International Journal of Smart Business and Technology
Vol.7, No.1 (2019), pp.37-44
http://dx.doi.org/10.21742/ijsbt.2019.7.1.04

A Study on the Changes in the Land Use Paradigm in the Era of the 4th Industrial Revolution - Focus on the Effective Use and Commercialization of Damaged Areas in Development Restriction Area

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Abstract

This study suggests a business model for maintaining and utilizing the damaged areas in the development regions restricted to Korea. It suggests the most effective use of land use for them. The contents of the proposal are as follows: (1) economic efficiency due to the establishment of a solar-based warehouse combining environmentally friendly energy technologies; and (2) economic efficiency due to the provision of mobile homes (modular housing) to improve the housing welfare of low-income households. Finally, even if the land lacks business feasibility due to the institutional purpose of the damaged land maintenance project, it is necessary to purchase damaged land positively to prevent further damage and to link the land cost festival to preserve future value.

Keywords: *Urban regeneration project, Empty house, Utilization methods, Regional classification, Sustainability*

1. Introduction

The damage to the restricted development area is illegally converted after unauthorized licensing and used for warehouses, factories, and workplaces. This means that the profit from leasing illegal buildings is less than the amount due for the compulsory execution of unlawful acts. This is because a large number of people cause it. According to a report by the Ministry of Land, Transport and Maritime Affairs in Korea in 2013, about 70% of the respondents who said that illegal activities persist in a survey of local government officials are "It is because it is profitable even if payment of the transition compulsory gold is paid." It can be seen that "the residents or the landowners are illegally developing illegal activities." To improve land use efficiency during the 4th Industrial Revolution, the Ministry of Land, Transport, and Maritime Affairs introduced the gold system and economic sanctions against illegal gains to prevent unlawful activities. It is a fact that it is being raised. Therefore, this study suggests a

Article history:
Received (March 9, 2019), Review Result (April 4, 2019), Accepted (May 5, 2019)
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Print: 2288-8969, eISSN: 2207-516X, IJSBT

business model for the maintenance and utilization of the damaged areas in the development-restricted areas of Korea and suggests the most effective use of land for them.

2. Theoretical background

2.1. Preliminary study on the living environment of residents in the restricted area

Previous studies have also actively pursued a plan to purchase land in the restricted area for permanent preservation [1][2]. We sought the conservation measures of developed countries that had been introduced earlier than Korea regarding the institutional system. There are difficulties in introducing and implementing such a system in Korea, but the nationalization plan, the aspect of environmental preservation, and subsidies [3].

2.2. Preliminary study on conflicts in the restricted area

Most of the studies on the green belt have focused on assessing its effectiveness [4]. The analysis of land and housing prices in the Green Belt, the social benefits and cost estimates of the Green Belt, and the impact of the designation of the Green Belt on the urban spatial structure was a major theme. The survey also analyzed the public's understanding of the green belt system and the willingness of the residents to pay for it [5]. In addition, in the analysis of cognition and analysis of the restricted area management system, we analyzed the complaints and officials about the restricted area in Seoul [6]. In the analysis of expert's recognition of the restricted area management system, 13 types presented in the civil service survey analysis were suggested through the expert questionnaire and civil servant workshop.

3. Connecting urban regeneration with local university's commercialization of land use by alternatives

3.1. Assumption of the economic feasibility study

In the case of public sector feasibility studies, public and public buildings have the characteristics of public goods, so they should analyze the economic benefits as seen from the national economic perspective and the financial analysis utilized in the private sector.

Table 1. Financial feasibility vs. financial feasibility economic feasibility

Item	Financial feasibility	Economic feasibility
Target	Financial net present value measurement	Social net present value measurement
Preparation of financial statements	Cash inflow - cash outflow	Social benefits - social costs
Income and loss inclusion rules	Cash Flow 100%	Social impact 100% (Direct or indirect, non-existent)
Positive variable	Annual cash inflow (Denominated in monetary units)	The sum of consumers paying physicians (Social benefits)
Negative variable	Annual cash outflow, initial investment cost	Social opportunity costs and initial investment costs by year of resource consumption
Valuation of income and loss	Evaluate with a present value under current market conditions	Evaluate competitive potential prices calculated from ideal market conditions

The feasibility analysis method is generally based on the value of input and output using the benefit/cost ratio method (B/C), the net present value method, the internal rate of return method, the payback period method, and the ROI. The cost-benefit ratio is a method used to judge the feasibility of the business by converting the total benefits and costs into the present value.

3.2. Commercialization plan

3.2.1. Construction of warehouse using solar facilities

In the case of public sector feasibility studies, public and public buildings have the same characteristics. Development of warehouse facilities in connection with the renewable energy supply project of the Korea Land & Housing Corporation's Construction Technology Headquarters. This can be implemented to recover green space function and improve the urban environment by permitting the installation of legitimate logistics warehouses for existing use. The premise of the analysis is based on the average land area and the coverage rate in the application area of the application case and estimated the approximate project cost, assuming the following assumption to be about 8.4 billion.

Table 2. Estimation of warehouse composition using the photovoltaic facility

Distribution	A site	B site	Total	Court
Local district	Natural greenery / GB			
Site area (㎡)	5,719	3,654	9,373	
Building area (㎡)	2,994	2,023	5,017	
Coverage ratio	52.36	55.38	53.53	60% or less
Total floor area	5,979	4,037	10,017	
Floor area ratio	104.55	110.50	106.87	120% or less
Number of parking spaces	16	12	28	22 (400 ㎡ / more than 1 unit)
Highest height	7.90	7.90	-	8m or less
structure	Iron frame			
Number of floors	2 stories above ground			
Usage	warehouse			
Building cost	Unit price per py	1,682,222 (KRW)	1,682,222 (KRW)	Office: Office and cosmetic area Floor area: Floor area Average floor height: 1st-floor factory 9m / 2nd-floor window 5m Outer wall: Euro zinc panel (150T, KS foam) Sloped Roof (Zinc): Zinc Panel (260T) Chang-ho: Corporation:
	Office building cost	50,000,000 (KRW)	30,000,000 (KRW)	
	Roof construction cost	54,360,000 (KRW)	36,720,000 (KRW)	
	Construction cost	3,014,604,060 (KRW)	2,976,964,060 (KRW)	
Solar installation cost	Per KW (1 pyeong)	1,250,000 (KRW)	3,294,588,299 (KRW)	Reflecting the whole building area
Compensation fee	Purchase of land (Purchase of scattered debris)		2,135,700,000 (KRW)	The obstacle is due to the valuation by the provisions of the Law on

	Compensation water compensation (building, interior)	-	Acquisition and Compensation of Land for Public Service. The land purchase cost refers to the cost of the land sale, such as buying and selling the land.
	Rights compensation (goodwill, mining rights, etc.)	-	
sub Total		2,135,700,000 (KRW)	
sum		8,407,252,359 (KRW)	Construction costs, solar installation costs, land compensation

We analyzed NPV, IRR, and BC based on the initial investment cost versus the initial investment cost during the operating period. To calculate the operating profit, the warehouse rent in Gyeonggi province was surveyed (rental deposit and rent). This analysis assumed 6.5% of the current rental deposit conversion rate, and the warehouse rent per ㎡ was calculated as 8,598 Won). The initial investment cost of the project estimated using the photovoltaic facility is 8,407,252,668 won. The initial annual operating profit is 898,968,236 won, the operating cost assumes 40% of the operating profit, assuming a 2% rise yearly, depreciation is based on a 40-year straight-line method, and a 4.5% social reduction rate. The initial investment cost of the project estimated using the photovoltaic facility is 8,407,252,668 won, the initial annual operating profit is 898,968,236 won, the operating cost assumes 40% of the operating profit, assuming a 40% straight-line depreciation and a 4.5% social reduction rate, the NPV is KRW 1,062,017,379), IRR is 5,23%, and BC is 0.75.

3.2.2. Construction of mobile public rental housing (modular housing) for low-income families

The Public Housing Division of Korea Land & Housing Corporation is actively promoting the mobile public rental housing business. This project is a new public rental housing business concept that removes the old housing of low-income households who cannot repair the house in the city and builds and supplies modular housing. Modular housing makes up 70 ~ 80%. It is a type of industrialized housing that is assembled in the field. It can secure homogeneous housing quality through mechanized production, and it is possible to supply it quickly. In particular, according to the roadmap for housing welfare, this project can provide stockpiles of modular housing as a business model for supplying emergency housing to low-income households that need temporary housing in an unfavorable situation. The premise of the analysis is based on the average land area, the coverage rate in the application area of the application case, and the estimated project cost of about 7.3 billion.

Table 4. Modular housing project cost

distribution	History	Cost		Remarks
Local district	Natural greenery / GB			
Site area (㎡)	9,373			
Building area (㎡)	5,017			
	Moving Installation Cost	49,500 (KRW)	248,341,500 (KRW)	
	sub Total		5,215,171,500 (KRW)	
Compensation fee	Land purchase cost (Purchasing scattered	2,135,700,000 (KRW)		The obstacle is due to the valuation by

	debris)		the provisions of the Law on Acquisition and Compensation of Land for Public Service. The land purchase cost refers to the cost of the land sale, such as buying and selling the land.
	Obstacle compensation fee (Buildings, trees, etc.)	-	
	Reward (Goodwill, mining rights, etc.)	-	
sub Total		2,135,700,000 (KRW)	
sum		7,350,871,500 (KRW)	

NPV, IRR, and BC analyzed the future economic benefits of modular housing (mobile housing) based on the initial investment cost versus operating profit during the operating period. To calculate the operating profit, we surveyed public rental housing (private supply standard) rents in Gyeonggi province. In this analysis, assuming pure monthly rent only, 6.5%, the result is 11,071 (won). The initial investment cost of the modular housing construction project is 7,350,871,500 won. The initial annual operating profit is calculated based on the characteristics of the modular housing, and the quality of the housing is different from that of the public rental housing (private supply standard) (Private supply standard) Reflecting the 90% level of quality, the rent per m2 of modular housing was estimated at 10,286 won.

3.2.3. Purchase of damaged land for lack of business and preservation of future value

Given the institutional intent of the damaged land maintenance project, it is necessary to actively review land to avoid further damage by purchasing damaged land and preserving its future value even if the land lacks business capability.

4. Conclusion

This study examined the concept of alternatives for damaged areas in Korea in four dimensions. The premise of the analysis was limited to the extent that it could be linked with the existing projects of the Korea Land Corporation 6 based on the average criteria. The results of the analysis are as follows: First, as a result of estimating the economic feasibility of the solar-based warehouse incorporating eco-friendly energy technology, it is judged that the net present value is higher than the social return rate of 4.5% on the other hand, the BC analysis was smaller than 1, but it was estimated at the level not considering the ripple effects of the local economy. Second, as a result of estimating the economic feasibility of mobile housing (modular housing) supply to improve the housing welfare of low-income households, the internal rate of return was 5.65%, much higher than the 4.5%. Still, the BC analysis is below 1, and the BC figure is expected to rise if we reflect various levels of future benefits. Finally, even if the land lacks business feasibility by the institutional purpose of the damaged land maintenance project, it is necessary to purchase damaged land positively to prevent further damage and to link the land cost festival to preserve future value.

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