

Land Readjustment Program for Pabna City of Bangladesh: An Application Towards Urban Regeneration

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Abstract

Urbanization and the diffusion of haphazard settlements have been a phenomenon in most Asian developing countries. Pabna, one of the fastest-growing secondary cities of Bangladesh, meets up the lack of public funding for compulsory procurement and infrastructural provisions with its high land value and gradually making the city geographically vulnerable. In such circumstances, the Land Readjustment program can very well be appreciated, a powerful tool for the development with minimum public expenditure to achieve unified control over unplanned land areas, which also works as a flexible technique for Spatial Planning. The objective of the study is to design a model for the Land Readjustment project in Pabna city. The study also reviewed the justification of land suitability for future urban development in Pabna city. ArcGIS 10.7 software has been used to illustrate the 2D model of the proposed design of Land Readjustment. This proposed project is financially viable to recover the cost of the development. The proposed development scheme of the study helps to make the city development plan, which can provide necessary guidelines to the concerned authority for its proper implementation and management.

Keywords: *Land Readjustment; Urban Development; Urban Regeneration.*

1. Introduction

Settlements are an expression of spiritual aspirations and material requirements. But the unplanned haphazard, and disorganized development creates an untoward living environment of a city. Due to population growth, a massive rate of urbanization, and economic development, many people are moving from rural areas to urban areas. Thus, urban growth has become a matter of concern in several ways. Besides, the rapid growth of urbanization has created land value both in the housing sector and urban settlement areas. In a developing country like Bangladesh, the natural resources are limited, and the rate of urbanization is increasing at an alarming rate, also leading to the secondary cities of the country. As a result, arranging accommodation for the additional people has become a challenge. Pabna is one of the fastest-growing secondary cities of Bangladesh. According to land-use change analysis of Pabna District, urban area in 1996, 2006, 2016 are respectively 193 km², 434 km², and 479 km² (Asif

et al., 2018). The urban area of Pabna District has been expanded more than double compare with the year 2006, which means the degree of sprawl became higher over that time (Asif et al., 2018). Population expansion is spreading mainly from Pabna Municipality of the District, where land availability for urban settlement is limited and not commensurate with population growth and prices. Most housing developments of the city are aimed at middle-income or high-income groups. As a consequence, the urban poor remains unconsidered. Land Readjustment program can very well be appreciated in such circumstances, a powerful tool for the development with minimum public expenditure to achieve unified control over unplanned land areas, which also works as a flexible technique for Spatial Planning. It provides public facilities: commercial facilities, community facilities, utility facilities, and so on. Considering all the mentioned issues, Pabna Municipality has been chosen as the study area. The objective of the study is to design a model for Land Readjustment Project in Pabna Municipality. The result of the study is expected to provide an incomparable solution on transferability of Land Readjustment (LR) in Pabna Municipality.

2. Literature Review

Land readjustment project is a strong urban development and re-development tool of urban management. This planning tool is particularly suitable for public-private development, widely used in an international context (Schrock, 2012). Urban regeneration is another important strategy of urban development, which transfers the economic and social geography of a place. Land readjustment plays a vital role towards urban regeneration. Before Selecting Pabna Municipality as the study area, this study reviewed the urban growth rate in Pabna District, where the authors showed the changes in land use pattern from 1996 to 2016 (Asif et al., 2018). This study also reviewed the justification of land suitability for future urban development in Pabna City from a secondary data source (journal) entitled "Integrating GIS and AHP for Land Suitability Analysis for Urban Development in a Secondary City of Bangladesh", which showed that Pabna City is suitable for future urban development (Mohit and Ali, 2006). In the reviewed journal, Analytic Hierarchy Process (AHP) was applied for Land Suitability Analysis (LSA) (Mohit and Ali, 2006). According to the 'Table-3: Degree of impact of land suitability parameters (V_i)' of the reviewed journal, degree of impact with scored was defined by six-point scale: 5 (High), 4 (Moderately High), 3 (Moderate), 2 (Moderately Low), 1 (Low) And 0 (Excluded) (Mohit, Ali, 2006). The reviewed journal's outcome showed the most suitable areas for residence, commerce, and industry, which was considered in this proposed Land Readjustment (LR) Program of Pabna Municipality. The reviewed journal provided the land use proposals for the year 2015, but there was no further work on it (Mohit and Ali, 2006). For calculating the contribution ratio, and cost recovery, some other research work was also reviewed (Mahmud et al., 2014; Wihadanto et al., 2017).

3. Study Area Profile

Pabna municipality is one of the oldest municipalities of Bangladesh, established in 1876 (Parvez and Islam, 2020). This city is situated between 23°80' and 24°05' north latitudes and between 89°10' and 89°25' east longitudes (Mohit and Ali, 2006). Pabna district has moderate and pleasant weather (*Bangladesh Bureau of Statistics (BBS)*, 2011). The total area of Pabna municipality is 27.23 sq. km, and it's total population is 116305 (*Banglapedia*, 2015). There

46.21% of the total land area of Pabna municipality is residential area, 2.51% is commercial area, 4.44% is industrial area (Figure 1)). The data of 2008 from MIDP were used for referring to the existing condition of Pabna Municipality. If recent data were used, this study could provide a more reliable result.

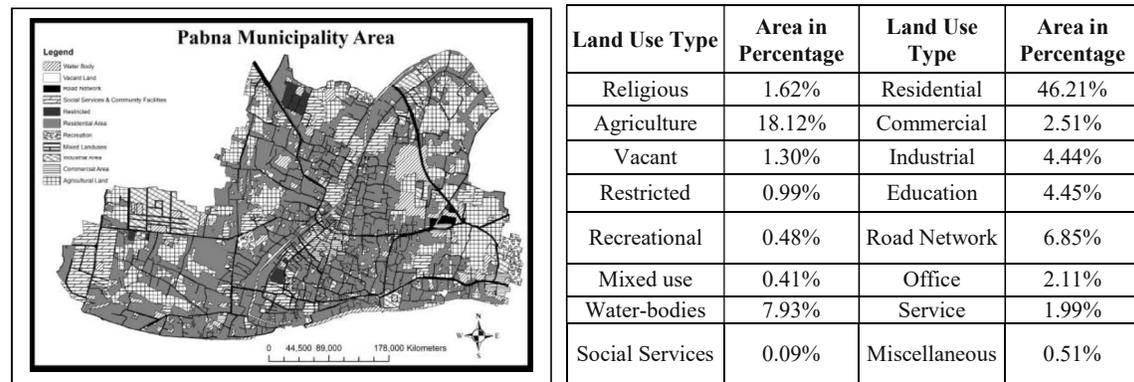


Figure 1. Existing land use of Pabna Municipality Area (Source: MIDP, 2008).

4. Methodology

This study mainly focused on secondary data sources MIDP, 2008; ADP; BBS Report of Pabna City, 2011; Population Housing Census, 2013; Banglapedia; LGED; and some research papers were also reviewed. Land suitability for urban development in Pabna municipality was also justified from a reviewed journal (Mohit and Ali, 2006). A new model was proposed for Land Readjustment program in Pabna Municipality area. The data analysis process was conducted by qualitative and quantitative approaches, where three steps were followed: replotting schema, determine the contribution of land, and cost recovery. ArcGIS 10.7 software has been used to illustrate the 2D model of the proposed design of Land Readjustment. Besides, essential data were analyzed with M.S. Excel and GIS (Geographic Information System).

5. Land Readjustment Program in Pabna Municipality

5.1 Replotting Schema

The proposed design after replotting of Pabna Municipality is given in figure 2. The following steps are considered while replotting procedure (Wihadanto et al., 2017):

- Existing Condition of the study area (location, size, and shape of lots)
- Development of Infrastructure and Facilities
- Integration of Water Body and Agricultural Land
- Designing a Settlement block
- Allocation of Reserved Land (Commercial land and Industrial land)

While replotting, this study tries to distribute the land in its original location as much as possible, at least in the same block of its existing condition (Wihadanto et al., 2017). This study focused on a modified grid pattern for designing the settlement area. Although the landowners

of the study area lose a small portion of their land, in exchange, they receive more significant benefits through the land readjustment program. For re-shaping, the settlements block, in some part of the study area, water body, and agricultural area has been integrated. Besides, commercial areas and industrial areas are proposed in the periphery area on the basis of the reviewed paper entitled "Integrating GIS and AHP for Land Suitability Analysis for Urban Development in a Secondary City of Bangladesh" (Mohit, Ali, 2006).

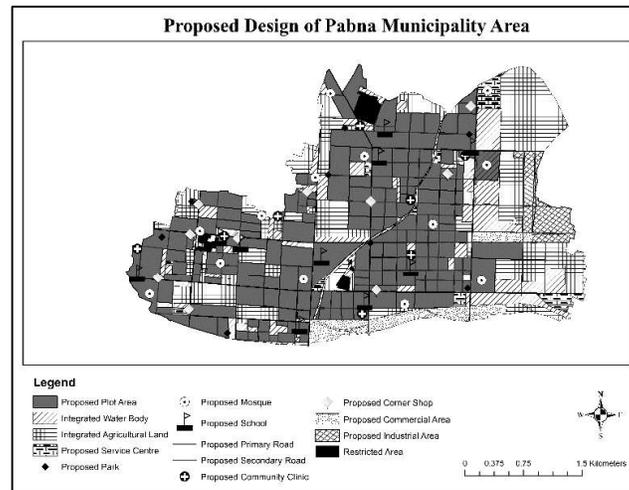


Figure 2. Proposed Design of Pabna Municipality.

5.2 Determine the Contribution of Land

Contribution of land is a form of contribution which is given by the landowner by reducing the amount of land area of each plot, and the contribution ratio in land readjustment program is done by dividing the amount of land that is used for public services from the total of the area (Wihadanto et al., 2017). The contribution ration calculation of land readjustment in Pabna Municipality is given in the bellow: (Table 1)

Table 1. Calculation of Contribution Ration in Land Readjustment.

Category	Before LR (sq. km)	After LR (sq. km)	Difference
Road Network	A0= 1.87	A1= 5.33	A1-A0= 3.46
Green Open Space (GOS) Public	B0= 3.26	B1= 3.52	B1-B0= 0.26
Other Public Facilities	C0= 3.02	C1= 3.21	C1-C0= 0.19
Plot Building	D0= 12.60	D1= 9.64	D1-D0= -2.96
Green Open Space (GOS) Private	E0= 4.3	E1= 2.42	E1-E0= -1.88
Reserved Land	F0= 2.18	F1= 3.11	F1-F0= 0.93
Total	T0= 27.23	T1= 27.23	

The contribution calculation of each unit of settlement area is given below:

- o Land area for public facilities after replotting (L1)= A1+B1+F1= 11.96

- Land area for public facilities before replotting (L0)= A0+B0+F0= 7.31
- Land area for settlements before replotting (P0)= C0+D0+E0= 15.27
- Additional area for public facilities (TL)= L1-L0= 11.15-7.31= 4.65
- Percentage of Contribution (CR)=(TL/P0)*100%= (4.65/15.27)*100%= 30.45%

In Table 1, Public Green Open Space (GOS) indicates park and other recreational center, Private Green Open Space (GOS) indicates small garden, and other public facilities includes religious, office, service, education etc.), and reserved land includes restricted land, and specific land for commercial, industrial land uses. According to the proposed model of land readjustment, land use for community facilities, services, and road network is 23.28%, where its standard value is 15% to 25% of the total land.

5.3 Cost Recovery

Total cost of the proposed land readjustment program has been calculated into different sectors: Land Development Cost, Cost of Relocation of Building and Compensation, Landscaping Cost, Survey and Design Cost, and Miscellaneous Cost. Total tentative Land Development Cost, Cost of Relocation of Building And Compensation, Landscaping Cost, Survey, Design, and Miscellaneous Cost are respectively 29028.23 crore BDT, 23079.29 crore BDT, 110 crore BDT, 0.0063 crore BDT. According to the "Detailed Estimate of Purbachal New Town Project," per katha development cost is estimated 202,638 BDT, which includes the construction of roads, bridges, footpath, provision of service facilities, cutting and filling, etc. in the Land Development sector (Mahmud et al., 2014). And, Landscaping Cost includes integrating and re-shaping water bodies, agricultural land, preservation, and storage facilities.

The Revenue of the land readjustment program will be collected from Land Acquisition, Servicing, and Infrastructure, Income from Land Disposal. Total expected Revenue from Land Acquisition Cost, Costs of Servicing and Infrastructure, Income from Land Disposal are respectively 18749.8446 crore BDT, 22463.78 crore BDT, 13647.49 crore BDT. The total Revenue of the project is 54862.1146 crore BDT.

Table 2. Approximate Total Cost and Revenue from the project

Total Project Cost	52847.5263 crore BDT
Total Revenue of the Project	54862.1146 crore BDT

5.4 Implementing Phase

Implementing Phase of the project will be taken under the supervision of the government, ensuring public participation (Mahmud et al., 2014).

Table 3. Implementing Phase of Land Readjustment

Phase	Time Period	Program Description
Phase 01	2021-2025	Construction of roads, Development of settlements blocks of the east part of Pabna Municipality
Phase 02	2023-2030	Development of settlements blocks of the west part of Pabna Municipality
Phase 03	2029-2035	Distribution of services and distribute the land to the owners

6. Conclusion

This study identified that urbanization in Pabna city is getting complicated day by day. So, Pabna Municipality area has been chosen as the study area, where the objective of the study is to design a model for Land Readjustment project in Pabna city. This study focused on replotting and contribution while proposing a model of land readjustment. The contribution ratio in the proposed schema of land readjustment is 30.45%. The total Project cost and total Revenue of the project are respectively 52847.5263 crore BDT and 54862.1146 crore BDT. In this study, total three Phase has been proposed for implementing land readjustment program in Pabna Municipality. Only the proper implementation and management of the program can provide a successful outcome of land readjustment towards urban regeneration in Pabna Municipality. This study can be encouraging for other urban areas. All the required steps for implementing land readjustment in Pabna Municipality, the government should take all necessary steps as soon as possible towards urban regeneration and securing urban lifestyles for a prosperous future.

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