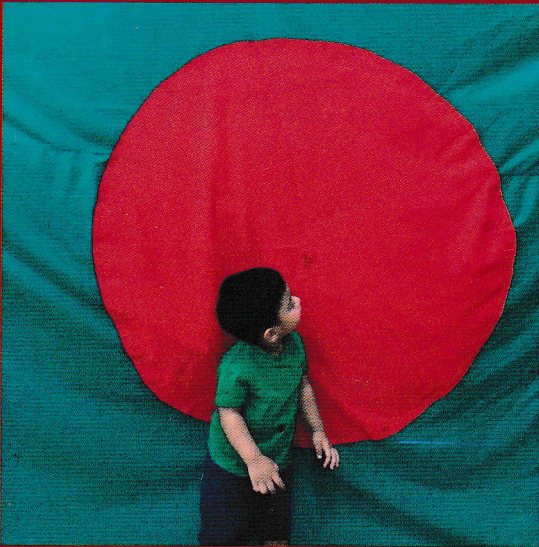




Environment and Sustainable Development in Bangladesh

Geographical Perspectives



Editors

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Study on Urban Landuse Models: The Case of Bangladesh Cities

Syeda Ishrat Najia

Abstract: The paper presents appropriate landuse model for Bangladesh cities. Two specific objectives have been addressed in this paper; firstly, a review of ecological models of urban landuses and secondly, landuse model for Bangladeshi cities. The study found two different patterns of urban landuse model for Bangladeshi cities; one is influenced by rivers and another is by rail and roads. Eight general landuse categories have been identified, these are; Central Business District; Other Business District; Residential; Slum and Squatters; Administrative; Education, Health and Social-Cultural; Industry; and Agricultural and others. These models show different types of pattern of Bangladeshi cities from those of the Western and South East Asian cities. Unplanned urbanization is one of the major factors behind it.

Keywords: Urban landuse, CBD, Population growth, Urbanization, Dhaka City

Introduction

The beginning of scientific urban studies in Bangladesh started in early 50s while it increased momentum in the 1960s. Led by Professor Ahmad, the geographers were the most involved and prolific urban researchers in the 1960s (Islam, 1994). Typical themes were urban morphology, ecology or internal landuse structure (Khan and Masood, 1962), industrial location (Ahmad and Rahman, 1962), residential pattern (Khan and Islam, 1964) and population growth (Atiqullah and Khan, 1965). Another area on historical analysis of social change was also found during that period. The research paradigms began to change after the independence of the Bangladesh particularly from 1972 onwards. Research themes were fairly different though the analysis of



patterns and problems of urbanization, rural- urban relations, and distribution of urban centres by size remained a major area of research from the beginning of the 1970s through the next decade. Social unrest, environmental hazards, famine and poverty became pervasive issues just after the emergence of Bangladesh as an independent sovereign state in 1971. Geographic, physical planning, historical, sociological, anthropological and more recently geographical information system and remote sensing approaches have been popular and widely used by the urban geographers. The focus of these studies were urbanization, urban development and planning, urban environmental issues, urban land management, governance, economy, transport, slum and squatters, social mobility etc. while a large variety of aspects of urbanization, urban development and urban landuse have remained untouched. Most of these researches were micro rather than macro and were exploratory type. Despite of these efforts there is yet to be major effort at building a theory of urbanization (Islam, 1994). The present study was an effort to touch such an area. The spatial arrangements of urban landuse have been generalized by the urban geographers, economists, sociologists for western cities and also for South East Asian Cities. In Western cities the major urban landuses are found in the pattern of concentric (Burgess, 1925) or in some sectors in the city (Hoyt, 1939) or they are also found as separate nuclei (Harris and Ullman, 1945). The South East Asian Cities show different patterns (McGee, 1967; Yeung, 1994 and Dutt, 1983). However, no formal attempt had been made by any scholar to present a generalized statement or model for the urban landuse pattern of cities of Bangladesh (Najia et al., 2008). Thus, the present study aims to search a landuse model for cities of Bangladesh. Data used in this study were collected completely from secondary sources. Thirty two existing landuse maps used in this study were collected from various sources; i.e. academic thesis, Urban Development Directorate (UDD) and Local Government Engineering Department (LGED) to investigate the generalized landuse pattern of cities. The paper has addressed two specific objectives; firstly a review of ecological models of urban landuses and secondly identify a landuse model for Bangladeshi cities. The study found two different patterns of urban landuse model for Bangladeshi cities; one is influenced by rivers and another is by rail and roads. Eight general landuse categories have been identified, these

are; 1) Central Business District 2) Other Business District 3) Residential 4) Slum and Squatters 5) Administrative 6) Education, Health and Social-Cultural 7) Industry and 8) Agricultural and others. These models show different types of pattern of Bangladeshi cities from those of the Western and South East Asian cities. Unplanned urbanization is one of the major factors behind it.

Models of Urban Structure

Cities show considerable variation in their internal spatial structure. Many historical, cultural, physical, technological and economic factors explain these variations. Even cities that share common institutions and histories provide considerable contrasts, but the most pronounced differences occur among cities in the developed and developing and centrally planned economics (Hartshorn and Alexander, 1992). Accessibility and topographic considerations, importance of transportation, transformation of the city from monocentric to a polycentric structure have played important role in the growth process as well as city shape.

In 20th century, Geographers and Sociologist have tried to identify, analyze and explain spatial arrangements of cities. The internal structure of a city comprises of residential, commercial, industrial, transportation, administrative, institutional, educational, cultural, open spaces, recreational and other spaces (Islam, 2001). Spatial pattern shows differences and similarities in landuse and/or social groups within a city. This pattern also reflects how urban areas have evolved economically, socially and culturally over a period of time. However, each city has its own distinctive characteristics (Waugh, 1995). Therefore, several models describing and explaining urban structure have been put forward. It is important to review these models, as they still apply with respect to an understanding of residential, commercial and industrial structure.

The following section lists the basic assumptions, describes the theories behind, applies to the real world, and gives the limitations of urban models.

Burgess, 1925

Based on Chicago City Burgess attempted to identify the outward expansion of the city and the socio-economic groups of its inhabitants



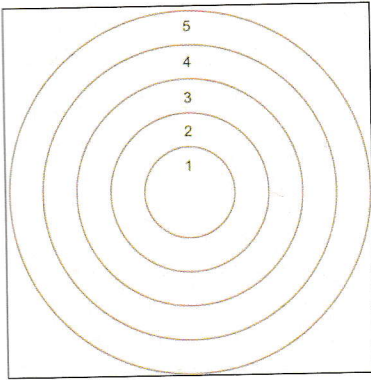
in 1924. The main aim of this model was to describe the residential structures of Chicago City. However, geographers have subsequently presumed that Burgess made certain assumptions which included; flat morphological features gave equal advantages in all directions, land values were highest in the centre of the city and declined rapidly outwards, cities contained various socio-economic groups and areas, transport systems were limited significance, the poor had to live near to the city centre and work place to reduce travel cost etc.

Burgess's model is known as concentric zones model (Figure 1). There are five concentric zones in this model. Zone one is the Central Business District (CBD). It is the centre of commercial activities and entertainment and the focus for major transport route as well. Zone of transition is the second zone, where the oldest housing is either deteriorating into slum property or being 'invaded' by light industry. It contains poorer social groups and first generation immigrants. Low class housing areas are occupied in the zone three. Inhabitants who have escaped from zone two or by second generation immigrants who work nearby factories live in this area. The fourth zone is the zone for middle income group or housing and high class housing occupied the fifth zone where people can afford expensive properties and the high cost of commuting.

Hoyt, 1939

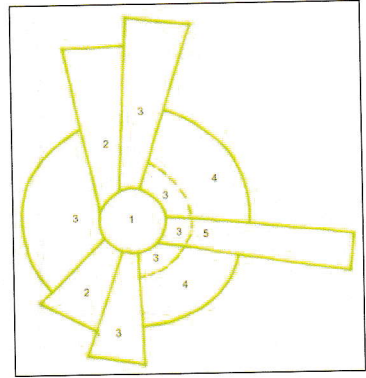
Hoyt's model is known as sector model (Figure 2). Hoyt attempted to develop his model based on the mapping of eight housing variables for 142 American cities to account for changes in, and the distribution of residential patterns. Assumptions were made by Burgess, were followed by Hoyt also but there were new three additional factors. He emphasized on ability to pay resolved landuse conflicts and stated that wealthy people have the affordability to pay highest rates thus chose best sites. Wealthy citizens could afford private cars or public transport. Thus they lived faraway from industry and nearer to main roads and similar landuses attracted other similar landuses, therefore this process led to a sector development.

Hoyt recommended that spaces of highest rent tended to be beside main roads of communication and that the city developed in a series of wedges. An area once had developed with a distinctive landuse, it tended to retain that landuse as the city extended outwards.



Content: 1. Central Business District (CBD), 2. Transitional zone, 3. Low income housing, 4. Middle income housing, 5. Commuter zone

Figure 1: Concentric Zone Model by Burgess



Content: 1. Central Business District (CBD), 2. Transitional zone, 3. Low income housing, 4. Middle income housing, 5. Commuter zone

Figure 2: Sector Model by Hoyt

Mann, 1965

Mann tried to apply the Burgess and Hoyt models to three industrial towns in England: Huddersfield, Nottingham and Sheffield (Vaugh, 1995). His model combined the ideas of Burgess's concentric zones and Hoyt's sectors. Mann assumed that because the prevailing winds blow from the south-west, the high class housing would be in the south-western part of the city and industry, with its smoke (this was before Clean Air Acts) would be located to the north-east of the CBD. His conclusion can be summarized as; the twilight zone was not concentric to CBD but lay to one side of the city which allowed, elsewhere, more wealthy residential areas. Heavy industry was found in sectors along main lines of communication.

Low class housing should be called the 'zone of older housing' (age-based classification, rather than social). Higher class or in Hoyt's terms, 'modern' housing was usually found away from industry and smoke. Local government (political) played a role in slum clearance and gentrification. This led to large council estates which took the working class/low incomes to the city edge (opposite to Burgess's model).

Ullman and Harris, 1945

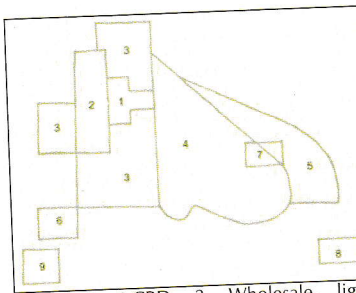
Ullman and Harris model is known as multiple nuclei model (Figure 3). They tried to develop a more realistic model than those of Burgess and



Hoyt. Multiple nuclei developed as a response to the need for maximum accessibility to a centre, to keep certain types of land use apart, for differences in land values and more recently, to decentralize (Waugh, 1995). The basic assumptions of this model were modern cities have a more complex structure than that suggested by Burgess and Hoyt. Several independent nuclei helps cities to grow rather one CBD. Each nucleus acts as a growth point and has a function different from other nuclei within that city for example, London city is financial; Westminster is government and administration; the West End is retailing and entertainment; and Dockland is industrial. There will be an outward growth from each nucleus until they merge as one large urban centre. Therefore if the city becomes too large and congested, some functions may be dispersed to new nuclei. Ullman and Harris identified nine different distinctive nuclei within city areas.

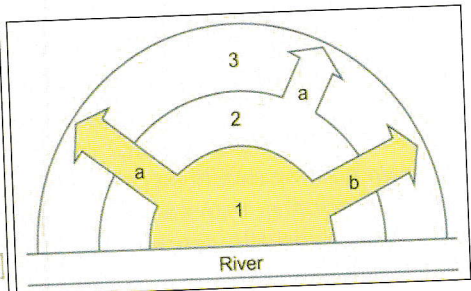
Bunge, 1957

Bunge's model is known as exploitive model of urban structure (Figure 4). Based on research in Detroit Bunge developed an adaptation of the concentric-zone. According to this model, the city divides into three areas based on the ownership of resources and ability to pay, with exploitation due to the flows of money from inner city needy areas to affluent sub urban sections. Thus, Bunge characterized three areas in the exploitive model as 1) the city of death, 2) the city of need and 3) the city of superfluity (Bunge, 1957).



Content: 1. CBD, 2. Wholesale, light manufacturing, 3. Low class residential, 4. Middle class residential, 5. High class residential, 6. Heavy manufacturing, 7. Outlying business district, 8. Residential suburb, 9. Industrial suburb

Figure 3: Multiple Nuclei Model by Harris and Ullman



Content: 1. City of death, 2. City of need, 3. City of superfluity, a. Machine tax b. Death tax

Figure 4: Exploitive Model by Bunge

The city of death is the poor inner city area that is exploited by the rest of the city through the exaction of a machine tax which results from wage payments below the workers worth. The poor residents in this area also pay a death tax, which involves the payment of higher prices for food, housing, insurance and other services than occurs in other parts of the city. This area suffers additionally from lack of city services and amenities and is described as a slum area in the model. The city of need occupies an intermediate location just beyond the city of death. It is inhabited by the working class. This area is also exploited by the suburban based business interests and the politicians. The outer ring, the city of superfluity is the home of the elite entrepreneurs and managers, who live a life of leisure and mass consumption subsidized by the exaction of payments from other groups. The model provides insight into the problems of the inner city poor, especially their housing situation. Critics would argue that the economic system itself is not the root of the problem, but the lack of skills and training together with the absence of job opportunities in lower income communities. Table 1 evaluates the limitations or criticisms of the urban models evolved by researchers in different periods based on developed countries with elaboration of the characteristics of the studied cities with their mean features.

Cities in Developing Countries

Cities in economically less developed countries, which have grown rapidly in the last few decades, have developed different structures from those of older settlements in developed countries. In a global context, Asia has been a rapid urbanizing continent (Yeung, 1994). There are considerable intra-regional differences in both the size of the urban population in individual countries and the level of urbanization. The Asian population becoming more urban, the proportion of the urban population concentrated in large cities is also increasing. Again a phenomenon, prominent in some Asian countries, is the excessive concentration of population in the largest city, the so called primate city. Despite some observed similarities between most developing countries, few attempts have been made to produce models to explain landuse pattern. Clarke has proposed a model for West African cities, McGee for south-east Asia and Waugh based on two television programs on Sao Paulo and Belo Horizonte together with some limited

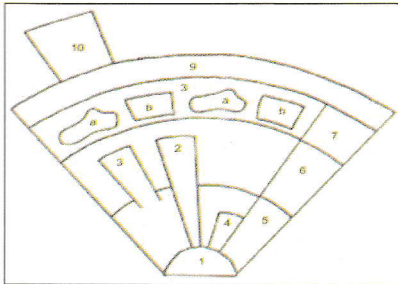


fieldwork for Brazil (Waugh, 1995). Some others have also proposed by Yeung for Singapore cities, Dutt for South Asian Cities, and the present author based on 32 cities for Bangladesh cities (Najia et al., 2008).

Table 1: Limitations of Urban Models Based on Developed Cities

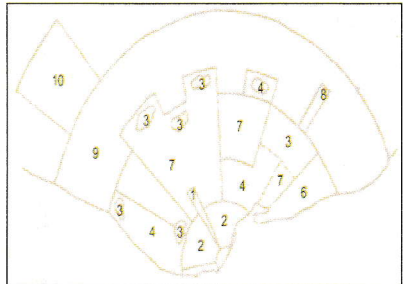
	Burgess	Hoyt	Mann	Ullman-Harris	Bunge
1	Zones , in reality, are never as clear-cut as shown on each model				
2	Each zone usually contains more than one type of landuse/housing				
3	No consideration of characteristics of cities outside USA and North-west Europe				
	↓	↓	↓	↓	
	Based on 1 USA city	Based on 142 USA cities	Based on 3 English cities (in north and Midlands)	Based on cities in economically more developed world	Based on 1 USA city
4	Redevelopment schemes and modern edge-of-city developments are not included (most of the models pre-date these developments)				Based on city's general characteristics rather focused on individual landuses
5	Based mainly on housing: other types of landuse neglected		Industry not always to north-east of British cities		Economic system is not the root of the problem, there are some other problems also
6	Cities not always built upon flat plains				
7	Tended to ignore transport				

The South Asian and South-East Asian cities show different patterns (McGee, 1967). Many South-East Asian cities are characterized by a port around which the entire city grows. In a sector of landuse there are alien commercial zones. High class residential areas are found in some particular sectors, squatters and industrial estates are found away from the city (Figure 5). In Yu-man Yunge's model (1960) for Singapore city three different landuse play important role in arrangements and expansion of other landuses e.g. port, CBD and government areas (Figure 6).



Content: 1.Port zone, 2. Foreign commercial zone, 3. Foreign commercial zone, 4. Western Commercial zone, 5. Government area, 6. High class residential, 7. New high class residential, 8. Medium density residential , 9. Market and grazing area, 10. New industrial zone, a. slum and squatter, b. suburb

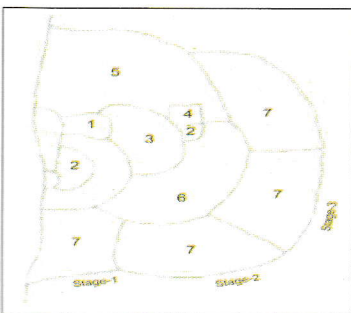
Figure 5: South Asian City Structure Model by T G McGee



Content: 1.Modern commercial zone, 2. Mixed landuse zone, 3. Slum and squatters settlement, 4. Middle income housing, 5. High income housing, 6. High and middle income housing, 7. Governmental residential zone, 8. Airport, 9. Market and grazing zone, 10. Industrial zone

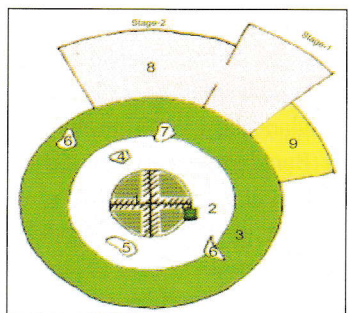
Figure 6: Singapore City Model by Yue Man Yeung

According to Islam (2001), South Asian cities like Dhaka and Kolkata show different pattern from those of the western and South-East Asian cities. Unlike in Western cities Asian cities show presence of settlements of the poor (slums/squatters/*basti* etc.) in various parts of the city. In Dhaka and Kolkata location of such settlements are almost common (Islam, 2001). The pattern of urban development which has emerged in India is greatly at variance with the ideal typical urban development hypothesized by the theory of urbanization. A.K. Dutt (1983) suggested two models; colonial based urban structure model (Figure 7) and bazar based urban structure model (Figure 8).



Content: 1. Administrative zone, 2. Anglo Indian resident, 3. Central business district, 4. Bazar based intensive commercial landuse, 5. Local inhabitant's zone, 6. European town

Figure 7: South Asian Port based City Model by Dutt



Content: 1. High income residential and mixed commercial landuse, 2. Mixed residential (high and low income), 3. Low income residential, 4. Religious enclave (Muslim, etc), 5. Linguistic cluster (Bengali, etc.), 6. Caste group (washerman, etc., untouchable, etc.)

Figure 8: South Asian Bazar based City Model by Dutt



Model for Bangladesh Cities

In Bangladesh, urbanization is taking place mostly due to migration from rural areas, which is partly due to population pressure on land and partly due to lack of demand for labour in rural areas (Chowdhury, 1978; Eusuf, 1996). According to the Population and Housing Census (2011), there are 506 urban centres in the country of which only 43 urban centres exceed population of 100,000 and above (BBS, 2013). The urban population is highly concentrated in few large cities especially in mega city Dhaka. Thus Dhaka is experiencing dynamic process of change in characteristics of population and infrastructures and their use through invasion and succession as well as gentrification (Khatun, 2017). These process changes and growth of Dhaka and some other metropolitan cities has addressed by number of researchers after the independent of Bangladesh rather medium and small sized cities of the country but research on landuse driving forces in the context of developing country particularly in Bangladesh remains neglected and thereby relative importance of all those forces mentioned cannot be ascertained with empirical data (Elahi and Alam, 1998). Here demographic factors, are the key issues for transforming the landscape for both in rural and urban context.

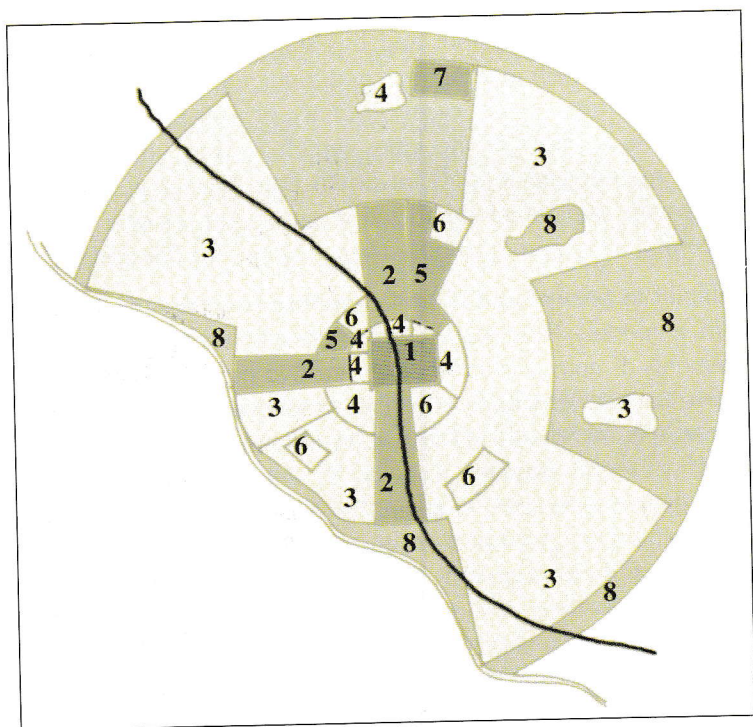
The beginning of research on landuse structure in Bangladesh was started at the then Department of Geography (currently Department of Geography and Environment) University of Dhaka in the early 60s (Najia et al., 2008). Most of these researches emphasized on commonly comparing with ecological models rather to concentrate on urban landuse model for Bangladesh cities. Therefore Najia (2010) tried to develop landuse model for Bangladesh cities based on 32 landuse maps collected from various sources. It is found that Bangladeshi cities show different patterns from other ecological models and models of some developing countries as well. Two different models can be identified for Bangladesh cities in Najia's model; one is influenced by river (Figure 9) and another is influenced by rail and road (Figure 10). The basic assumptions were urban landuse in Bangladesh is very diversified and mixed landuse also very prominent feature. Existence of agricultural land within the city limit is one of the significant characteristics. Socio-cultural impacts as well as morphological and human

factors contribute in city growth and shape. River, rail and roads play major role in linear spatial arrangements of landuse structure. It also contributes to make geometric shapes of various landuses as well.

Each city of Bangladesh has its own landuse character (Najia et al., 2008). However the general characteristics of cities can be explained as: numbers of the studied cities have distinctive influences of river on concentration of intensive commercial landuse of cities such as Chittagong, Kishoreganj, Faridpur, Bhairab, Habiganj, Maoulavi-bazar, Netrokona, Bandarban and Barguna. Due to access to river commercial activities took places near river sides and these activities also took places besides railway stations and bus stations. Commercial landuse and the access to main internal road and municipal roads further invites other spatial settings in most cases. Presence of wide agricultural land is very common to most of the cities which is very uncommon with ecological models and models for South East Asian and South Asian Cities. Overall unplanned urbanization and urban growth may have influences for such unique landuse characteristics for Bangladesh cities.

It is difficult to present and describe landuse structures of Bangladesh cities in a model. Thus Najia (2010) tried to present urban spatial arrangements of generalized landuse into two models. There are eight distinctive landuse structures in Najia's proposed models both for river influenced (Figure 9) and rail and road influenced (Figure 10) which included; 1. Central Business District, 2. Other Business District, 3. Residential, 4. Slums and Squatters, 5. Administrative, 6. Education, Health, Social and Cultural, 7. Industrial, 8. Agricultural and others. The city centre is considered as the core area of a city which is highly influenced by the river or the rail and the roads. At the centre of the city CBD found in a square shape with access to roads or river. Following the CBD another Other Business District also found in a linear shape along the outward access to roads. Due to proximity to access of various facilities and services of city centre slum and squatters, administrative and educational, health, social and cultural landuses take places besides one another without following any distinctive character. These landuses found sometimes in square, half circle or triangle shape. Residential landuses take places initially in half

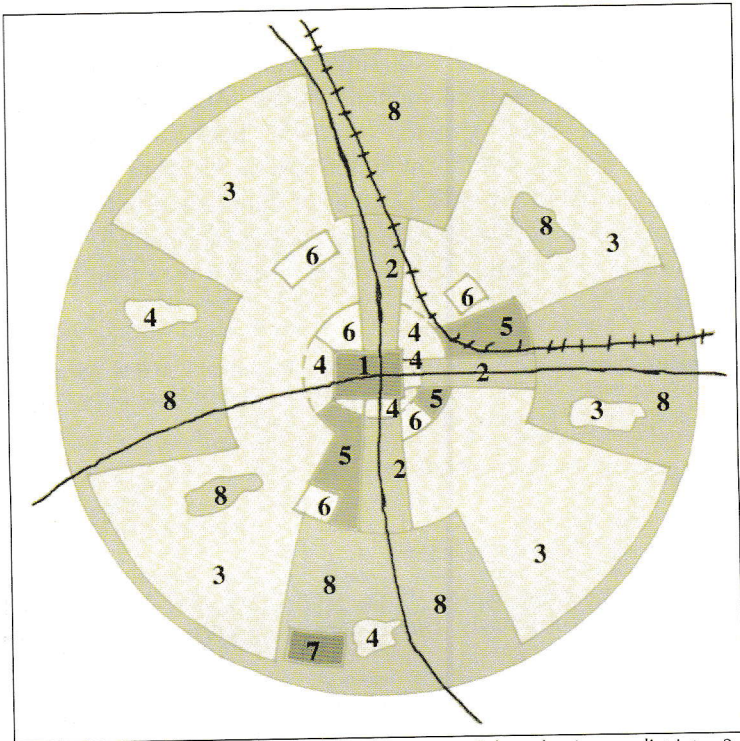
circle and later it expanded outwards in all directions in fan shapes. Residential landuses invite educational, health, social and cultural landuses to meet demand of the inhabitants. Thus these landuses found within and or besides the residential landuses in a very irregular shape. Industrial landuse found very insignificant in most of the cities which indicates the economic backwards of cities as well. The spatial distribution of industrial landuse of cities also found in irregular shape. Each cities have significant agricultural and some others landuses which take places in a circular pattern at the limits of cities.



Content: 1. Central Business District, 2. Other business district, 3. Residential, 4. Slum, 5. Administrative, 6. Education, health, social and cultural, 7. Industry, 8. Agriculture and others

Figure 9: River Based Model

Source: Najia, 2010



Content: 1. Central Business District, 2. Other business district, 3. Residential, 4. Slum, 5. Administrative, 6. Education, health, social and cultural, 7. Industry, 8. Agriculture and others

Figure 10: Rail and Road Based Model

Source: Najia, 2010

Urban Structure Models: Conclusions

The models described as above sections were put forward to try to explain the landuse structure with particular cities and the differences within cities in the developed world and some cities of the developing world. It must be remembered that each model has its own limitations. Each city is unique and has its own distinctive structure. Therefore landuse pattern not necessarily similar one another to existing models. In developed countries, the modern cities have several nuclei with its landuse arrangements and functions-government offices, shopping, finance, entertainment, education, transport and others. These nuclei



are linked by well transportation routes. However in developing countries cities are growing with single nuclei in most cases except some large cities those have multiple nuclei. Apart from unplanned urbanization and urban growth, economic backwards and limited industrial set up has significant influences in landuse pattern. The present study is based on only 32 cities of Bangladesh which may not be representative for all the cities of Bangladesh especially for the Mega city Dhaka and other large cities. Further research may help to reduce such limitation.

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