A Study on Estimating Standard Unit Costs of Government Funding Project for Higher Education

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As the government's budget support increases for universities through higher education project funding, efforts are being made to ensure that funding decisions are based on objective evidence such as national subsidy outcomes and adequate grant levels. Recognizing that existing funding formula relies on similar operational experiences or analogy-based calculation, this study looked into ways to improve the funding formula so as to secure more reasonable and objective grant allocations.

Calculating the standard unit cost of project grants means computing costs based on scientific evidence, even when public budgeting is designed to support non-for-profit entities such as universities. Using the standard cost per unit provides a basis for systemized performance management of grant projects, and ultimately helps to enhance the effectiveness and efficiency of national subsidies. Deriving standard unit costs can be used in policy procedures, as it will offer objective evidence to request higher education budgets when consulting with the National Assembly and Ministry of Strategy and Finance. It will also induce a rational allocation of budgets required to achieve set goals for subsidized projects.

A theoretical analysis formed the basic research of this study so as to estimate the standard unit cost of funded projects. The theoretical analysis involved the concept,

function, calculation method and estimation method of a unit price. Analysis results pointed to the fact that as a principle, costs should be calculated for all grant programs including public funding for universities which are non-for-profit entities. The implication is that this will enable systemized management of project performance. The analysis also provided guidance in adopting the most adequate unit cost estimation method for this study. As a result, this study analyzed the expense settlement data of funded higher education projects over the past 2-4 years, and provided grounds to use the parametric estimating method comprising cost estimation relationships (CER).

On that basis, this study analyzed the extent of budget support provided to higher education projects in the recent 2-4 years, and how each institutional beneficiary is currently utilizing their funds. Four major projects were selected to represent each project type for the analysis: the Advancement of College Education (ACE) project from the education sector, Brain Korea 21 Plus (BK21+) project from the research sector, Leaders in INdustry-university Cooperation (LINC) project from the industry-academia collaboration sector, and Lifelong-Education-Centered University project from the lifelong education sector. Analysis identified that the lack of a central grants management system made it difficult to secure objective evidence for fund allocation, and that there was insufficient prime cost analysis to measure university education and administration expenses. These factors were found to be weakening the credibility of how education budgets are measured and formulated. They also hindered the effectiveness of project administration as well as the accuracy of performance assessment.

This study found that countries possessing a long history and accumulated experience of university funding including the US, UK and Australia make funding decisions using an objective calculation formula. They have guidelines established at the central government level which set out a detailed explanation of each item of expenditure and prime costing standards. The guidelines help universities to secure funds and execute budgets in a reasonable manner. The implication of this finding is for the government to develop a scientific basis for performance evaluation of project grants in the future.

Building on the basic research, status quo analysis and foreign case review, this study estimated the standard unit of project cost for each university and project group

participating in the ACE, BK21+, LINC and Lifelong-Education-Centered University projects by Monte Carlo simulation modelling, using each university's budget execution data as the parameter. The standard unit cost was calculated in two types: first, an estimation based on budget execution data, and second, an estimation reflecting experts' opinion on the rate of change for each expenditure item through the Delphi technique. Universities' opinion on increase and decrease variations was reflected because when calculations are derived only from budget execution data, results can be confined to the boundary of existing budgets. In particular, the Monte Carlo simulation method used for this study's estimations has a function to support decision-making so that unit cost calculations can reflect various values while being based on parameters. Therefore, reflecting Delphi opinion also offered an opportunity for feasibility verification.

The standard unit costs calculated in these two types were then compared with the 2016 standard unit costs for each project calculated by previous methods. This was to predict the validity and feasibility of this study's unit cost estimating and to verify the necessity of utilizing standard unit costs. Estimation results were also used as preliminary data to develop methods to calculate unit costs and embed them in policy planning.

Simulation estimated the standard unit cost for the ACE project at approximately 2.5 billion Korean won (KRW), and 2.6 billion KRW when reflecting universities' opinion. The actual 2016 budget allocation for ACE is approximately 1.8 billion KRW, 41.8% less than the estimated value. The standard unit cost estimation for the BK21+ project is approximately 390 million KRW per project team. The 2016 budget for this project is 490 million KRW, 20.1% higher than the estimation. The LINC project shows a standard unit cost estimation of approximately 3.8 billion KRW. The actual budget for 2016 stands 2.2% higher at 3.9 billion KRW. The Lifelong-Education-Centered University project's standard unit cost estimation is approximately 440 million KRW. The 2016 budget is 510 million KRW, 12.63% higher than the estimation.

University opinion surveys reveal that they place more weight on ways to efficiently administer each item of expenditure, rather than on raising project funds. But results show that the 2016 budget is lower than the estimated value only for the ACE project.

For the other three projects, the actual budget is higher than the estimations. Though this be interpreted positively as universities having secured necessary budgets, it does not offer objective evidence with regard to budget increase or reduction.

Monte Carlo simulating predicted costs through parametric estimating, and proved to be a rational method to objectively support decision-making for higher education budgeting policies. Allocating grants by parametric estimating can be the most feasible alternative in the current higher education environment as it witnesses a growth of project grants and the creation of an administration/management structure. Should institutional infrastructure support this alternative method to be applied in higher education policy planning, and especially be linked to performance management, it will contribute considerably to the effectiveness and efficiency of national subsidy projects.

Four key strategy plans were proposed in this direction: to restructure the grants program and ensure systemized administration; to strengthen objectivity and coherence when calculating project funds; to ensure effective management and operation of budget expenditure items; and to build infrastructure to use standard unit costs. First, in order to restructure government funding programs and reinforce performance management, this study identifies the need to categorize higher education project grants by type, develop a set of common guidelines for fund execution at the central government level, and systemize project performance assessment. Second, in order to ensure objectivity and coherence when calculating grants, estimating should be based on data evidence and a manual for project administration should be developed. Also required is the process of periodically monitoring fund management and disclosing review outcomes. Third, in order to effectively manage budget expenditure items, this study classified key projects by type into education, research, industry-university collaboration and lifelong education projects. Items of expenditure for each project type were then analyzed, and detailed future management methods were presented in accordance. Fourth, in order to build infrastructure for the utilization of standard unit costs, this study proposed to establish an integrated management system for project funding, build infrastructure to analyze prime costs in linkage with the University Finance Information System, and improve the system to reflect universities' fund acquisition records on the Higher Education Information Disclosure System.

Implementation tasks proposed under this plan include setting up a 'General Management Committee for Project Grants,' establishing and revising laws related to higher education project funding, sourcing funds through central and local governments, and establishing an exclusive body to operate and support funded projects. First, this study purports that a 'General Management Committee for Project Grants' will help to build a framework for the restructuring and categorizing of all grants. The committee will also provide guidance for practical project administration and performance management, which can be fed into developing strategic ways to raise project performance. Second, laws governing higher education subsidies should be established and/or revised so as to provide clauses to set up a comprehensive project grant system. The laws should be backed by steps to establish rules outlining the details of funded projects, and to legislate a pan-governmental 'Comprehensive Performance Management Committee for Project Funding' for reinforced performance monitoring. Third, if the proposed methods of securing finance through central and local governments are to be practically implemented, strategic budgeting needs to accompany the process. A foremost step to take is to increase the central government's subsidy and local governments' investment in universities. Fourth, this study finds the need to set up an exclusive body to operate and support funded university projects, which will integrate the current segmental management of grants. The body will also systemically oversee the process of selecting and assessing beneficiaries, developing an evaluation framework, monitoring and conducting research on grants and prime cost calculation, and managing overall performance.

Lastly, this study proposes three recommendations for further research. First, future research should incorporate more case studies of key projects in each sector of education, research, industry-university collaboration and lifelong education, so that the standard unit cost secures representative value. Analyzing and monitoring standard unit costs should be a sustained process, which includes research on each sector's projects that hold three or more years of fund execution data. Second, considering that the standard unit cost signifies unit project costs and should be appropriated through accurate calculation, performance management needs to be objectified by measures such as providing prime cost data, unifying unclear expenditure items, and setting rules

for prime costing. Future research also needs to look into the prime cost of educational expenditure across the whole higher education sector at the national level, not only the expenditure of universities. Third, methods should be established to verify and comprehensively manage how huge amounts of government subsidy are actually being spent by universities. For this, further study should standardize fund execution reporting forms and collect the entirety of execution data, upon which to conduct analyses that grasp the essence of parametric estimating rather than merely analyzing the approximate tendency value.

○ keyword : higher education, government funding project, standard unit cost, cost estimating, monte carlo simulation