

Developing Unplanned Residential Land Through Implementation of Land Readjustment: A case study of Aliganja, Rajshahi

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Abstract

Urbanization and the spread of unplanned settlements have been a phenomenon in most developing countries of Asia. The right interaction between each land use phase for physical, economic, social, cultural, and economic cooperation is a sign of good urban planning. In the context of our country, other aspects of planning are not taken into account; only the establishment of a building plot is considered. The study's goals are to determine the issue caused by uncontrolled development and provide a model for the Aliganja, Rajshahi, Land Readjustment Project. To fulfill its objectives, the study used data from both primary and secondary sources. To analyze the data it is used Ms. Excel, SPSS and formatted a Likert scale model for people's perception. It also used Arch GIS 10.6 to digitize the existing map of the area. After considering all the perspectives of a residential area a land use plan has been proposed for the smart growth of Rajshahi City Corporation (RCC). The site's land use model has been developed using AutoCAD 2021 to ensure optimal space utilization for all community facilities and to estimate project costs. All community amenities and necessary residential requirements are maintained in the design. This study can help to ensure a legal shaping and determining of the real qualities of urban space.

Keywords: Urban Planning; Residential Area; Land Readjustment; GIS; RCC.

1 Introduction

Settlements are an expression of spiritual desires and material necessities. But the unplanned haphazard, and disorganized improvement makes an untoward living environment in a city. Due to population growth, an enormous rate of urbanization, and economic development, many people are moving from rural areas to urban areas which is a matter of concern in several ways. In developing countries like Bangladesh, the natural resources are limited but the rate of urbanization is increasing which has created land value both in the housing sector and urban settlement areas (Ferdouse Ratu & Roy, 2021). Population expansion is spreading mainly from Rajshahi Municipality, where land availability for urban settlement is limited and not commensurate with population growth and prices. Most housing developments in the city are aimed at middle-income or high-income groups. As a consequence, the urban poor remains unconsidered. The land Readjustment program is often very well appreciated in such circumstances, as a strong and sustainable tool for the development with minimum public expenditure to achieve unified control over unplanned land areas. The 2030 Agenda for Sustainable Development, which is a global development plan accepted by the United Nations in September 2015, defines 17 Sustainable Development Goals (SDGs) and 169 targets to be achieved by 2030. For example, Goal 11 aims at making cities and human settlements inclusive, safe, resilient, and sustainable (Çağdaş & Linke, 2021). Sustainability requires the reconciliation of three things: economic demands, and environmental and social equity (Kutoyi, n.d.). "Land readjustment" could be a technique for managing the urban development of urban-fringe lands, whereby land parcels are assembled for their unified planning, adjusting, and subdivision as a single estate, with the deal of a few of the new building plots to recover the costs and the redistribution of the other plots back to the landowners (Mahmud et al., 2014). This study aims to find out the problem due to unplanned development in the area and to provide organized land parcels through the rearrangement of plots, provision of infrastructure and public facilities by eliminating unplanned development. An unplanned

development always becomes a burden for the city in the future, and the dwellers will face many kinds of problems. There are almost 45% built-up areas and 55% areas that are not built-up yet. So, we think Land Readjustment will be the best choice for making the place physically and aesthetically beautiful with all community facilities and utility services, which will increase the beauty of the city more. The study area is situated in the fringe area of the city and occurring scattered settlements which are not a sign of good urbanization. The quantity of homes and community amenities is insufficient to accommodate the projected population growth. Therefore, land readjustment is a useful strategy to prevent land overuse.

2 Literature Review

Land readjustment (LR) is a useful tool of urban development that is beneficial for both stakeholders and the government. In East Asian countries such as Japan and the Republic of Korea, land readjustment is a widespread practice. It's also been utilized in Germany to facilitate the assembling and planning of privately owned land on the peri-urban outskirts, as well as the supply of infrastructure and services to that property. The government pools or assembles the many privately owned property parcels in a specific area and produces a land use plan for the entire area, including allocating spaces for public infrastructure and services such as highways and open spaces, using this approach (World Bank, 2015). A study was conducted to evaluate and analyze the success of Turkish land readjustment (LR) solutions to apply ancient wisdom to current issues. The performance gaps in Turkish LR methods that need to be improved have been found by assessing and comparing the outcomes with the best or expected results of an ideal LR system. It is feasible to enable countries to determine whether their strategies could have been realized or not by combining good practices with indicators, as well as highlighting improvements in their LR system (Yilmaz et al., 2015). A Dutch proposal in a paper improves on the German LR by allowing just the value rise attributable to property readjustment to be charged which excludes the substantial value increase that accrues from modifying the land use plan, often resulting in German municipalities having to subsidize (Muñoz Gielen, 2016). For land readjustment, usually, 10% of the land is contributed for cost equivalent and more than 15% for the infrastructure development and open spaces. The cost for the development of infrastructure and other services is subsidized by the government (Joshi, 2014). Ensure tenure security, accessibility of land information, land use, land transaction, and other restrictions are handled by land boards and municipalities, as well as a temporary land court, is appeared for any complaints or disagreements of landowners (Doebele, 1982). In the Bangladeshi context, Pabna, one of the secondary cities that are expanding the fastest, compensates for the absence of state support for mandatory purchases and infrastructure by having a high land value and progressively becoming a geographically vulnerable city. So, a land readjustment program was taken in a study that also made a design model in Pabna City (Ferdouse Ratu & Roy, 2021). By making the area a place of symbolic identification for the locals, providing a sense of place, belonging, pride, and satisfaction, LR can be exhibited as an effective method of reducing social inequality and a gauge of social and economic benefit accomplishment (Das, 2019).

3 Methodology

In this study, the site was selected and observed the characteristics of the site Aliganja which is situated 5.5 km east of the CBD of Shaheb Bazar (This area lies between 24° 23' 39" N north latitude and between 88° 34' 11" E east longitude.). For this study, 65 acres area is taken where the population is approximately 14,000 (according to the Master Plan of Rajshahi City, the density is 220 population per acre). The primary data was collected through a reconnaissance survey, questionnaire and physical observation. The questionnaire was about demographic information, economic information, land information, opinion about existing facilities and implementation of land readjustment. The survey method was a random sampling method and the population size (number of households) was taken at approximately 185 (analyzing base map and physical observation), considering a confidence level of 90% and a margin of error of 10% the sample size was taken 51 for this study. Some important secondary data was taken from the Bangladesh Bureau of Statistics (BBS), Google Earth image and necessary information from other articles. After collecting the data necessary analysis was conducted and find out the problems and needs of the area. For planning existing land use map was prepared using Arch GIS and a further plan is done to make the place an ideal residential area. The layout plan is done using AutoCAD according to necessary land use calculation ensuring all the necessary facilities of a residential area. (The information of land owners collected through a questionnaire, in this case, there may be some misinformation about the number of landowners and their amount of land. This research it is tried to focus on the potentiality and importance of LR in the Rajshahi City fringe area)

4 Data Analysis

4.1 Base Map Analysis

Using Google Earth Pro and Arch GIS 10.6 we have digitized the existing site map. Then we analyze the land use of the area. It is mainly a residential area with distributor and access roads, community services such as retail shops, a school, an undulated playground (by observation) and other urban services etc. are placed in an unplanned condition. The area is mostly a Plane surface. It's sparsely populated. Most of the people live by the roadsides. The rest of the land is used as agricultural land. Mango fields cover some of these agricultural lands sharing papaya fields, vegetables so on. There were almost 32% residential area, 33% agricultural area, greeneries and vacant land 20% and 15% land used for retrial, road, communication and other community facilities.

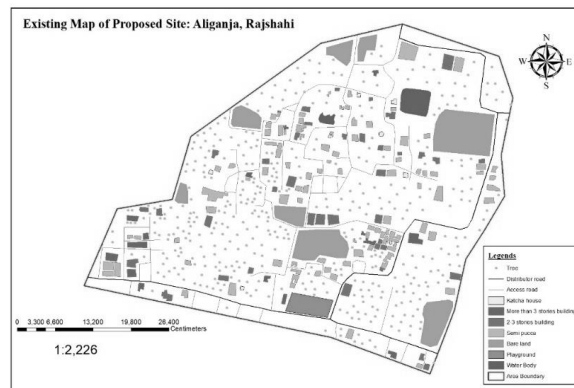


Figure 1. Existing land use map of the study area.

4.2 Existing Facilities Analysis

To analyze the existing community facility and the services necessary questionnaire survey was done and analyzed through Likert Scale Model. It is categorizing the answer to the questions and need to give certain marks for the answer from 1 to 5.

Then to compute the range for the model, it is needed to simply subtract the highest Likert scale to the lowest Likert scale and then divide the answer by the total scale number.

Table 1. Likert Scale table of community facilities.

Facilities	Average Point	Result
Electricity	3.4	Acceptable
Sewerage	5	Very Poor
Transportation	2.9	Acceptable
Water Supply	4	Poor
Drainage	5	Very Poor
Environment	2.42	Good
Gas Supply	5	Very Poor

4.3 People's Willing of Land Readjustment

This graph (Figure 2) shows the willingness of people of getting land in the land readjustment project. People want to lead a healthy life. Here it is found that about 78% of the people want to readjust their land. On the contrary, 22% of people won't be happy with land readjustment. The land readjustment program is needed to include all the stakeholders but due to a lack of time and contributors it did not become possible.

5 Proposed Layout Plan

Based on the collected data and identification of the current difficulties in the Aliganja region, an urban planning technique 'Land Readjustment' will be an ideal tool for minimizing problems on a broad scale. This section contains a detailed overview of the proposed 2D model of the study area. The cost estimation with exact dimensions is calculated in the next chapter.

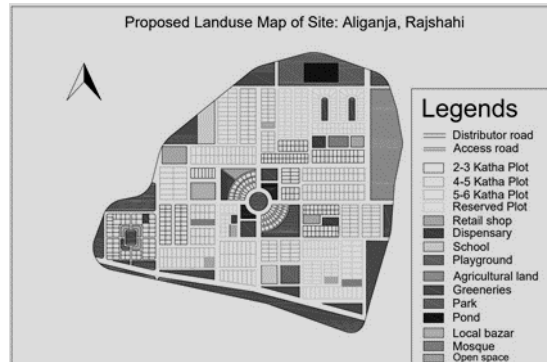


Figure 2. Proposed layout plan of the study area

According to facts and observations, the proposed model contained two types of roads around the study area. One is Distributor Road and another is Access Road. Road network percentages were mandated by the Bangladesh Government's Roads and Highway Department (RHD), but due to the presence of squatter development, exact amounts were not complied with. Improving road access can lead to two scenarios. One is a gradual increase in land prices and the other is increased accessibility in which investors would be willing to invest. All the community facilities are located at a suitable distance so that the residents can easily access them. This plan ensures a nice and convenient environment to live a healthy life.

6 Cost Estimation of Land Readjustment

6.1 Land Readjustment and Financial Budget Proposal

According to (Mahmud et al., 2014) the whole land readjustment process in the study area Aliganja is categorized into three steps: 1) Managing the principles and assumptions. 2) Create the detailed. design of the study area. 3) Implementation process through the financial aspects. Based on this systematic process the land readjustment technique is applied to the study area. [All the cost estimation measures are taken from (Mahmud et al., 2014)].

6.1.1 Managing the Principle and Assumptions

6.1.1.1 Determining contribution ratio

The contribution ratio is a vital part of the project which means the percentage of the land from the landholder is sacrificed for this project for creating the service facilities like schools, colleges, parks, mosques, roads etc. From this project, the contribution ratio is 40%. This is the minimum ratio that can be profitable for the project. Something has to take considered to determine the ratio:

- Every land owner will share the cost of the project from their contribution area.
- The contribution must be minimum otherwise it discourages the landowner to share their land.
- The amount of land each owner has to contribute will depend upon the total cost to be shared by all the landowners, the monetary value of the land after the project and the land required for providing facilities.

6.1.1.2 Replotting Procedure

The following things were taken into consideration while redistributing serviced plots:

Only the original landowners will receive the serviced plots in accordance with their contribution to the project. The remaining plots will be prepared for sale.

Landowners will be allowed to choose their plot with the following priority:

1. Land owner with the existing house
2. Land owner of corner plot of the same block
3. Landowners of consolidated parcels located at 2 or more than 2 different locations.

After ensuring all the issues the monetary compensation was estimated at **8.53 crore** for the land owners of the area.

6.1.2 Detail design of the site: Principles & Policies

6.1.2.1 Principles for Existing Structure and Facilities:

While keeping, enhancing or demolishing the existing structures the following things were taken into consideration.

- Existing roads that are wider than 40 feet will be kept as they are.
- Existing community-serving facilities such as- schools, colleges, mosques, temples, hospitals etc. will be kept at the present location as much as possible.

6.1.2.2 Principles for Agricultural Land Preservation:

12 Acre area is preserved for agricultural purposes. Before that this agricultural land is not protected and some areas are consumed.

6.2 Financial Aspects and Implementation Strategy (Cost Analysis)

6.2.1 Calculations Justification:

- Equation of calculating floor space:
Land (plots) space in square feet (C_1) = remaining amount of land after contribution (Katha)×720
- Land (plots) space cost per square foot is 1200 tk. (BDT)
Total land (plots) cost= Total land (plots) space ×12000
- Selling Land (plots) space is 3000 tk. (BDT) in per square foot.
So, equivalent Land (plots) space for cost recovery (C_2) = Total land cost÷3000
- Now, equivalent Land (plots) space required to return to the land owner in square feet = ($C_1 - C_2$)

Table 2: Total Development and Project Cost

Total Development cost (Crore BDT)			Total Project cost (Crore BDT)		
Cost Sector		Total Cost		Cost Sectors	Total Cost
1. Monetary Compensation		8.53 crore		Total	113.28 crore
2. Land Development	Dredging/Cutting & Filling	0.384 crore	4.75 crore	Development cost	56.64 crore
	Road construction	4.36 crore		Total interest of 5 years with a 10% interest rate (Total interest = Total development cost * interest rate (10%) * years)	
3. Development of water bodies, Community facilities and Utility facilities (according to LGED)		100 crores		Total Project cost = 169.92 Crore	
		Total = 113.28 crore			

6.4 Cost Recovery

6.4.1 Cost recovery through selling plots

The remaining Land space after returning to the land owners will be sold for cost recovery. Cost recovery through selling plots is estimated at **135.65 crore**

6.4.2 Cost recovery by selling services plots for community facilities

In this process, the cost will be recovered by selling serviced plots of community facilities to different private sectors. The plots which are designated for hospitals, small clinics, colleges and markets/shops will only be sold. These will be sold at the market rate. The total area required for different community facilities was determined from the Private House Land Development Rule of Bangladesh, 2004. So, this required 15% of the total land for

different community facilities. The total area of serviced plots for community facilities = 9.82 acres = 427768.5 sq. ft

Consider the selling price per square foot of community facilities is 1000 tk.

Now, the total cost recovered by selling community facilities is= (427768.5 ×1000) tk.= **42.77 crore**

6.4.3 Total Revenue & Profit

Table 5: Total Revenue & Profit

Total Revenue		Total Profit	
Source of Revenue	Amount of Revenue	Total cost of the project	169.92 crore
Selling Residential Plots	135.65 crore	Total revenue of the project	178.42 crore
Selling serviced plots of community facilities	42.77 crore		
Total Revenue =	178.42 crore	Total Profit of the project =	8.5 Crore

7 Conclusion

This study is to develop the residential land and to reduce the spontaneous and haphazard growth of residential settlement of the urban fringe area at Aliganja, Rajshahi. To evaluate the project objectives are taken which are to find out the problems due to unplanned development in the area and to apply land techniques to solve the problems. By analyzing the present study area different problems have come out such as water supply problems, scattered growth of houses etc. Using the Likert scale model, we have found sewerage, drainage, and gas supply conditions are not so good. For the implementation LR project, replotting and cost recovery have been kept focused. The project's total cost and total revenue are gradually 169.92 crore and 178.42 crore and the total profit of the project is 8.5 crore. Proper guidance, management and implementation of the project will ensure a profitable and successful outcome in this area. This project will be helpful for other studies and other LR projects. Local government should take a significant role in this land readjustment project to increase the livelihood condition of the people of this area. This project can be seen as a model for urban planners and policymakers around the world, especially in developing countries, to design sustainable plans to improve unplanned and squatter scenarios.

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