How to Guarantee Effectiveness of National Rental Housing Policies Applying SD Approaches?: Focused on Residential Development

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Abstract

This research analyzed co-related reasons from the perspective of main agents and tenants to obtain the Capacity of Developable Land to secure the effectiveness of the plan for the supply of National Rental Houses. Causal Loop Diagram was used to analyze the related factors, and behavioral analysis on the change of supply was carried out according to the ratio of the government investment.

As a result, first, we can figure out that the government capital investment is the most important factor for the harmonious supply of the National Rental Houses. Second, main agents are closely connected with each other. That is, The effectiveness of the National Rental Housing supply will be achieved when the government secures the capital for this plan, main agents secure the supply, and the tenants act as responsible consumers.

Key word: National Rental Housing, Government, Main agents, Tenants, Dynamic Behavior analysis

1. Introduction

1.1 Raising questions

If the basic needs of life, such as, food, clothing, and shelter, are not satisfied for someone, it means that she/he is not living under the condition of the equal right. In case of Korea, even if the living of people has improved, the number of households that are not given the minimum living standard,

which is an index of living, is up to 2 million 60 thousand[1]-13% of the whole households. This index has reduced by 1 million and 280 thousand compared to the index from the year of 2000 which was 3 million 340 thousand-24.4% of the whole households; however, the ratio of households that do not meet the standard of the minimum housing is high shown as 65.9%. In addition, if we look into the proportion of the home ownership in 2005, South Korea had 55.6%. It is a lot lower than United States-68.3%, United Kingdom-69.8%, and Japan-61.2% of the home ownership.

Concerning these aspects, National Rental Houses have been provided to those who are making 50%~70% of the monthly income of urban workers. Now, the problem is that the former National Rental Housing supply plan from 1998 to 2012, which was to produce 1 million houses, has been postponed to 2018.

Changes in the numbers of supply could happen because of the variables from the political factors that will occur when long term supply plan is processed-for instance, change of the land use plan, amendment of legal factors from the effectiveness of the policy- This cannot guarantee the living of people who manage their lives with minimum income.

For these reasons, with the tendency of the reduction in the supply of National Rental Housing compared to the former plan, government needs to make a solution to settle down the minimum income class people. Policy for the supply can be variable depending on the decision made from the government. In this case, we should secure the effectiveness of the plan from examining the relationships among those factors to locate the fundamental reasons.

1.2 Objective of this research and the method

The objective of this research lays on understanding the factors that should be considered among the government, main agents, and the tenants to secure the effectiveness of the National Rental Housing plan focusing on the housing site plan.

The procedure of this research includes ①Study on the condition of the present National Rental Housing plan, ② Study on the existing housing sites plan, ③Making Casual Loop Diagrams to secure housing sites, ④Performed simulations using Vensim DSS which is a System Dynamic software, ⑤Proposal of a policy for the effectiveness of the National Rental Housing plan.

2. Supply of the present National Rental Housing and it's features

Main purpose of the National Rental Housing plan is to make a better living condition for second-class citizen by providing them with low-priced houses. It also helps low-income households to stabilize their living from this

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[1] based on the 2005 population census.

assistance in purchasing houses.

The beneficiaries of the National Rental Houses are extended to the level of the middle-class citizen on account of the change in the recognition of living. However, low-income households are the main beneficiaries.

2.1 Present condition of National Rental Housing supply

This plan was started from 1998 as a part of 100 national matters in the people's Government era. The administration made a decision to build 50 thousand National Rental Houses in Oct. 1998 encouraging to build Rental Houses. In May 2002, under the chairmanship of the President, the meeting on National Rental Housing in the presence of the Minister of Economy led to changing the former 500 thousand supplies of National Rental Houses up to 1 million.

In September 2003, houses were built on the basis of low-income to middle-income household support plan. These houses were supported by the government ranging from 10~40% to build 36.4~59.5m^2 houses. These houses were to be rented not less than 30 years, so it was planned to provide 1 million houses from 2003 to 2012.

National Rental Housing was integrated into [Bogeumjari Housing][2] since the September 2008 amendment of the housing site inducement law, as a result, this plan is in the process of providing 400 thousand houses in total from 2009 to 2018. Basically, the total length of time for this plan has been stretched out, and 624,285 houses have been provided by 2008.

Table 2.1 National Rental Housing Achievement by the end of 2008(unit: household)

'98	'99	'00	'01	'02	'03
2,501	20,226	10,009	35,227	50,819	71,791
'04	'05	'06	'07	'08	total
91,423	96,183	88,999	89,228	67,879	624,285

• Data: Ministry of land, Transport and Maritime Affairs, Housing Business Handbook: 2009(Gwacheon: Ministry of land, Transport and maritime Affairs, 2009: 395).

We can think of some reasons why this plan has been prolonged. First, there are conflicts brought up from the tension between the local government and the local residents. Next, there is a conflict caused by strengthening the limited development district between many environmentalists and local residents. As a result of these reasons, annual supply of the National Rental Housing can't meet the expected numbers of the houses.

The existing annual plan for the supply ranges from 80 thousand to 110

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[2] Bogeumjari housing 1) Build in preferred locations near cities such as metropolitan areas, GB.   2)induce rapid supply of housing by public participation in the construction. 3) low-income people should be able to afford the price of houses 4)It was planned to customize houses for the future occupants. National Rental Housing, Permanent Rental Housing, and the long-term rental housing are included in this plan.

thousand houses. Goal of this plan, which is declared in 2003, is to provide a million houses from 2003 to 2012. For now, the supply cannot keep up with demand.

Table 2.2 National Rental Housing Construction Plan(unit: 10 thousand household)

	'03	'04	'05	'06	'07	'08	'09	'10	'11	'12	Total
Ⅰ Type (the Pyung Types: 14 ~ 15)	2.4	3.0	3.0	3.3	3.3	3.0	3.0	3.0	3.0	3.0	30
Ⅱ Type (the Pyung Types: 16 ~ 18)	2.4	3.0	3.0	3.3	3.3	3.0	3.0	3.0	3.0	3.0	30
Ⅲ Type (the Pyung Types: 18 ~ 20)	3.2	4.0	4.0	4.4	4.4	4.0	4.0	4.0	4.0	4.0	40
Total	8	10	10	11	11	10	10	10	10	10	100

• Data: Ministry of Construction & Transportation in Korea, the Housing master plan: 2003~2012(Seoul: Korea Development Institute, 2004·1: 52).

The drop in construction achievement leads to questioning the effectiveness of this NRH supply plan by reason of the increase in performance-based allotment. If we compare the construction achievement of the local government with the Korean Housing Corporation, who are the main agents in this project, we can see that there is relatively a big gap in the construction supply. This gap is due to the avoidance in construction from the civil complaints caused by the disagreement among local residents. The local government running out of capital can also bring about this gap. Local governments have poor performance in the NRH supply on account of these aspects that have impacts on twilight zones causing the drop in tax revenue.

Table 2.3 NRH construction achievement for each agent(unit: household)

	'98	'99	'00	'01	'02	'03
Local Government	-	-	-	-	2,202	8,290
KNHC	2,501	20,226	10,009	35,227	48,617	63,501
	'04	'05	'06	'07	'08	Total
Local Government	6,108	16,317	7,063	6,552	9,737	56,269
KNHC	85,315	79,866	89,749	103,758	75,145	613,914

•Data: Excerpts from the Housing Business Handbook: 2009.

Korean Housing Corporation is handling this project from loosening the Greenbelt areas to solve the lack of housing sites. In this case, disparity of supply will be shown depending on the regional gap of housing sites. Therefore positive support from the local government is needed to allocate

National Rental Houses to proper housing sites, and this will help solving the regional disparities. Besides, it will make acquirement of housing sites easier.

Table 2.4 national Rental Housing for each city and province by the end of 2009(the case of KNHC) (unit: household)

	The first approved househld
The whole area	604,049
Seoul	1,035
Busan	21,021
Daegu	26,035
Incheon	38,546
Gwangju	26,401
Deajeon	19,495
Ulsan	11,377
Gyeonggi-do	254,598
Gangwon-do	22,152
Chungcheongbuk-do	29,585
Chungcheongnam-do	28,103
Jeollabuk-do	29,044
Jeollanam-do	20,578
Gyeongsangbuk-do	22,635
Gyeongsangnam-do	45,875
Jeju-do	7,569

•Internal date of Korea national Housing Corporation(KNKC), business approval achievement in Housing Construction: 2010.

2.2 National Rental Housing Supply plan

The present government is going to build and provide 52 thousand houses in 2010 to accomplish 1 million National Rental Housing supply. Considering unsold apartments in non-capital areas, it was decided to reduce the number of supplies to non-capital areas-40 thousand houses, which is 80%, will be allocated to the capital areas, and 10 thousand, which is 20%, will be allocated to non-capital areas.

Table 2.5 2010 Homebuilding Plans for each city and province

(unit: 1 thousand)

	National Rental Housing and others (Permanent Rental)
the whole area	63.8(12)
Capital regions	51.1(9.6)

Seoul	13.7(0.8)
Incheon	6.6(1)
Gyeonggi-do	30.8(7.8)
Metropolitan City	1.5
Busan	0
Daegu	0.4
Gwangju	0.8
Daejeon	0
Ulsan	0.4
Province(道)	11.2(2.4)
Gangwon-do	1.7(0.3)
Chungcheongbuk-do	1.1(0.3)
Chungcheongnam-do	4.4(1)
Jeollabuk-do	2.6(0.8)
Jeollanam-do	0
Gyeongsangbuk-do	1.4
Gyeongsangnam-do	0
Jeju-do	0

•Data: Ministry of land, Transport and maritime Affairs, the Housing master plan(Gwacheon: Ministry of Land, Transport and maritime Affairs, 2010: 37).

3. Plan to secure housing lands

3.1 Direction of government NRH plan

According to the direction of government NRH plan[3], every year around 10,000,000-pyeong will be designated as Public Housing Site, and more than 25% of it will be used for the National Rental Housing. The present government has been trying to secure the land for National Rental Housing from allocating more than 50% of houses built in the reserved areas of Greenbelt cancellation to National Rental Housing. All the system related to this plan will be ameliorated to secure the housing sites for the NRH as well. A certain proportion of National Rental Houses will be built under Urban Redevelopment Project, such as, Housing renewal and improvement of the housing environment, and some proportion of lands for NRH will be secured under Urban Development Project as well. Free Economic Zone and industrial complex will also be allocated a certain proportion of National Rental Houses. Government will encourage in developing idle lands such as deserted public facility lands, and purchasing multiplex houses to keep up with the demand of housing site.

As stated by the 2009 Bogeumjari Housing plan from Ministry of Land, Transport and Maritime Affairs, government has been exploiting limited

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[3] Quoted from a web reference of National Rental Housing, Ministry of Land, Transport and Maritime Affairs

development districts, redevelopment zones, and new town areas to accomplish the plan to supply 1 million 500 thousand houses by 2018; however, mostly 500 thousand houses will be built in new town areas, and only 300 thousand will be allocated to the limited development districts where consumers prefer to other areas.

3.2 Current state of support for the housing site supply

Support for the National Rental Housing consists of support for the housing site supply, National Housing Fund, and support in tax. As stated by the business guideline for land development Chapter IV, Article 17, and Article 12, Section 1, of the legislation for public rental housing, lands for the National Rental Housing, which should be rented for more than 30 years, are to be provided more than 25%. If the promoter wants to provide the housing site, Article 18, Section 1 of the same law states that the supply price of the housing site, and the way of it will be decided depending on the area of the housing for each type.

Table 3.1 Rental Housing sites by the supply price (unit: %)

		Capital Regions/Busan Regions	Increase or Decrease	Others area
site cost (the below)	60㎡ below	60	60	60
	60㎡ ~85㎡	C: 85 /B: 80	70	60
site cost (the above)	85㎡ ~149㎡	Appraised value		

•Data: Ministry of Land, Transport and maritime Affairs, Land development business guideline 2009: 31)

3.3 Housing Site securement plan in research

If we look into former plans for the housing site securement, there were several plans suggested so far; plan to use negotiable zones in the Limited development distict(Kim, Ho-cheol, Park Shin-young, 2003; Ju, Myeng-gul, 2004; Go-cheol, 2005), plan to provide incentive to local government and residents, plan to utilizing idle lands such as Urban Planning Facilities delayed for a long time, and a plan to do small scale purchases, leasing, and using various ways(Jin, Jeong-su, 2005), asking for the necessity of broad area consultative group(Kim, Gab-sung, Park, Shin-young, Kim, Guen-yong, 2005), plan to have Korean Housing Corporation construct National Rental Houses in urban areas, and keep the current way of housing site development.

Kim, Ho-cheol · Park, Shin-young(2003) said that there are positive aspects, for example, not only occupants will be able to make living from

finding new jobs near metropolitan areas, but also the government will be able to solve the housing problem of low-income households by providing them National Rental Housing on the right time despite the fact that the current way of developing housing site and utilizing Greenbelt area will cause destruction of environment, and population concentration in the capital area.

Ju, Myeng-gul(2004) stated that housing supply rate, work distance with multiple employment centers, accessibility of public transportation and infrastructures, and land price should be considered over all to achieve the effectiveness of this plan before deciding locations for NRH if the negotiable zones in the limited development districts are going to be used. That is, these following features should be considered for the target class people of the National Rental Housing program to be able to move in; negotiable zones in cities, towns, and boroughs, negotiable zones where there are many low-income class population so that they can have reasonable work distance, locations that have high accessibility of public transportation such as bus, subway, etc, and negotiable locations with low land price to supply Rental House with lower price. However, NIMBY phenomenon could be found when limited development districts are used as National Rental Housing locations, and also the delayed development of housing site will be an obstacle.

Choi, Soo(2005) stated that housing sites for National Rental Houses should be from local area seeing that they are going to be provided to local residents. These following ideas were suggested for each reason; location should be chosen considering proper distance to acquire high occupancy rate, multiple complex and townhouses should be used to secure housing sites, lands that have changed their uses should be used as housing sites.

Go, Cheol(2005) stated that developable lands near non-metropolitan areas should be used to secure enough housing sites. Reserved attitude toward the construction of National Rental Housing and also the resistance of the local residents should be overcome. If the National Rental Houses set in, local governments will avoid building National Rental Houses since they cannot handle the costs for the infrastructure with their low local tax revenue. If they push the plan economic contraction could occur in the region. Consequently, residents living in the limited development districts will be against to the fact that the compensation money is decided when they didn't have the right of their property. Thus government has to pay highly rated compensation money to acquire housing locations in the limited development district, and also the existing residents in those areas should have to deal with the declining price of their property and the decrease in quality of living environment owing to the fact that low-income class people will come into this area. Conflict between local residents and local government is necessary in this case.

Jin, Jeong-su(2005) said that we would not have to worry about slumism

inasmuch as the beneficiary of National Rental Housing is extended to the class of people whose average income is less than 2,100,000 won. It's started with the idea that people think of National Rental Hosing area as permanent rental houses areas for low-income households. It's suggested that the government should actively promote the purpose of this plan.

Kim, Gap-sung · Park, Shin-young · Kim Geun-yong suggested that cooperation of the local government and central ministry is required for the use of negotiable zones in Greenbelt area, and also the Land Use Restriction should be alleviated. It's also the necessity of broad area consultative group is suggested.

Park, Shin-young(2006) said that NRH plan in metropolitan area is possible when the Korean Housing Corporation secures proper housing sites. It's also suggested that purchasing multiplex houses can widen the supply of acquired public rental multi-family housing.

3.4 Exploring Research Results and Related Variable

After the former result from the analysis of the housing site, the following table 3.2 shows variables that affect the acquirement of National Rental Housing sites. These variables are negotiable depending on how deep the government is involved in this plan.

Table 3.2 Search of variables related to acquirement of the housing sites for NRH

	the Consideration
Related variables	the government, the Main agents, the Tenant, local resident, Environmental Organizations
	Secured housing site rate, jobs-to-housing, life-area, the intention to enter housing, friction between a local government and a resident, friction with environment organization, operating broad area consultative group
	the adjusted area in Green Belt, the change of land use in city, small scale developable land
	finance, ability of new residents to pay rent, land use price, according to the Green Belt compensation with the adjustment of restricted development zone, housing price

4. Causal Loop Diagram for the acquirement of the housing sites

4.1 Analytical Framework

The purpose of the model is to secure the effectiveness in NRH supply, so the relationship of each factor affecting the rate of housing site acquirement will be drawn from studying various factors in the structure. It is to secure the effectiveness of NRH supply, and those factors will be drawn from the perspective of government, main construction agents, and expected residents.

The relationship between the subordinate system and the variables drawn from the current research were analyzed from Casual Loop structure providing that each variable was drawn under the condition that the influence factors have even performance, and fluctuation driven by external factors is flat.

4.2 Casual Loop Diagramming

4.2.1 Government related structure

• Loop R1(Plan to improve living standard): Local economy-Procurement of jobs for low-Income class-Household numbers of minimum living standard-Living condition-Local economy

• Loop R2(Plan to secure housing site): Operating broad area consultative group-Procurement of housing site-Quantity of NRH construction-Household numbers of minimum living standard-Living condition-Local economy-Investment rate of government capital-Government subsidies-allotment of housing site development-Procurement of housing site
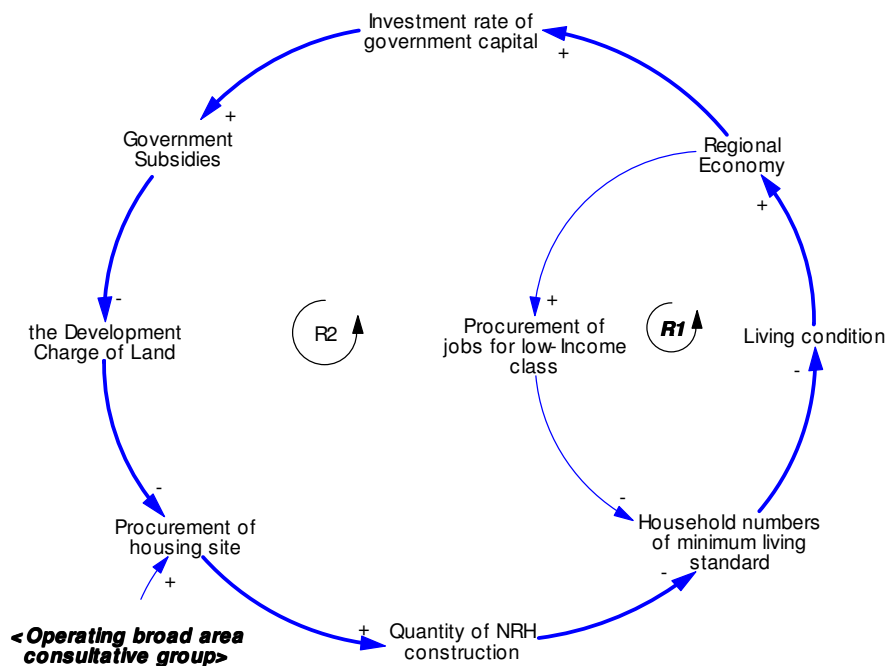

Figure 4.1 Causal Loop Diagram of Government side

What the government pursuit is to increase the quantity of NRH construction for the settlement of low-income class.

Figure 4.1 is the plan to secure housing site. It shows that the government has to operate broad area consultative group to enhance the effectiveness of work in local governments and central ministry, and also a plan for the construction of management system should be considered. Government also has to be the principal agent in providing capital for this plan. That's because of the possibility that local government and the Korean Housing Corporation could downsize the quantity of the NRH supply if they face the highly rated price of housing sites compared to the market price. It could happen because there is not much outcome when it comes to the construction of long-term rental houses.

4.2.2 Main agents related structure

• Loop R1(Procurement of housing site): Government subsidies-Government investment rate-allotment of housing site development-secured housing site rate-ratio of using low-income living area housing sites- Procurement of jobs for low-Income class-Wages of low-income class-Local economy- Investment rate of government capital
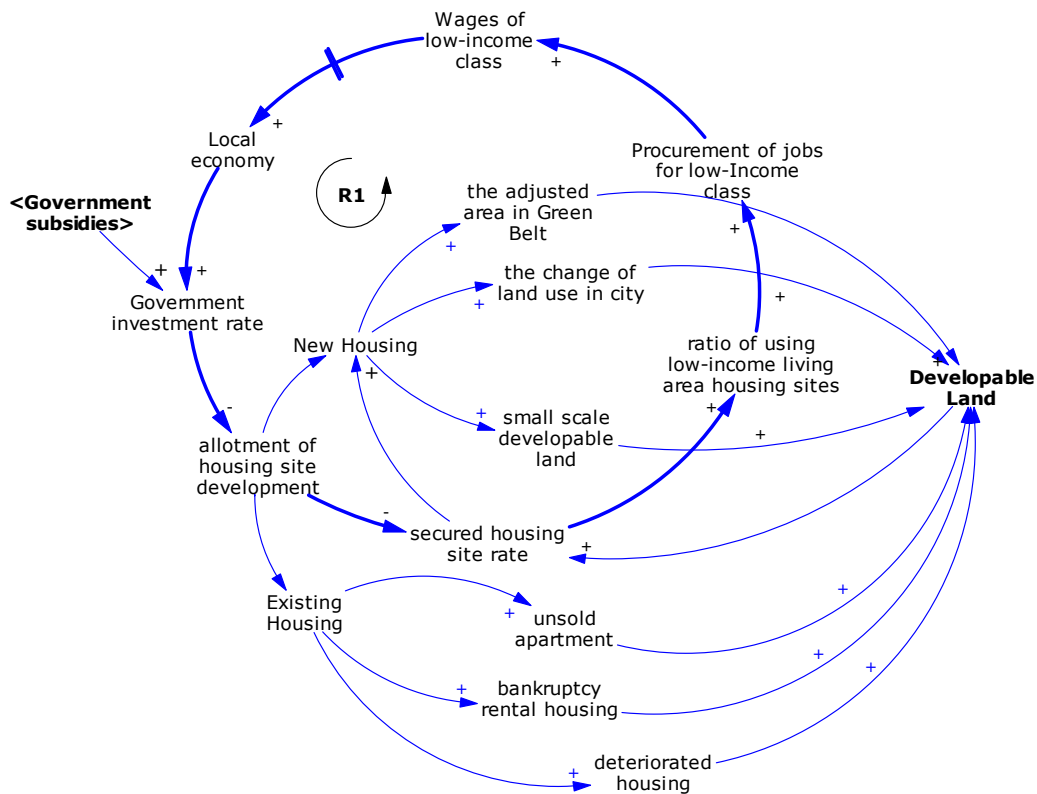

Figure 4.2 Causal Loop Diagram of the main agent side

Local governments and Korean Housing Corporation can receive government subsidies for the housing site development. These subsidies are decided from the gap between the actual supply price and the production price. If low supply price is set, agents can reduce their housing site development charges.

By raising the government capital rate according to land financial requirements, each agent can either seek to build new houses utilizing negotiable Greenbelt areas, properties that could change the usage purpose, small scale developable properties, or secure developable locations using the existing houses, unsold rental apartments, private bankrupt rental houses, and substandard housing of the elderly.

Secured developable locations will have positive influence on settlement of living by easing the procurement of the housing site, allowing low-income class to come into the urban zone of life, and by letting people to find their jobs easier than those who live in other areas. It will lead to the improvement of living standard, and the economy will grow in general. The improved economy will help government to invest more capital to the NRH plan. After all, It is possible to say that the secured housing of low-income households will be better or worse depending on whether the government actively intervene in this plan or not.

4.2.3 Tenant related structure

- Loop R1(Plan to secure housing site): Investment rate of government capital-Subsidies for rent-Ability of new residents to pay rent-Ratio of secured housing site of local government-Rate of people rented in urban zone of life-Amount of secured job-Local economy- Investment rate of government capital
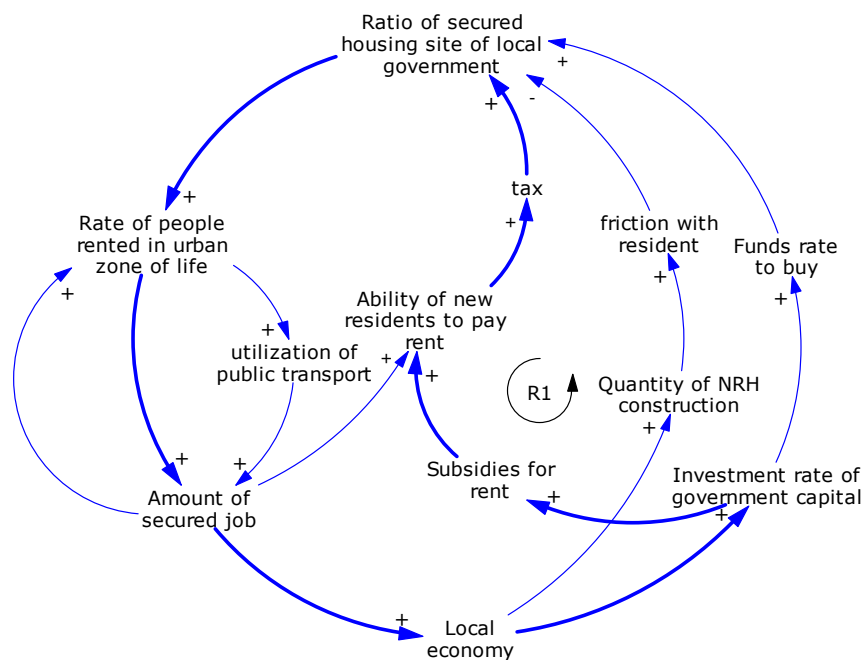
Figure 4.3 Causal Loop Diagram of the expected tenant side

In case of National Rental Housing, people are entitled to be given the National Rental Housing depending on their ability to pay the rent. People of the minimum income class can easily get affected by the income related factors, residence area and the work area should be close to make a effective zone of life. Since low-income class people have high frequency in using public transportation, reduction in transportation fare should also be considered.

If the subsidy for the minimum income class is aided depending on the rate of government capital investment, these people will be able to reduce their expenditure, and they will be able to keep a balanced life. It could also suggest plans on how to mitigate the conflict among local residents. Settled life of residents will prompt increased tax revenue, and it makes the rate of secured housing site go up. This plan shows the cycle of the NRH construction in the urban zone of life.
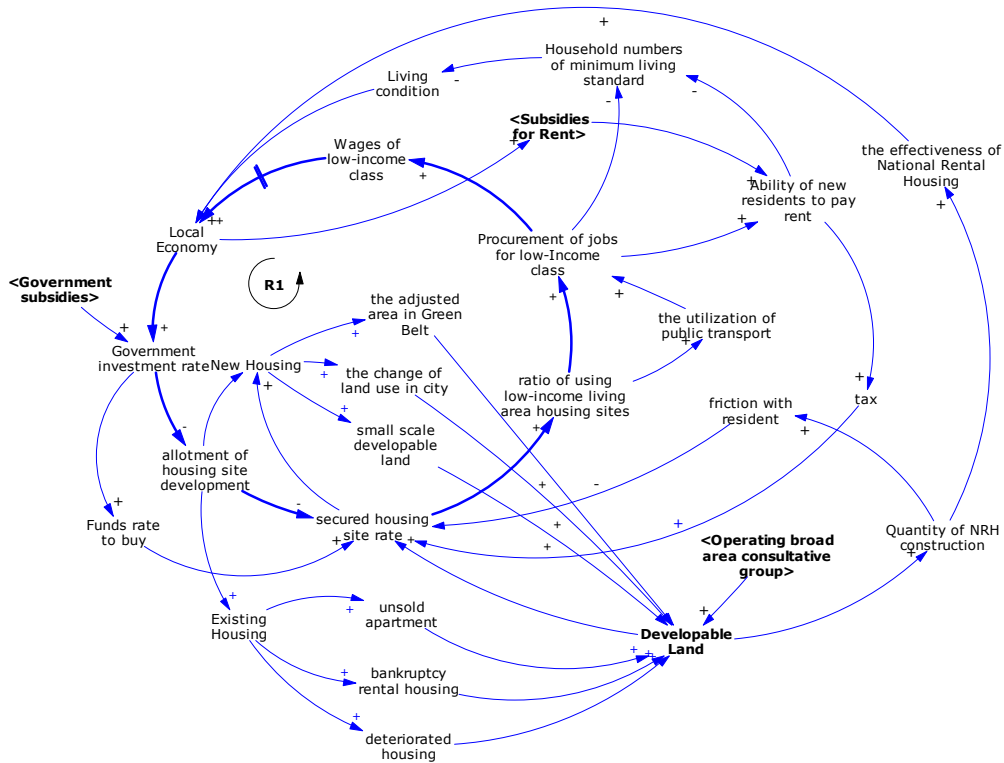

Figure 4.4 Integrated Model for the secured National Rental Housing site

Causal relationship from the integrated Causal Loop Diagram shows that the relationship of the agents is not independent, but it's closely related. Close interaction in this relationship affects the plan of National Rental Housing supply.

For this reason, Government has to focus on providing the capital; main

agents have to focus on securing supply of NRH; new residents should try to make the living environment better as supervisors of their complex. And then, these new residents will be able to enjoy the settled life in the urban zone of life. Interaction in this relationship can be thought as a plan to secure the effectiveness of National Rental Housing.<refer to figure 4.4>

4.3 Simulation

Causal Loop Diagram was converted into a computer simulation to see how it's going to work out.

A proper tentative parameter was given based on the existing research to realize this model. It was to minimize the subjective judgment. The period of this simulation was from 1998 to 2008. Quantity of the supply, which is performance record, was analyzed. It's not only impossible to collect numbers appropriate for the goal of this research, in case of National Rental Housing, but there is also a limitation of involving relationship of abstract and qualitative variables rather than the relationship of quantitative variables.

This research didn't use an accurate numbers, but it's in accord with the point of this research to analyze the change of dynamic formation.

Figure 4.5 is a Stock/Flow Diagram drawn after considering the supply of the National Rental Housing with the government subsidy. It shows a flow the relationship of factors focusing on the subsidy.
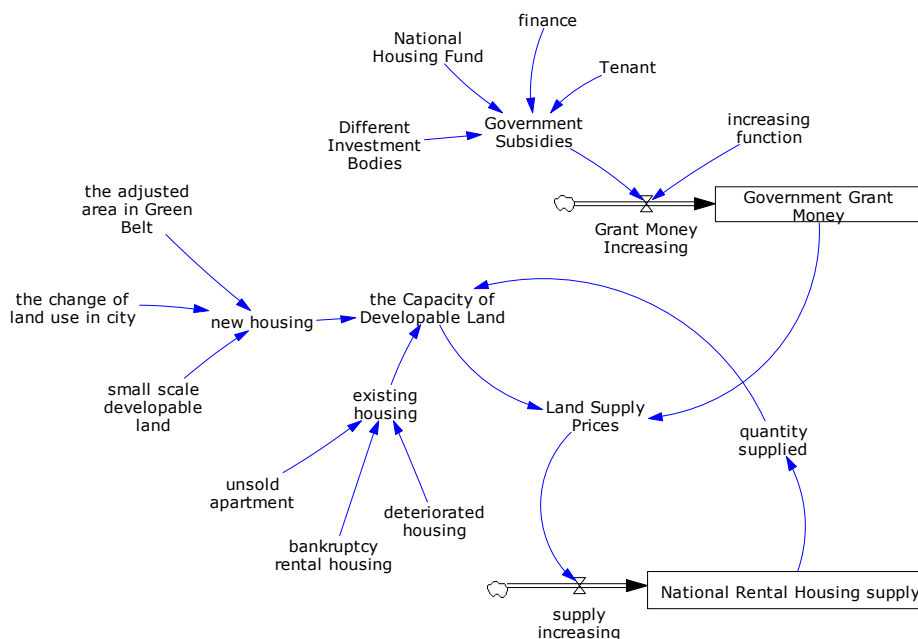

Figure 4.5 Stock/Flow Diagram of National Rental Housing Supply with government subsidy

Figure 4.6 shows reduced span of NRH supply according to the

Investment rate of government capital. If the government raise the Investment rate of national finance, the length of time needed to secure the housing site can be shortened. Therefore the supply of NRH could go up.
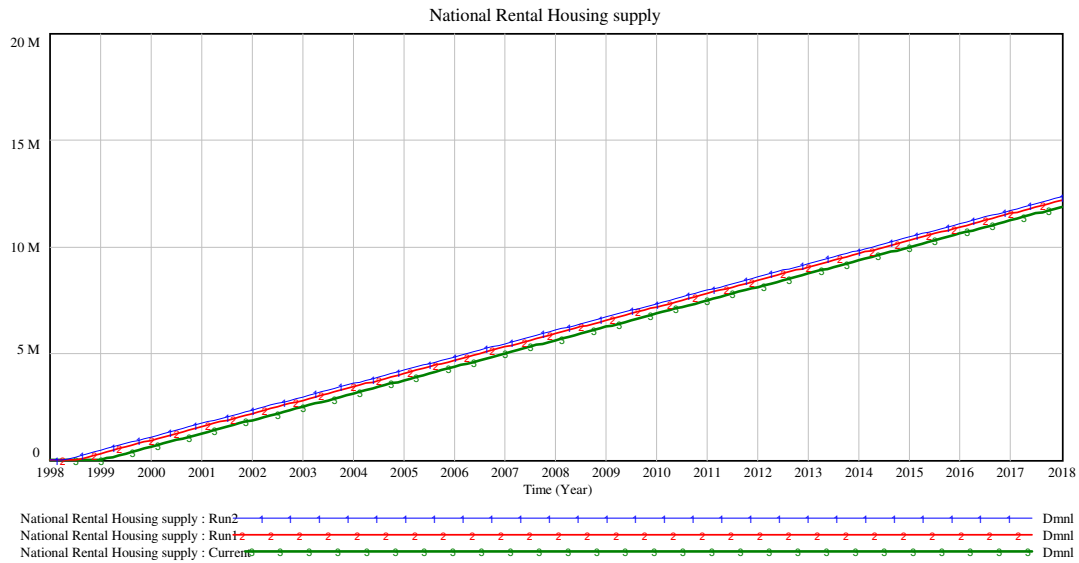
National Rental Housing supply

Figure 4.6 NRH supply according to the investment rate of government capital

We should look into the government financial support and the policy. In 2008, there was an increase of NRH supply caused by the demand left a number of unsold apartments. Consequently, government adjusted the plan of building National Rental Houses in the urban area, and it caused the Korean Housing Corporation to downsize its supply. There was a gradual drop of NRH supply due to the fact that National Rental Housing is susceptible to the government subsidy.
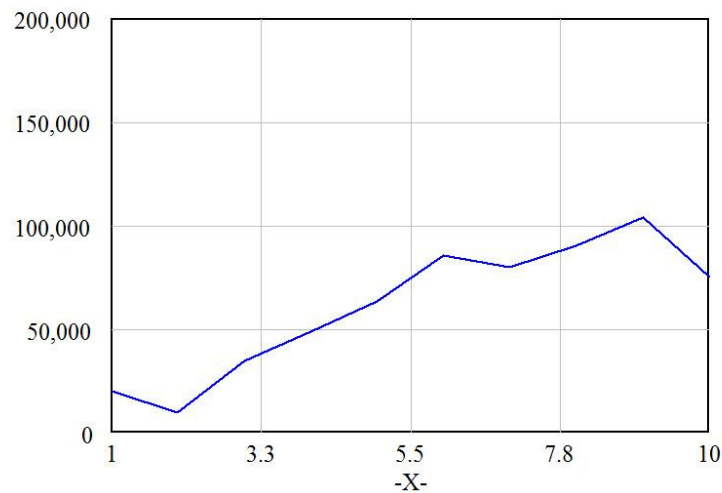

Figure 4.7 Change of supply in the Korean Housing Corporation

5. Conclusion

Overall supply is on average 30 thousand, which is lower than the former plan. It would not be too much to say that the policy for the low-income class has been downsized when it comes to the supply. It's natural that revision and decision of government policies change frequently; however, the reason why the current supply plan cannot meet the former plan is because the role of government in this plan and the importance of government subsidy was neglected when the plan to secure the housing site was done focusing on the infrastructure of the construction.

Overall policy should be suggested after considering the fact that government, main agents, and the expected residents have different roles to pursuit in this plan. Government has to realize its role as a source of finance; Local governments and the Korean Housing Corporation have to realize that they are the main agents of the supply; Occupants have to do their role to keep their living environment in order. This will be able to be the solution to the conflicts among local governments, local residents, and the environmental groups.

Improvement of the government subsidy support system is the ultimate solution if we want to minimize the side effect that could occur when the government focuses on the acquirement of the supply to keep up with the plan. It also corresponds with the initial purpose of this policy.

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[Equations]

•Government Grant Money=INTEG(Grant Money Increasing, 1)
Units: Dmnl

•Grant Money Increasing=Government Subsidies*increasing function
Units: Dmnl/year

•Government Subsidies=
 National Housing Fund+Different Investment bodies+Finance+Tenant
Units: Dmnl

•Different Investment Bodies=6.7 / Units: Dmnl

•Finance=13 / Units: Dmnl

•Tenant=16.1 / Units: Dmnl

• increasing function=0.1 / Units: 1/year

•national Rental Housing Supply=INTEG(supply increasing, 1)
Units: Dmnl
•supply increasing= WITH LOOKUP (Land Supply Prices,
[(1900,0)-
(2100,800000)],(1998,2501),(1999,22727),(2000,32736),(2001,67960),(2002,
118800),(2003,190573),(2004,281996),(2005,378179),(2006,467178),(2007,5
56406),(2008,624285)))
Units: Dmnl/Year
•Land Supply Prices= Government Grant Money*the Capacity of Developable
Land
Units: Dmnl
•quantity supplied=   National Rental Housing supply
Units: Dmn
•the Capacity of Developable Land= ACTIVE INITIAL ((existing housing*new
housing)*quantity supplied, 15364.7)
Units: Dmnl
•new housing=
(the change of land use in city*small scale developable land*the adjusted area
in Green Belt)/3
Units: Dmnl
•existing housing=(deteriorated housing*bankruptcy rental housing*unsold
apartment)/3
Units: Dmnl