

Public Building Value Evaluation Using Contingent Valuation Method Based on Market Value Estimation

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Abstract: Building deterioration reflects the degradation of basic building performance including structural performance, energy performance, durability, and safety, and it also includes perceived deterioration, which considers a user-based perspective. More than 50% of the existing buildings in Korea are over 15 years old and public buildings compose 2.5% of all buildings domestically. Therefore, there are several different problems, such as poor energy efficiency, structural performance, and safety. To address the challenges of increasing stock in deteriorated buildings, it is necessary to make decisions about reconstruction or renovation. In this study, we propose a new method to evaluate public building value with a contingent valuation method (CVM). By estimating willing-to-pay (WTP) from users of private buildings in similar situation with the public building, it is possible to compare market prices and calculate a correction factor to adjust the WTP data. Finally, we apply the correction factor to the WTP of a public building and estimate market price, willingness to pay (WTP). Finally, we apply the correction factor to willing to pay (WTP) of public building and estimate market price.

Keywords: Public building, Value evaluation, Contingent Valuation Method (CVM), Market Value

I. INTRODUCTION

A. Background

Global awareness about an increase in building stocks is a significant contemporary issue. For example, the present condition of the Korean government's budget represents a ratio of change for new construction, which is much greater than repair or maintenance. This means that the amount of increase reflects building stocks that are greater than the amount of increase in new construction. In 2014, in Korea [1] there were about 4.5 million buildings that are more than 15 years old. According to a survey conducted by the U.S. Energy Information Agency, 72 percent of floorstock belongs to buildings more than 20 years old. As such, problems with deteriorated buildings continues to increase. Building deterioration means that each part of the building's various elements are in a deficient condition and there is a degradation of structural performance, energy performance, durability, and safety. From the point of view of building users, the reduction of building performance affects comfort in real life and also psychological pressure due to continuous dissatisfaction in various building elements. In other words, deterioration causes stress in the use of a building, and this grows into an overall social problem. Likewise, the typical lifetime of a public building in Korea is 10 years. [2] However, strict budgets in operating and maintaining public buildings in practice creates a passive approach to maintenance, repair, and rehabilitation. [3] As such, it is necessary to prepare rationale and systematic evaluation standards to efficiently prioritize and allocate funding in the national budget. Such

tools would reduce and maximize funding for facility management, reconstruction, and renovation of public buildings. [4]

II. RELATED WORK

A. State-of-the-Art Public Facilities Value Evaluation

A. Korea

According to the National Property Act Article 14 and enforcement ordinance Article 9, all public buildings that are ordered by the Central Administrative Organization and use governmental funds are national property. Guidelines for the National Accounting Rules mention that the value of infrastructure should be specified in financial government statements. By depreciation on an accrual basis, tangible assets and infrastructure by national account standards are defined and classified following the nation asset valuation of the Ministry of Strategy and Finance. According to the National Property Act, applying methods like straight-line depreciation following economic durable years consider depreciation and appropriate historical cost. In the case of a public tract house, the apartment price is determined by the sum of the average construction fee and land costs following the Housing Act in the second clause of Article 38. Lastly, the Korea Appraisal Board declared the price of apartments to include public buildings. According to the Korea Appraisal Board, the evaluation of an office building is divided into a market approach and a cost approach. The former is for land and the latter is for the building. The valuation of land has a standard in 'Public Notice to Values and Appraisal of Lands, etc. Act'. It said that land should be evaluated by office land price. Further,

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the buildings should be considered by structure and grade. Lastly, the cost subtracts a depreciation amount to estimate a building's value.

In an earlier study, [5] basic research was done for value evaluation of road facilities to assist in efficient facility management. In this study, 14 kinds of asset evaluation methods were applied to existing road facilities and compared. The conclusion is that Written-Down Replacement Cost (WDRC) is the best method for asset evaluation when objectively compared with other methods. Further, it represents the deterioration of facilities by flow of time, and an increase or decrease of asset value in a budget. Also, Hong (2009) mentioned that there are three kinds of real estate appraisal: a comparison method, cost method, and income capitalization approach.[10]

B. Overseas

In the United States, the Governmental Accounting Standards Board (GASB) amended GASB 34 to enhance the obligations of the central and local government. (GASB, 2000) The Amended GASB 34 offers two different valuation methods: one is a depreciation approach and the other is a modified approach. In the U.K., the Department for Transport published a Guidance Document for Highway Infrastructure Asset Valuation in 2005. This guidance is more detailed than GASB 34 in terms of asset valuation. Road facilities are included in the depreciated replacement cost.[5]

One method for evaluating a building's value is simply decided by depreciated book value. Moreover, in the case of public buildings, it is hard to evaluate a building's value because there is no market price. In other words, there is no official data or indicator to value evaluation. Therefore, it is necessary to have a value evaluation method that considers typical characteristics of a public building. Such a method would help to address the challenges created by an increasing stock of buildings that are deteriorating and to assist in determining whether renovation or reconstruction is best to maintain value. Recognition of the current value of a building and an ability to forecast future value can maximize cost-effectiveness during the maintenance phase.

III. PUBLIC BUILDING VALUE EVALUATION USING CONTINGENT VALUATION METHOD BASED ON MARKET-VALUE ESTIMATION

A. User performance value

There is no clear definition of user performance value in the dictionary or other research, and as such, we identified and put forth an operational definition of user performance value. In this research, the concept of user

performance value is increasing users' satisfaction in building performance or overall function. Building users are divided into two groups: permanent occupants who primarily use the public buildings, for example, residential buildings, public offices, libraries, and police offices, and another group that includes temporary visitors from the local community.

B. Contingent Valuation Method (CVM)

The Contingent Valuation Method (CVM) can be a measurement tool to evaluate public goods. The CVM is used to evaluate non-market goods as a monetary unit, such as environment goods or public goods in a virtual market. This method was originally used for environment goods valuation in the political economy of an environment. Subsequently, it spread to other fields, such as traffic, culture, and other information services. CVM was first presented by Ciracy & Wantrup. There are several specific features. First, CVM is free from restraints in the level of supply of goods or policy surrounding goods and benefits that authorities are willing to measure. Therefore, various results can be deducted. [6] Portney (1994) stated that valuation through CVM offers a greater opportunity for fundamentally and deeply improving the value in comparison to the economic preference theory. Second, CVM provides the only way to measure value, which cannot be measured by indirect methods in the market. [7] [8] CVM is not a method used to evaluate value where people select in the real market non-market goods, like the theory of revealed preference, such as the "travel cost" approach. Instead, it is a method to evaluate value by asking questions directly to people. The CVM compensates goods that are not dealt with in the market or can be used in cases where replaceable goods are not present. Third, evaluation through CVM can directly derive a compensated demand curve. Finally, CVM can evaluate the number of people who don't consume non-market goods and can measure both use value and existence value. For example, the Korea Infrastructure Safety Corporation completed a study about repair and reinforcement for seismic performance improvement. In this study, they applied a use value to evaluate the value of public buildings by CVM.

C. Development of Process

In this study, we evaluated public building value by considering the concept of user performance value. The Contingent Valuation Method (CVM) was utilized to elicit willingness-to-pay (WTP) for a specific public building or public office. The CVM approach had some limitations. First, individuals do not necessarily have a strong incentive to think seriously about their answer because they will not be penalized for any answer. Secondly, individuals who do take such questions seriously might have an incentive to lie or distort their answer, with the bias possibly going in

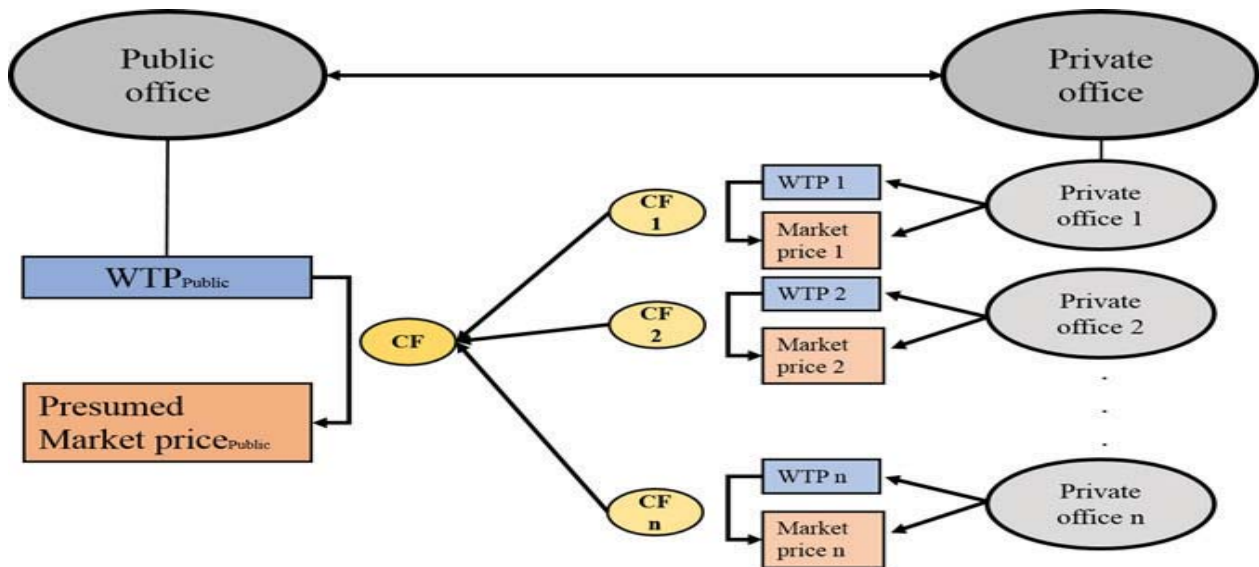


Figure 1 Process of methodology

either direction. [11] Therefore, there is much concern about individual subjective answers about willing WTP. To address this, we used a correction factor (CF) to control bias in this study. We derived our own correction factor from several private buildings that were similar to the public buildings that we investigated. [10]

for private offices were compared to estimate correction factors (CFs). Then an average was calculated and define as a general correction factor. Finally, the general correction factor for a public office was applied to arrive at the presumed market price for a public building: Presumed Market Price. This indicator can be compared with real market prices of a private office. The process of study is represented in Figure 1.

Table 1
 Real estate price determination factors

Classification		Determination Type	Determination Factor
General factor	Social factor	Population status	Total population, Job
		Family status	The number of households
		Educational standard	Educational facilities, cultural level
		Lifestyle condition	Income level
	Economic factor	Household financial assets	Financial expenses, interest rate, exchange rate
Regional factor		-	Size of region, formation of composition, function
Individual factor ¹	Area, height, structure, material		Total floor area, building area, material
	Suitability of building and environment		Surrounding with building
	Design and equipment		Suitability of design of each function, adequacy of facilities

To test the proposed method, we chose a public office to elicit willing-to-pay. We compared this with private office market prices obtained from a market survey. To obtain consistency and reliability, we compared the WTP of private offices with more than two cases and researched market prices for specific points. WTP and market prices

IV. CONCLUSION

In this paper, we proposed a public building value evaluation method with new criteria to aid in decision making regarding the deterioration of public building stocks. We considered user performance value in the value evaluation of public buildings. A Contingent Valuation Method (CVM), which is a nonmarket-valuation method to evaluate public goods, doesn't have a market price or market value. We applied this method to public building value evaluation and gathered willingness-to-pay (WTP) data through a survey or personal interviews. As answers could be subject to bias, we calculated and applied a correction factor to the WTP of other similar buildings for two or more cases. To obtain a general correction factor (CF), we selected private office buildings that were in the same region, had similar social factors, economic factors, size, structure, and construction period, etc. We applied the CF to the WTP of a public office building and predicted a presumed market price of public office building as an indicator of a building's value. Further case studies with other public office buildings are necessary to verify the proposed method. We plan to conduct a case study in a future study. This method considers user perspectives in valuing a public building and also facilitates decisions on renovation versus restoration of older public buildings.

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