

The Practice of Land Readjustment in Thailand

after the Introduction of a Land Readjustment System

Aspect of Technical and Financial

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Abstract

Land Readjustment (LR) as an urban development method for developing countries in Asia, will help solve the issue of lack of land supply and also the cost burden of infrastructure, two common problems particularly found in the region. Thailand is the only country in South East Asia that has been able to establish a formal LR system with the introduction of an LR law in 2004 after many years of preparation. The purpose of this paper is thus to review the practical application of LR in Thailand before and after the introduction of law through analysing the aspect of technical and financial. Three projects were chosen as the case study and the selection of these projects is based on the date of implementation, whereby Rama 9 (located in Bangkok) was started in the year 2000 (before law) and Samut Sakhon and Tharahat (both located outside Bangkok) were started in 2013 and 2009 respectively. The analysis found that changes to the technical and financial aspects after the introduction of law enabled better project implementation.

Technical

Before the enactment of the LR law, Rama 9 project adopted a simple approach whereby replotting was not based on evaluation of land and a fixed contribution (17.5%) percentage was used. This approach was agreed by landowners as it might be easier to understand and also many lands before the project were in same condition of having no access. Based on the LR law, appraisal of land was required to determine the final replotting proposal. Thus for the replotting of Samut Sakhon and Tharahat project, evaluation of original land was used to identify the varying contribution for each landowner based on the land condition. This approach enabled equity among landowners to be maintained and thus facilitating agreement from landowners to be achieved.

Financial

LR projects require financing for both project initiation and implementation. The lack of financial support for the Rama 9 project delayed the project during the initiation stage. However, the good project location enabled reserve land to be sold early in the project period to cover project cost. Samut Sakhon and Tharahat projects are implemented by the government and are entitled to receive a budget for project initiation and also a subsidy for the construction of city planning road. However, the provision of full infrastructure in Tharahat project is delayed due to delay in obtaining funding from municipality and the reserve lands being unable to be sold. Under LR law, a loan system has now been introduced to promote future projects.

Keywords: Land Readjustment, Thailand, Financial, Technical, Law

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1. Introduction

Land Readjustment (LR) is defined as a method of land development whereby a group of land parcels are consolidated and redistributed to create new infrastructure and better land utilisation with and the cost of the project to be covered by sales of a part of the lands. LR is seen as a potential solution to solving some of the urban problems faced by developing countries such as inefficient use of land and also inadequate infrastructure. While LR has been a widely used in countries such as Japan, it is a fairly new concept particularly in South East Asia countries.

Specifically, to the South East Asian region, LR is aimed to solve the problems of urban areas such as the following;

- Solving issue of “Pocket/Blind” land. A typical character caused by ribbon development along the main road (such as seen in Thailand) which has left the areas behind these developments as undeveloped due to inconvenience in terms of accessibility ¹⁾.
- Materialisation of plans, increasing difficulties in land acquisition and mitigating constraints in public financing ²⁾.
- Ensuring adequate land supply ³⁾.
- Improvement of urban areas ⁴⁾.

As LR system is complex, without the knowledge in LR and also the absence of necessary law which are common in developing countries, implementation of LR can be difficult. Thailand is the only country that has successfully established a formal LR system with an LR Law passed in 2004 after years of preparation. The success of LR project implementation in Thailand is fairly recent and only a few pilot projects have been fully completed. Table 1 below shows a summary of Thailand's LR framework.

Studies on LR in Thailand has been undertaken by a number of authors. Archer (1986) looked into the applicability of LR in Thailand. Hino (2006) and Matsui and Deguchi (2014) reviewed the LR system of Thailand in comparison to Japan's LR system. Sukolratanamee (2007) examined LR as an alternative for financing urbanisation by looking into Bangkok projects. However, his analysis of the projects was limited from initiation up to the year 2006. A more recent study by Kubo (2015) analysed the financial feasibility of projects in order to find the role of government subsidy. The continued review of projects is necessary to understand the influence of Thailand's new LR institutional system on the implementation of the pilot projects. According to Inoue (1982), the applicability of LR does not only depend on theoretical research only but also attaining experience to develop an effective method.

This paper thus aims to review the LR practice in Thailand based on project based analysis before and after the introduction of LR law from the perspective of technical and financial. The focus on technical and financial is due to both aspect being seen as important in developing countries where expertise and funding are lacking. The findings will allow a better understanding of the effects of law on project implementation. The result of this paper's analysis will allow other countries, especially in South East Asia, that lacks any LR law to obtain clearer view on which aspect they would need to look into a more specific in order for them to consider undertaking a LR project.

2. Background of LR in Thailand

The effort to transfer/export the LR concept and practice from Japan to other countries in Asia began with the conduct of various seminars and conferences. One of the earlier known seminar was the International Seminar on Urban Development Policies held in 1982, in Nagoya and attended by participants from Japan and 12 other countries. One of the objectives of this seminar was to evaluate the effectiveness of LR for urban land management in developing countries through examination of projects in Japan. In 1985, an International Seminar on *Kukaku Seiri* was held in Tokyo, Tsukuba and Nagoya focused specifically on LR, the possibility and improvement of its application. The following year, a regional workshop entitled “Land for housing in Asian cities; the potential of Land Pooling/Readjustment” was held in Bangkok that also discussed the possibility of transfer to countries of Asia ⁵⁾.

The Japanese government through its Japanese International Cooperation Agency (JICA) has also been actively providing support to countries in South East Asia in establishing their own LR system. For Thailand, four major studies/projects have been provided under the JICA's program⁽¹⁾ spanning from 1993-2014. These projects were aimed at developing an institutional system and strengthen the human resource capacity to undertake LR. The reports published based on the implementation of these projects are very important as it contains the necessary information on the achievement and the deficiencies of the system. Therefore this section has mainly utilised findings in these reports to better understand the situation of Thailand LR system.

In introducing LR in Thailand, a number of issues were encountered throughout the years. In the early years, the main issue was the lack of supportive legal frameworks for LR. There were many problems that could not be dealt with without special laws such as those related to land records, tax and other public handlings ⁶⁾. Moreover, if LR were to be started without any law, it would require the 100% agreement from landowners. Implementing agencies would also need to have the necessary skills to undertake negotiations and design which during that time were lacking ¹⁾. The requisite for the consent of landowners in addition to the conflict of interests among them often created a lengthy delay in implementation ⁷⁾. In order to implement LR, it was recognised that measures to legislate an LR Act, establish organisation and manpower development, secure funding resources were necessary to be instated ²⁾.

In 2004, an LR Law was finally endorsed. This law consisted of 8 chapters (89 articles) which covered from the general provision of LR to the LR Fund. Under this law, the Minister shall be authorised to issue ministerial regulations and notifications in compliance with the Act. Even with the presence of the law, implementation of pilot projects were still delayed. The necessary ministerial orders and regulations to support the law and provide the procedural basis for implementation was unavailable or not enforced ⁸⁾. In terms of financing, there was still a lack of financial support and gaps can be seen between project plan and also fiscal plan ⁷⁾⁹⁾. Human resource problems also still existed particularly concerning the counterparts area. The number of staff were insufficient and decision-making process was still unclear and staff needed improvement in the negotiation and plan adjustment skills ⁸⁾.

The Government of Thailand with the support of JICA continued their efforts in establishing a complete system and in promoting the use of LR in the country. By 2013, the LR system was greatly improved in that all necessary ministerial orders were enacted, standards for LR fund was developed, and regular trainings were provided with supporting manuals and guidelines ¹⁰⁾.

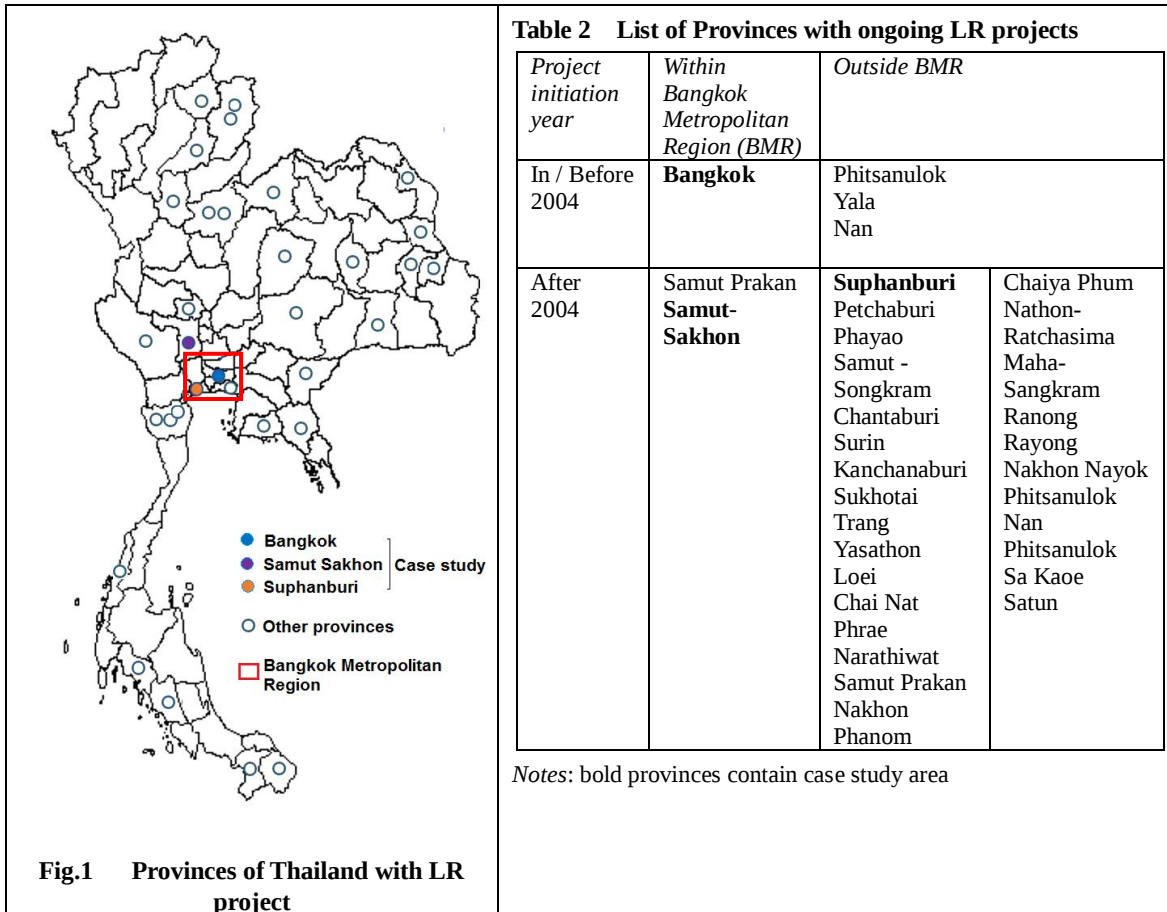
The subsidy for city planning road increased and the LR fund finally is able to be utilised. However, it was also found that the disposition of some of the reserve land has only begun and thus the increase of local authorities' financial resources is needed ¹⁰⁾.

According to Hayashi (2012), the implementation of LR is complex and often faced by constraints related to participation, financial and also technical (replotting system and land registration). This is similarly true for Thailand. The presence of law is an important aspect for initiating an LR project, but its progress is very much dependent on techniques (process and also technical) and also financial. This study thus focuses specifically on the aspect of technical and financial.

Table 1. Outline of Thailand Land Readjustment System

Country	Thailand
Legal	Land Readjustment Act 2004
Purpose	- Preventing urban sprawl - Development of infrastructure and flood protection - New town project
Implementing Body	(1) The Association; (2) The Department of Public Works and Town & Country Planning, National Housing Authority, and local administrative organisations; (3) Government agencies or any other juristic person established by the Government for Land Readjustment; (4) Any other government agency as provided for in the Ministerial regulation.
Agreement	Letters of consent of at least two-thirds of all land owners in the Project shall be presented in support of an application and the land owners shall possess land in the aggregate of at least two-thirds of the land in that vicinity.
Funding	Land readjustment fund National Subsidy (Department of Public Work and Town & Country Planning) Local Authorities

(Source: Land Readjustment Law, Department of Public Works and Town & Country Planning documents)



3. Methodology

This study focuses on Thailand because firstly it is the only country in South East Asia that has successfully implemented LR under a formal system. LR is greatly affected by the local conditions and thus a study of a country within the same region might offer solutions that are better suited to countries in South East Asia. Secondly, while Thailand has successfully established an LR system, the success of the pilot projects implementation under this system has been less reviewed. Understanding the experiences of Thailand through project based analysis is important as problems from real experiences can be identified. By focusing on specific aspects of the system, the issues can be evaluated more clearly. Based on the aim, the following research questions have been identified.

- How was replotting carried out to secure land owner's agreement and financing of project?
- What are the source of financing obtained and its effect on project implementation?

To achieve the objectives of this study, a review of the LR practice in three selected pilot projects was undertaken. The selection of these projects was based on their period of implementation; before and after the endorsement of an LR law, and location within and outside Bangkok Metropolitan Region. The selection of analysis in both these two different periods was to find out what has been the changes to implementation approach of the project after the law was introduced.

Table 3. Comparison of case study projects

	Rama 9	Tharahat	Samut Sakhon
Location	South-eastern side of Bangkok, between central Bangkok area and Suvarnabumi International Airport.	Tharahat project is located in Suphan Buri province, a province located 120km from Bangkok outside of BMR.	Samut Sakhon province located just outside Bangkok
Implementation period	2000- 2016	2009 - present	2013-present
Status	Completed	Main road construction completed, land registration completed. Construction of internal road pending.	Main road under construction
Implementer	Association (with support from Bangkok Metropolitan Agency)	Department of Public Works and Town & Country Planning	Department of Public Works and Town & Country Planning
Purpose	Solve issue of inaccessibility	Constructing city planning road	Constructing city planning road
Financial	100% reserve land	Subsidy Local authorities budget Reserve land	Subsidy Reserve land
Technical	No evaluation. Standard contribution of 17.5%	Evaluation Varying contribution (15%-30%)	Evaluation Varying contribution (13% - 25%)

(Source: Summarised based on information obtained during interview)

Table 4. Summary of project history of Rama 9

Year	Stages	Year	Stages
2000	Project initiation and Planning - Area study - Discussion with landowners	2011	Project was approved by Land Readjustment committee (Based on law)
2003	Association formed	2012	Sales of reserved land
2004	LR Act was enforced and Association dissolved	2013-2015	Implementation Issuance of title deeds Surveying Construction of infrastructure
2005-2009	Design and Negotiation		
2010	Association formed under law	2016	Completion

The study will thus give a better understanding of the implications of having a law to the implementation of a project and to pin-point specifically what factors requires the support of a law. Data for this study have been obtained through interviews conducted between 27th February – 2nd March 2017 and responses sent via email with the relevant government staff of Thailand ⁽²⁾ and also reviewing existing literature.

Up to 2016, there are about 34 pilot projects that have been started. These projects are located all over Thailand (Fig.1), with some undertaken before the law and some after the law. The case study project chosen are Rama 9 project (Bangkok), Samut Sakhon project (Samut Sakhon province) and Tharahat project (Suphanburi province).

Initiated in year 2000, Rama 9 project is located in Bangkok and was implemented by an association. Samut Sakhon is located outside Bangkok but within the Bangkok Metropolitan Region (BMR) is implemented by the government. Tharahat is located outside the BMR and

also implemented by the government. Rama 9 project has fully completed, while Samut Sakhon (implemented in 2013) and Tharahat (implemented in 2009) are in its construction stage.

4. Case study Analysis

Case study 1 : Rama 9 project

Rama 9 project area was one of the earliest area identified by the government as a potential area for undertaking a pilot LR project. The project is located in an area of high potential for development and is zoned for housing in the recent Bangkok Comprehensive Plan (2013). The project site covers an area of 8.8 hectares with a total of 56 lots and 32 landowners. 5 of the total lots are owned by Bangkok Metropolitan Agency (BMA) and which mainly are located along the main road and thus blocking access to the rear private lots (see Fig.3a). All the land in the project area did not have access and was therefore undevelopable. The purpose of the project was thus to solve the issue of accessibility in the project area.

Project initiation and planning (Before law)

- **Technical**

The project was initiated in the year 2000 with the BMA undertaking a study of the area and holding meetings with land owners to discuss the project and prepare the conceptual plan. Simple replotting approach whereby a standard contribution (every landowner contribute the same percentage) was used in preparing plans. Based on the interview, landowners agreed to this approach as it was simple, uncomplicated and easy for landowners to understand.

5 different concept designs were proposed to landowners that showed the different road network, reserve land and contribution rate. Fig.2 shows an example of concept design with the highest contribution. These concept designs were prepared for landowners' consideration whether or not they would like to participate in the project. The start of the project had been difficult as landowners had less knowledge of LR and there was the lack of trust from landowners that the project would progress without the support of law. At this stage, 3 landowners decided not to join the project.

An association was formed in 2003, which was later dissolved in 2004 due to the enactment of the LR Act. Rama 9 project implementation was delayed partly due to the lack of clear procedures/ supporting regulations to proceed with the project. The following few years after the law was enforced, the necessary regulations were eventually set up to support project implementation. This then enabled a new association to be formed in the year 2010.



Fig.2: Concept plan

Source: Bangkok Metropolitan Agency

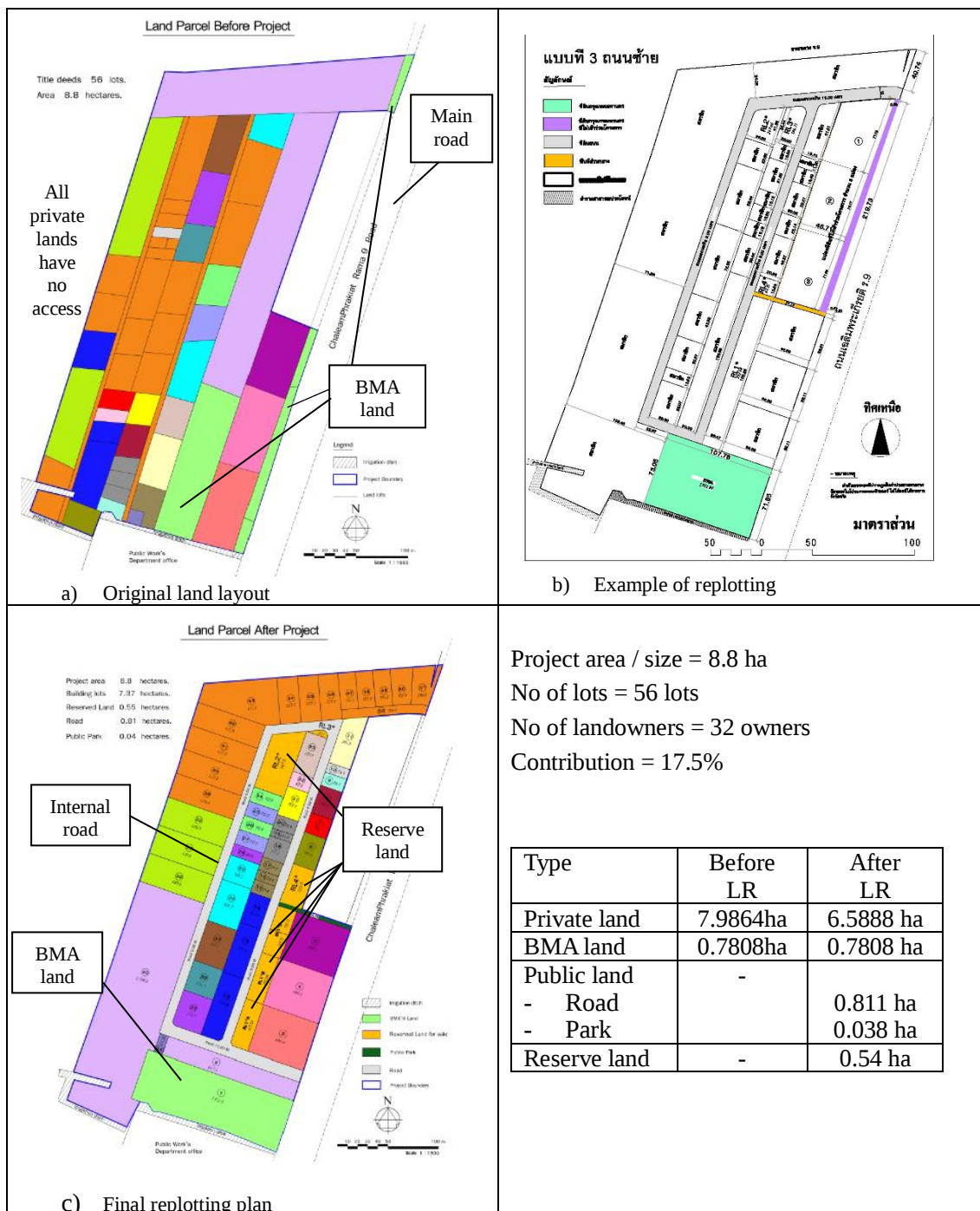


Fig.3 Plan showing changes from original to final layout of Rama 9 project

(Source: Bangkok Metropolitan Agency)

- **Financial**

The Rama 9 project was initiated before an LR law was established and thus there was no financial support available to be provided by the government. This led to a delay in the project financing during project initiation. This lack of financial support eventually led to the landowners of large lands paying the initial cost upfront.

Replotting Design and Construction (After 2004)

- **Technical**

Once landowners agreed to join the project with a 17.5% standard contribution, a detailed replotting design was prepared. Based on the contribution percentage, multiple designs for road network and location of land was proposed (An example is shown in Fig.3b). The final replotting plan (Fig.3c) resulted in improved accessibility to lands and pooling together of fragmented lands owned by same landowners. This design brought benefits to landowners as it made lands more developable, in addition to an increase in land value (estimated 105% increase). One of the main issue in replotting, however, was that the project involved the BMA land. As this land needed to be relocated/readjusted and there was no law to back such practice, lengthy discussions had to be carried out with the higher authorities. Under the new LR law, regulations in regards to of utilising of government land were produced in the year 2008 that would ease future projects involving government land in the future.

- **Financial**

The total cost of Rama 9 project implementation was financed by the sales of reserve land. This implementation cost included surveying fees, construction of infrastructure and services (water and electricity), but excludes land-filing for the private lands. The project was able to sell the reserve land early in the project period (Table 2) and therefore infrastructure construction proceeded smoothly. The ability of Rama 9 project to sell the reserve land was due to the location of the project area, within Bangkok where there is a high demand for development.

Case study 2 & 3 : Tharahat (Suphanburi) and Samut Sakhon

Tharahat project is located in Suphan Buri province, a province outside of the Bangkok Metropolitan Region (BMR). The project was started in the year 2009 with the purpose of building a city planning road, improving private lands accessibility and providing a flood protection for the area. The project covers an area of 31.3 hectares with 32 landowners. Currently, the construction of some roads is pending.

Samut Sakhon project is located in Samut Sakhon province, a province located within the BMR boundary and about 5km from the city area of Samut Sakhon province. The project was started in 2013 with the purpose of building a city planning road. The project covers an area of 18.8 hectares with a total of 22 landowners. This project is currently in construction of infrastructure stage and is expected to be completed in 2019.

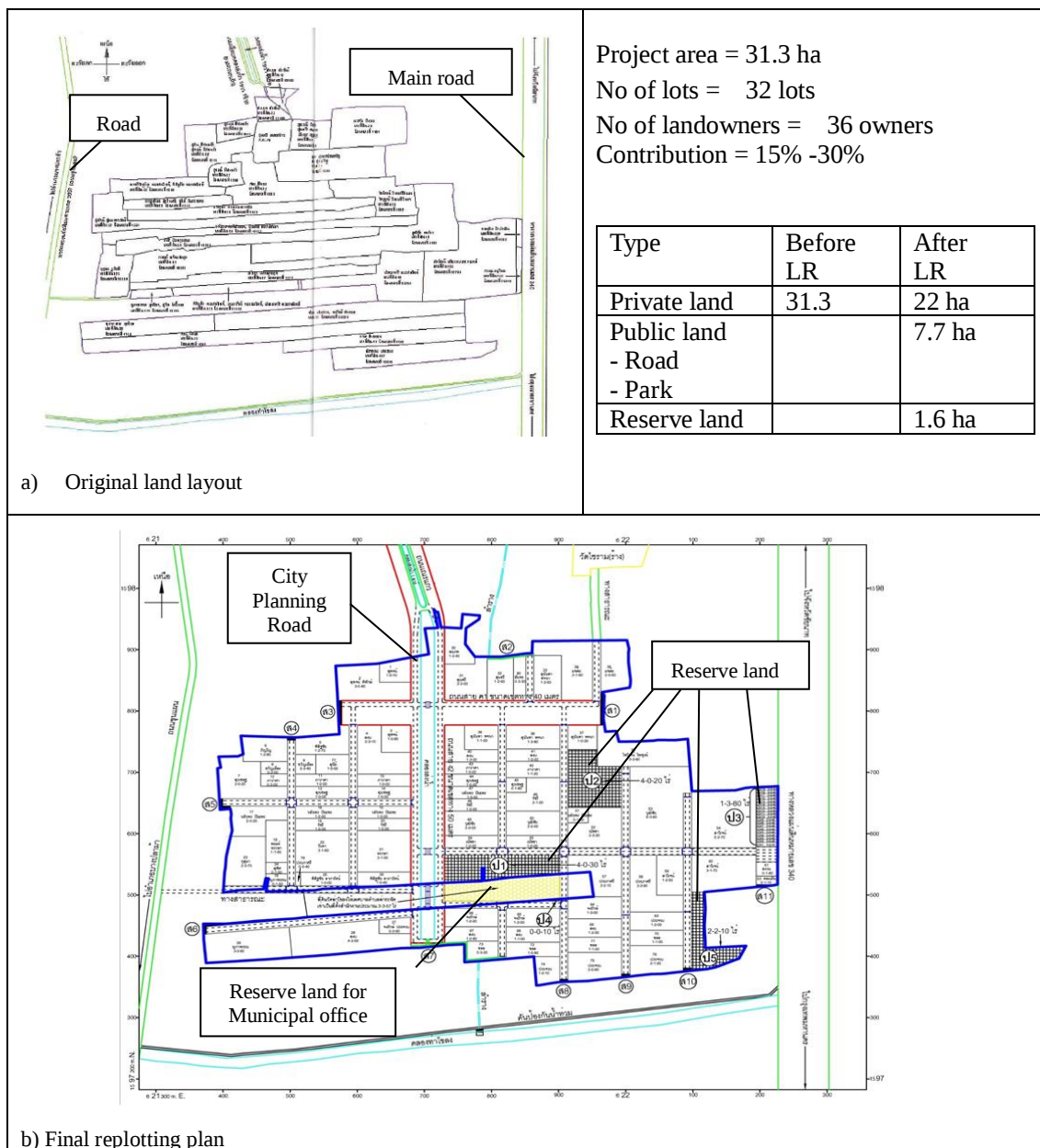


Fig.4 Plans showing changes from original to final layout of Tharahat project

(Source: Department of Public Works and Town and Country Planning)

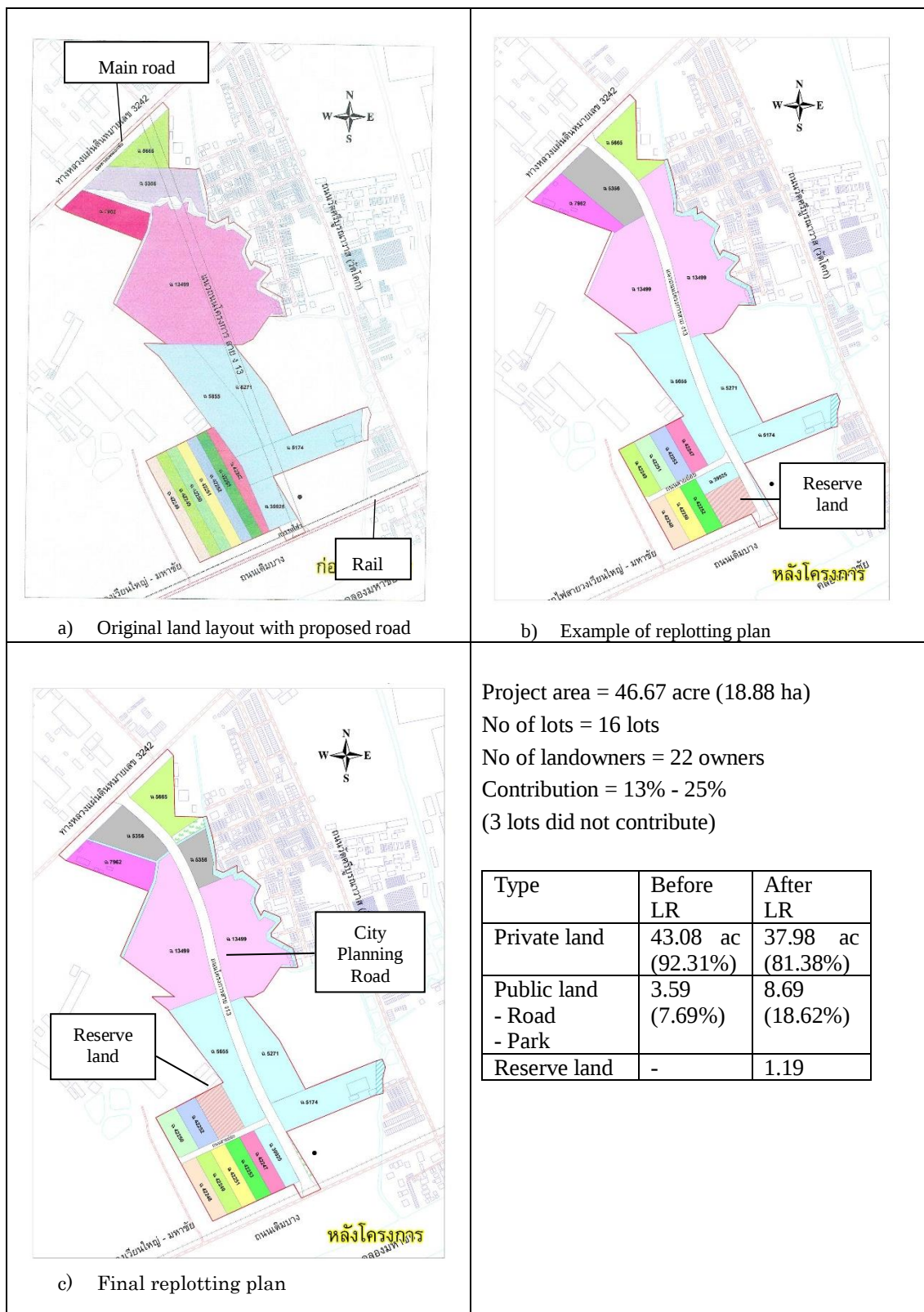


Fig.5 Plans showing changes from original layout to final layout of Samut Sakhon project

(Source: Department of Public Works and Town and Country Planning)

Project Initiation and Planning (After law)

- **Technical**

Similar to Rama 9 project, during project initiation, landowners of Tharahat and Samut Sakhon project were informed on the proposed contribution percentage. The landowners will decide on participating the project based on the contribution percentage agreed at this project initiation. For Tharahat project, contribution ranges from 15%-30% and for Samut Sakhon project, the contribution ranges from 13% to 25%.

Both the project was started after the enforcement of law. However, for Tharahat project, all the subordinate regulations of LR law had not been endorsed at the time the project was started. This led to delay as implementers do not have a clear procedure to follow. For Samut Sakhon project, the necessary regulations had already been enforced thus the project had clear procedures to follow.

- **Financial**

As both of the Samut Sakhon and Tharahat project are undertaken by the government, the initial cost of the project was covered by the budget under the Department of Public Works and Town & Country Planning (DPT). This is different from Rama 9 project that did not have any budget in initiation stage. Budget in initiation stage is needed to pay cost such as undertaking a study of the project area.

Replotting Design and Construction (After 2004)

- **Technical**

According to the law, appraisal of land for each original landowner shall be used as a basis for determining the new plots of land. For both the Samut Sakhon and Tharahat project, evaluation replotting method was used whereby different landowners would contribute different percentages of their land based on the evaluation of original and final replotting of their land. The use of evaluation in replotting for both Tharahat and Samut Sakhon projects was necessary as the original conditions of each land was different. The evaluation was based on location, shape and accessibility of land. After the law, continuous training was also provided to the staffs and manuals of replotting was prepared to help guide staff to undertake proper replotting.

In Tharahat project, landowners agreed on 4 kinds of contribution rates for the land lots depending on the location of the lands;

15% contribution if the land is next to main highways and main roads.

20% contribution if the land is next to secondary roads.

25% contribution if the land is next to next to small roads

30% contribution if the land is inaccessible

Tharahat internal road was designed in a grid pattern and altogether the road network of Tharahat project covers a length of 6 km. A modular technique for replotting was used whereby landowners were involved in putting together rectangular parcels of land within this demarcated road network. Through use of this approach, owners' agreement can be obtained and thus only one replotting plan was prepared.

In Samut Sakhon project, proportional evaluation replotting method was used. Lands that were accessible at the start of the project contributed the least, and lands that were not accessible contributed the most. The shape of land also affected the percentages of contribution and the final contribution were 13%, 16% and 25%. In terms of the design of road network, the design of Samut Sakhon project is simpler as it involves a smaller number of land and most of which can be served directly by the city planning road. Replotting design, however, was done multiple times such as to change the shape or location of land in order to satisfy individual landowners and ultimately gain their agreement. As an example of revision to design in Samut Sakhon project is the location of reserved land from the initial location fronting the main road to the final location fronting secondary roads (Fig.5b &5c).

The use of evaluation in replotting for both Tharahat and Samut Sakhon projects required each landowners' contribution of land at varying percentages according to their original and thus ensuing equity among landowners. Moreover, such replotting can be carried out as implementers gained the necessary skills from training.

- **Financial**

- a) Tharahat and Samut Sakhon project has a purpose to build a city planning road, therefore were entitled to a subsidy for construction of this road. As to promote projects with city planning road, the DPT budget has been substantially increased over the years. In 2014, it increased three times compared to the budget in 2013 ¹⁰⁾. With this secured funding, the city planning road of Tharahat and Samut Sakhon project will be able to be completed. The construction of internal road, on the other hand requires additional source of financing as discussed below.
- b) In Tharahat project, completion of internal road construction is pending due to financing issues.
 - (i) Part of the reserved land that has been allocated has been given to the municipality for their utilization. In return for the reserve land, the municipality will be responsible for contributing to provision of infrastructure. However, the construction will depend on the available budget which is received gradually and thus delaying completion of this project.
 - (ii) The remaining reserved lands are currently unable to be sold. Based on the interview undertaken, in general, buyers are more interested to buy reserve lands that has full infrastructure already installed.
 - (iii) The design of the internal road affects the costing of project

Currently, the standard of roads in Tharahat varies in order to solve this lack of budget problems. During the period of Tharahat project, the LR fund has only begun to be set up. Therefore, although a loan is available under the LR fund based on the LR law, this project could not include an application for loan during the project approval.

In Samut Sakhon project, as only one the internal road will be provided, this was decided to be included in the subsidy of the city planning road. Therefore, it is presumed that this project will not have any issues on financing. Reserve land that would be sold later in the

project period will be used to cover other costs such as constructing a safety rail for area bordering rail tracks.

5. Conclusion

LR is complex and affects rights of owners, title deeds, tax and so on, and therefore there is a requirement to have a Law to carry out its implementation. Regulations in support of the law and clear procedures, however, are also needed to ensure a smooth process. Through analysis of the case study project, it can be seen that period of implementation of projects has become shorter as the LR system become more matured. Whilst it was difficult at the beginning to promote LR, it has since become much easier as staff gain more experience and landowners can see the benefit of projects from pilot projects completed with good quality infrastructure and result in good environments.

Based on the main objectives given earlier, the following can be derived:

Technical

How was replotting carried out to secure land owner's agreement and financing of project?

Before law

- ❖ Simple replotting with no evaluation method and standard contribution was used in Rama 9 project as this approach was easier to be understood by the landowners who lacks LR knowledge and possibly due to lack of experience by implementers for negotiating complex replotting. As all land in the project area had similar conditions of having no access, this approach can be taken and agreed by all landowners.

After law

- ❖ In Tharahat and Samut Sakhon, evaluation method was used for determining the varying contribution percentage. This method was able to be carried out firstly due to the requirement of law. Secondly, due to necessity from the original condition of land whereby all lands in the project area did not have similar conditions in terms of accessibility. Thus, this method allows landowners to receive benefits equally based on the land value increase. Thirdly, due to implementers having continuous training to improve skills and their efforts in negotiation. Finally, as these projects are government initiated and available to receive a subsidy for city planning road, the percentage of contribution from landowners can be lower.

Financial

- *What were the source of financing obtained and its effect on project implementation?*
- ❖ Project management / Initiation financing
Rama 9 project initiated before the endorsement of LR law and implemented through the Association did not receive any government financial support and thus the project needed to be self-financed. This delayed the implementation as landowners needed to pay for the initial cost. Both Tharahat and Samut Sakhon project was a government project, therefore,

budget can be obtained from the Department of Public Works and Town & Country Planning (DPT) to cover the cost of project initiation.

❖ Project implementation

Reserve land in Rama 9 project was able to be sold quickly and therefore the project could be completed successfully. This is due to the good location of the project in an area of high demand and high development potential. The ability to sell the reserve land is important for projects such as Rama 9 that was unable to get financial support. However, in Tharahat project, completion of construction of internal road is pending. This is due to the inability to sell reserve land or lack of financing by local authority. Tharahat project shows the importance of having a budget to construct road before reserve lands can be sold.

- ❖ Under the LR law, a formal LR fund has been established and administered by the DPT. The LR law clearly states that the LR funding can be given as loan to the LR project implementer. The budget of LR fund can be used for management (30%) and project (70%).

As LR fund and the necessary guidelines has already been established, it is anticipated that loans would be able to be provided to cover the cost of project initiation and project construction (before sales of reserve land) in future projects. However, problems are still foreseen in terms of selling of reserve land. The inability to sell reserve land will affect the progress of the project. This issue may arise due to insufficient study when selecting the project site, in an area where demands for land is not high as compared to areas in/ near Bangkok. Therefore site selection would be important to ensure reserve land can be sold to cover project cost.

Notes:

(1) JICA's assistance:

- The study on application of Land Readjustment in National Urban Development Trust (1993)
The objectives are to formulate LR plan for the first implementation project in Thailand and also proposed an LR system for Thailand
- The project on the Development of the Method of Urban Development carried (1999-2005).
The overall objective is to develop and to provide a training system
- Land Readjustment Promotion Project (2005-2009).
To develop the institutional and human foundations in the public and private sectors for the promotion of land readjustment in Thailand.
- Self-sustainability of Land Readjustment system (2010-2014).
Capacity of DPT to implement LR projects as well as support other LR executing organization is developed.

(2) Correspondence with Thailand's government officers through Interview (February 2017) and Email:

- Chief of Land Readjustment Section, Bangkok Metropolitan Agency
- City Planning Analyst, Bangkok Metropolitan Agency
- Director of Chanthaburi office, Department of Public Works and Town & Country planning
- Director of Singburi office, Department of Public Works and Town & Country planning
- Director of Land Readjustment Bureau, Department of Public Works and Town & Country planning

- Director of Land Readjustment Fund, Department of Public Works and Town & Country planning
- Senior City Planning Analyst, Department of Public Works and Town & Country planning, Suphanburi office
- Senior City Planning Analyst, Department of Public Works and Town & Country planning, Samut Sakhon office

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- 13) Matsui M and Deguchi C, *The Characteristics of Land Readjustment Systems in Japan, Thailand, and Mongolia and an Evaluation of the Applicability to Developing Countries*, 2014, Proceedings of International Symposium on City Planning, Hanoi
- 14) Department of Public Works and Town & Country planning, *Manual series for Land Readjustment in Thailand* (for technical staff), undated