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Critical Criteria Based on Facility Condition Index for Supporting Priority Decision-making in Educational Facilities

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Abstract: The objective of identifying the cause of inconsistency in determining priority of educational facility maintenance, any related factors were thoroughly identified and tested, to see if it has any effect on decision-making process in resource allocation for educational facilities. On the assumption that 'the more there are to be repaired/maintained and deferred, the higher the relevant cost will be, this will lead to a significant social loss. Accordingly, this study established a framework of determining resource allocation priority based on deferred maintenance and its related expenses. For doing so, it was required to determine relative ranking in terms of resource allocation within a pre-assigned school district, in consideration of the criticality of each deferred maintenance attribute/variable.

Keywords: educational facility, maintenance service, resource allocation, priority decision

I. INTRODUCTION

In general, for private assets, its maintenance service is carried out from the beginning with asset management perspective. Therefore, it is fairly easy to get feedbacks on selecting the level of maintenance during implementation phase, decision-making for reinvestment, the criteria of investing resources which is based on either profit or available budget, and post-monitoring performance. Maintenance system for national infrastructure is also developed in terms of asset management.
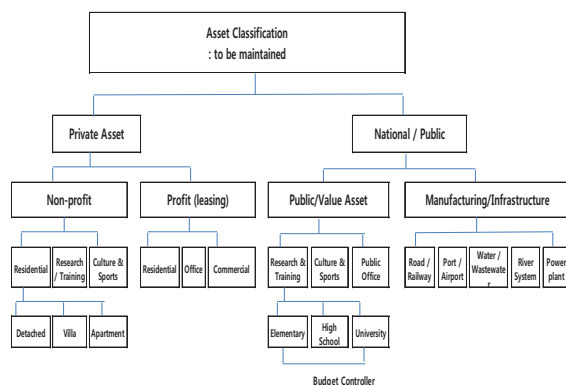

Figure 1. Asset Management Classification (Shin, 2015)

However, compared to other infrastructure and manufacturing facilities, its maintenance service for building assets is relatively passive. Also, although work breakdown system is well established to check facility condition and to report maintenance status, it is highly difficult to find a consistent resource allocation principle, a generalized procedure, and even consistent application

methodology, which vary depending on the Client's interest. In particular, educational facilities are evenly spread out all over the country, even compared with other types of public assets (Fig1).

II. ESTABLISHING PRIORITY SELECTION IN MAINTENANCE RESOURCE ALLOCATION

The demand on maintenance service in educational facilities is evidently increasing, as its volume of aging assets increases. However, the volume of required budget is still quite short of increasing deferred maintenance.
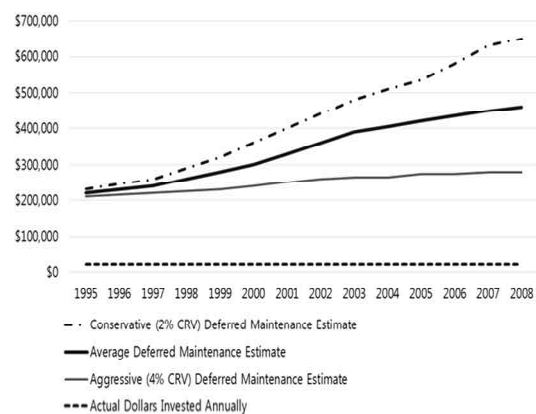

Figure 2. US Public School Building Maintenance, Repair & Renewal Expenditures and Deferrals (ASCE, 2013)

Therefore, it even more requires developing a priority decision-making tool for maintenance resource allocation, and establishing historical data system, as there is an increasing demand in educational facilities. However,

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these are not readily available at the moment. For the purpose of resolving the cause of inconsistency in determining priority on educational facility maintenance, relevant factors were thoroughly investigated that may have an effect on decision making of resource allocation for educational facilities. As a result, this study established a basis of determining resource allocation priority based on deferred maintenance and its related expenses.
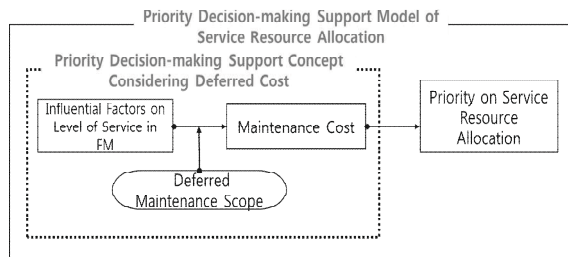
Figure 3. Concept of Priority Decision-making Support Model of Service Resource Allocation

On the assumption where 'the more there are to be repaired/maintained and deferred, the higher the relevant cost will be, which can be likely to result to social loss', it was to determine relative ranking in terms of resource allocation within a pre-assigned school district, in consideration of the criticality of each deferred maintenance attribute/variable(Fig3).

Ⅲ. PROPOSING A COMPLEMENTARY CONCEPT OF FACILITY CONDITION INDEX

The application variable used as facility condition indices are shown below in [Fig 4]. The difference between EFCI (expanded facility condition index) and EFCI (efficient facility condition index, newly named in this study) is described in [Fig 5].


Figure 4. Type of FCI

The existing EFCI and FNI apply deferred maintenance cost redundantly. Therefore, in order to prevent redundant application in prioritizing facility condition index, this study reclassified facility condition index (Figure 5).

Figure 5. Revised Definition of FCI

The following [Fig 6] shows a comparison with the existing methodologies, after re-establishing revised facility condition index, facility efficiency index, and advanced facility condition index.
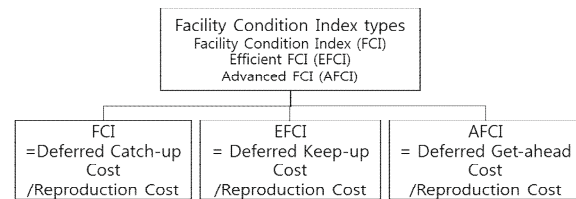
Figure 6. Type of Revised FCI

IV. CONCLUSION

In general, when resources are invested into building assets, resultants are mainly asset values such as profit, vacancy rate, etc., which are directly related to the level of asset performance. However, in case of educational facilities (considered as both public goods and merit goods), its special circumstances shall be considered, including academic achievement and the level of concentration on academic works. It is because the purpose of maintenance on educational facilities is not only to assist users in learning and achieving academic improvement, but also to encourage users to have an interest in learning. Therefore, those that are used to create a safe and comfortable learning environment shall be considered as a significant factor to determine maintenance service resource allocation. In other words, it is important to reflect the type of use, its criticality, and each sectional level's criticality depending on portfolio structure. Those that are considered as decision-making criteria of resource allocation are Public Facility Condition Index (hereinafter called as PFCI), level of criticality for each deferred maintenance attribute/variable, age of facility, and history of repair/maintenance.

REFERENCES

[1] Albrice, D., Branch, M. and Lee, T-s., "Municipal Portfolio Stewardship with Limited Budgets; The Application of Matrix correlations as a Tool to support Resource Allocation Decisions in the Public Good", *presented at the Joint Conference of the Institute of Asset Management(IAM),London,November2014*,pp. 1-12, 2014.
[2] ASCE(American Society of Civil Engineers), "2013 Report Card for America's Infrastructure", 2013.
[3] Shin, S.W., "A Priority Decision-making Support Model of Service Resource Allocation for Educational Facilities", Thesis for Doctor of Philosophy: the Graduate School of Ewha Womans University, 2015.