (Johnston cited in Haggett, 1965; Haggett, Cliff and Frey, 1977).

As to Haggett components of spatial systems were movements; the channels along which they flow; nodes on those networks of channels; hierarchies of nodes; surfaces; and diffusion – which could flow down the hierarchies, along the channels and across the surfaces (Johnston cited in Haggett, 1965; Haggett, Cliff and Frey, 1977). From the view point of developing countries: (Peter Rogers, etal) the major determinants of land use are; Demographic factors such as population size and density; -technology; -level of affluence; -political structures; -economic factors: systems of ownership; -attitudes and values.

3. Survey Results

3.1. Demographic and Socio-economic Characteristics of Sample Household Heads

Out of total surveyed 196 head of sample households 169 or 86.2 per cent are males and 27 or 13.8 per cent are female. This is primarily because in Ethiopian culture generally household heads are men. Those 27 female heads are probably either unmarried, or divorced or widowed. Majority of head of sample households were married accounting for 79.1 per cent of the total surveyed head of households. Divorce cases were very minimal only accounting for 3.1 per cent of the total. About 31 per cent of sample households are having more than 7 members, which indicate a large family size. Majority of sample households i.e. 56.6 per cent were having their family size between 3-6 persons (Table 1).

Table 1
Marital Status of Head of Sample Households and Their Household Size in Hawassa City, 2013

No.	Sex Wise Head of Households			Marital Status			Household Size		
	Sex	Head of H.H.	Per cent	Head of H.H.	Per cent	Head of H.H.	Per cent	Head of H.H.	Per cent
1	Male	169	86.2	Single	16	8.2	<3	27	13.8
2	Female	27	13.8	Married	155	79.1	3-6	107	54.6
3	…	…	…	Divorced	6	3.1	7-10	48	24.5
4	…	…	…	Widowed	19	9.7	>10	13	6.6
5	…	…	…	…	…	…	No Response	1	0.5
Total No. of Head of H.H.		196	100.0	…	196	100.0	…	196	100.0

Source: Based on Survey Conducted by the Author in 2013

From total 196 sample household heads, 100 (51.0 per cent) were self employed and 31.6 were government workers both accounting for 82.6 per cent of the total employment. Head of sample households engaging in non government organizations and other forms of livelihood (income from renting a house, remittances, outputs from agriculture at rural areas, supports from relatives and the like) reported to be least i.e. 8.2 and 9.2 per cent respectively. Among self employed household heads who were 14.3 per cent reported they were earning more than 4000 birr a month which was the highest income. Sample heads of households reporting their income in different income slabs were 27.0 per cent who earned 2001- 3000 Birr, 25.5 per cent earned above 4000 Birr, 22.5 per cent earned 1001-2000 Birr, 19.4 per cent earned 3001-4000 Birr and the least 5.6 per cent earned less than 1000 Birr per month (table 2).

Table 2
Head of Sample Households with Their Income and Employment in Hawassa City, 2013

Employment	Percentage Total 196 Sample Households Monthly income in Birr										Total Head of H.H.	
	<=1000		1001-2000		2001-3000		3001-4000		>4000			
	Head of H.H.	Per cent	Head of H.H.	Per cent	Head of H.H.	Per cent	Head of H.H.	Per cent	Head of H.H.	Per cent	Head of H.H.	Per cent
Government	0	0.0	8	4.1	18	9.2	19	9.7	17	8.7	62	31.6
Non government	1	0.5	3	1.5	4	2.0	5	2.6	3	1.5	16	8.2
Self	10	5.1	25	12.8	27	13.8	10	5.1	28	14.3	100	51.0
Other	0	0.0	8	4.1	4	2.0	4	2.0	2	1.0	18	9.2
Total	11	5.6	44	22.5	53	27.0	38	19.4	50	25.5	196	100

Source: Based on Survey Conducted by the Author in 2013

In table 3 average monthly income and educational level of household heads are compared. Out of total sample household heads, 182 or 93 per cent head of sample households of the total are educated and the rest 14 head households or 7.0 per cent head of sample households are having no education. Out of these total 196 head of sample households 24.5 per cent are having 9-12 class pass, 20.9 per cent primary level pass, 20.9 per cent Bachelor, 20.4 per cent are diploma holders, 6.0 per cent are having master and above. Generally income is more among sample households with having some education. Maximum 27.0 per cent head of households are in the slab of 2001-3000 Birr income per month, 25.5 per cent in 4000 Birr and above, 22.4 per cent in 1001-2000 birr and only 5.6 per cent earn less than 1000 birr per month.

Table 3
Head of Sample Households with Income and Their Education Level in Hawassa, 2013

Monthly Income in Birr	Percentage Total 196 Sample Households Education Level													
	Primary Grades 1-8		Secondary Grades 9-12		Diploma		Bachelor		Masters and above		No education		Total sample H.H.	
	Head of H.H.	Per cent	Head of H.H.	Per cent	Head of H.H.	Per cent	Head of H.H.	Per cent	Head of H.H.	Per cent	Head of H.H.	Per cent	Head of H.H.	Per cent
<=1000	3	1.5	5	2.6	1	0.5	1	0.5	0	0.0	1	0.5	11	5.6
1001-2000	17	8.7	10	5.1	9	4.6	2	1.0	1	0.5	5	2.6	44	22.4
2001-3000	8	4.1	15	7.7	13	6.6	8	4.1	3	1.5	6	3.6	53	27.0
3001-4000	2	1.0	8	1.1	9	4.6	16	8.2	2	1.0	1	0.5	38	19.4
>4000	11	5.6	10	5.1	8	4.1	14	7.1	6	3.1	1	0.5	50	25.5
Total	41	21	48	24.6	40	20.4	41	21	12	6.1	14	7.1	196	100

Source: Based on Survey Conducted by the Author in 2013

3.2. Transportation Oriented Land Use Changes

Table 4 reveals that 124 or 63.3 per cent head of sample households reported that they have already changed initial use of their premises. Only 72 or 36.7 per cent sample households reported they did not change the initial use of their premises. Initially designated use of the house premises was purely residential for 179 or 91.3 per cent of total sample houses in the past. However it has been suggestive that these plots had been given from agricultural land in the city surroundings and perhaps stayed unconstructed for some significant time unknown in the past. Before 20 years actually 154 sample houses were residential and 20 sample houses were agricultural. The results show that numbers of pure residential uses are dropping steadily from time to time except for years before 10 years to 20 years which are a bit higher than the number before 20 years. The reason for this difference might be the conversion of agricultural lands to the residential use during before 10 years to 20 years table. For instance the figures are 154 for the time before 20 years, 168 for the time before 10 to 20 years and 118 for the time during the last 10 years and the figures are dropped down to 72 for existing situation during the survey, 2013.

Table 4
Head of Sample Households Reported About the Change in Initial Use of Their House Premise in Hawassa City, 2013

If Any Change in House Premise	Total Sample Head of H.H.		Initial Use of House Premise							
			Residential		Commercial		Mixed		Other	
	Head of H.H.	Per cent	Head of H.H.	Per cent	Head of H.H.	Per cent	Head of H.H.	Per cent	Head of H.H.	Per cent
Yes	124	63.3	111	62.0	6	60.0	6	100.0	1	100.0
No	72	36.7	68	38.0	4	40.0	0	0.0	0	0.0
Total	196	100.0	179	100.0	10	100	6	100.0	1	100.0

Source: Based on Survey Conducted by the Author in 2013

Out of 124 conversions, 77 or 62.1 per cent head of sample households reported changes are done from pure residence to dual use for both residential and commercial purposes. If we add up 77 and unchanged 72 households it will be 149 or 76.0 per cent houses where sample households actually living. Besides they are using it partly for other purposes too.

Table 5
Head of Sample Households Reported About the Kind of Change in Initial Use of Their House Premise in Hawassa City, 2013

The Kind of Change in Initial House Premise	Total Sample Head of H.H.		If any Change			
			Yes		No	
	Head of H.H.	Per cent	Head of H.H.	Per cent	Head of H.H.	Per cent
Residential to Commercial	30	15.3	30	24.2	0	0.0
Dual Use for Residence and Commerce	77	39.3	77	62.1	0	0.0
Residence to Industry	1	0.5	1	0.8	0	0.0
Dual Use for Residence and Industry	7	3.6	7	5.6	0	0.0
No Response	9	4.6	9	7.3	0	0.0
Total	124	63.3	124	100.0	0	0.0
Reported No Land Use Change	72	36.7	0	0.0	72	100.0
Total Sample	196	100.0	124	100.0	72	100.0

Source: Based on Survey Conducted by the Author in 2013

The type of change is more of diversified commercial uses with some mixture of manufacturing mainly consists of wood and metal works. Components of changes in commercial use include café and restaurants, photographing, pharmacies, clinics, shops for different consumable items, shops for cloths and services like beauty salon for men and women, groceries and so on. Administrative land uses mostly belong to government and non-government offices and they reflect true mixture in which case they are not conversions from other uses. Unstructured interview is conducted with middle level leadership of the Office for Transportation of Hawassa, with City Administration and with Bureau of Transportation and the results show that unplanned conversions are happening due to lack of shopping facilities which is resulted by failure of ensuring mixed uses around residences and again due to failure of integrating land use and transportation planning.

Figure 3 A Picture Showing Full Commercialization of Frontage of the Residential Premises Along Certain Asphalt Roads in Hawassa City, 2013,(This picture was taken by the author during field survey, 2013)

The reason for changes that have taken place, for 92 or 47 per cent head of sample households reported their expectation to get additional income. Except problems associated with unplanned changes, the use of residential premises for both living and commercialization was beneficial because respondents cannot be displaced and face problems by losing their living place (table 6 and figure 4). The sample households who did not report the changes in their premise might be from high economic status or the house premises along those roads which are not able to attract commercial activities. At this important juncture having known how much transportation oriented land use changes are taking place it is required to integrate transportation and land use development. If both transport and land uses are integrated, it will bring positive impact in the overall development of the city.

Table 6
Head of Sample Households Given Reasons about the Change in Initial Use of Their House Premises in Hawassa City, 2013

Reasons of Change in Initial Use of House Premise	Sample Head of H.H.	Per cent
Additional income	92	47.0
Big space	8	4.1
Use is officially changing	9	4.6
Use is informally changing	3	1.5
No response	12	6.1
Total	124	63.3
Reported no land use change	72	36.7
Total Sample	196	100.0

Source: Based on Survey Conducted by the Author in 2013

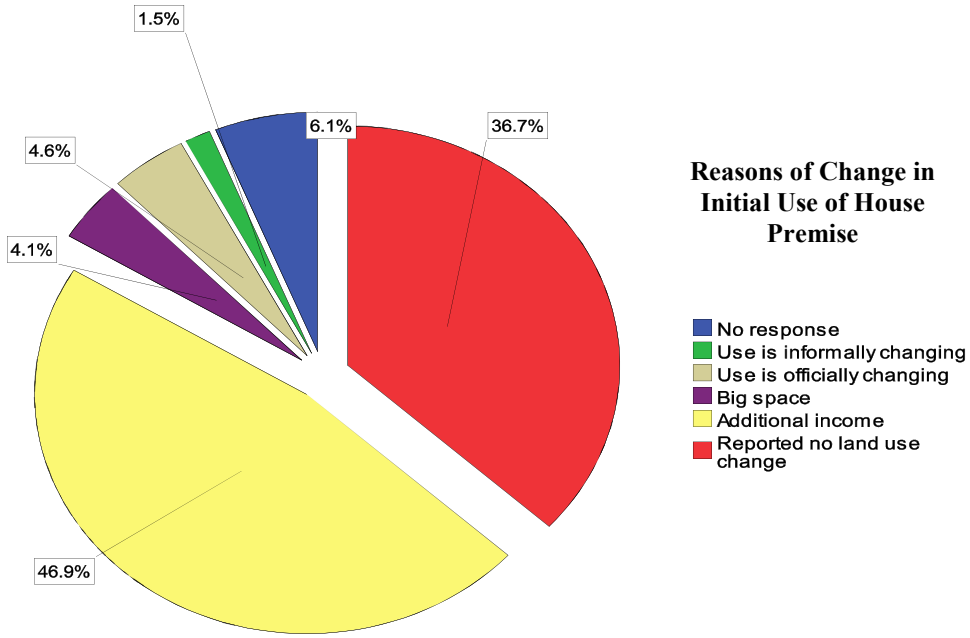

Figure 4 Head of Sample Households Given Reasons about the Change in Initial Use of Their House Premises in Hawassa City, 2013
Source: Based on Survey Conducted by the Author in 2013

Status of sample households in different periods is compared in order to examine temporal variations in the uses of house premises. The uses of premises were residential for 154 or 78.6 per cent and agricultural for 20 or 10.2 per cent sample households both accounting to 88.8 per cent before 20 years and beyond. These figures have risen to 168 during 10 to 20 years. The reason behind increase in residential premises is because of conversions of agricultural uses into residential uses within 10 years period. The house premises of 20 sample households were under agriculture before 20 years among which later on 15 premises were converted into residential use and 4 changed to commercial use and 1 changed into mixed use. Out of 7 premises that were reported as commercial before 20 years, 1 is changed into residential use and 5 remained as it is i.e. commercial, while 1 premise has been changed into mixed use.

Table 7a
Head of Sample Households Reported About the Use of Their House Premises in the Course of Time in Hawassa City, 2013

Use of House Premise Before 10 to 20 Years	Total Sample Head of H.H.		Use of House Premise Before 20 Years											
			Residential		Commercial		Cultural		Mixed Use		Agricultural		Unknown	
	Head of H.H.	Per cent	Head of H.H.	Per cent	Head of H.H.	Per cent	Head of H.H.	Per cent	Head of H.H.	Per cent	Head of H.H.	Per cent	Head of H.H.	Per cent
Residential	168	85.7	144	73.5	1	0.5	1	0.5	1	0.5	15	7.7	6	3.1
Commercial	14	7.2	4	2.0	5	2.6	0	0.0	0	0.0	4	3.0	1	0.5
Mixed Use	11	5.6	6	3.1	1	0.5	0	0.0	2	1.0	1	0.5	1	0.5
Unknown	3	1.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	3	0.5
Total	196	100.0	154	70.6	7	3.6	1	0.5	3	1.5	20	10.2	11	5.6

Source: Based on Survey Conducted by the Author in 2013

The Chi-Square Test is applied to see if there is a link between time and changes in the use and to examine if changes are statistically significant if any at all. The output table 7b shows that there is a linear relationship between time and use changes and the relation is also statistically significant at 99 per cent level of confidence. Therefore the null hypothesis that states independence between time and use change is rejected at 1 per cent level of significance.

Table 7b
Chi Square Test Results for Head of Sample Households Reported About the Use of Their House Premises in the Course of Time in Hawassa City, 2013

Chi-Square Tests	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	130.117[a]	15	.000
Likelihood Ratio	59.521	15	.000
N of Valid Cases	196		

a. 18 cells (75.0%) have expected count less than 5. The minimum expected count is .02.

Source: Based on Survey Conducted by the Author in 2013

About 154 or 78.6 per cent of sample households are in residential use before 20 years and these figures have risen to 168 in 10 years time and as a result residential share has become 85.7 per cent before 10 to 20 years. The conversion of agricultural land to residential use may probably be the main reason for increase in residential use during 10 to 20 years period. Table 8a shows that out of 154 residential premises 55 are converted to other use during the last 10 years time. Out of 55 changed premises 15 premises were reportedly changed from residential to commercial. However 40 premises were changed from pure residential to dual use for both residence and commercial purposes. Before 20 years, in 20 plots where agriculture was practiced, 15 plots were changed to residential premises, 4 premises changed into commercial and 1 premise changed into mixed use during 10 to 20 years.

Table 8a
Head of Sample Households Reported About the Use of Their House Premises in the Course of Time in Hawassa City, 2013

Use of House Premise During Last 10 Years	Total Sample Head of H.H.		Land Use Before 20 Years											
			Residential		Commercial		Cultural		Mixed Use		Agricultural		Unknown	
	Head of H.H.	Per cent	Head of H.H.	Per cent	Head of H.H.	Per cent	Head of H.H.	Per cent	Head of H.H.	Per cent	Head of H.H.	Per cent	Head of H.H.	Per cent
Residential	118	60.2	99	50.5	1	0.5	1	0.5	0	0.0	11	5.6	6	3.1
Commercial	25	12.8	15	7.7	5	2.6	0	0.0	1	0.5	4	2.0	0	0.0
Mixed Use	53	27.0	40	20.4	1	0.5	0	0.0	2	1.0	5	3.6	5	2.6
Total	196	100.0	154	70.6	7	3.6	1	0.5	3	1.5	20	10.2	11	5.6

Source: Based on Survey Conducted by the Author in 2013

The Pearson Chi-Square Test holds true with the same background confirming there were significant use changes with the change of time. Unfortunately it is not the only change from residential premises to commerce and mixed use but pavements are also changed to commercial use as illustrated in figure 5.

Table 8b
Chi Square Test Results for Head of Sample Households Reported About the Use of Their House Premises in the Course of Time in Hawassa City, 2013

Chi-Square Tests	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	32.344[a]	10	.000
Likelihood Ratio	26.132	10	.004
N of Valid Cases	196		

a. 12 cells (66.7%) have expected count less than 5. The minimum expected count is .13.

Source: Based on Survey Conducted by the Author in 2013

The residential use has been reducing steadily time after time where as commercial use has been rising in contrary. I79 out of 196 uses were initially residential. However this use was dropped down to 154 before 20 years and again has risen up to 168 due to conversion of agricultural land to residence during before 10 to 20 years. The residential use further dropped to 118 and 72 for the last 10 years and during survey respectively table 9. Commercial use has increased more than 4 times compared to the use before 20 years and the survey period. These two instances of residential use and commercial use are clear indications for changes of land uses through time.

Table 9
Head of Sample Households Reported About the Use of Their House Premises in the Course of Time in Hawassa City, 2013

Land Use	Initial Land Use Through	Before 20 Years	Before 10 to 20 Years	During the Last 10 Years	During Survey, 2013
Residential	179	154	168	118	72
Commercial	10	7	14	25	30
Cultural	…	1	…	…	…
Mixed	6	3	11	53	84
Agricultural	…	20	…	…	
Manufacturing	…	…	…	…	1
Other	1	…	…	…	…
Unknown	…	11	3	…	…
No Response	…	…	…	…	9
Total	196	196	196	196	196

Source: Based on Survey Conducted by the Author in 2013

Figure 5 A Picture Showing Unplanned Changes that Include Commercialization of Pavements in Hawassa City, 2013, (The picture was taken by the author during field survey, 2013)

Figure 6, recent map shows the land use in Hawassa City where changes have already been taken place and planners have made adjustments to reconcile with the existing situations. Such practice distorts the very aim and concept of planning. Plans should be proposed, discussed and implemented effectively before any change takes place. Plans are not meant to compromise with the unlawful changes in land use. Areas indicated on the map as mixed use are actually dominantly provided for residential purposes earlier.

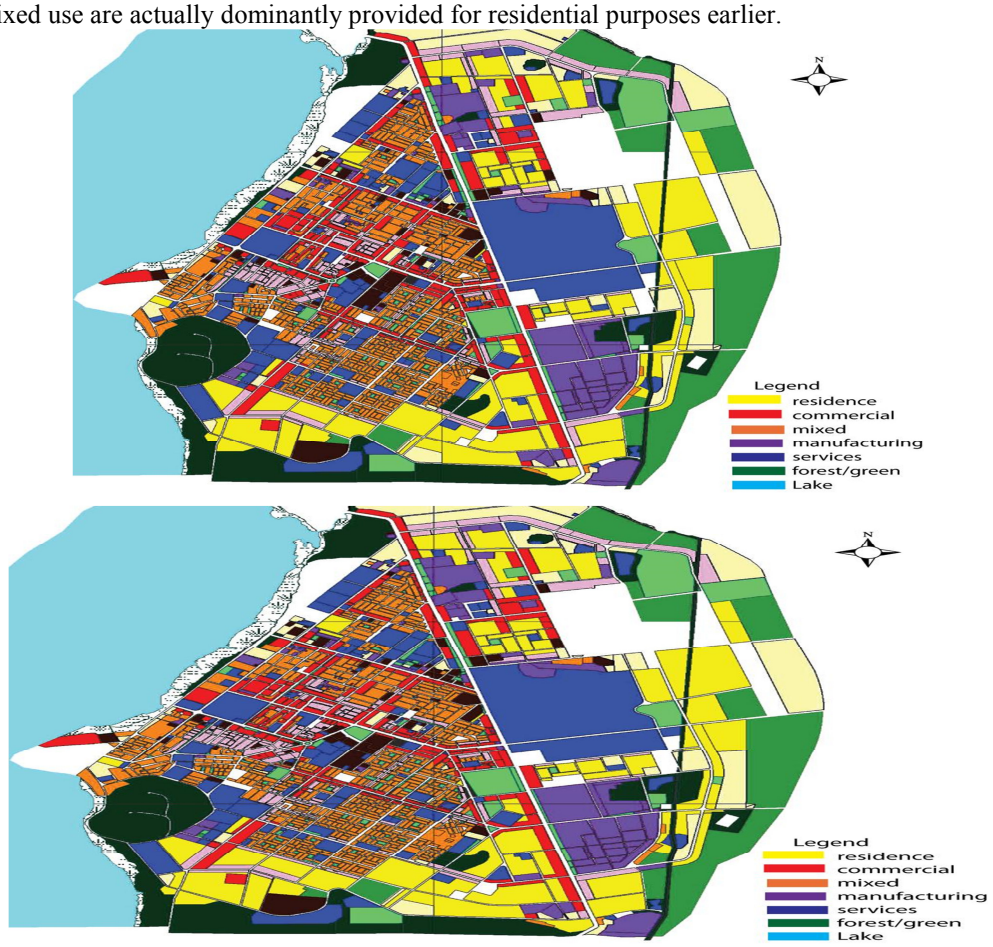

Figure 6 Land Use in Hawassa City, 2013
Source: Hawassa City Administration, 2014

4. Discussions, Recommendations and Conclusions

4.1. Discussions

Land uses along newly constructed asphalt roads have shown dramatic alterations from their previous uses. From those who reported the change, for 92 out of 124 the main reasons for introducing changes are getting additional

income. Other reasons combined give less than 26 per cent. Though their main reason reported as getting additional income, the main force that derived the change is transportation development. Expectation for additional income emerged because of increased movements along those road strings, because of increased accessibility due to transportation development. Apart from spatial variations, changes of land use are also significantly associated with change of time. This is because with change of time the mode of transport changed and changes in transport brought changes in accessibility and followed by changes in land uses. For instance conversions of residential premises to other functions before 20 years were not many but these figures have dramatically risen during the recent 10 years interval following changes in road quality. The study results have shown that the city has been experiencing land use conversions following upgrading and/or construction of roads. This happened because of transport generated accessibility and the accessibility motivated trips so that more trips made along transport routes. It should be noted that the core problem is not land use change because it may continue for future as well but the main problem is unplanned changes which have negative consequences. The study results show that changes usually take place at frontage of the residential premises while the family continues to live. The shops which are run in the residential premises are not recognized by municipality but many times shops are licensed by trade offices and taxes were levied by custom offices. In most cases it is found that residents are using the same premise for dual purposes specifically for living and generating income. This has been happening without having permits from municipality and in haphazard way not conforming to the proposed plan. In due time it results in unwanted development and even affects socio-economic situation of the people by affecting the health of residents. Unplanned changes are due to lack of coordination between transport and land use systems. Ethiopian urban planning experiences show that different planning institutions are established to prepare city plans. But in most cases implementation is left to municipalities. Besides transport agencies and urban planning institutes are independent in which case transport plan and urban land use plans are isolated.

4.2. Recommendations

Unplanned land use changes are observed which is creating conflicting land uses. It is dangerous for general public and highly risky for public health and life. For instance metal and wood works in the residential premises co-exit bearing greater risk. Therefore development between transport and land use systems should be integrated. Publicly agreed and approved plans should guide city development instead of following changes and making adjustments. Plans should be able to forecast upcoming changes and be able to guide the overall development of the city. Implementation of plans should also be followed up and their periodic revisions are also important based on the prevailing dynamism in social, economical, environmental and technological situations.

This study only dealt with land use changes associated with transport improvement in terms of infrastructure and availability of vehicular modes considering asphalt roads constructed during the last seven years. Other research is recommended to involve non asphalted roads in order to evaluate the effect of asphalt roads cum non asphalt roads. Further research is recommended to examine optimal and more productive ways of integrating transport and land use systems to benefit individual residents and society in large in Hawassa City. Certain asphalt roads are found to be extremely underutilized and it is suspected that this has happened due to lack of feasibility study prior to investment. Therefore it is suggested to investigate the actual reason for underutilized roads and in connection to this, it is suggested to investigate the criteria to be satisfied while planning to construct new asphalt road.

4.3. Conclusions

Road transportation and land use are inseparably linked with urbanization. This necessitates the need for integrated development of the two important systems in urban space. Uncoordinated development between transport system and land use system are core problems in Hawassa City particularly on newly constructed asphalted road strings. Intended use of lands in Hawassa City has been dramatically changed through time. The dominant use of land before many years was residential, and now this is not the case. About 63.3 per cent of total head of sample households have reported changes in their initial use of land holdings. Of these total changes, 47 per cent of changes are due to anticipated potential of their premise to bring additional income. Expectations are generated due to increased public movements on newly developed roads which brought unbelievable dynamics along the roads.

The road development created accessibility and such improved accessibility contributed for increased traffic movements which are ended up with unplanned land use changes. Head of sample households reported that main reason for full or partial changes of their house premises into commercial uses is because of getting advantage of additional income along newly constructed roads. The changes were very little in the past when city was small and roads were not developed and movements were limited. Out of total 196 head of sample households 179 reported initial use of their house premise was for residential purpose and only 10 house premises were in commercial use. When 20 years before residential premises were 154 and only 7 house

premises were in commerce. Commercial use had been increasing as the time passed when the residential use had been decreasing. Total number of 15 premises which were under agriculture before 20 years, were converted into residential premises between 10 to 20 years. Decrease in residential use and increase in commercial use is continuing from the very beginning. Most of these house premises have become of multipurpose use i.e. residential cum commercial.

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