https://doi.org/10.3828/idpr.2023.7

Hyung Min Kim

Land value uplift for infrastructure in land readjustment: a case study of Yeongdong (Gangnam) in Seoul, South Korea

This paper reviews the economic rationale of Land Readjustment (LR), investigating the (full-)cost recovery principle from the lens of the Henry George theorem in Korean contexts. This research articulates how land value uplift was used for infrastructure in LR. South Korean LR is explored due to the manifestation of the tight link between land value uplift and infrastructure. In Korean LR, a portion of land by private owners should be surrendered for new urban infrastructure. Nevertheless, the LR scheme was accepted by Korean landowners because serviced land converted from un-serviced land is more valuable. This research carries out a case study of the largest Korean LR project – Yeongdong (YD) – a central part of Gangnam in Seoul, on a land area of 26.8 km^2 implemented in the period 1967–1991. YD experienced drastic land value uplift as high as almost 13,000 times over twenty-six years after the conversion from farmland. Local-level infrastructure was fully funded by LR by virtue of land value uplift, without other public funds, demonstrating the land value-infrastructure nexus.

Keywords: land value capture, infrastructure, land readjustment, land value-infrastructure nexus, Gangnam, full-cost recovery

Introduction

This research articulates how land value uplift is used to fund infrastructure through Land Readjustment (LR). It stresses the tight link between Land Value Capture (LVC) and infrastructure. This link, labelled land value-infrastructure nexus in this research, is the underlying basis of LR in the sense that a portion of land by private owners is given up for urban development project costs with the expectation that serviced land will become more valuable. The interest in LR has re-emerged along with the pervasive unsustainable forms of urban development in developing countries (UN Habitat, 2018). LR has been extensively utilised worldwide as an urban development scheme with significant variations across different countries such as Japan, Germany, France, Sweden, Australia, South Korea, Turkey, India, Taiwan, Indonesia and Nepal (Turk,

Hyung Min Kim is a Senior Lecturer in Faculty of Architecture, Building and Planning, The University of Melbourne, Parkville 3010, Australia; e-mail: hyungmin.kim@unimelb.edu.au

2008). Recently, new legislation has been proposed to introduce LR in the Netherlands (van der Krabben and Lenferink, 2018), demonstrating the growing interest in efficient funding mechanisms for urban infrastructure. The keys to LR are land pooling and landowners' land contribution that allow for public land, funds for infrastructure and the master planning process.

This paper investigates how the land value-infrastructure nexus was embedded in the implementation of LR in Seoul, South Korea by detailing one large-scale LR project – Yeongdong (YD). YD is a central part of Gangnam in Seoul, one of the most spotlighted locales in South Korea due to high housing prices, a high concentration of producer services, a proliferation of IT companies, and a high reputation for educational services, provoking a trend in *Gangnamisation* (or copying Gangnam) elsewhere in South Korea (Park and Jang, 2018).

This paper pays attention to one research question using a case study of the YD project as large as 26.8 km^2 in Seoul. This question is about the full-cost recovery principle embedded in South Korean LR: how was land value uplift captured for infrastructure through LR? This question is related to the Henry George theorem at the stage of development. George's argument favours broad-based recurrent land tax for overall public expenses, but this research focuses on the balance between land value uplift and infrastructure. LR is centred on cost recovery for urban development, hence resulting in partial LVC instead of George's goal for full value capture. This question can provide significant implications, especially for developing countries where numerous informal settlements are spreading without appropriate infrastructure. Infrastructure requires lump-sum capital at an initial stage of urban development, but once provided, infrastructure produces long-lasting effects on the city's productivity and liveability. Urban development tends to be irreversible, whether it is formal or informal, because it is an outcome of the accumulation of capital, materials and social networks (Hodge, 1984). The costs for destruction and re-conversion back to the original land use such as agricultural land are too high to carry out. Also, the deconstructive actions of settlements destroy the social networks accumulated among the residents as seen in the resistant actions against forcible eviction from informal settlements (Dekel, 2020). How the foundation of new settlements is appropriately established and funded at the outset of the development is extremely important, to which the LR technique can contribute (Seong et al., 2023).

First, a literature review of the Henry George theorem is provided to link it to the land value-infrastructure nexus, along with the institutional origin and the economic rationale of LR. Research methods are then described, with the next section outlining South Korean contexts in implementing LR. Next, findings from the case study centred on the land value-infrastructure nexus are presented, followed by discussions and conclusions.

Literature review

Henry George theorem and the land value-infrastructure nexus

In his seminal book *Progress and Poverty*, Henry George (1879) proposed a single tax on unimproved land value to recoup socially created windfall gains and mitigate land speculation. His core argument was that a single tax on land should be implemented while eliminating other types of taxes such as income tax, because 'rent swallows up all the gains' (277) and 'wherever land was monopolised, increase in productive power would simply give the owners of the land the power to demand a larger share' (286). Due to the limited supply of land, demand for the land alone is the factor to decide 'land rent' (or land value) and the urban economics discourse has also acknowledged the inelasticity of the land supply (O'Sullivan, 2012). The land value is accrued through its (inherent) productivity and competition amongst potential end users to occupy the site. In other words, the contribution of the landowner to the increases in the locational value of the land (or site value) is minimal or even zero, but all increases in land rent are privately pocketed by the landowner in the pervasive freehold land system that strengthens the monopoly of land. As such, his claim is centred on land value tax to a full scale that can accomplish 'an equal right to the land' (362). As the legitimacy of privatising land value was challenged by George, he also stressed the quantity and significance of land rent to the extent that revenue from land tax, if implemented properly, is large enough to cover all public expenses, later dubbed the 'Henry George theorem' (Behrens et al., 2015' Stiglitz, 1977).

George's claim has been influential worldwide although no state has perfectly implemented it. His core principles have been embedded in a wide range of public policies and taxation in a form of recurrent tax and event-based levies (Hughes et al., 2020; Kim and Kent, 2023) and public sectors have sought ways to accomplish LVC in funding infrastructure (Peterson, 2008). LVC is an overarching term to refer to public efforts to recoup land value increases by public actions. In valuation practices, land value is estimated by a residual approach – total property value after all required capital input, operating costs, and taxes (Kellett and Nunnington, 2019). The uplift of this residual land value is the target for LVC.

Land value-infrastructure nexus and urban development

LVC has been acknowledged as an important source for infrastructure and, more broadly, urban development and public finance. In the contemporary policy applications of Georgism, a single tax on land is shifted to various forms of LVC and the overall public expenses have been narrowed into infrastructure. Urban development needs all sorts of infrastructure facilities such as new roads, sewerage, drainage, powerlines, internet lines, parks, community facilities, sports grounds and so on. Without quality infrastructure,

new development fails to establish liveability and productivity in the development site. Multiple exemplary land-based public financing methods are in place for infrastructure delivery. These examples have taken different forms of operation depending on the developmental and taxation contexts of each state, but they are centred on land value and/or planning gains from up-zoning, land use conversion and other types of planning permissions (Claydon and Smith, 1997; Crook and Monk, 2011).

There have been five mutually interrelated approaches to implementing the land value–infrastructure nexus (see Appendix 1). The discussion here focuses on lump-sum gains (or land value uplift), generated in the process of urban development. These examples are not definite institutional types of the land value–infrastructure nexus. Instead, what is revealed here is that LVC has been employed for infrastructure provision and urban development as an important revenue source in multiple ways. In other words, the land value-infrastructure nexus has been well accepted and embedded in multiple countries. Mostly the land value–infrastructure nexus has been accomplished along with the urban planning process and land management. While these five approaches aim to implement LVC for infrastructure, they do not necessarily result in the same outcomes.

First, betterment levies are designed to recoup land value uplift (Rebelo, 2017). Especially when the size of windfall gains is outstanding and public actions for the land value uplift are noticeable, betterment levies can be better justified. The Growth Area Infrastructure Contribution (GAIC) is a typical example of a betterment levy to recoup windfall gains borne of rezoning urban growth boundaries in Victoria, Australia (Taylor, 2016; Kim and Kent, 2023). The revenue from the GAIC has been used to fund regional infrastructure.

Second, developer exactions and impact fees make growth 'pay its way' (Peterson, 2008, 45). New development needs infrastructure to be funded by developers who will 'use' the infrastructure. Although these event-based levies follow either a 'user-pay principle' or 'impact mitigation' principle (Spiller, 2012, 139), developers/landowners accept them by virtue of expected improvements in land value in their residual land value calculation. Development impact fees have been widely implemented to fund new infrastructure in the suburban locations of US cities (Nelson, 1988). In the UK, planning gains are used to fund public housing as described in Section 106 (Crook and Monk, 2011; Gurran and Whitehead, 2011).

Third, public land sales/leases have been significant revenue sources for urban development where state land ownership is in place, such as in China (Anderson, 2009; Zhao and Cao, 2013) and Singapore (Lim et al., 2002). In China, due to a revenue sharing structure between central, provincial and local governments, land leasing fees and land transfer fees have not sufficiently funded all the infrastructure requirements (Yang and Wang, 2008), but still, revenue from the land lease is playing a pivotal role in funding urban infrastructure.

Fourth, public agencies can be part of the development process through which public sectors can retain both development risks and gains (Peterson, 2008). Publicly owned land is usually selected for public development or eminent domain is used for land acquisition (Malloy, 2008; Kim et al., 2017). If the public development project fails to acquire land at a cheap price, land value uplift is likely monopolised by private landowners, weakening the effects of the LVC. However, this raises a concern about just compensation for land appropriation. Under prevailing neoliberalism, the proactive role of government in leading real estate development is not encouraged due to the potential for inefficiency and development risks, but public development has long been adopted in many countries. For instance, UK's new towns were developed by New Town Development Corporations after land acquisition and compensation at an agricultural land value before development progressed following the Pointe Gourde principle so that the public sector could capture land value uplift (Peiser and Chang, 1999; Freestone, 2021). Singaporean land acquisition prevented private sectors from appropriating land value uplift by offering compensation at a value without proposed development (Han, 2005). By doing so, Singapore was able to realise state land ownership of over 80 per cent of its land, construct new towns, establish well-known public housing programmes and provide infrastructure (Han, 2005). The primary objective of these public development agencies might not be a value capture. However, providing infrastructure is an essential responsibility for their development projects, which need public funding in most circumstances. Through public land ownership, the benefits from land value uplift can be retained within the public sector to a varying degree.

Fifth, there are policy and public financing measures to exchange land with urban infrastructure among which LR is representative. Based on the confidence that urban infrastructure can improve land value, landowners are invited to contribute a portion of their land to the urban development project in exchange for enhanced infrastructure quality in and around their land area. Some countries have also implemented landowner's compulsory contribution to new development. In Vietnam, land-based financing, called 'land-for-infrastructure' (Nguyen et al., 2018), has been an instrument to provide infrastructure. By providing land use rights to private developers for new urban development projects, the private sector has the obligation to provide local infrastructure, undertaking negotiations between them (Labbé and Musil, 2014). In Vietnam's context, land use rights are offered at a cheaper price than the market value (Thu and Perera, 2011). This two-price system financially benefits the real estate developers who secure monopolistic power over urban land. These in-kind financial gains are large enough to cover the infrastructure costs requested by the government. A more complicated technique, Tax Increment Financing (TIF) in the USA, has been developed in public finance in the context of the land value-infrastructure exchange. The TIF is based on the meticulous estimation of land value increases that new infra-

structure can bring about, resulting in an increase in the future local property tax base. With this prospect of the property tax increment, local governments can issue a bond to fund the current infrastructure costs. The TIF does not directly exchange landownership with infrastructure, but inter-temporally exchanges future land value uplift with current infrastructure plus financing costs and risks. One common principle in these approaches is the exchange of land (or land use rights), more precisely speaking, land value uplift, with infrastructure in institutionally structured ways, which was manifested in LR. Now, the focus turns to how the idea of LR has emerged.

The origin and implementation of LR

The formal legislation of LR dates to 1902 in Frankfurt-am-Main during the era of the Kingdom of Prussia (Mullin, 1976). The legislation was led by the mayor, Franz Adickes (1846–1915), hence famously known as *Lex Adickes* (Chun, 2018). He was the mayor between 1891 and 1912, leaving an influential legacy in urban planning and development worldwide. In 1893, a bill for LR was proposed by Adickes who received assistance from a housing reform group called the *Verein Für Wohnungsreform* (Mullin, 1976). After nine years of struggle in the Prussian parliament (or Landtag), the bill was finally enacted in *Lex Adickes* in 1902 and gradually the Act was adopted by other municipalities, known as *bauland umlegung*. Through *Lex Adickes*, Frankfurt was able to retain up to 40 per cent of privately owned land to provide local infrastructure such as roads and parks (Mullin, 1976). The key idea of the bill was transferred to Japan as reflected in the City Planning Act of 1919 (Ishida and Hatano, 1987).

The policies led by Adickes were forerunners for the land value–infrastructure nexus. Although it is not explicit whether Adickes was influenced by Henry George, it is plausible to assume that he had already heard of George's idea due to the presence of the Union of German Land Reformers (founded in 1898), influenced by Henry George and the German translation of *Progress and Poverty* in 1881 (one year after its original publication) (Silagi and Faulkner, 1992). Where Adickes's reform-minded policies originated is uncertain, but *Lex Adickes* shares two important principles with George's ideas: 1) land value for public use (or infrastructure) by recouping gains generated by public actions, and 2) a (full) cost recovery for infrastructure (in LR) and/or overall public goods. However, despite the shared objectives between these two approaches, there are significant differences in implementation. While Henry George strongly claims a broad-based recurring land tax is the most efficient way, LR is a geographically targeted one-off approach within the development project sites including land pooling, land development and master planning processes.

The economic mechanism of LR and LVC

The key economic principle of LR is full (or partial) cost recovery of urban development. Doebele (1982, 2), in the first comprehensive book about LR, stressed the full-cost recovery principle: 'the *cost-equivalent rate* [emphasis in original], the percentage of lot areas that, if sold, would produce exactly enough money to recoup the costs of installing the infrastructure'. From the landowners' point of view, participation in LR is very similar to an equity investment. In fact, they are investing in local infrastructure with their land assets while the municipality (or an agency) is a facilitator. Hence, profitability is an important criterion in LR for both municipalities and landowners (Larsson, 1993). Cash compensation is paid to landowners who do not want to participate in LR despite variations in different countries (Larsson, 1993). While municipalities take the pre-determined amount, land value uplift more than the required infrastructure cost can accrue to landowners. From the municipalities' point of view, LR funds all required infrastructure in the project site and secures land for infrastructure.

The required infrastructure cost will be funded by the revenue from the sales of reserve land (or cost-equivalent land) (Lee, 1987; Larsson, 1993). By doing so, municipalities can provide new infrastructure with 'zero' public expense.[1] In Valencia, Spain, landowners in high-density urban areas are obliged to surrender 60–80 per cent of the total surface for on-site infrastructure (Gozalvo Zamorano and Muñoz Gielen, 2017). The Spanish LR-regulations include multiple approaches such as providing affordable housing, off-site infrastructure and additional building plots (Gozalvo Zamorano and Muñoz Gielen, 2017). However, a high reduction – the proportion of land to be surrendered for public purposes and the development cost – would result in landowners' appeals against the proposed LR plan. Therefore, the reduction rate should be decided carefully.

Foreseeable land value uplift encourages landowners to be part of the LR project. Without financial gains, the landowners would not welcome LR on their land. For these landowners, how much land they should give up (or the reduction rate) is crucial. With the principle of full-cost recovery, the reduction rate is decided by the required infrastructure cost. Landowners' land contribution can be based on either value (if the valuation is available) or land area (Archer, 1989). Cash payments for LR are also in operation in some countries such as Germany allowing for multi-purpose public expenses beyond local-scale road infrastructure (Muñoz Gielen and Mualam, 2019). The cash contribution approach is implicitly financialising the land assets to pay for the 'readjustment charge' (or *Umlegungsvorteil*) in Germany or 'betterment levy' in Israel in return for improved (or serviced) land (Muñoz Gielen and Mualam, 2019). These payments can cover the required cost for 'hard' infrastructure, such as roads and beyond.

1 However, each country has implemented LR differently. For instance, in Germany, essential local infrastructure facilities, such as roads, water supply and sewerage and parks, were funded not by LR but by municipalities.

The scale in the Henry George theorem is much larger than LR because the Georgist approach takes all land rents for public purposes while LR recoups land up to a maximum of the required infrastructure cost. While the Henry George theorem is about the balance between the total volume of land rents and public expenses, the land value-infrastructure nexus is about the balance between LVC and the expenses for infrastructure (Figure 1). Land value-infrastructure nexus means an institutionally established endogenous link between narrow-scoped infrastructure and land value. This concept is centred on the Henry George theorem that covers broad-scoped public expenses and a maximum level of LVC. In LR, LVC is achieved by the surrender of the land asset by landowners.

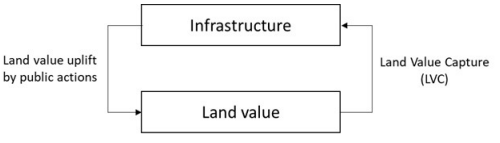

Figure 1 Land value-infrastructure nexus

Despite marked interest in LR, very little scholarly effort has been made to relate LR to Georgist thinking, requiring rigorous research for which the Korean case study is rightly placed. The LR approach virtually turns the agency (the municipal government or a public development agency for South Korea) into an entrepreneurial land asset manager. It receives land for infrastructure and now it should manage and sell the land of which ownership is handed over to the government through reserve land. Failing the sale of reserve land at a planned (or lower) price leads to a failure to fund infrastructure. However, selling the reserve land at a higher price than the required infrastructure cost brings new public revenue for the government. Land booms benefit both the landowners and the government in this arrangement.

Research methods

This research employs a single case study approach illustrating Korean LR practice. By doing so, this research provides the detail of the implementation of the Korean LR project, which is often missing in the literature. The details will shed light on the complexities of LR under specific institutional, spatial and economic contexts. The single case study approach enables the articulation of land value-infrastructure nexus – the objective of this research – in an urban development project. The selection of YD is not because it is generalisable, but because the project was highly influential in reshaping the city. Korean LR was investigated by Kresse et al. (2020), Lee (1987), Kim et al. (1982) and La Grange and Jung (2004) among others. These past studies paid attention to institutional frameworks and specific techniques in the Korean context. This research builds on their elaboration by illustrating the link to LVC and the citywide impacts of LR.

This research draws upon archival data about Korean LR in the periods Seoul's LR had been proactively implemented. Key resources used in this research include 1) archival records, 2) formal information requests to the government, and 3) news articles.[2] Firstly, the website of the Seoul Metropolitan Archives provides public records and documents on Seoul (https://archives.seoul.go.kr/). The search for 'land readjustment' (or *tojiguhoegjeongli* in Korean) resulted in 61,193 documents. Among them, the records with the case study area 'Yeongdong' were sorted resulting in 21,122 records. The title of those records was screened by the author to sort out important information. Then, secondly, where necessary, the original documents were requested formally through the Korea Public Information Disclosure System (https://www.open.go.kr/) if the public records were unavailable online. The Korean government is responsible for replying to these requests and this system has been used for academic research as well (Kim et al., 2015a). One of the key documents obtained through the Disclosure System is the final financial report of YD. Due to unavailable details about yearly income and expenses, only aggregated amounts are presented. Five requests were made through the system for further data collection. They included the list of reserve land in YD, publications by the Korea Land Development Corporation (currently Land and Housing Corporation), and the maps of LR in YD. The government institutions provided those materials after removing the personal details of individuals such as the name of landowners. These datasets are tabulated or used to create maps. Thirdly, news articles were collated by the keyword search of both 'Yeongdong' and 'reserve land' (*chebiji* in Korean). As a result, 480 news articles were found in the period 1968–1999. These news articles were all screen-captured for review. The selected information from these datasets is used to provide details about the governance of Korean LR. Korean currency is converted to US dollars assuming 1 USD is KRW1,000 for the convenience of understanding. In fact, the foreign exchange rates against the USD ranged from 271 to 1,401 (KRW/USD) in the period 1967–2020. While the metric system is primarily used, the Korean traditional spatial unit, *pyeong*, is occasionally used when it supports clear understanding. One *pyeong* is 3.3 m^2.

Contextual backgrounds of LR in Korea

LR was introduced in 1934 when the first Urban Planning Act, the City Planning Ordinance (called *Joseon Sigaji Gyehoeg Lyeong*), was established in the Korean Peninsula during the Japanese colonial rule (Son, 1994). The city planning ordinance was transplanted from Japan's urban planning system (Yum, 2019). In Japan, LR has been

2 Interviews were not adopted in this research because the project in question commenced more than fifty years ago. All planners involved in the project are now retired.

popular to the extent that it has developed over 30 per cent of Japan's urban areas and it is regarded as the 'mother of city planning' (Sorensen, 1999). The initial introduction of LR and the city planning ordinance to the Korean Peninsula was intended to uphold industrialisation and support an imperial ambition, and these planning institutions continued up to 1962 (Yum, 2019). In Seoul, there were ten LR projects on a land area of 17 km^2 in the period 1937–1945 until the end of the Japanese colonial rule and it also assisted two post-Korean War reconstruction projects on a land area of 1.2 km^2 in the 1950s (Kim, 2016). Then, in 1962, urban development legal institutions were newly established by enacting the Urban Planning Act and the Land Acquisition Act. Furthermore, the Land Readjustment Act was enacted by being separated from the Urban Planning Act. Consequently, the LR technique was actively employed in the 1960s and the 1970s while there was a transition from LR to a public land development approach for more accelerated housing supplies in the 1980s (La Grange and Jung, 2004, Kim, 2023). While LR was carried out across South Korean cities, the largest areas were developed through LR in Seoul due to unparalleled population increases. Across South Korea, 480 LR projects were completed or under progress covering 461 km^2 by 1989 (SMG, 1990 [2017]b).

Table 1 provides an overview of LR in Seoul, and Figure 2 exhibits the locations of these LR projects. By 1989 the land area developed through LR accounted for 40 per cent of the total urbanised area of Seoul (350.52 km^2) (SMG, 1990 [2017]b). As seen in Figure 2, exclusive of greenbelts, the vast land area of the southern Han River was developed by LR being a primary instrument for urban expansion. The case study area – YD – is located in the southern part of the Han River (Figure 2).

Table 1 A profile of LR projects in Seoul

Commencement	# of Projects	Total land areas (km^2)	Average project area (km^2)
1937 - 1945	10	17.0	1.7
1945 -1959 (post-War reconstruction)	2 (9 sites)	1.2	0.6
1960 – 1969	20	63.7	3.2
1970 – 1979	14	49.7	3.6
1980 - 1989	5	47.5	9.5
Total	51	179.1	3.5

Source: Adopted from SMG (1990 [2017]b, 1990 [2017]a) and Kim (2016)

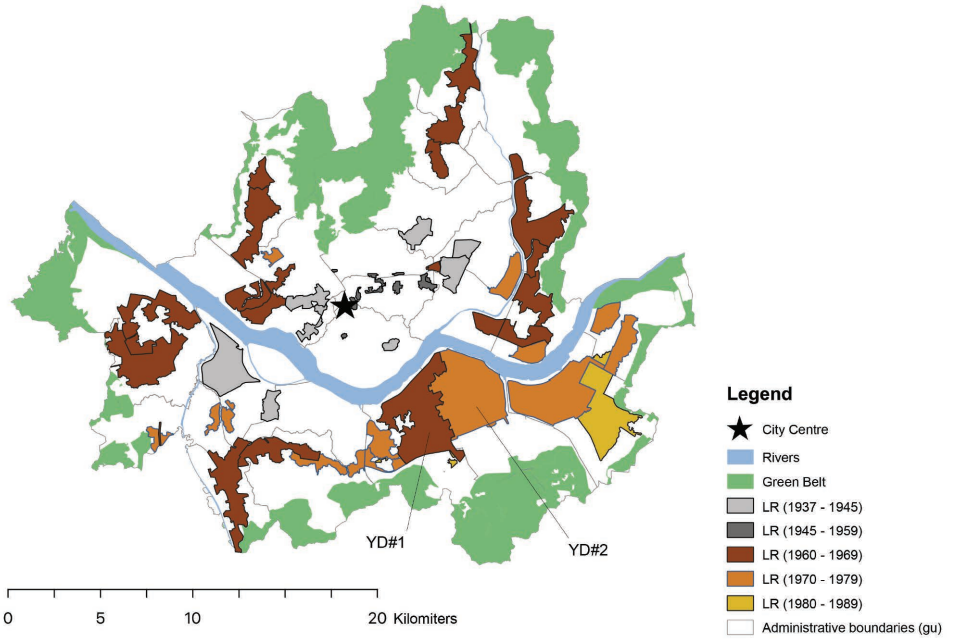

Figure 2 Location of LR projects in Seoul, the 1960s–1980s
Source: Redrawn from Kim (2016)

Land value-infrastructure nexus

Background of the case study area: Yeongdong (YD)

This section investigates how the full-cost recovery principle was maintained in the case of the largest Korean LR project: YD, which comprised two project sites (YD #1 and YD#2) and two small additional sites (Additional YD#1 and Additional YD#2) in southern Seoul. When LR was proposed, YD was agricultural land offering vegetables to residents in Seoul (SMG, 1988). Of the original landowners, 98 per cent were farmers holding less than 3 ha of farmland (Lim, 1994) while there were also a few large landowners who had accumulated sufficient capital (Son, 2003). Those original landowners mostly sold their land in the process of LR to continue their agriculture somewhere else. Their sales were prompted by speculative investors and real estate brokers. In YD#1, each landowner held 1,175 m2 (or 356 *pyeong*) on average before LR commenced (Lim, 1994).

Accessibility to YD was geographically limited due to the Han River (Figure 3). There were only three bridges over the Han River by the late 1960s including one railway bridge (*Hangangcheolgyo* constructed in 1900) and two vehicle/pedes-

trian bridges (*Hangangdaegyo* in 1917 and *Yanghwadaegyo* in 1965) (Lee, 2016). While a concrete plan for the southern part of the Han River was absent, the construction of a new bridge commenced in 1966 without much media attention (Son, 2003). Although two plans – the South Seoul Plan in 1963 and the New Seoul White Plan (or *sae-seoul baegji gyehoeg*) in 1966 – were formulated for southern Seoul, these were imaginative and diagrammatic without clear implementation actions. However, when the Seoul-Busan highway plan was announced, attention was paid to the new bridge as the starting point of the highway from Seoul and the YD project was followed concurrently.

In fact, Koreans were doubtful about the success of highway construction due to the lack of capital, engineering skills and experience. South Korea was referred to as one of the poorest countries after the Korean War. According to the World Bank (2020), its per capita GDP was USD 94 in 1961 (or 87th out of 103 countries). Cumings (1997) described the situation:

> There you have it: no capitalists, no Protestants, no merchants, no money, no market, no resources, no get-up-and-go, let alone no discernible history of commerce, foreign trade, or industrial development, so on and so forth. (300)

The post-Korean War period saw tumultuous political unrest and, finally, a new government was established by a military coup d'état carried out by Major-General Park Chung-hee in 1961 (Kim and Han, 2012). With his undivided power, the developmental state began. However, the South Korean government had few resources, being unable to afford urban development and infrastructure. The YD project was driven to achieve Park's nationwide highway initiative for which land acquisition was essential. After visiting West Germany in 1964, he propelled highway construction for economic growth with a reference to the German *autobahn* (Son, 2003; Cho and Kwon, 2021). Priority was given to the Seoul-Busan highway of 428 km (Son, 2003). Given the very tight government resources, how to fund the construction cost was a great challenge. In the early 1960s Korean per capita annual GDP was less than USD 100 (KOSIS, 2021). The central government commanded the Seoul Metropolitan Government (SMG) to execute LR and to secure land for the 7.6 km length highway within Seoul's administrative boundary without government expense (Son, 2003). These conditions resulted in an extremely large-scale LR project, funding both nationwide and local-scale infrastructure. The initial motivation for the Yeongdong LR project was to secure the land for the Seoul–Busan highway. However, that project generated great impacts on housing supply, land markets and the creation of a new business centre to be discussed in the following sections. There was no clear guideline in deciding on the maximum or minimum land area of Korean LR projects. Instead, the full-cost recovery principle played the foundational role in the reduction rate and, partly, the size of the project area. For instance, high expected

infrastructure costs required high reduction rates to fully fund infrastructure. As such, higher reduction rates were applied at a later stage (notably in the 1980s) when higher standard infrastructure quality was required with growing interest in a better quality of life.

In the 1960s, almost one-third of the Seoul residents lived in shantytowns (Lee, 1987) and the annual population growth of Seoul was nearly 9 per cent, from 2.4 million in 1960 to 4.8 million in 1969 (SMG, 1970). Accommodating the increasing population was an essential task, but such large-scale greenfield development would have never been imagined without the central government's highway project.

The profile of the YD project is summarised below (SMG, 1988):

- Project period: 1967–1991 (1967–1991 for YD#1 and 1971–1991 for YD#2)
- Land area: 26.8 km^2 (comprised of YD#1, YD#2, additional YD#1, and additional YD#2)
- Reduction rate: 39.1 per cent in YD#1 and 36.8 per cent in YD#2
- Public space after LR: 5.3 km^2 (or 41.8 per cent) in YD#1 and 3.6 km^2 (or 27.2 per cent) in YD#2
- Planned population: 600,000.

The cost recovery principle

The cost recovery of infrastructure costs is a fundamental principle fully maintained in YD and other Korean LR projects. As seen in the final financial report (Table 2), income was primarily sourced not from the government's general tax but from the sale of reserve land. In the period 1968–1991, the aggregate amount from the sale of reserve land was USD 175.4 million, and the land equalisation charge – payments by the landowners who received more land than the average after reduction – was USD 30.1 million. Other than the small amount of miscellaneous income, reserve land was a unique source of income for LR (Table 2).

Most of the expenses were used to fund infrastructure. By 1991, the aggregate amount of expense for infrastructure construction was USD 146.5 million, which was even lower than the net income from the sale of reserve land. In the period 1968–1991, income was larger than expense. In the future prediction, more infrastructure was planned to be invested in. Although precise details about yearly cash flow are unavailable, it is confirmed from the aggregate financial statement that the cost recovery principle was fulfilled. The future income and expenses were based on their estimation, but it was highly likely that the value of unsold reserve land could exceed the pace of the rise in the future construction cost.

Table 2 Final financial report: income and expense of the YD LR project, 1991

Income	Amount (million USD)	Expense	Amount (million USD)
Sales of reserve land	175.4	Construction	146.5
Land equalisation charge	30.1	Operation	6.6
Miscellaneous	14.1	Equalisation payment	16.9
Sub-total (1968–1991)	219.6	*Sub-total (1968–1991)*	170.0
Future estimated income*	143.0	Future expense**	192.6
Total	362.6	Total	362.6

Source: SMG (1991), requested via https://www.open.go.kr/
Note: * Future estimated income includes 1) sales of reserve land and 2) equalisation charge. In 1991 when this statement was written, there were plots of reserve land and unpaid equalisation charge to be paid by the landowners who contributed less than the average within the project. ** Future expense includes 1) construction and 2) equalisation payment. There were infrastructure construction plans to be made after the financial statement was made. There were government duties to pay for the landowners who contributed more than the average.

The YD project enabled the SMG to have public land and fund local-level infrastructure within the project site including the following infrastructure and engineering work by 1988 (SMG, 1988):

- 9.2 km^2 of public lands such as schools, police stations, markets, roads and parks (see Table 3)
- Engineering work
- Sewerage of 711.6 km
- Paved roads of 82.2 km in total (or 7.0 km^2)
- Powerlines and water pipes
- Highway over 8.2 km with USD 1.2 million (SMG, 1990 [2017]b, 705).

Table 3 Post-LR land use in YD

Land use		Land area (km^2)	%
Private urban land		17.5	65.5
Public land	Roads	7.0	26.2
	Parks	0.5	1.8
	Markets	0.3	1.1
	Schools	0.1	0.3
	Others	1.4	5.1
	Sub-total	9.2	34.5
Total		26.8	100.0

Source: SMG (1991, 51)

Land value changes

Seoul saw unprecedented socio-economic and demographic changes in the period from the 1960s until the 1980s. However, what appeared in YD was even more dramatic (Table 4). Population growth in Seoul was significant, increasing from 3.3 million in 1963 to 10.6 million in 1989, a 3.2-times increase (Table 4). Economic growth was much faster than population growth in the corresponding period – an 88.1-times increase in Seoul's estimated GDP and a 27.1-times increase in estimated per capita GDP. However, a more surprising change was observed in YD's land price movements. Between 1963 and 1989, land values increased almost 13,000 times in the YD district. While a precise projection of post-LR land value changes was not made at the beginning, a government official document reported that the land value of YD#2 would change from USD7–15 to USD20–30 (or a 30–330 per cent increase) when calculating the reduction rate in 1971 (SMG, 1990 [2017]b). The average price of USD 20 per pyeong was applied to estimate the area for reserve land in YD#2 (SMG, 1971). With the estimated total construction cost including engineering work for urban land, road and sewage construction at USD 10.68 million, 534,150 pyeong (or 1.76 km^2)(= USD10.68 billion/USD 20 per pyeong) was set aside for reserve land within YD#2 (SMG, 1971). The reserve land within YD#2 was changed at the implementation stage in 1972 to 1.6 km^2 accounting for 12.4 per cent of the total project area of YD#2 (SMG, 1990 [2017]b).

However, the *ex-ante* estimation for the value of reserve land turned out to be very low. Two plans for land pooling were announced in 1971. Then, readjusted land of YD#2 was returned to the landowners from 1981 to 1985 (SMG, 1990 [2017]b). The average land value reached USD 400 per pyeong by 1979 (Table 4), which was twenty times higher than the initial estimation. From the entire YD project sites, 3.8 km^2 of land was acquired in total by the SMG as reserve land and, in 1990, the SMG still retained the reserve land of 0.126 km^2 that could bring in further fiscal income in the future (SMG, 1990 [2017]a). The initial plan was to carry out YD#1 from 1968 to 1971 and YD#2 from 1971 to 1974 (SMG, 1990 [2017]a). Given the prolonged project period, the government projection of the land value uplift was underestimated compared to what was observed in the land market (Table 4). The rise in land value continued in the 1980s. Under the unprecedented land market changes, real estate brokers (called *bokdeokbang* in Korean) prompted the original farmers to sell their land to speculative investors and developers (Kim et al., 1982). The farmers did not have sufficient knowledge and capital for urban development and thus eventually, the majority of them sold their land partly due to persistent persuasion by profit-seeking brokers (Son, 2003). Although the farmers achieved substantial gains, they lost the benefits from such a drastic land value uplift.

Table 4 Changes in population, land value and Gross Domestic Product (GDP), 1963–1979, selected years

	Population in Seoul)[1] (thousand persons)	Population in YD)[2] (persons)	Land value in YD)[3] (USD per *pyeong*)	Estimated GRDP of Seoul)[4] (billion USD)	Estimated GDP per capita in Seoul)[4] (USD)
1963	3,255	26,936	0.4	0.7	215
1973	6,290	47,424	30	3.5	552
1979	8,114	301,934	400	16.2	1,993
1989	10,577	643,805	5,183	61.7	5,837
Increase (1963–1989)	3.2	23.9	12,958	88.1	27.1
Annual increase on geometric average	4.6%	13.0%	43.9%	18.8%	13.5%

Note:
1) *Source*: The Seoul Research Data Service, http://data.si.re.kr/node/368.
2) *Source*: Seoul Statistical Yearly Book, each year
3) *Source*: Korea Land Development Corporation (1980, 145) for 1963–1979 (in Sinsa-Dong, one of the locales in Gangnam) and Kwon (1995) for 1989 (Gangnam estimates)
4) Nominal GDP. In the period 1986–1990, Seoul accounted for 25 per cent of the national GDP. Seoul's GRDP was estimated by multiplying 0.25 by the national GDP.
Source: Statistics Korea, https://kosis.kr/statHtml/statHtml.do?orgId=301&tblId=DT_111Y002&conn_path=I3

The key to the process of the YD project was a land value increase that had been achieved by the following inter-connected reasons. First, new transport infrastructure improved accessibility of the site at national, metropolitan and local scales, which was directly reflected in land value. The construction of the Seoul–Busan highway, the essential part of the YD project, enabled Seoul to be connected to major cities. The nationwide highway networks started from the YD site. The YD project secured land for the Seoul–Busan highway within the administrative boundary of Seoul while the central government covered the construction cost (Son, 2003). On a metropolitan scale, a new bridge initially named the Third Han River Bridge and later renamed the Hannam Bridge (literally meaning the Han South bridge), allowed for access to the existing urban areas. Although that bridge was constructed for the smooth evacuation of the Seoul residents in case of further military conflict against North Korea, it served the YD site, linking the traditional urban centre of Seoul. Following the Third Han River Bridge, in the 1970s more bridges – Mapo Bridge (1970), Jamsil Bridge (1972), Yeongdong Bridge (1973), Cheonho Bridge (1976), Jamsoo Bridge (later

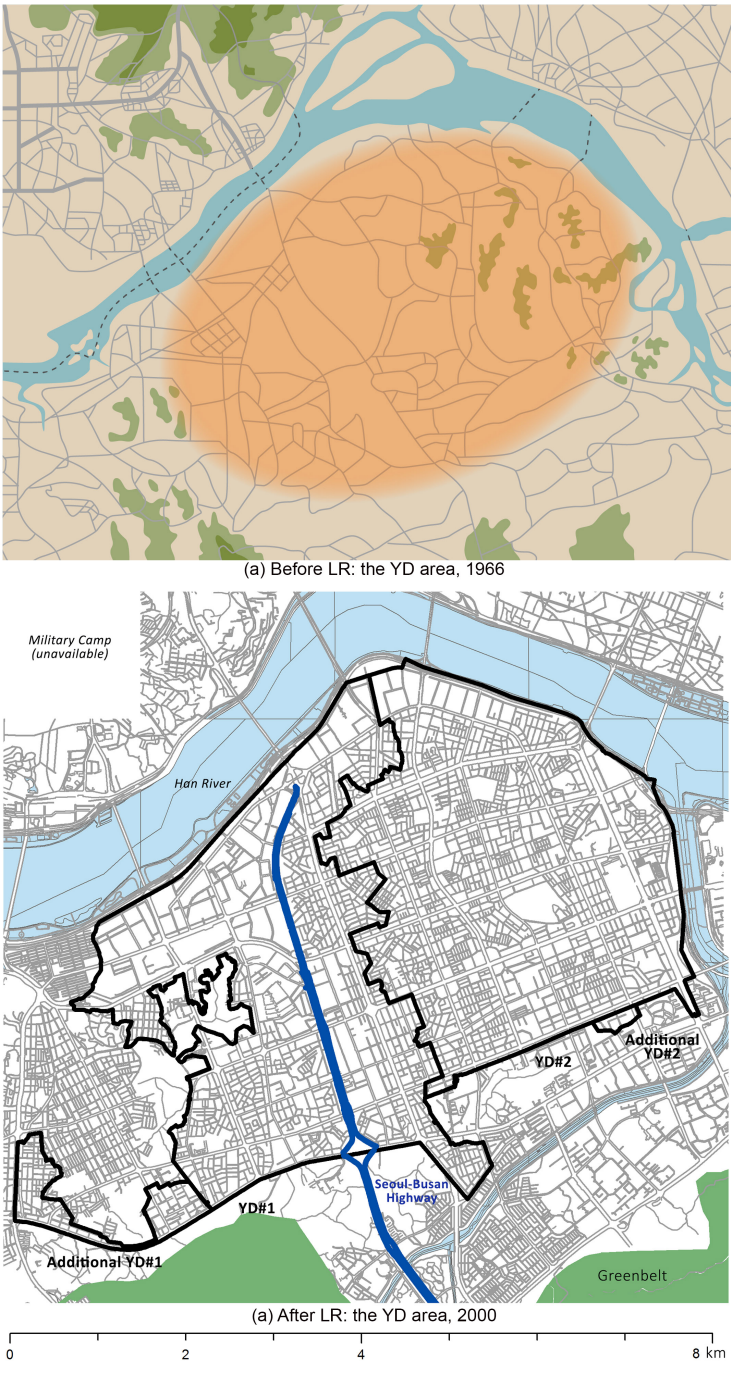

Figure 3 Before and after LR in the YD area
Source: a) reproduced from the 1960 and 1966 Seoul maps (Seoul Museum of History website) and b) The 2000 Seoul GIS map

upgraded to Banpo Bridge) (1979), Seongsu Bridge (1979), and Jamsil Railway Bridge (1979) – were built connecting the north and south sides of the Han River (Lee, 2016). Furthermore, new metro lines, notably Lines #2 and #3, were constructed to service the southern part of the Han River. In and around the YD district, the construction of Line #2 commenced in 1977, with a section beginning operation in 1980. Line #3 was opened in 1985 (Son, 2003). Although the bridges over the Han River and the metro lines were not part of the YD project and were separately funded, they have enhanced accessibility to the YD district, and therefore, increased its land value. Within the YD site, at a local scale, new road networks were created in a grid pattern (see Figure 3[b]). To facilitate the flow of vehicles, tunnels and bridges were engineered and constructed within the grid. In the period 1968–1980, a total length of 82.2 km arterial roads and highways, with a width of up to 70 m, was constructed in the YD district (SMG, 1988). The YD district was as large as almost half of Manhattan in New York. In fact, the YD project benchmarked for the grid road networks of Manhattan (Son, 2003). Elsewhere in Seoul, grid structure was rare, due to historically established street networks based on natural topography. While the construction of the roads within the YD site was funded by LR, metropolitan-scale transport facilities, such as Metro Lines #2 and #3 and bridges over the Han River, were funded by the government separately from the YD project account. Regardless of the funding source, all these transport networks have contributed to the accessibility of YD and, therefore, land value.

Secondly, in addition to transport infrastructure, new urban infrastructure was provided changing the site from non-serviced to serviced land (Figure 3(a)/(b)). These included power supply, gas supply, water pipelines, hospitals, police stations, parks, schools and markets. Engineering work was carried out to prevent flooding on this low-lying land bordering the Han River. More than 48 ha of land was converted into urban parks (SMG, 1988) although, in the beginning, only land for those parks and playgrounds was provided without facilities on it (Kim et al., 1982). The sites for these urban infrastructure facilities were sold at cost to their respective government departments/agencies such as the Department of Education for school sites, the Korea Electric Power Corporation for power generation sites, and the police office for police station sites (Kim et al., 1982). A school relocation project was carried out by the SMG to decentralise the population and ensure the quality of education. Through that project, fifteen secondary schools were relocated from northern Seoul to the southern part in the period 1976–1988, and among them, eight schools were newly located in YD (Seoul Museum of History, 2011). Those schools played a pivotal role in enhancing the reputation of education quality in Gangnam. Including those school sites, the land was secured for public infrastructure through the reduction of land ownership, with government agencies responsible for the installation and management of these facilities.

Third, the LR project converted the land from agricultural to urban use and/

Figure 4 Plans for YD: 1) Bird's eye view (1968) and 2) road network changes in a part of YD (1969)

Source: SMG and Gukjeon Engineering (1968) and redrawn from the map provided by the SMG through the Korea Public Information Disclosure System

or from low to high density, which had great potential for land value increases. At the initial stage, the YD project prioritised engineering works such as road networks, drainage and flood control without thorough consideration of land use zoning. The initial plan of YD#1 did not include a land use map but detailed networks for roads and pipelines which form the current layout of the site (SMG and Gukjeon Engineering, 1968) (Figure 4). The most outstanding feature from a bird's eye view was the new road networks (Figure 4).

One of the most outstanding land use plans emerged with the announcement of apartment districts in 1975 (SMG, 1988). To facilitate housing supply in a form of high-rise apartments rather than detached housing, 5.4 km^2 of land including 40 per cent of public space, was designated for residential apartments in YD as seen in Figure 5 (SMG, 1988). The apartment district included a combination of low-rise apartments (five to six storeys) with a population density of 500 people/ha and high-rise apartments (twelve to

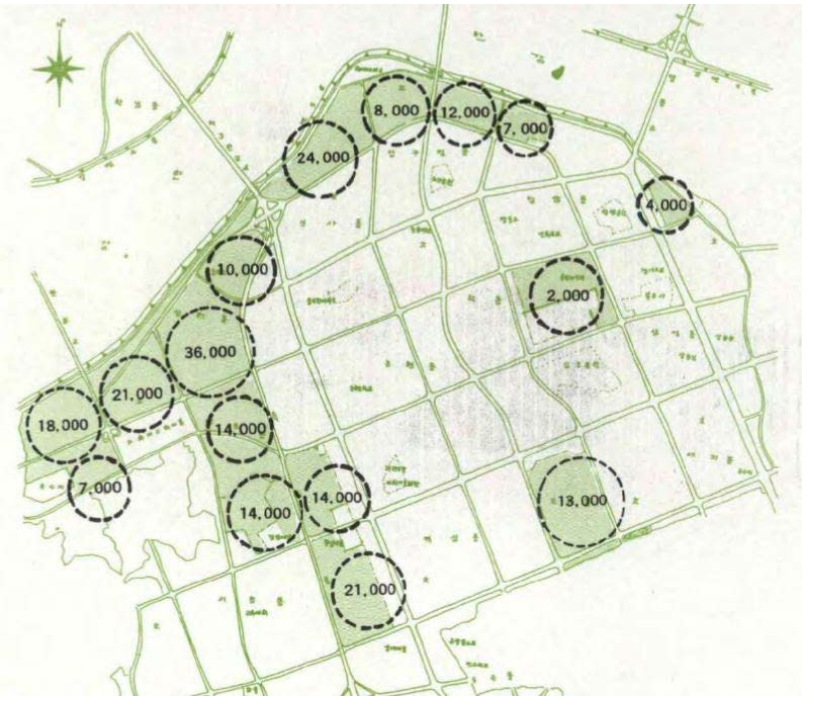

Figure 5
Apartment districts in YD
Source: SMG (1976)

fifteen storeys) with a population density of 1,100 people/ha. These areas were planned to accommodate 260,000 people in total and each district was to accommodate 10,000–15,000 people including school(s), parks, playgrounds and stores based on the concept of the neighbourhood unit (SMG, 1988). Those planned apartment districts invited construction companies to kick off construction and the increased density limit drove up land prices. In 1992, in the Gangnam district, there were 116 apartment complexes, comprised of 1,120 buildings and 71,569 homes, which accounted for 73 per cent of its housing stock (Gangnam-gu Office, 1992). The Gangnam area has become the most expensive residential area in the 2000s (Kim and Han, 2012).

Fourth, the LR project spatially directed the population growth of Seoul into the project site by providing new residential land with urban infrastructure. As presented in Table 4, the population growth of YD surpassed Seoul's growth rate significantly. The influx of new populations led to the creation of new economic opportunities in and around the YD site. The new office supply shows that the Gangnam area emerged as an important centre in the 1980s and in the 1990s, the volume of new office supply in Gangnam exceeded the CBD (Kim et al., 2015b). Since then, Gangnam has become a centre for producer services, IT companies and start-ups (Bae and Joo, 2020). However, the YD site did not attract residents with ease at the beginning. In

fact, news media reported difficulty in selling reserve land in the early 1970s due to uncertainties and low demand. To facilitate population relocation to the YD site, the SMG built apartments for government officials. In 1971, on the reserve land of 2.4 ha, the SMG built the first apartment complex in YD, comprised of twelve apartment buildings, for government officials who did not have homeownership elsewhere (Son, 2003). These apartment buildings had 360 small-size homes with a floor area of 12 pyeong (40 m^2) or 15 pyeong (50 m^2) (Gangnam-gu Office, 1992). Followed by this first project, a government housing agency – the Housing Corporation – carried out three apartment complex projects in the period 1973–1974. One of them was built through funding from international aid – the Agency for International Development (Son, 2003). In total, these three residential projects were built on a land area of 18.6 ha, constructing eighty-six apartment buildings, providing 4,270 homes and accommodating more than 20,000 residents in the early 1970s (Gangnam-gu Office, 1992). This initial influx formed a critical mass for other businesses and residential developments to follow. The growing volume of population and economic activities contributed to land value increases in YD.

Fifth, formal land ownership is a precondition for LR. Unregistered (or informal) buildings and land tenure can be formalised through LR. Informality is eliminated through land pooling and ownership restructuring processes. Formal land ownership is generally more valuable than informal land tenure, although how informality is handled is dependent upon government policy and negotiations between the public authority, landowners, developers and informal settlers. Informal settlements were not common prior to LR due to inaccessibility and the predominantly agricultural land use, but informality certainly existed. In the YD#2 site, 70.6 ha of land was unregistered before LR (SMG, 1990 [2017]b, 737). LR formally defined ownership of all land clearly on cadastral maps. While government efforts continued to remove informality in surrounding villages, as seen in slum upgrading projects in 1979 (MoCT, 2002), large-scale informality has not been established within YD.

As such, in YD, land value uplift was sufficient to cover the planned infrastructure and implicitly compensate the landowners demonstrating the embeddedness of the land value–infrastructure nexus in LR. The scale of land value uplift as seen in YD resonates with the Henry George theorem. As presented in Table 4, the land value uplift within the YD project site was sufficiently large, but LR allowed the SMG to recoup only a small portion of it, leaving windfall gains to the landowners who continued their ownership. Even with the small capture, all required local-level infrastructure was funded and land for them was secured as manifested in the case study of the YD project. If a more aggressive value capture was implemented as advocated by Henry George, the volume of revenue from it would have been much higher although such institutions were not incorporated in South Korean LR.

Discussions and conclusions

This research investigated the economic mechanism and the implementation of LR within the South Korean context. The case study of YD reveals that the land value–infrastructure nexus was achieved by funding the full cost of local-level infrastructure at the urban development stage through LR. This research provides evidence that the volume of land value uplift is sufficient to fund the required infrastructure in new urban development. However, there are significant institutional and contextual variations in LR implementation in different countries. Hence, the case study presented in this research needs careful interpretation. In YD, land value uplift exceeded the initial calculation by a great margin due to the mixed outcomes of enhanced accessibility, urban amenity facilities, land use conversion, a new population influx and the removal of informality. There was unprecedented land value uplift – an almost 13,000-times increase (or a 44 per cent increase per annum on geometric average) over less than three decades. The pace of the land value increase exceeded other key economic indicators such as population and the GDP. Seoul's LR projects, as manifested in YD, had contributed to providing decent infrastructure by recouping a portion of land value uplift in the form of land assets. The case study of YD offers implicit evidence of the Henry George theorem although the scope of Korean LR covers initial infrastructure development and partial LVC. LVC in YD to a full extent means more public income that could be used for citywide/regionwide/nationwide infrastructure beyond the project site and the potential to lessen other types of taxes such as income tax – a core argument by Henry George. Such a radical experience of YD is not generalisable even in other Korean LR projects due to the nationwide emphasis on the YD project. Nevertheless, the transfer of a significant portion of land ownership to the SMG greatly eased the fiscal burden of providing infrastructure. While the complete set of local infrastructures had not been installed from the outset of the project, the government acquired land for infrastructure *for free*, and legitimately. If a compensation approach at market value was employed in land acquisition for the public interest, the government must have faced a challenge to afford the land cost because land prices increased exponentially. Similarly, if landowners' cash payments rather than land contributions were employed, the cashless landowners would have not been able to afford the payments for infrastructure contributions.

This research sheds light on the land value–infrastructure nexus that can create an opportunity to offer a win-win solution for the government, landowners and the function of the city. Hence, cities with high demand for peri-urban development due to increasing urban populations should consider this development scheme to properly fund urban infrastructure without significant government expenses. Even governments with weak fiscal capacity can succeed in quality infrastructure provision. LR is not a 'broad-based' land value taxation that does not acknowledge major exceptions (Terrill, 2017) but a shared equity investment in land specifically for infrastructure. The

give-and-take arrangement of un-serviced and serviced land requires a certain level of land value uplift for the economic feasibility of landowners. The government also benefits from land value uplift thanks to the transferred ownership of reserve land that can increase the fiscal revenue along with land market booms. LR in the YD project seemed to be based on the user-pay principle in theory but played a role as a betterment tax in practice due to the large scale of land value uplift. Compared to land value taxation, LR might have been welcomed, possibly due to the one-off payment by land without cash contributions given the fact that most landowners were cashless farmers. While LR can fully fund infrastructure, it does not raise public revenue for the long-term management of infrastructure. LR creates room for high-quality infrastructure that requires lump-sum initial capital investment, possibly reducing maintenance costs at a later stage as seen in Australian infrastructure charges used for 'gold plating' standards (Kellett and Nunnington, 2019, 13).

In conclusion, the case study of South Korean LR demonstrates that LR is an effective urban development scheme that could be applied more broadly, especially in rapidly expanding peri-urban areas. How new infrastructure is funded, and how the battle for development gains has progressed are under-researched areas that can provide significant planning and development policy input for cities aiming to provide the quality infrastructure that inevitably needs land.

Acknowledgements

I appreciate constructive comments from two external reviewers. This research was supported by the Korea Foundation and the Laboratory Program for Korean Studies of the Ministry of Education of the Republic of Korea and the Korean Studies Promotion Service at the Academy of Korean Studies (AKS-2022-LAB-2230001). The initial findings were presented at AsRES 2021 and ICAPPS 2021. I would like to express my gratitude to Ms Minkyung Kim (Jade) for her valuable research assistance in collecting data and creating figures. Any remaining errors are the responsibility of the author.

References

Anderson, J. E. (2009) 'Financing urban development in China', *Chinese Economy*, 42(2), 48–62.

Archer, R. W. (1989) 'Transferring the urban land pooling and readjustment technique to the developing countries of Asia', *Third World Planning Review*, 11(3), 307–330.

Bae, Y. and Joo, Y.-M. (2020) 'The making of Gangnam: social construction and identity of urban place in South Korea', *Urban Affairs Review*, 56(3), 726–757.

Behrens, K., Kanemoto, Y. and Murata, Y. (2015) 'The Henry George theorem in a second-best world', *Journal of Urban Economics*, 85, 34–51.

Cho, W. and Kwon, Y. (2021) 'The era of Seoul's rapid growth (1960s–1970s): the role of ex-military elite mayors', *Cities*, 110, 103073, 1–16.
Chun, J.-S. (2018) 'The Lex Adickes in its East Asian contexts: the introduction of land readjustment and its spatio-political effects', in J. M. Cho (ed.), *Transnational Encounters Between Germany and East Asia Since 1900*, New York, Routledge, 101–122.
Claydon, J. and Smith, B. (1997) 'Negotiating planning gains through the British development control system', *Urban Studies*, 34(12), 2003–2022.
Crook, T. and Monk, S. (2011) 'Planning gains, providing homes', *Housing Studies*, 26, 997–1018.
Cumings, B. (1997) *Korea's Place In The Sun: A Modern History*, New York, Norton.
Dekel, T. (2020) 'Spatial and organizational aspects of anti-eviction strategies', *Environment And Urbanization*, 32(2), 389–406.
Doebele, W. A. (1982) 'Introduction', in W. A. Doebele (ed.), *Land Readjustment: A Different Approach to Financing Urbanization*, Toronto, Lexington Books, 1–10.
Freestone, R. (2021) 'A brief history of new towns', in R. B. Peiser and A. Forsyth (eds), *New Towns for the Twenty-First Century: A Guide to Planned Communities Worldwide*, Philadelphia, University of Pennsylvania Press, 14–31.
Gangnam-Gu Office (1992) 'Gangnam multi-family housing white paper' [Gangnam Gongdong-Jutaeg Saenghwal Baegseo] Ii. Seoul, Gangnam-Gu Office. (In Korean).
George, H. (1879) *Progress and Poverty*, New York, Robert Schalkenbach Foundation.
Gozalvo Zamorano, M. J. and Muñoz Gielen, D. (2017) 'Non-negotiable developer obligations in the Spanish land readjustment: an effective passive governance approach that "de facto" taxes development value?', *Planning Practice and Research*, 32(3), 274–296.
Gurran, N. and Whitehead, C. (2011) 'Planning and affordable housing in Australia and the UK: a comparative perspective', *Housing Studies*, 26(7–8), 1193–1214.
Han, S. S. (2005) 'Global city making in Singapore: a real estate perspective', *Progress In Planning*, 64(2), 69–175.
Hodge, I. (1984) 'Uncertainty, irreversibility and the loss of agricultural land', *Journal Of Agricultural Economics*, 35(2), 191–202.
Hughes, C., Sayce, S., Shepherd, E. and Wyatt, P. (2020) 'Implementing a land value tax: considerations on moving from theory to practice', *Land Use Policy*, 94, 104494, 1–7.
Ishida, Y. and Hatano, H. (1987) 'Influences of Lex Adickes upon legislations of Japanese land readjustment system', *Collected Papers of the Japanese City Planning Association Nihon Toshi Keikaku Gakkai Ronbun Shu*, 22, 121–126 (in Japanese).
Kellett, J. and Nunnington, N. (2019) 'Infrastructure for new Australian housing: who pays and how?', *Cities*, 92, 10–17.
Kim, H. M. (forthcoming 2023) 'Peri-urban rent gap and land value capture by government-led urban development in South Korea', *Environment and Urbanization*, 35(2), online first.
Kim, H. M. and Han, S. S. (2012) 'Seoul', *Cities*, 29, 142–154.
Kim, H. M. and Kent, A. (2023) 'Henry George down under: urban development, land value capture and infrastructure in Australia', in N. Phelps, A. Hurlimann and J. Bush (eds), *Planning In An Uncanny World*, New York and Abingdon, Routledge, 110–130.
Kim, H. M., Han, S. S. and O'Connor, K. B. (2015a) 'Foreign housing investment in Seoul: origin of investors and location of investment', *Cities*, 42, 212–223.

Kim, H. M., O'Connor, K. B. and Han, S. S. (2015b) 'The spatial characteristics of global property investment in Seoul: a case study of the office market', *Progress In Planning*, 97, 1–42.
Kim, I.-J., Hwang, M.-C. and Doebele, W. A. (1982) 'Land readjustment in South Korea', in W. A. Doebele (ed.), *Land Readjustment: A Different Approach to Financing Urbanization*, Toronto, Lexington Books, 127–174.
Kim, I., Lee, H. and Somin, I. (eds) (2017) *Eminent Domain : A Comparative Perspective*, New York, Cambridge University Press.
Kim, S.-W. (2016) 'Tojiguhoegjeonglisa-Eob' [Land readjustment project], *Seoul Solution*, Seoul Metropolitan Government (in Korean).
Korea Land Development Corporation (1980) 'Tojigaebal, [Land development], Seoul, Korea Land Development Corporation (in Korean).
Kosis (2021) 'Annual Indicators', Korean Statistical Information Service, https://kosis.kr/statHtml/statHtml.do?orgId=301&tblId=DT_111Y002&conn_path=I3.
Kresse, K., Kang, M., Kim, S.-I. and Van Der Krabben, E. (2020) 'Value capture ideals and practice–development stages and the evolution of value capture policies', *Cities*, 106, 102861, 1–20.
Kwon, I. (1995) 'Development process and land use change mechanism of newly developed urban area in the case of Kangnam, Seoul' (Phd thesis), Hanyang University (in Korean).
La Grange, A. and Jung, H. N. (2004) 'The commodification of land and housing: the case of South Korea', *Housing Studies*, 19(4), 557–580.
Labbé, D. and Musil, C. (2014) 'Periurban land redevelopment in Vietnam under market socialism', *Urban Studies*, 51(6), 1146–1161.
Larsson, G. (1993) *Land Readjustment: A Modern Approach To Urbanization*, Aldershot, Ashgate.
Lee, D.-S. (2016) *A History of Han River Development [Hangang-Gaebalsa]*, Seoul, Construction and Economy Research Institute of Korea (in Korean).
Lee, T.-I. (1987) 'Land readjustments in Seoul: case study on Gaepo project', *Third World Planning Review*, 9(3), 211–233.
Lim, L. C., Adair, A. and Mcgreal, S. (2002) 'Capital flows into the Singapore real estate market: an analysis of the land sales program', *Journal of Real Estate Literature*, 10(2), 265–277.
Lim, S. H. (1994) 'Landowners, developers and the rising land cost for housing: the case of Seoul, 1970–1990' (Phd thesis), University College London.
Malloy, R. P. (2008) *Private Property, Community Development, and Eminent Domain*, Aldershot, Ashgate.
MOCT (Ministry of Construction and Transport) (2002) 'Gaebaljehanguyeog Chwilagjeong-bibang-An-Yeongu' [Village improvement plans in green belt areas], Gyeonggi, MOCT (in Korean).
Mullin, J. R. (1976) 'American perceptions of German city planning at the turn of the century', *Urbanism Past & Present*, 3, 5–15.
Muñoz Gielen, D. and Mualam, N. (2019) 'A framework for analyzing the effectiveness and efficiency of land readjustment regulations: comparison of Germany, Spain and Israel', *Land Use Policy*, 87, 104077, 1–11.

Nelson, A. C. (1988) 'Development impact fees', *Journal of the American Planning Association*, 54(1), 3–6.

Nguyen, T. B., Van Der Krabben, E., Musil, C. and Le, D. A. (2018) 'Land for infrastructure in Ho Chi Minh City: land-based financing of transportation improvement', *International Planning Studies*, 23(3), 310–326.

O'Sullivan, A. (2012) *Urban Economics*, New York, Mcgraw-Hill/Irwin.

Park, B.-G. and Jang, J.-B. (2018) 'The Gangnam-ization of Korean urban ideology', in J. Doucette and B. Park (eds), *Developmentalist Cities? Interrogating Urban Developmentalism in East Asia*, Leiden, Brill, 134–161.

Peiser, R. B. and Chang, A. C. (1999) 'Is it possible to build financially successful new towns? The Milton Keynes experience', *Urban Studies*, 36(10), 1679–1703.

Peterson, G. E. (2008) *Unlocking Land Values to Finance Urban Infrastructure*, Washington, DC, World Bank.

Rebelo, E. M. (2017) 'Land betterment capture revisited: a methodology for territorial plans', *Land Use Policy*, 69, 392–407.

Seong, E. Y., Kim, H. M., Kang, J. and Choi, C. G. (2023) 'Developing pedestrian cities: the contribution of land readjustment projects to street vitality in Seoul, South Korea', *Land Use Policy*, 131, 106735, 1–9.

Seoul Museum of History (2011) *40 Years of Gangnam, Exponential Growth*, Seoul, Seoul Museum of History.

Silagi, M. and Faulkner, S. N. (1992) 'Henry George and Europe: precursors of land reform in Germany; Marx and the land question; the beginnings of the Georgist movement in the Empire', *American Journal of Economics and Sociology*, 51(2), 247–256.

SMG (Seoul Metropolitan Government) (1970) *Seoul Statistical Yearly Book*, Seoul, SMG.

SMG (Seoul Metropolitan Government) (1971) *Yeongdong2jigu (1.2.3.4 Gong-Gu) Gamboyulgyesanseo* [Reduction rate estimation for Yeongdong District #2], Seoul, SMG. (In Korean).

SMG (Seoul Metropolitan Government) (1976) *Yeongdong-Apateujigujonghabgaebalgyehoeg* [Yeongdong apartment district comprehensive development plan], Seoul, SMG. (In Korean).

SMG (Seoul Metropolitan Government) (1988) *Yeongdong Tojiguhoeg Jeongli Sa-Eob Geonseol Gongsaji* [The records of Yeongdong land readjustment construction], Seoul, SMG. (In Korean).

SMG (Seoul Metropolitan Government) (1990 [2017]a) *Seoultojiguhoegjeonglibaegseo (Ha)* [Seoul land readjustment white paper (2)], Seoul, SMG. (In Korean).

SMG (Seoul Metropolitan Government) (1990 [2017]b) *Seoultojiguhoegjeonglibaegseo (Sang)* [Seoul land readjustment white paper (1)], Seoul, SMG. (In Korean).

SMG (Seoul Metropolitan Government) (1991) Yeongdong (1,2jigu) *Tojiguhoegjeonglisa-Eobgyehoeggwa Hwanjigyehoegbyeongyeong-Ingagongsawanlyogonglam-Wanlyo* [A public notice for Yeongdong (Districts 1 and 2) land readjustment project plan: the approval of the change in replotting, and the completion of construction], Seoul, SMG. (In Korean).

SMG (Seoul Metropolitan Government) and Gukjeon Engineering (1968) *Yeongdong Je2gong-Gu Tojiguhoegjeonglijigu Gisuljosabogoseo* [Yeongdong the second land readjustment precinct technical report], Seoul, SMG. (In Korean).

Son, J. M. (1994) *Iljegangjeomgi Dosigyehoeg Yeongu* [Urban planning during the Japanese colonial rule], Seoul, Iljisa (in Korean).

Son, J. M. (2003) *Seoul Dosigyehoeg-Iyagi 3* [Seoul urban planning story 3], Seoul, Hanul (in Korean).

Sorensen, A. (1999) 'Land readjustment, urban planning and urban sprawl in the Tokyo metropolitan area', *Urban Studies*, 36(13), 2333–2360.

Spiller, M. (2012) 'Land management and planning legislation', in K. Wellman and M. Spiller (eds), *Urban Infrastructure: Finance and Management*, Chichester, Wiley-Blackwell, 121–148.

Stiglitz, J. E. (1977) 'The theory of local public goods', *The Economics of Public Services*, London, Macmillan Press, 274–333.

Taylor, E. J. (2016) 'Urban growth boundaries and betterment: rent-seeking by landowners on Melbourne's expanding urban fringe', *Growth And Change*, 47(2), 259–275.

Terrill, M. (2017) 'What price value capture?' (Grattan Institute Report No. 2017-05, March), Carlton, Australia, Grattan Institute.

Thu, T. T. and Perera, R. (2011) 'Consequences of the two-price system for land in the land and housing market in Ho Chi Minh City, Vietnam', *Habitat International*, 35(1), 30–39.

Turk, S. S. (2008) 'An examination for efficient applicability of the land readjustment method at the international context', *Journal of Planning Literature*, 22(3), 229–242.

UN Habitat (2018) 'Global experiences in land readjustment' (Urban legal case studies volume 7), Nairobi, UN-Habitat.

Van Der Krabben, E. and Lenferink, S. (2018) 'The introduction of urban land readjustment legislation as an institutional innovation in Dutch land policy', *Habitat International*, 75, 114–121.

World Bank (2020) 'World Development Indicators, World Bank', https://databank.worldbank.org/source/world-development-indicators (accessed 20 June 2023).

Yang, D. Y.-R. and Wang, H.-K. (2008) 'Dilemmas of local governance under the development zone fever in China: a case study of the Suzhou region', *Urban Studies*, 45(5/6), 1037–1054.

Yum, B.-K. (2019) *Seoul-Eun Eotteohge Gyehoegdoeeossneunga* [How Seoul was planned], Pajoo, Sallim (in Korean).

Zhao, Z. J. and Cao, C. (2013) 'Land transfer fees for urban infrastructure development in China' (Working Paper), Cambridge, MA, Lincoln Institute of Land Policy.

Appendix 1 Types of land value capture in implementation

Type	Rationale	Example
Betterment levies	Land value uplift by public actions such as new transport investment and rezoning	• Special assessments in USA • GAIC in Victoria, Australia
Impact fees	User-pay principle (or impact-mitigation principle) making growth 'pay its way'	• Impact fees in USA • Section 106 in UK
Public land sales/leases	Raising revenue from leasing public land and retaining a portion of land value uplift by limiting permanent privatisation of land ownership	• Transfer of land use rights in China • Leasehold in Canberra, Australia and Singapore
Public development	Retaining gains from new development within public sectors or for the public	• New towns in UK, Singapore and South Korea • Public development on publicly owned land
Land-infrastructure exchange	Value creation by serviced land that has new urban infrastructure	• Land readjustment • Land-for-infrastructure in Vietnam

Note: The table does not include recurrent land tax. These five types are mutually unexclusive.