CHAPTER 2

LAND READJUSTMENT

> "Land readjustment as a different approach to financing urban development combines significant advantages with a number of technical complexities. It is no panacea for the staggering problems of furnishing infrastructure to a world likely to double its urban population in the next few decades. On the other hand, it is a device that deserves to be understood, and possibly experimented with, in many countries currently unaware of its existence and possibilities."
>
> (Doebele, 1982)

2.1 Introduction

In 1990, United Nations Centre for Human Settlements adopted a resolution that:

> "Under land readjustment programmes, undeveloped areas, usually an urban fringe, can be designated for improvement, including the rearrangement of plots, the grading of land, the construction of roads and the provision of infrastructure. Instead of paying a betterment levy, landholders must surrender part of their land to the local authority as payment for the improvements. The local authority can then resell this portion of land to recoup the improvement costs."
>
> (HABITAT, 1990)

Land readjustment is one of land management methods used in urban development or redevelopment processes. It is the process of bartering raw land for serviced land, and is therefore suited to countries where governments find it difficult to finance public infrastructure investment (Shoup, 1983).

In this chapter the concept of land readjustment method is outlined with its historical background, techniques, and the main characteristics. The potential use of land readjustment in urban land development is also explained with the advantages and disadvantages of the method.

2.2 Urban development

Modern urban areas are burdened with many problems such as: population concentration, deterioration of living environments, necessity for preventing fires and other disasters, traffic congestion, insufficient housing and housing sites, sprawl phenomena. To increase the supply of serviced land to accommodate rapid urbanisation, Grimes (1982) expressed that there are four major objectives of all that public authorities are trying to achieve in cities.

(1) There is first the need to identify or select locations where growth should be accommodated.
(2) These locations should be serviced in a cost-effective, rather than a high-cost manner.
(3) The financial burden on public bodies resulting from the infrastructure provision should be reasonable. Typically this means that costs should be recovered from the ultimate beneficiaries to the maximum feasible degree.

(4) There should be means of encouraging the right type of development on the land once it is serviced. Desirable land uses may be those that increase the access of poor families to housing and jobs; or that to do not result in large increases in land values; or in general that promote any policy objective that it is felt to be worth while.

2.3 Land use control mechanism

Governments in all countries have perceived the need to control the use of urban land in the general interest of the community. Land use in the community interest involves more than the recognition of spillover effects on contiguous land. One objective is to provide public amenities, such as open space. Another is to increase efficiency of land development or redevelopment for more desirable purposes. In land use, there are distributional aims such as making land available to all groups in the community and ensuring that the benefits of development go to the community as a whole. To achieve these aims, Courtney (1983) indicated that there are five common forms of land use controlling mechanism. These are;

(1) Zoning
(2) Subdivision
(3) Building regulations
(4) Approval by government agencies
(5) Urban planning

2.3.1 Zoning

Zoning is the demarcation of a city by ordinances and the establishment of regulations to govern the use of the zoned land (Courtney, 1983). It also includes general rules about location, bulk, height, and thus plot ratios, shape, use, and coverage structures within each zone. It is an attempt to organise and systematise the growth of urban areas by setting up categories, classes, or districts of land in the community. It also prescribes the uses to which buildings and land may be put, and applies uniform restrictions on the shape and placement of buildings. The main objectives of such regulations are to improve efficiency, to provide land for public good and services.

Zoning is also used to affect the distribution of benefits, especially the protection of the rights of existing owners, although it can be used more positively to release land for redistributional purposes such as low-income housing.

2.3.2 Subdivision

Subdivision regulations govern the development of raw land for residential or other purposes. They prescribe standards for lot sizes and layout, street improvements, procedures for dedicating private land to public purposes, and other requirements in far more detail than in the zoning plan. They also include procedures for filing maps and for receiving the approval of the public departments that grant permission. In the main, the objective of such detailed controls is to ensure that developments take account of the community's need for public goods and services, of minimum standard requirements.

The subdivision of land prior to development is one of the most important determinants of neighbourhood patterns. Once the size and shape of lots have been defined, the essential character of land uses, street patterns, and public utilities is determined. Lot size and shape also strongly affect the type, size, and quality of structures and the density of population.

The regulation and planning of subdivision on the outskirts of cities are widely accepted as essential to development. It has been practised in many developing countries for private development and the specification of public involvement. Subdivision is an effective way of controlling land-use, but current standards are often too high, too detailed and flexible, unrelated to local conditions and often even to the planning objectives of the community .

2.3.3 Building regulations

Building regulations limit or define the way new structures are to be built and the materials to be used. They may also be applied to the maintenance and improvements of existing buildings. They may prohibit the erection of any structure what so ever or restrict the style of architecture, the position of the building on the lot, or its distance from the street, its height or depth.

Building regulations are one of the oldest and most common methods of controlling land development. These are defined for a specific local, regional, or national area, depending on the size of the country, the political structure, the variations in climate, local standards, and other factors.

2.3.4 Approval by government agencies

Approval by government agencies is the main way in which controls over development rights, subdivision, and building are enforced. Generally, building permits are required to ensure compliance with the local by-laws and in some cases with the general city plan. A building permit is usually granted tentatively on the basis of schematic designs of the proposed building or group of buildings prepared in line with zoning, subdivision, and building regulations. The design is finally approved when the full set of contract documents is available.

2.3.5 Urban planning

In the broadest sense, planning is the allocation of scarce resources to achieve certain goals, and it therefore includes most functions of government. The common use of the term, however, refers to the process of making decisions about the physical environment and evaluating how changes in this environment affect people and the economy in relation to some specified objective. The plan is then put into operation with the use of the regulatory instruments.

Courtney (1983) also pointed out that the most commonly used planning processes are: comprehensive general planning, master planning, and action planning. Comprehensive and master planning tend to assume a static or slow-growing urban situation, quite manageable in terms of public investment decisions, and the long-range planning of major infrastructure projects. This assumption is usually close to reality in developed countries, where a prime objective of planning is to maintain the established order. Developing countries, however, are characterised by rapid growth, a major

backlog of demand for infrastructure investment, and heavy competition for the limited financial resources. The pressing urgency of change with limited resources requires a more dynamic planning process.

Action planning highlights the critical issues, identifies the priority investments for infrastructure, and thereby establishes the areas in which growth and changes should occur. It is applied not only to the expansion of the city, but also to the renewal, upgrading or densification of older areas. Such planning does not require elaborate data gathering and can readily become an ongoing process involving selective action in key areas. It requires that priorities be established and that planning and decision-making be responsive to them. When the planning process is used to guide key investment decisions, it becomes an important positive tool in controlling and influencing the pattern of development and thereby encouraging efficiencies in public resource allocation over time and space.

2.4 Land management methods

Dunkerley (1983) stated that the unprecedented expansion of urban population in most of the developing world is causing an exceptionally rapid increase in the demand for urban land. Land location is specific, and existing urban plots cannot be reproduced. Thus the rising demand for urban land tends to be met primarily by converting rural land at the periphery of the existing built-up area. The subdivision of agricultural holdings and the provision of access roads is followed by the extension of other services.

In order to handle and manage these requirements, first it is necessary to make an appropriate and extensive plan. To realise this plan, it is crucial to

take into consideration most important objectives to be accomplished and the conditions of the project area so that the most appropriate, concrete programme of urban development and land management may be selected. There are various urban development and land management methods and projects, which can be categorised in many ways (NCPB, 1982; Rhind and Hudson, 1980; Davis, 1976).

Table 2.1 attempts to categorise some land management methods so that they are contrasted with land readjustment.

2.5 Historical overview of land readjustment

The origin of land readjustment concept goes back to the German Lex Adickes' Law, which was adopted in Frankfurt-am-Main in 1903. Kuppers (1982) outlines an early form of land readjustment in Germany. As a result of its central position on the Rhine and Main rivers, the town of Frankfurt-am-Main in Germany entered a phase of rapid development as a centre of trade and industry after being annexed by Prussia in 1886. After the Industrial Revolution in Germany, building activities rapidly increased in Frankfurt-am-Main. In 1891, Franz Adickes was elected Lord Mayor of the city, giving priority to providing building sites. Intensive development of residential areas and shortage of building sites had caused property prices in Frankfurt-am-Main to soar despite political and administrative efforts being made to keep property taxes in line. One politician called for the value increase accrued by the conversion of farmland to building land to be confiscated by taxation. It was Adickes and Guastave Lube who were to initiate property reorganisation by voluntary regroupment contract.

Adickes' initial efforts at land regroupment were based on an exchange of property with private landowners in return for handing over suitable parcels for building streets and other facilities for the city. It was not always possible to reach agreement with those whose properties were to be affected. Therefore, most regroupment took place in areas where property owners were most agreeable to process, not necessarily where it was needed the most. It was also difficult to consider small property owners in new allocation schemes. They were not interested in exchanges, and many requested that the City to buy their properties outright. The City often refused, as prices demanded were too high.

In 1902, new Land Regroupment bills were submitted to the Prussian Diet with provisions stating that regroupment could take place by petition of one-half of the owners within the regroupment area. The head of local government would be responsible for project, and the new law would be applicable only to Frankfurt-am-Main. Its basic form was seen as giving maximum security to the rights of property owners. The "Act Concerning Regroupment of Property in Frankfurt-am-Main" became law on January 1, 1903. Contained in Article 13 of the Act was clause stating that monetary compensation was to be given to owners when land required for streets and other public facilities was more than 30% in excess of the amount of land surrendered by the owners.

In 1907, the level of expropriation without compensation was raised to 40% when regroupment was initiated by property owners, 35% when initiated by resolution of City Council. After the foundation of the Federal Republic of Germany, the German Bund passed the Federal Building Act in 1960. In this Act, articles 45-122 contain provisions on regroupment boundary regulation, expropriation and compensation (Kuppers, 1982).

In addition to German experience, land readjustment was also widely used in Japan, South Korea, Taiwan, Turkey and some cities in Australia and Canada (Archer, 1992; Yomralioglu, 1992). It has also been adopted in Indonesia and Nepal (Archer, 1986; Sjahrul 1987; Acharya 1988). The implementations of land readjustment in some of these countries are mentioned in section 2.13.

2.6 Definition of land readjustment

The term land readjustment has been used under different names in the literature. Such names are, *urban land readjustment* (Chou and Shen, 1982); *land readjustment* (Doebele, 1982; Minerbi *et.al*, 1986); *land pooling* (Archer, 1982); *land regroupment* (Kuppers, 1982); *land reform* (King, 1977); *land reordering* (Davis, 1976). Sometimes, the term land readjustment has been confused with the concept of *land consolidation*. Doebele (1982) has expressed that;

> "For uniformity, the term *land consolidation* has been reserved for descriptions of procedures that change the boundaries of rural or agricultural and forest land, while *land readjustment* has been used for projects in urban areas or that have as their objective the conversion of rural land to urban building sites or the redevelopment of existing urbanised areas. Since this mechanism has not yet been much discussed in English, it is hoped that *land readjustment* can become the commonly accepted term."

To contribute to the standardisation of a commonly accepted phrase, the term *land readjustment* has been preferred to use in this thesis.

There is no any international accepted definition of land readjustment. However, some authors have expressed some different definitions as follows:

> "Land readjustment/ pooling is a technique for managing the urban development of urban-fringe lands, whereby a group of separate land parcels are assembled for their unified planning, servicing and subdivision as a single estate, with the sale of some of the new building plots to recover the costs and the redistribution of the other plots back to the landowners."
>
> (Archer, 1992)

> "It is a technique by which public facilities in a certain area, such as roads, parks, and sewerage that are necessary for life, are created and/ or improved, and individual sites are made easier to use and their site utility is increased by dividing them into more regular shapes."
>
> (NCPB, 1982)

> "Land readjustment is an instrument for land organisation, which means both the provision of land needed for public purposes and the suitable formation of private land according to the rules of town planning."
>
> (Seele, 1982)

In a simple meaning, land readjustment can be defined as a land reformation process, because it changes the original location of land parcel and land-use within the project area. Conceptually, land readjustment aims to take rural or unplanned urban land, usually irregularly subdivided, and re-allocate it in the required balance for public and private use according to town planning requirements (Figure 2.1).

The concept is a simple one. When there is a need to develop a suburban area, first, a site plan is prepared by the municipality. Then the area is subdivided into an appropriate pattern of streets, parks, schools, and sites for other uses. Within site blocks formed by the streets, new lots are allocated for private development. Public use areas are then determined by measuring the square meters in the planned streets, parks, and so forth and comparing them to the total area of the project (Doebele, 1986). Each cadastral parcel is converted into building lots. After the project the city will be able to reorganise urban development, and at the same time, the private landholders will receive new lots which are as near to the same location as possible to their original land.

2.7 Objectives of land readjustment

Land readjustment aims to manage existing land structure when a systematic urban land development is required. The main objectives of a land readjustment project may be given as follows:

- Development of new urban sites
- Redevelopment of an already urbanised area
- Improvement and expansion of public facilities
- Disaster rehabilitation

2.8 Procedures in land readjustment

There are a number of steps to accomplish in a land readjustment project. Differences in the national land policies from one country to another mean

that, to adopt the land readjustment procedures, slight changes will be expected. However, the steps in the process will be given here in a general context. A sequential order of land readjustment procedures is also given Table 2.2.

2.8.1 Decision of the authorities

To implement a land development project in a particular area, there must be a real land need for public and private requirements. For this purpose, a land readjustment project is designed and proposed to local authorities by the land planning branch. Then the city council discusses the alternative approaches and makes a decision about the project. If the project is approved by the council, all landowners in the project area, including corporate, communal, and association ownerships are informed. Land owners in the project area are asked to contribute an equitable portion of their land to build public facilities. The rest of the project steps are then carried out by municipality.

2.8.2 Land survey of project area

The basic land surveying works have to be completed before the project is began. All needed legal records and maps such as zoning plan, property map, and topographical maps are updated. Meanwhile, survey control densification is redesigned for further use. After updating the required documents, it has to be ensured that the property and topographical maps reflect the final layout of the project area. All kinds of boundaries such as cadastral parcel, project area, zoning details and site block outlines must be shown precisely in a base map. Using this map, site blocks are demarcated in the field and fixed block corners are re-surveyed and new point coordinates are calculated.

Table 2.2 Steps in urban land readjustment process

1. Determination of the project area
2. Approval of the project by the city council
3. Announcement of the project
4. Completion of detailed plans
5. Survey of the project area, boundaries
6. Owner identification
7. Determination of land characteristics
8. Drawing the implementation plan
9. Re-examination of land records
10. Calculation
11. Subdivision layout
12. Exchange, division, and consolidation of land
13. Land distribution
14. Compilation of records on distribution
15. Compilation of replotting plan
16. Submissions of reports to the authorities
17. Approval of the reports
18. Announcement of replotting plan
19. Hearing objections
20. Notification to landowners
21. Making final corrections
22. Demarcation of new boundaries
23. Drawing of cadastral map
24. Registration of new land rights
25. Distribution of new land titles
26. Final reports

2.8.3 Calculation

In a general term, the calculation process of land readjustment based on three steps (Figure 2.2). These steps are;

(1) All land parcels are put together to form a whole. This only happens in a mathematical way and does not appear in the land register.
(2) The public user areas such as roads, green bands, schools, hospitals are subtracted from this whole.
(3) The rest of the project area is subdivided into building land and redistributed to the original landowners.

In order to follow these steps, the project area is determined on the base map by drawing a precise project boundary. According to this boundary, all land parcels within the project area are determined by the registered legal parcel size. At the same time, basic property information such as parcel ID, location, registration number, owner names, addressees, and other interests are also extracted for further use.

Regarding the project boundary, if a land parcel is entirely involved in the project, the parcel's registered size is taken as an input area. Sometimes, a land parcel can be divided into two or more lots by the project boundary. In this case, only the area which is inside the project boundary is taken as an input area.

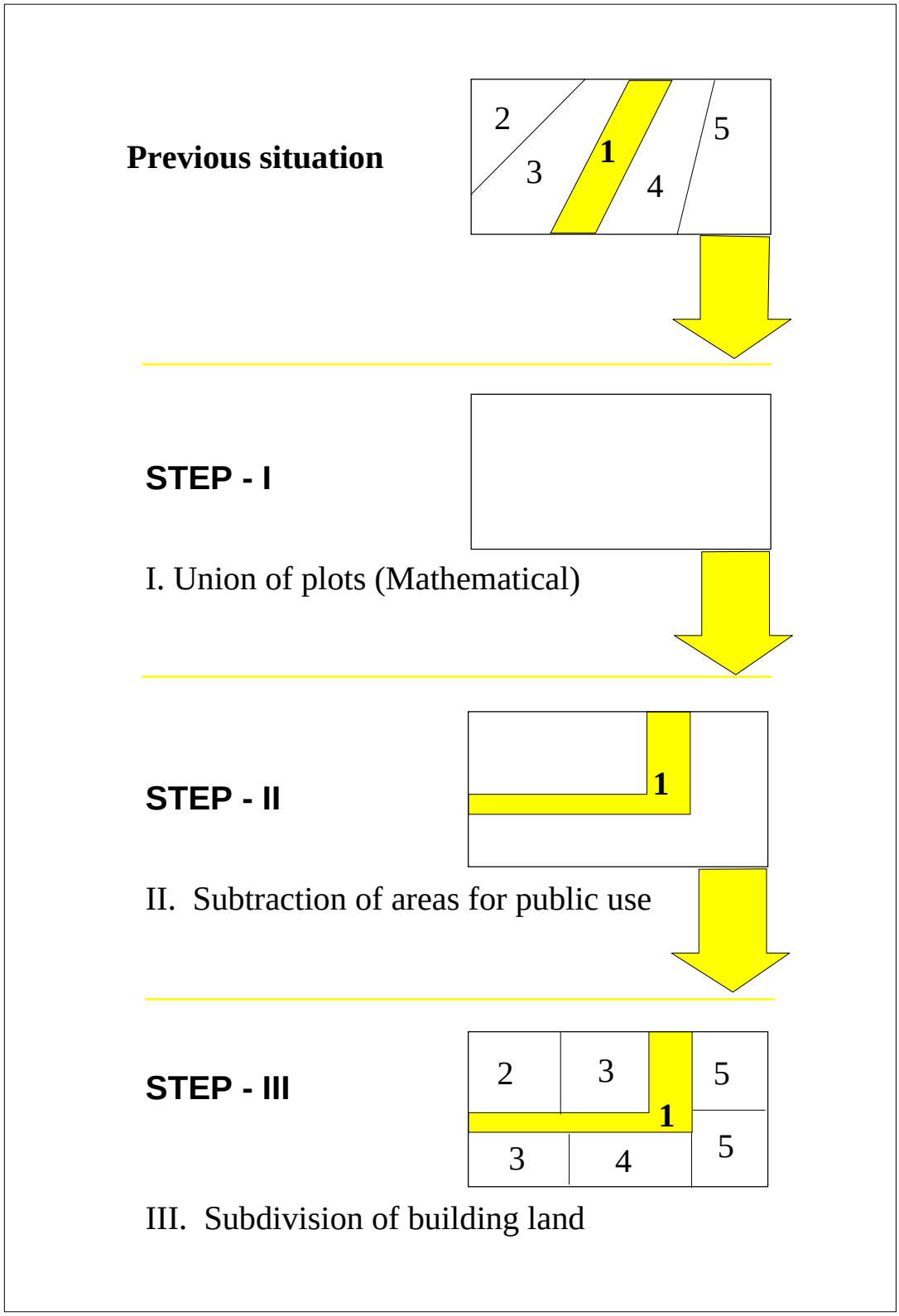


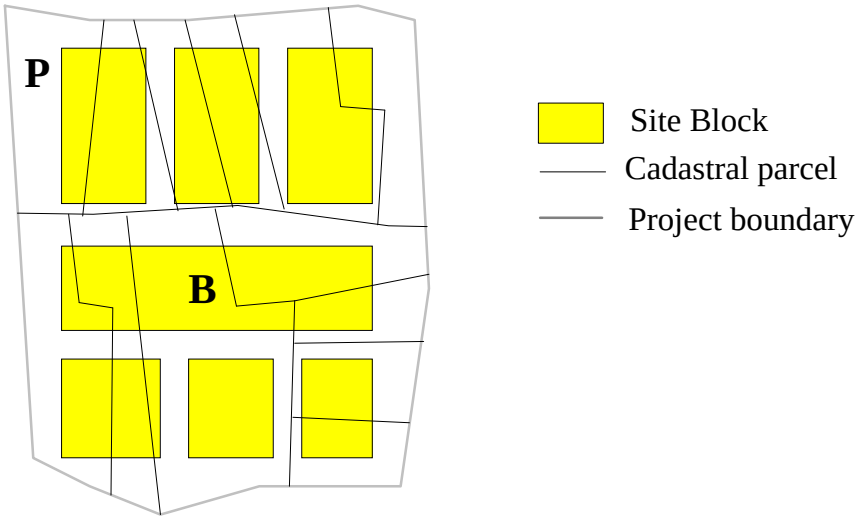
Figure 2.2 Calculation steps in land readjustment process

The determination of participating land parcels is followed by the calculation of site block areas. Using these variables, a single contribution coefficient is determined with the formula [2.1] in Figure 2.3. This coefficient represents the contribution percentages (**CP**) of each landowner by land portion. The **CP** is then applied to each of the land parcels to determine their individual contribution rates (**CR**).

In order to determine the contribution rate, two different calculation methods are practised in land readjustment. One of them is based on ***market value*** approach and the other based on ***areal*** approach. Some numerical examples based on these two methods are given in Appendix A.

2.8.4 Land redistribution

Land redistribution is the most important and complex step of the entire process. The main purpose of land redistribution is to create new building lots by zoning standards and then reallocate the cadastral parcels into the created lots. Within this framework land exchange between individuals and the community, and also among individuals is performed. Landholders receive new lots in a different size and location to their original land parcel. Often several pieces of fragmented lands parcels are consolidated into one parcel. The parcel sizes and minimum area of new lots are given by the zoning plan. The basic principle in the land distribution process is to keep land in its original location as much as possible, at least in the same block.



$$CP = 1 - ([B] / [P]) \quad [2.1]$$

$$RP = 1 - CP \quad [2.2]$$

$$CR_i = CP * P_i \quad [2.3]$$

$$NP_i = P_i - CR_i \quad [2.4]$$

where:

CP = The contribution percentage within the project
[P] = Total area of the input land parcels
[B] = Total area of the site blocks
RP = The percentage of land given back to original landowners
P_i = Land parcel area
CR_i = The contribution area for a parcel
NP_i = Land area given back to owner
i = 1,2,...,n (n = the total number of land parcels involved in the project)

Figure 2.3 The equations in land readjustment

2.8.5 Final registration

After the land distribution, a tentative subdivision layout is announced to the landowners. For a certain duration, landholders can object to the plan by writing their objections to the authorities. Landowners demands are considered by the planning committee and final decisions are made. After possible corrections, new cadastral maps are drawn and new lots are registered by the land title office. New land titles are prepared and distributed to the original landholders.

2.9 Characteristics of land readjustment

Land readjustment basically increases the site utilities when the urban infrastructure is comprehensively developed and improved. According to NCPB (1982) and Nakamura (1986), land readjustment can be characterised by the following features:

(1) **The infrastructure of the urban area can be comprehensively improved on an areal basis.**
A comprehensive project plan for the effective use of the land can be made, and the following improvements can be simultaneously carried out. Public facilities such as roads, parks, rivers and canals can be created and/ or developed; land for schools including nursery schools and kindergartens, and public office buildings can be secured. Supply or disposal facilities for utilities such as water, sewerage and gas can be developed effectively and economically. As a result, site utility is increased when the urban infrastructure is comprehensively developed and improved.

(2) **Landowners receive equitable development benefits.**
When the development project is limited to a road, a park or a river, cost defrayment benefits are often unfairly and partially shared. For

example, some individuals whose rights happen to fall within the project area lose them through purchase, while others may simply benefit because their land, previously located in the back, acquires road frontage. In land readjustment, the development cost and benefits are fairly shared through equitable contribution and replotting disposition.

(3) **Residents of the project area can maintain their normal life.**
Owners of land, leaseholders and other persons who have some rights within the project area can maintain their everyday life and business activities without interruption during the project period.

(4) **No waste in land use is created.**
Since lot shapes and land conditions are altered over the whole project area in a land readjustment project, there are no irregularly shaped and/ or excessively small lots created as in the case of the land purchase method. Therefore, site utility does not decrease.

(5) **The project is usually limited to the infrastructure of the urban area, and does not include the direct improvement of buildings in the area.**
The project implementing body does not directly build or improve buildings within the project area. Often in practise, owners of buildings rebuild them or renew their functions when they are affected by replotting.

(6) **The project procedures are complex and it takes time for the landowners to understand them.**
The procedures of land readjustment are complex and require professional knowledge so that it takes time for the owners to understand the project itself. In addition, since many people's interests are involved, it is necessary to listen to their opinions fully, and adjust the project accordingly, which also requires much time.

(7) **Participation by all landowners is a necessary condition of a land readjustment project.**
Contribution is an important characteristic of land readjustment. Landowners within the project area are asked to contribute an equitable portion of their lands in order to accommodate public

facilities. Although landowners lose a small portion of land, they receive great benefit through the project's ability to maximise site utilisation by regularising shapes of lots.

(8) **Land rights are transferred after the replotting.**
Replotting is a unique characteristic of the process. It refers to the redistribution of pre-adjustment sites minus contribution lands for public facilities. All existing land rights and interests from previous sites are transferred to newly-replotted sites. This transfer of rights is called *replotting disposition*.

(9) **Development costs of a land readjustment project are lower than any other type of land development projects.**
In a land readjustment, both costs and benefits of development are shared by all landowners through equitable contributions and replotting disposition.

(10) **The land registration books, cadastral maps, street names and number can be arranged in an orderly manner, clarifying the boundaries of ownerships.**
During the land readjustment project land parcel boundaries are resurveyed and redemarcated according to the detailed urban planning programme. All related land records are reorganised. Therefore, the practice of land readjustment can be considered as a method of strengthening of the cadastre.

2.10 Advantages of land readjustment

Land readjustment is a crucial land management tool in urban planning when suitable reformation of private land is necessary for residential purposes. It is a method by which the city government, other designated public bodies, or even private associations can participate directly in the process of urbanisation and thereby share in its profits (Muller, 1992). Land readjustment projects provide an opportunity for simply and inexpensively

resurveying the land and demarcating new and clear lines (Chou and Shen, 1982). Therefore, the practice of land readjustment can be considered a way of strengthening the reorganisation of cadastre. Minerbi (1986) pointed out that land readjustment;

- ***mobilises*** landowners in a temporary association for joint development of their fractionalised land parcels as a single planning unit,
- ***phases*** private structure development with public infrastructure provision,
- ***coordinates*** public planning with private development with a detailed administrative process,
- ***improves*** districts by providing infrastructures and facilities in appropriate locations according to a district design plan by reserving private land at no cost to the government,
- ***appreciates*** land values through public improvements and increased site utility,
- ***finances*** development by the sale of appreciated reserved land to new investors.

In addition, some of the advantages of land readjustment has been given by Doebele (1982) as follows;

- Land readjustment permits fragmented and scattered landholdings to be consolidated into a single unit for better planning, servicing, and subdivision,
- Land readjustment permits the public agency concerned to recover costs while private owners receive some of their land back, ready for building,

- A prerequisite and advantage is that it renew cadastral and land registration in those areas of a city under most pressure for development,
- Land readjustment permits an orderly and efficient method of obtaining sites for schools, parks, markets, and all other needed public buildings and facilities.

Besides the improving land utilisation for government, land readjustment is also a significant method for landowners to economically improves the use of their land. In essence, some benefits of land readjustment for both government and landowners may be given in Table 2.3:

2.11 Shortcomings of land readjustment

While land readjustment remains a strong urban development and redevelopment tool, a number of shortcomings of the method has been identified by Nishiyama (1980), Miyazawa (1982), and Satoh (1986).

A significant criticism is that land readjustment has succeeded in providing physical facilities, but that it neglected social aspects of urban life and failed to improve the community environment as a whole. An equally significant criticism is that the major beneficiaries are only large landowners. At the same time, landowners have protested at reduction of their land area without compensation through the readjustment process.

Table 2.3 The benefits of land readjustment for the government and landowners.

Land readjustment benefits for the government

- Compensation expenses for public-use land are greatly reduced so that the provision of public areas is captured in a more economical way,
- A zoning plan is realised in a short time, and urban land development projects are achieved rapidly,
- Tax revenue increases within project area. This provides an extra source to government,
- The land development programmes in urban fringe areas are systematically carried out,
- The existing cadastral records are updated, reorganised and cadastral administration is improved.

Land readjustment benefits for landowners

- After the project, land values increase very rapidly and land become more valuable for landowners,
- A cadastral parcel is re-shaped and transformed into a sufficient site lot that can be used more economically,
- Fragmented small parcels are consolidated into a new building parcel so that land use are maximised,
- Because of the effects of land readjustment project are same for every landowners, disputes about land planning injustices are reduced,
- At the end of the project, basic public services are supplied to new lots, therefore the new social services are brought into to the project area,
- There is no extra charge to landowners for the project expenses, except that they forfeit part of their land. In many case, all project expenses are met by the municipalities.

However, Doebele (1982) discusses that the theory of land readjustment is simple but its application can become complex. In fact, three different issues are involved:

(1) **Equity going into project.** Some owners will have flat, easy-to-develop land that already has high value for farming. Others will have hilly, rocky, or marshy land more costly to develop. Equity would seem to indicate that the former owners should receive better treatment in the calculations than the latter.

(2) **Equity during the project.** The actual construction of roads and other urban services can take years in a large project. Some land plots will be immediately impacted, particularly those falling in the beds of planned street, while other land will be much less affected. Equity indicates that some adjustment be made for those who have most difficulty and loss of income during the construction.

(3) **Equity after the project.** The new plan for the area may designate some areas for commercial uses, some for industrial or other productive uses, some for high-density residential development, some low-density residential use, and so forth. Each of these designations carries a different per square meter value. A lot near the centre of a large project and designated commercial may have many times the value per square meter of a low-density residential lot on the periphery of the project. An equitable system would adjust for these differences so that an owner whose land happens to be designated commercial, for example, does not receive a windfall compared to another whose land the plan has put to a less valuable use.

2.12 Requirements for land readjustment

According to Davis (1976) and Doebele(1982), some of the requirements for land readjustment may be given as follows:

(1) In most countries, major new national legislation will be required and, in some cases, constitutional amendment.

(2) The national, provincial, and municipal governments must support the idea. In particular, the key ministries that deal with public works should be thoroughly sympathetic to making it work.

(3) There must be real and generally recognised need. This is certainly so in a well-developed political democracy. Land readjustment is slow, complex, and expensive; realisable and commensurate benefits must be obtained from the process.

(4) There must be a reasonable stable and strong national economic situation. Public assistance of various kinds, usually including subsidy, is needed in substantial amount.

(5) The country must possess an efficient system of cadastration, title registration, and objective real-property appraisers.

(6) There must be, at the local level, an adequate level of technical and professional knowledge.

2.13 Selected land readjustment applications

Land readjustment has been widely practised by some countries around the world. Particularly, under the different names as stated in section 2.6, the land readjustment has been used in Germany, Japan, Taiwan, South Korea, Canada, Indonesia, Nepal, Australia, and Turkey as an effective urban land development tool. These countries have different land policies and land registration systems. Because every country has its own land readjustment legislation, there is not one single land readjustment model that has been standardised and used world-wide. Nevertheless, the main concept of land readjustment has been commonly recognised by these countries, even though implementation and procedures are slightly different. In order to understand how the process has been practised, some land readjustment applications in Australia, Taiwan, Japan, Germany, and Turkey are summarised in the following subsections.

2.13.1 Australia

Land readjustment is known in Australia as land pooling (Archer, 1992). It is a technique for the financing and management of the subdivision of privately owned land into well-planned serviced building sites. It is based on a scheme, or plan, prepared by a local municipal council, after consultation with the landowners involved. After proper adoption it constitutes a binding and compulsory partnership among the owners for design, servicing, and subdivision of their lands as a single estate, with both cost and returns being shared among them (Doebele, 1982).

Land pooling has been used only in the state of Western Australia, mostly in and near the state capital of Perth since 1951. The process has been carried out mainly on land not occupied by owners and usually has yielded substantial profits, often with fewer management problems than conventional development. For this reason it has generally not been resisted by landowners when they have been consulted in advance, even though after consultation it is compulsory. An important aspect of the Australian system is that detailed written statements of the costs and benefits are usually available to each landowner at the key stages of the project. While some aspects are compulsory for minority owners, every owner has enough information to act in his best interest as the project proceeds (Archer, 1982).

In the Australian system, the council prepares a scheme plan and text. The Valuer assesses the market value of each parcel (excluding any buildings) as it is at the time, and then as if the parcels had been subdivided into fully serviced building sites. The cost of subdividing and providing services are computed by the council, and the number of building sites needed to recover these cost (cost-equivalent land) is computed. These sites are tentatively identified, and the remaining sites are allocated among the participating landowners. These owners are informally notified of the allocation before the scheme is officially exhibited. After public exhibition, owners may file objections, which are reviewed by the town planning board in its report to the minister for urban development and town planning. After his review and approval, the scheme becomes legally binding.

The municipality then makes a formal land ex-change offer to each owner, who may accept or request arbitration if there is a disagreement about the values assigned. Meanwhile, the municipality takes out a short-term bank loan and, through the minister of public works, takes over the land and

carries out the surveying and engineering works necessary to create finished building sites. At this point, any owners who want to get out of the project may claim cash compensation for the land taken. Most owners, however, find it much more profitable to stay in the project and receive back their share of building sites.

When the construction work is completed, roads, parks, and other public lands dedicated, and the subdivision registered, each landowner receives back his share of sites, with whatever cash adjustment may be necessary to maintain the same relative values as values of the land put into the project. The council sells its cost-equivalent lots at auction and uses the proceeds to pay off the bank loan. Any surplus is distributed among the participating owners.

An interesting feature of the Australian system is that lands are valued only when they go into the project. This establishes a percentage share for each owner. When the project is complete, the owner receives exactly the same percentage of the total value of all the lots created, less those taken as a cost-equivalent land. If the lots actually received back have less or more appraised value than the percentage share, a cash adjustment is made so that each share is kept equal (Archer, 1982).

2.13.2 Taiwan

For decades after the founding of the republic of China in 1912, wars and social commotions prevented the solution of land problems in the country. To solve China's land problems, Dr. Sun Yatsen called for equalising land rights, allotting land to farming, maximising returns from land, and assuring equal access to benefits from land. These ideals were incorporated in the

republic's constitution, adopted in 1949. In those days, Taiwan reflected the situation in mainland China, the distribution of landownership was unequal; land tenancy was prevalent; rents were too high; tenant farmers had no reasonable rights; agricultural production was low; and the tenant's life was precarious (Lee, 1982).

When the government of the Republic of China moved to Taiwan in 1949, the government determined to make the island province a model for all of China. In Taiwan, agrarian land reform, which had been part of the philosophy of Sun Yatsen, but which could never be realised on the main land, was vigorously implemented in the early 1950s. However, this reform, which split up large estates into plots owned by the tillers, created new problems. The new plots were small, irregular, and sometimes in different locations. For efficient production, it was necessary to reunite them in a way that would permit common irrigation systems and use of machinery. Therefore, agrarian land consolidation was begun on a trial basis in 1958, and extended to a national program in 1962. From the agricultural productivity point of view, the results were quite successful (King, 1977; Doebele, 1982).

In spite of this success in rural areas, Taiwan has been slow to apply similar principles of land readjustment to urban development. In Kaohsiung, which is the second largest city of the country, urban population surged, primarily in the form of numerous squatter settlements of high density and very poor housing and sanitation conditions. Fragmented and tiny landholdings, plus the squatting, rendered the private market ineffective (Chou and Shen, 1982). To solve these problems, the municipal government had extremely limited financial resources. However, an active municipal administration in Kaohsiung has developed its own rules and procedures for urban applications.

The municipality had two alternatives to deal with these problems. First, large-scale expropriation of private lands, which would be cleared of existing irregular housing, were developed as a unified project with adequate public services, subdivided, and then resold to individual developers. Second alternative was the land readjustment, which would achieve the same ends, but by taking part of the land to finance the installation of services and returning the remainder to the original owners.

After considering the alternative advantages and disadvantages, the city chose land readjustment as its main vehicle for urban development. In Kaohsiung, the land office stated that the land for public uses, engineering expenses, and consolidation expenses should all be contributed by the benefited original landowners. Furthermore, such liability could be paid with land instead of cash. According to a resolution of the city council, the maximum contribution amount cannot exceed 40 percent of the total original area. Moreover, the land used as payment must be vacant land (Chou and Shen, 1982).

Appraisal of land value before and after readjustment is based on the Land Law. According to this law, the readjusted plots must be redistributed in compliance with the original land or price of the original plots; after the readjustment, landowners who suffer losses shall be compensated by those who enjoy the benefits. However, there is no criterion for determining the land price in this law. Generally, in assessing value, adjoining lands with similar prices are considered and their value is used as a standard for the appraisal of lands before the project. For appraisal of the land value after the project, it is necessary to estimate the likely development after readjustment, using for reference real-estate sales and purchases in neighbouring areas already developed to determine the value of land.

By the end of 1978, a total of 2,175 hectares in forty-nine areas have been completed under the land readjustment programme. Statistics on sixteen areas where urban land readjusted indicate that the increase in land values ranges between 560 and 163 percent. The government estimate that urbanised land will expand by 1996 to a total of 161 500 hectares, double the present area. In view of this, the readjustment of urban lands must be accelerated to forestall difficulties that might obstruct growth (Lee, 1982). The government is also working out incentives to encourage landowners to organise themselves for the purpose of introducing readjustment of their own lands.

2.13.3 Japan

As in Taiwan, land readjustment in Japan had its origins in agricultural land consolidation to increase the efficiency of production. In 1919, the first City Planning Act legitimised land readjustment for urban purposes. Land readjustment became so popular that it diverted energies from conventional city planning, and was of great importance in re-building, both after the great earthquake of 1923 and bombings of World War II, as well as in solving the land problems connected with the construction of the high-speed rail line from Tokyo to Osaka. In 1954, land readjustment legislation was enacted. Land readjustment has been one of the most important forces shaping Japanese urbanisation (Doebele, 1982). Of a total urban area of 5,600 square kilometres in Japan in 1965, about 27% either had been or were under land-readjustment procedures. From 1945 to 1965, some 900 square kilometres were affected, much of it around cities, often by private associations formed for this purpose (Miyazawa, 1982).

In Japan, five groups are legally allowed to execute a land readjustment project: private initiators, associations, local public bodies, administrative agencies, and public corporations. For each type of initiator there are slightly different procedures, but all involve public exhibition to comment and ultimate review by either the governor of the prefecture or the minister of construction.

In the land readjustment procedure, *equity* is the most important issue to success of the project. There are two levels. One is the economic effectiveness of the project: that is, the increase of private land values brought about by the project. The other important factor is equity between each landowner involved. The principle of replotting not only considers the equity of land value, but also the location, nature of the land, the area of lot, and other factors affecting each owner (Hayashi, 1982). In Japan, the replotting work is performed by the *evaluation method* of land value, or the *areal method*, or a combination of the two (Nakamura, 1986).

Evaluation is normally based on the street-value method, which has two-tier evaluation. One relates to streets, and the other individual lots. The street value normally uses index figures consisting of a *street coefficient* , an *accessibility coefficient*, and a *lot coefficient*. The street coefficient normally considers the condition of the street, its width, slope, existence of sidewalk, continuity, and so on. The accessibility coefficient deals with the proximity of railway stations, bus stops, schools, parks, and other amenity facilities. The lot coefficient deals with the environment condition of the land, or lot, such as density of the area, soil conditions etc. These three coefficients are aggregated to achieve the street value. This value must be adjusted according to land-market prices in the area, judged by sales or by such indexes as the property tax evaluation.

The areal method is based on the area itself. This method is adopted where land prices are similar or where a poor street pattern renders the street-value method inappropriate. The areal method is extensively used for perimeter development by private land readjustment associations, because it is more easily understood by the landowners. The contributory area is divided into two categories. One category is the cost -equivalent land and communal facility sites. The cost-equivalent land is sold to pay for infrastructure and other costs of the project. The other category comprises the individual contribution area mainly narrow street sites and the part adjacent to the lots of major streets. In other words, expanded street sites under eight meters are contributed by adjacent lots (NCPB, 1982).

The land readjustment process gives landowners and lessees the opportunity to express their objections to execution of the projects under the Administrative Appeals Law. In Japan, the largest number of complaints are concerned with replotting, followed by disputes about the amount of money for adjustment. Landowners often feel unfairly treated because of the reduction of land area without compensation through the process. Thus, opposition against land readjustment has become rather strong; a nation-wide organisation of opposing groups has been formed (Miyazawa, 1982).

However, the important role of land readjustment in planned urban development has been commonly recognised in Japan. The projects affect many fields, such as housing land supply, urban-sprawl prevention, reconstruction after disasters by war and fire, and redevelopment in commercial areas.

2.13.4 Germany

In Germany land readjustment has a tradition of about one hundred years (Muller, 1992). As in other countries, land readjustment in Germany began with the problem of consolidating agricultural land for greater productivity. With industrialisation, unrestrained urban development resulting from the haphazard marketing and development of small lots produced legislation to compel the consolidation of undeveloped land. If landowners are unwilling to voluntarily readjust and consolidate land into reasonable areas for development, municipalities may force orderly development by: compulsory readjustment; compulsory expropriation; or consolidation of farmlands or woodlands. In general, compulsory readjustment is used for peripheral areas; compulsory expropriation is used in areas for the promotion of urban development; and consolidation is used in agricultural areas.

All three systems make use of the highly developed German system of valuation boards, which since 1960 have been required to collect and analyse data on all real estate transactions. Land valuation boards receive copies of all contracts of purchase for real estate. Procedures for analysis are set forth in special federal legislation. Projects carried out by compulsory readjustment take about one to three years for reparcellisation, and about two years or less for the installation of services. Compulsory expropriation takes more time, and individual parcels are generally not on the market for about six years and may take more than a decade to complete (Seele, 1982).

Compulsory readjustment projects are always carried out by local government and do not require the consent of the owners. In the land readjustment process, market values are used in computing both the allocations of land before and after the project. The first value is representing

the value of land without services, the latter value represents all the increments that result from ownership of a fully serviced lot. Indeed, even the zoning designation is considered as part of this latter value. However, no matter what the calculations, not more than 30 percent of the market value of land contributed to the project can be taken. In a typical compulsory land readjustment project, about 15 to 20 percent of the land would be contributed for use as roads and green areas, and the landowner would then be assessed in cash up to 5 to 10 percent of the market value of his input to pay for construction cost (Doebele, 1982; Seele, 1982). Thus, the German system basically differs from the others in that contributions to recover the costs of services are normally made in cash, not in the form of cost-equivalent land.

There are two different measures to redistribute the new land. The portion of redistribution the individual landowner is entitled to results from the relation either of *market value* or of *area*. In rural regions, *land readjustment by area* is more common. In urban regions and in redevelopment areas *land readjustment by value* is preferred. To decide on one of those two measures, there are different conditions and results to be taken into account.

Land readjustment by area can only be applied if the land values are quite homogeneous. In this case the land contribution for public-use cannot exceed 30 percent of the landowners individual area. Concerning land readjustment by value the whole redistribution area is divided among the landowners, except the areas needed for public facilities. Each landowner gets a plot corresponding to at least the same value he had before the project. The land value increase caused by the land readjustment project is compensated either by money or land. The municipality has to pay for administration costs. In generally, the municipality is able to refinance by selling the areas of land contribution which were not necessary for public facilities. The construction

of sewerage, roads and green areas has to be paid by the landowners up to 90 percent of the cost as a infrastructure contribution (Muller, 1992).

The landowners can appeal against land readjustment when the measure is introduced and when it is completed. Judicial determination is by special courts of law and can only be made after objections to the authority responsible for the project. Protests against the land reallocation plan are mostly against the valuation of either the input or output in case of compulsory land readjustment by values or against the amount of land contribution in the case of compulsory land readjustment by area. At least 90 percent of all appeals are based on this (Seele, 1982).

2.13.5 Turkey

In Turkey, the limitation of financial, human, and technical resources restrict the urban land development process. Because of these limitations the government has difficulty in controlling rural-to-urban land-use change. There is a rapid immigration from rural areas to the cities and the appropriated land is not available in urban fringe to respond to immigration demands. This creates land allocation and settlement problems around the cities. As a result, many squatters have established patterns of land use rights that operate outside of the national cadastral system. The land allocated for public-use has been partly occupied by squatters (Dale and McLaughlin, 1988).

In order to provide land for both public and private sectors and to control urbanisation the government acquires land only in the cities and carries out all necessary tasks itself (Rivkin, 1983).

Most of the land developments are performed by local authorities using master plans and zoning regulations (Gurler, 1983). Basically, there are three different land development methods which are practised by the government. These are; Land compensation, Voluntary method, and Land readjustment.

Turkey has been discussed as a case study for this research. Therefore, details about these land development methods, particularly land readjustment applications in Turkey, are given in Chapter 7.

2.14 Chapter summary

This chapter has attempted to outline the concept of land readjustment. The definition of a land readjustment method was made. The current status of the method including its objectives, requirements, and its role to control the rural-to-urban land use changes have been presented. Some land readjustment applications from different countries were also reviewed.

Land readjustment is a powerful land management tool which provides great opportunities for local authorities when public and private land is needed for urbanisation. It is the process of exchanging raw land for serviced land, and therefore can easily be suited to countries where governments have difficulty to acquire land for public and private requirements.

Although land readjustment is a very effective land planning process in controlling urbanisation some technical issues limit the performance of land readjustment procedures. These issues including their possible solutions will be discussed in the following chapter.