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## A Study on the Effective Management of Public Rental Housing Maintenance

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### Abstract

**Purpose:** This study discusses efficient operation plans in terms of public rental housing maintenance in terms of LH, a major supplier. **Research design, data, and methodology:** After reviewing problems related to the maintenance and management of public rental housing discussed in several previous studies, problems in technology setting for repair maintenance costs for public rental housing, lack of public assistance for maintenance and management of public rental housing, management of housing funds, and lack of role of local governments in the supply and repair of public rental housing were derived. Based on this, the researcher conducted using literature research methods to present relevant improvement measures based on reasonable arguments. **Results:** this study presented four operational plans related to (1) realization of repair costs for public rental housing, (2) a public subsidy system for covering the maintenance costs for public rental housing, (3) efficient operation of the Housing City Fund, and (4) establishment of the public rental housing. This study aims to provide a foundation for the qualitative growth of the domestic public rental housing system. **Conclusions:** With this study, it is expected that social interest in maintenance of public rental housing centered on LH will be amplified to improve the quality of maintenance problems of public rental housing.

**Keywords :** Public rental housing, Maintenance costs, Housing city funds, public subsidy system, Direct subsidy, Indirect subsidy

**JEL Classification Code :** R11, R12, R21, R22, R31

### 1. Introduction

From 2005–2008, Korea's housing supply rate increased from 98.3% to 100.7%. In the most recent survey year, 2020, this rate has reached 103.6%, indicating a continuously increasing trend. However, as of 2020, the average replacement life of Korean houses is 25.9 years,

which is far shorter than the average replacement life of 72 years in the United States and 128 years in advanced European countries.

Meanwhile, Korea has continuously built public rental housing to promote housing stability and housing market stability for the homeless amid repeated rent and monthly rent shortages.

In 1962, 450 public rental houses were supplied to Mapo-gu, Seoul, and, as of 2021, long term public rental housing in Korea accounted for approximately 1.7 million households (accounting for 8% of all houses), which is a significant proportion of the OECD countries (Ministry of Land & Transportation, 2021).

Particularly, permanent housing provided by the permanent rental housing supply plan, which was included in the two million housing supply plan in 1989, is now 33 years old. Moreover, in 1998, national rental housing for low-income families is emerging as a significant task.

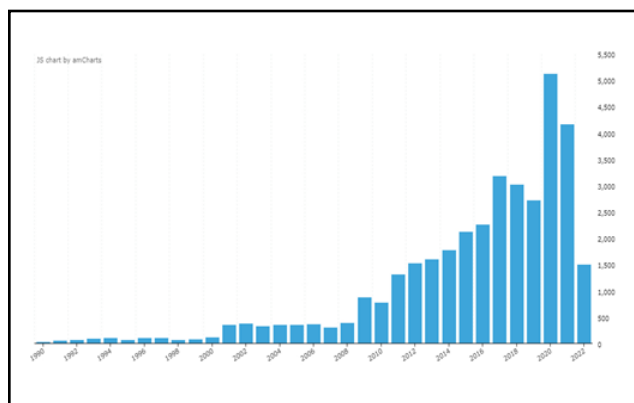
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However, the long-term repair of public rental housing, which was emphasized in a study by Lee and Kim (2005), is a chronic problem that Park and Oh (2018) have monitored. Owing to the governments lack of awareness of the need for maintenance of public rental housing, long-term repair allowances are insufficient compared to the realistic reserve price (Lee, 2019). Moreover, both public and local companies naturally suffer from financial difficulties.

Despite needing to develop various measures to improve the maintenance and management of public rental housing, previous studies on public rental housing are focused on new supply aspects and suggest related measures (Kim & Seo, 2021; Cho, 2021) or consumer satisfaction. Therefore, this study aims to discuss methods for improving the efficient operational plan in terms of public rental housing maintenance in terms of suppliers (i.e., supply and management entity of public rental housing in Korea). This study reflects on past problems, which have focused only on the quantitative expansion of public rental housing so far and suggests that it is the starting point for discussions on qualitative improvement for the operation of the sustainable public rental housing system.

## 2. Literature Review

Since the start of the transfer of maintenance of public rental housing from the Housing Act to the Apartment Housing Management Act in the same year, 125,000 domestic public rental housing maintenance issues were published in 2016, the frequency of mention in the media and public media has increased. Accordingly, studies related to the maintenance of public rental housing have been conducted since 2016 (Figure 1).



**Figure 1:** Keywords for Public Rental Housing Word Cloud Trends

Lee et al. (2018) analyzed a model for estimating the repair maintenance cost of public rental housing on the basis that the maintenance field of public rental housing is a significant factor in the management performance of business entities. As a result of the study, the repair maintenance cost per unit calculated by the number of households and area of 900–1,200 households is anticipated to be the lowest, suggesting implications for the repair maintenance cost plan.

Subsequently, Lim (2018) analyzed the difference in housing welfare performance between public rental housing and private rental housing. They found that private rental housing was inferior to public rental housing in terms of the minimum housing standard, the burden of housing expenses, and housing stability. Accordingly, the researcher suggested that to improve poor housing welfare of households living in private rental housing, expanding public rental and the housing benefit system as a government policy is necessary.

Bong and Choi (2019) conducted exploratory research on public rental housing policies in Korea using Ghekiere's typology. This study presents notable implications for the maintenance of public rental housing, and if the domestic public rental housing policy follows Generalism, maintenance of public housing should be carried out independently by Korea Land & Housing Corporation (LH), which is responsible for the supply and management of public rental housing. This suggests that to consider improvement measures in the repair and maintenance of aging public rental housing, the only way is to expand financial resources and improve the legal and institutional level to form a more efficient public rental housing supply system.

However, as in the study by Noh and Lee (2021), simply discussing the need to expand the financial resources for repair maintenance is inadequate as the management of public rental housing is an asset management concept as a public good and can be seen as a social cost. Accordingly, they emphasized that it establishing a database to take proactive measures rather than maintain aging public rental housing in terms of follow-up is necessary.

Considering other aspects, Park and Pong (2022) conducted a study on financing methods for expanding the supply of public housing. Discussions on financing methods for expanding the supply of public housing were selected as a study to be reviewed in that it is relevant to the financing method for securing repair maintenance costs for aging public rental housing. As a result of the study, even if public housing with a larger area than existing public housing is increased and the urban supply ratio is raised, the project cost is higher than before, but stable housing space caused by newly supplied public housing can be positively changed.

Lee et al. (2022) conducted a case study on remodeling the management of aging public rental housing. In terms of landscaping, green space, and space planning, they proposed measures for maintaining aging public rental housing in various ways. However, there is a limitation in that they could not present the biggest problem related to repair maintenance costs.

Based on a review of previous studies related to the maintenance of public rental housing, they affirmed that the efficiency of maintenance management of public rental housing should be improved amid a steady increase in supply and demand for public rental housing. However, the problem related to the provision of repair maintenance costs required for the maintenance of public rental housing was only discussed at the system level to analyze the model of future cost estimation or perform proactive management. Moreover, no policy suggestions were made. Based on the lack of research cases systematically presenting problems in the maintenance aspect of public rental housing. This study aims to present a framework for research analysis based on several research reports and previous studies.

### 3. Analytical Framework

The subject of this study is public rental housing supplied by LH. The analysis framework can be derived by summarizing the analysis results of previous studies (Table 1). Although each researcher has a different perspective on public rental housing, a comprehensive summary of their research results shows that a scenario is needed to reduce maintenance costs, expand housing benefits, and so on.

Based on cases discussed in terms of maintaining public rental housing as above, this study intends to examine each problem and improvement plan for public rental housing maintenance in Korea in four dimensions and propose related improvements, which are a problem in terms of setting standards for repairing public rental housing, related to public subsidies related to public rental housing, related to LH's main available funds, and the role of local governments in the spread and maintenance of public rental housing.

## 4. Problems in the Maintenance and Management of Public Rental Housing

### 4.1. Problem of Setting the Standard for Repairing and Maintaining Public Rental Housing

Repair maintenance costs are expenses incurred for maintaining facilities when maintenance continues occurring from a certain period after the completion of apartment houses (Moon & Kim, 2014). This repair maintenance cost is calculated by including it in the rental business cost, which usually accounts for the largest portion of rental business cost excluding depreciation costs and is spent in cash annually after a certain period (Kim, 2016). The problem is that, as the supply of long-term public rental housing increases, rent increase tends to be continuously suppressed according to policy stance and goals, while the cost of maintaining facilities for long-term rental housing is inversely proportional. According to a study by Kim (2016), in the case of SH Corporation, repair maintenance costs rose more than six times in 8 years to KRW 3.65 billion in 2014 and KRW 81.8 billion in 2010.

**Table 1:** Frame of Analysis

Researcher	Problem	Activation (improvement) plan	Implications
Lee et al.(2018)	Maintenance cost of public rental housing gradual accumulation	Developing scenario models to reduce repair maintenance costs	Public rental housing setting repair maintenance cost standards
Lim (2018)	Differences in housing welfare performance between public rental housing and private rental housing	Expansion of housing benefit systems	Necessity of public assistance for the maintenance and management of public rental housing
Bong and Choi(2019)	Korea's public rental housing policy is burdensome on LH according to the general stock trend	LH has developed a plan to expand its financial resources on its own to expand repair maintenance costs	Search for efficient management of LH funds
Roh and Lee(2021)	Post-response to aging public rental housing induces accumulation of social costs	Development of standardized indicators for maintenance cost management	Public rental housing setting repair maintenance cost standards

Park and Pong(2022)	Lack of financing to expand supply of public rental housing	Different public rental housing distribution management scenarios are more efficient	Public rental housing distribution management addition of local governments' roles
Lee et al.(2022)	Poor management of aging public rental housing	Design of remodeling plan in terms of green space and space planning	

However, simultaneously, the Seoul Metropolitan Government's comprehensive housing price index rose by only about 1.6 times (Figure 2).

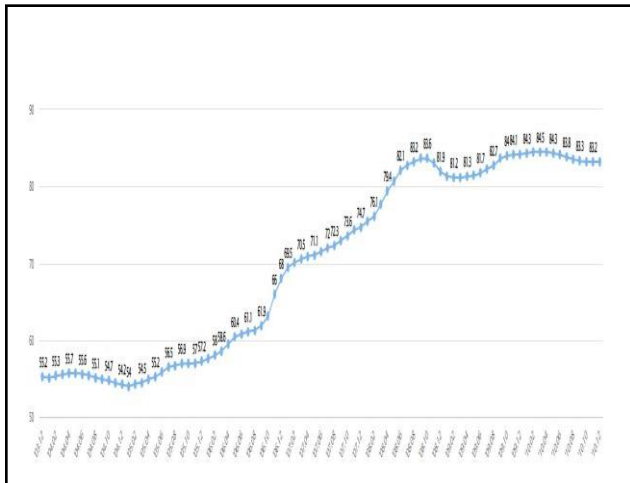


Figure 2: Seoul Composite Housing Price Index(2003-2010)

According to a research report by Jang and Song (2018), long-term public rental housing will have a significant financial burden from the 20th year onwards if the current repair maintenance cost system is established (Figure 3).

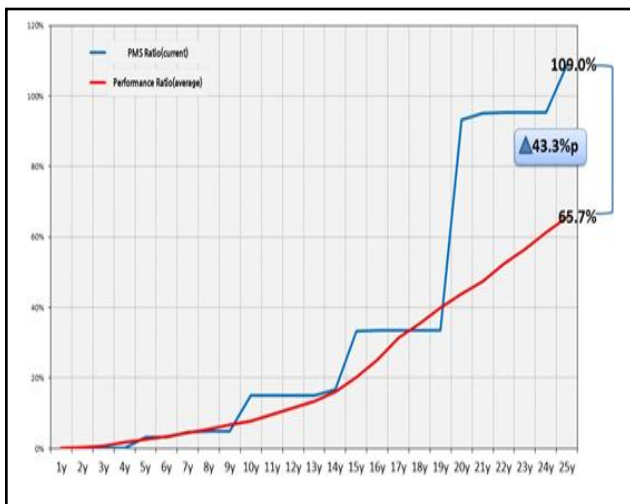


Figure 3: Annual Trend in Repair Maintenance Ratio of Public Rental Housing

#### 4.2. Lack of Public Assistance System for Maintaining Public Rental Housing

The financing structure of public rental housing in Korea is implemented according to the Special Act on Public Housing, which is provided by LH and SH, public institutions established by the state or local governments, and rents for public rental housing are determined at a lower level than general market rents. Moreover, public housing businesses have difficulty covering construction and supply costs. Accordingly, the government implemented indirect assistance to operators from the housing site development stage for the smooth implementation of the public rental housing supply.

The financial resources provided to them comprise the central government's finances, Housing City Funds, public rental housing operators' own funds, and rental deposits borne by tenants of public rental housing, which vary depending on the operator. LH is divided into investment and loan methods under the Housing City Fund Act (Figure 4), and investment is spent after the government's general accounting budget is transferred to the Housing City Fund.

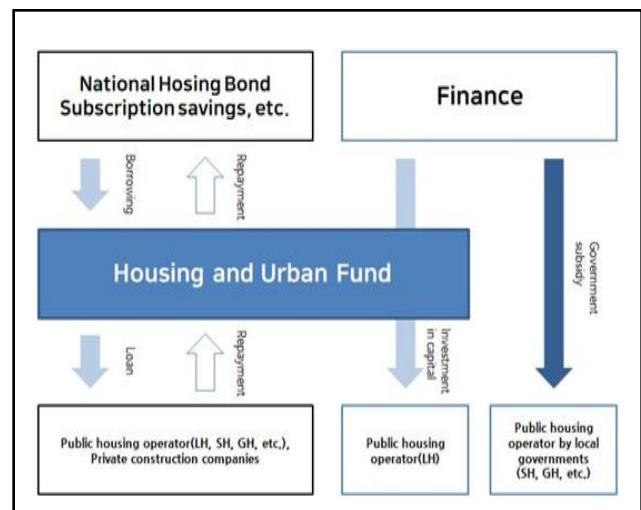


Figure 4: Conceptual diagram of investment and financing for public rental housing projects(Jang & Song, 2020)

The problem is that the unit cost of financial support comprising such investments and state subsidies does not reach the actual cost of public rental housing projects.

Long-term public rental housing requires LH, a public housing operator, to pay only 10% of total construction costs, but Jin(2015) reported that the total cost of LH's national rental housing projects between 1998 and 2013 was 67.7 trillion won (16.0%) and 21.9 trillion won (32.3%). Currently, provisions exist for the government to compensate for losses after separately accounting for public rental housing construction projects according to Article 112 of the Korea Land and Housing Corporation Act (LH Act); however, LH has not disclosed them specifically.

However, examining LH's public rental housing-related income statement (Table 2), sales are at a similar level every year, but operating profit continues to decline significantly as sales costs continue rising. Hence, their net profit declines every year, but direct subsidies for government-funded income reach less than approximately 10%, warranting the need to establish a more systematic public assistance system for them.

**Table 2:** LH Public Rental Housing Management Project Profit and Loss Statement and Government Direct Subsidy Trends over the past 3 years (unit: 1 million won)

Distinction	2021	2020	2019
Revenue (sales)	1.436.350	1.394.133	1.366.797
Cost of sales	3.215.524	2.993.085	2.655.095
Operating profit	-1.959.606	-1.739.691	-1.489.169
Current net profit	-1.828.907	-1.682.750	-1.787.285
Government-sponsored income (Direct subsidy)	137,656	188,986	120,836

#### 4.3. Inefficient Management of Housing City Fund

As of 2020, loans from the Housing City Fund, which are used as key resources in the supply of rental housing, amounted to about 12.8 trillion won per year, and more than 20 trillion won is being used, including other sales funds and lease loans. Among them, mid- to long-term funds operated under an account called spare funds, which is about 50 trillion won as of the first quarter of 2022. However, about 1.7 trillion won in short-term funds generate a 0.38% return and about 48 trillion won in mid- to long-term funds are not used to generate profits through reinvestment.

These funds are outsourced through an outsourced chief investment officer (OCIO) system and operated through a chief investment officer (CIO) institution. Dedicated

operators are continuously converted every 4 years, but the details of their technical evaluation proposals and specific evaluation guidelines are not disclosed.

Generally, OCIO evaluates proposals through the first quantitative evaluation and second qualitative evaluation, wherein matters corresponding to quantitative evaluation are evaluated based on the 3-year average and growth rate of total assets. The problem is that the total amount of operating assets and rate of increase or decrease are based on the asset management company's performance and not on the actual fund management performance. Because of these problems, OCIO continues to have agent problems, and for domestic OCIOs, they generally show low performance compared to overseas OCIOs owing to such problems (Ryu & Park, 2020).

#### 4.4. Lack of Local Governments' Role in the Dissemination of Public Rental Housing

As more than 70% of public rental housing in Korea is provided by LH, dependence on the supply of public rental housing to LH is abnormally high. Particularly, LH accounts for a high proportion of about 79.8% of long-term public rental housing (permanent, 50-year, and national rentals) for more than 30 years (Jang & Song, 2020), which shows that local governments do not have practical influence in public rental housing. Local governments accounted for only 17% of public rental housing operations, and other local governments accounted for less than 10% of public rental housing operations, excluding Seoul (66.9%), Busan (19.8%), Daegu (12.5%), and Incheon (10.5%).

As demand for public rental housing is generated in units of residential areas where people live, the role of each local government in improving local residents' quality of life in the supply and operation of public rental housing is critical. Currently, the law includes state and local governments as the main agents of public rental housing; however, the over-biasing phenomenon of urban housing construction results in entrusting both the purpose of introducing the public housing system and its responsibilities to one subject, overload. Even local Korean governments provide subsidies ranging from tens of millions to billions of won annually to support management costs such as repair, supplementation, and environmental improvement. More than half of these institutions do not disclose the results of deliberation and selection on the project on the institution's website, leading to wasted tax revenue due to opaque budget execution (National Rights Commission, 2020).



## **5. Improvement of Public Rental Housing Maintenance Management**

### **5.1. Realization of Setting Repair Maintenance Costs for Public Rental Housing**

Currently, repair maintenance costs for public rental housing in Korea are set aside at a rate of 1/40,000 of standard construction costs for permanent rental housing, national rental housing, happy housing, and long-term rental housing under special repair allowance. This means that all apartment buildings and facilities are viewed similarly, ignoring the characteristics of each apartment house and simply calculating the average amount by region to calculate repair maintenance costs.

Accordingly, to realize the repair maintenance cost of public rental housing, establishing standards that reflect changes in each social economy is urgent. Standards should be prepared to reflect the market transaction unit price of building materials required for the maintenance and management of public rental housing, and establishing standards to prepare progressive repair maintenance costs in consideration of the rate of depreciation is necessary. Additionally, a standard construction cost calculation standard that reflects housing characteristics, such as the number, area, and region of public rental housing, must be prepared to prevent deficits arising from maintaining the management of public rental housing operators.

### **5.2. Establishment of a Public Subsidy System for the Maintenance of Public Rental Housing**

Public assistance systems for the maintenance and management of public rental housing are largely divided into direct and indirect assistance, and related suggestions are presented. For direct assistance, preparing analysis data on the size and causes of losses is necessary for preventing project losses occurring in the management sector of public rental housing. As a representative solution, application of public service observation (PSO) proposed by Jin (2015) can be considered. PSO is called the mandatory national compensation system for providing public services and is a system wherein the government directly compensates for losses in policy projects implemented for public purposes. Particularly, public rental housing is subject to PSO application in terms of building a housing safety net for the vulnerable, and measures are needed to maintain more stable public rental housing by establishing loan support standards in terms of maintenance. In Canada, for example, 54.4 million out of 600,000 public rental housing inventories in Canada were subsidized through operational agreements, which are jointly borne by federal, state, and municipal governments (Pong, 2011).

In terms of indirect assistance, including the residual value incurred after the legal lease obligation period for houses constructed with public funds is necessary in calculating financial losses. While no policy considerations are related to the residual value that occurs after the legal lease obligation period ends, the increase in land price until the end of the public rental housing project is all attributed to the public housing business operator. The Netherlands, which has a long history of public rental housing among European countries, decided not to subsidize housing associations in the 1990s, which were suppliers of public rental housing at the time, by actively utilizing rental assets held by public housing operators. Of course, such extreme measures should not be followed by the fact that they can greatly impair the safety of business operations of domestic public rental housing operators. However, in line with the Dutch government's goals considering the preparation of residual measures such as the use of residual value to enable public rental housing businesses to operate stably and independently is necessary.

### **5.3. Improvement of Housing City Fund Management**

To operate the mid- to long-term Housing City Fund more efficiently, which is currently left with a large amount of surplus funds, measures are needed to solve the OCIO's agent problem. Particularly, the longer the contract period and lower the fund expertise, the higher the probability of agent problems. According to a systematic empirical analysis of investors' portfolios with prospective utility in the domestic capital market, the average evaluation period for prospective utility is 16 months (Shin et al., 2020).

Particularly, despite the current OCIO contract period of 4 years, the current operating remuneration system pays performance remuneration in addition to basic operating remuneration (Nam, 2019). However, in the current system, which complements low-use remuneration such as performance compensation, this may cause an unexpected moral hazard, which is the risk of investing in risky assets to present good short-term performance. Therefore, to develop an OCIO structure to generate stable profits, the government has attempted to determine the performance compensation system in the direction desired by the OCIO consignor. Overall, the method of operating an oligopolistic OCIO system consisting of NH Investment & Securities and Mirae Asset Management, and the method of operating OCIO entities subdivided for each asset can also help increase the operational efficiency of the Housing City Fund.

#### 5.4. Establishment of the Role of Local Governments in Public Rental Housing

One important improvement measure is the establishment of the role of local governments in terms of the spread and management of public rental housing. Apart from immediate implementation of housing development and supply by local governments, efforts to identify local residents' demand for public rental housing and provide data for local housing supply plans could reduce operating and planning costs.

Additionally, considering internalization of subsidy projects currently supported in the name of apartment management is necessary. For an objective and transparent examination of apartment housing management support projects, appropriate evaluation standards for each local government are prepared, and measures are needed to reflect these in the support ordinance so that substantial public housing management subsidies can be implemented. A local subsidy committee can be formed to systematically manage the operation of subsidies for each local government and will be able to secure funds to cover loss of long-term rental housing expenses incurred by the Korea Housing Corporation.

## 6. Conclusion

This study attempted to discuss efficient operational plans in terms of public rental housing maintenance from the supplier's perspective. Hence, after reviewing problems related to the maintenance and management of public rental housing discussed in a number of previous studies, research was conducted using literature research methods to present related improvement measures based on reasonable arguments. The main results of this study are summarized as follows.

As a result of establishing and examining the current problems in terms of public rental housing maintenance, the following four dimensions were presented: setting standards for repair costs for public rental housing, public subsidies related to public rental housing, and role of public rental housing. In this regard, the researcher suggests the following improvement measures for each problem:

First, establishing standards that reflect changes in the social economy in the measures related to the realization of the repair maintenance cost of public rental housing is a key concern. Second, in the plan related to the public subsidy system to cover maintenance cost of public rental housing, LH, the main body in charge of maintaining public rental housing, proposed operating a direct subsidy system to increase the construction cost of public rental

housing. Subsequently, in indirect assistance, a plan is proposed to include residual value generated after the legal lease obligation period for houses constructed with public funds in the calculation of financial losses. Third, to operate more efficiently the mid- to long-term Housing City Fund, which is currently left with a large amount of surplus funds, the government introduced a method of operating OCIO agents. Fourth, in the plan to establish the role of local governments in the distribution and maintenance of public rental housing, local governments should make independent efforts to identify the demand for public rental housing, provide data under regional housing supply plans, and strengthen subsidies.

Korea's public rental housing market is currently mature. Existing real estate policies have focused only on quantitative aspects and have somewhat neglected the problem of maintenance related to existing public rental housing. The problem of maintenance costs of public rental housing is gradually increasing. Permanent rental housing provided by the permanent rental housing supply plan, which was included in the construction plan of two million housing units in 1989, was introduced for long-term rental under the IMF in 1998.

## References

- Bong, I., & Choi, H. (2019). A study on Korea's public rental housing policy using Ghèkiere's social housing system typology. *Housing Studies Review*, 27(1), 31–51.
- Cho, H., & Lee, C. (2021). A study on the dualization of supply system for public rental housing. *Korea Real Estate Society*, 39(4), 157–173. <https://doi.org/10.37407/kres.2021.39.4.157>.
- Jang, I., & Song, K. (2018). A study on ways to improve the REITs business structure to expand the supply of long-term public rental housing. *A study report by the Korea Land and Housing Corporation*, 2018(85).
- Jang, K., & Song, M. (2020). Analyzing public rental housing supply trends and policy tasks. *Legislative Policy Report*, 65.
- Jeon, G. (2015). Case study on the financial solvency of local public enterprises. *Journal of Cadastre & Land informatiX*, 45(1), 75–97.
- Jin, M. (2015). Fiscal support study for the compensation of operating losses in public rental housing: focusing on the applicability of PSOs. *Research Report of the Korea Institute of Land and Housing*.
- Kang, B. & Seo, J. (2021). A study on the improvement of public rental housing system: focusing on the methodology for supplying public rental housing. *Journal of the Korea Real Estate Management Review*, (24), 159–184. <https://doi.org/10.37642/JKREMR.2021.24.7>.
- Kim, S. (2016). An empirical analysis of facility maintenance cost of public rental housing. *Seoul Studies*, 17(1), 83–97.
- Kim, S. (2014). A Study deficit income and expenditure improvement of public rental housing business in local public corporation. *Journal of Budget and Policy*, 3(1), 263–286.

- Kim, C., Lee, J., & Choi, H. (2021). Improvement of youth housing support system and public rental housing: focused on the residential satisfaction of youth group. *The Korean Journal of Local Public Enterprises*, 17(2), 107–135.
- Lee, H., Choi, S., & Moon, J. (2022). A case study on remodeling for old public rental housing management. *Journal of the Korean Housing Association*, 33(1), 9–18.
- Lee, H., Kim, S., Kim, D., & Cho, H. (2018). Forecast of repair and maintenance costs for public rental housing. *Journal of the Korea Institute of Building Construction*, 18(6), 621–631.
- Lee, H., & Kim, Y. (2005). A study on the problem analysis and improvements of long-term maintenance for the permanent rental housing in Korea. *Korean Journal of Construction Engineering and Management*, 6(1), 169–176.
- Lee, J. (2019). An analysis of the influence factors on the gap between standard unit price and actual saving unit price of long-term repair reserve. A master's thesis from *Seoul National University Graduate School of Public Administration*.
- Lim, S. (2018). The difference of housing welfare outcomes between public rental housing and market rental housing. *Korea Social Policy Review*, 25(3), 75–101. <https://doi.org/10.17000/kspr.25.3.201809.75>.
- Ministry of Land, Infrastructure and Transport (2021). *The inventory rate of long-term public rental housing is 8%*. OECD No. 9, South Korea Policy Briefing, September 21, 2021, from <https://www.korea.kr/news/policyNewsView.do?newsId=148892502>
- Moon, S., & Kim, S. (2014). An empirical analysis and forecasting on the facility maintenance of long-term housing. *SH Urban Research & Insight*, 4(2), 31–37.
- Nam, J. (2019). Improvement task for establishing the OCIO system in Korea. *Korea Capital Markets Institute*.
- National Rights Commission (2020). Resolution of the national rights commission. *Proposition No. 2020-488 to increase transparency in local government apartment management subsidy projects*.
- Park, I., & Oh, J. (2018). A study on the recognition of management satisfaction and management method of residents of public rental housing: focused on the residents of low-rise multi-family public rental housing in Seoul. *Journal of the Korean Society of Cadastre*, 34(4), 1–14.
- Park, J. & Pong, I. (2022). A simulation analysis of financing public housing provision. *Housing Studies*, 30(2), 107–139.
- Pong, I. (2011). Comparative study on the supply system of public rental housing in Canada and Korea. *Policy Research Report of the Gyeonggi Research Institute*.
- Roh, S. & Lee, E. (2021). The proposal of asset management indicators for public rental apartment. *Journal of the Korea Institute of Building Construction*, 21(3), 221–229.
- Ryu, D., & Park, D. (2020). Agency problems related to outsourced chief investment officers. *Journal of Money & Finance*, 34(3), 33–60. <https://doi.org/10.21023/JMF.34.3.2>.
- Shin, J., & Lee, D. (2020). Evaluation period and agency problem in outsourced chief investment officer(OCIO). *Journal of Derivatives and Quantitative Studies*, 28(1), 135–157. <https://doi.org/10.37270/JDQS.28.1.5>.
- Shin, Y., & Lee, Y. (2017). Socio-integrative planning characteristics of foreign and domestic public rental housing: focus on the USA, Netherlands and Korea cases. *Korean Institute of Interior Design Journal*, 26(5), 52–64.