Building Performance and Academic Performance in Higher Education: A Post Occupation Evaluation of Overseas Loan Financing Project

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Abstract: Physical infrastructure is one of the input instruments in the implementation and improvement of the quality of education. However, since the government fund is inadequate, so the development financing to improve the physical quality of higher education infrastructure is obtained through overseas loan financing. The problem in this study is to describe the contribution of investment in the provision of facilities and infrastructure on improving the academic and institutional performance of higher education. This study uses a Post Occupational Evaluation method that focuses on measuring building performance and the contribution to higher education academic performance. This study also compares the building performance and academic performance of universities that receive and do not receive loans.

Keywords: academic performance, building performance, post occupation evaluation, overseas loan financing.

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1. Introduction

Educational infrastructure is one of the instrumental inputs in education and learning. As an instrumental input, educational facilities are one of the determining factors in efforts to guarantee the quality of education. The assumption is if other quality determinants such as curriculum, teacher competencies, and students' capacity are supportive, then the building performance, the quality of education, and learning are also increasing.

The quality of educational facilities that accommodate various activities of the learning process can be measured, among others, through the design functionality and building performance. Functionality is a property given to infrastructure artifacts, in order to create a spatial usability effect (Warell, 2001). This means that the quality and variety of facilities will reflect user demands and needs for good productivity. This has to do with how well the building directly supports the activities in it.

The condition of the physical quality and functional effectiveness of the building is essential in supporting the effectiveness of education. A successful educational building is indicated by the extent to which the building functions, how students and teachers make use of the spaces, and how the design promotes the educational process (Heitor, 2005).

In reality, in the context of higher education in Indonesia, there is still a wide gap between the ideals of the need for quality educational facilities and the reality that can be provided, both at public and private universities. This is in line with the findings of Commission 10 of the Indonesian House of Representatives that stated there were three important problems in higher education namely relating to the ratio of lecturers, facilities and infrastructure, and accreditation (2017).

In the midst of limited state budgets, one of the efforts to improve the quality of facilities and infrastructure for higher

education is obtained through foreign loan financing (PPLN). Compared to domestic sources of financing, which generally build each building in stages, PPLN builds and develops a lot of university campuses promptly and comprehensively. Many universities that obtain PPLN are transforming quickly into representative campuses and have adequate educational facilities.

The research objectives were to describe the level of post-PPLN university buildings performance, to describe the level of academic performance of higher education institutions, and to analyze the contribution of building performance to the academic performance of higher education institutions.

Building performance is both a philosophy and science based on the premise that buildings must meet the requirements of safety, health, comfort, efficiency, and have long durability (Dunning and Morrow, 2019). Building performance is the output of the quality of facilities that determines the quality of education and learning. According to Son & Yuen (2002), there are four main indicators for measuring building performance, namely: legality requirements and regulatory compliance, functional requirements related to building functions, user requirements related to comfort and costs to be incurred by users, and performance requirements related to the physical performance of buildings, and installation of complementary infrastructure.

In line with the view above, Rush (1986) and Smith (1976) tried to see building performance as a whole, integration of factors; spatial performance, thermal performance, ventilation conditions, acoustics and visual performance, as well as the total integrity of the building.

Higher education academic performance empirically can be portrayed from three dimensions (Widodo, 2012). Student dimensions include aspects of tangibles (educational infrastructure), reliability (reliability of lecturers and academic staff), responsiveness, assurance (treatment of students), and empathy (understanding of student interests). The dimensions of the study program include aspects of the curriculum, learning and academic atmosphere, students and graduation, human resources, academic facilities and infrastructure, research, community service and cooperation, and management systems. The dimensions of the institution (faculty, university) include aspects of student and graduate standards, curriculum standards, learning and academic atmosphere, research and community service, and quality assurance.

The Ministry of Research, Technology, and Higher Education translates efforts to measure higher education performance through key performance indicators (KPI). On the other hand, in relation to the orientation of higher education in Indonesia which is being directed to achieve a position as a world-class university, there are several indicators of world-class university performance assessment, according to rating agencies such as the Times Higher Education World University Rankings or Quacquarelli Symonds (QS). QS ranking is one of the performance assessments which can be used a reference. Therefore, this study will also adopt these indicators as a measure of academic performance.

In 2020, QS has updated and proposed 11 criteria which are used as a reference for universities to become world-class, which includes academic reputation (30%), employer reputation (20%), faculty/student ratio (10%), international research networks (10%), citations per paper (10%) and papers per faculty (5%), staff with a PhD (5%). proportion of international faculty (2.5%) and proportion of international students (2.5%), proportion of incoming exchange students (2.5%) and proportion of outbound exchange students (2.5%).

There has been many research on post occupation evaluation (POE) on building performance. However, POE research related to the academic performance of tertiary institutions, especially universities built with PPLN funds, is still rare or has never been conducted. Therefore, this research tries to fill in the gap and the results show this reality. Research by Werner and Schindler (2004) states that it is generally recognized that the spatial structure of building factors is important in finding the performance. However, very few studies have linked way finding performance directly with the topological and geometrical properties of the spatial environment. In this study, researchers provide empirical evidence that path-finding/finding performance and people's ability to orient themselves in their environment depend in part on geometric relationships between different parts of space.

In this research on the challenges of defining international design principles for educational buildings, Heitor (2005) identifies the key factors that should be considered when addressing design quality in educational buildings. These factors are grouped into pragmatic concepts and design principles. Pragmatic concepts range from functional ideas to design solutions that address problems such as schematic planning/design and development. Heitor, further states that the initial phase (schematic design) anticipates the definition of a design brief based on functional ideas. Functional ideas discuss how various activities should be carried out differently by everyday users (students, lecturers, teaching assistants, visitors and guests) in the institution as a whole.

Ujang and Zakariya (2014) showed that social and emotional meanings, which are attached to or generated by elements of the urban environment are important, or even often more important than structural aspects and physical images. On that basis, this study examines the definition and concept of place in constructing a conceptual framework for urban regeneration, taking into account the principles of sense of place and environmental psychology (place attachment). The review highlighted the importance of place-based approaches and principles in regenerating cities, which have implications for the continuity of the meaning and identity of place in the Asian context.

Juarti, Marlailana, and Noorlaelasari (2015) reported the results of research on building performance. The research aims to assess the damage to the Politeknik Pos, Politeknik Negeri Bandung and the Politeknik Manufaktur buildings; both through visual inspection and testing, as well as non-destructive testing for latent damage. From this research, we can also calculate the weight of each building component which is reflected in the performance of building reliability requirements, such as security, safety, health, comfort and accessibility requirements of the building.

Jamieson, Fisher, Gilding, Taylor, and Trevit (2000) present the results of an analysis of the development of online and virtual teaching and learning environments to complement formal face-to-face patterns, raising questions about the ways in which new communication and information technology (ICT) is incorporated into the environment in campus. More importantly, these developments challenge the meaning of students' learning experiences on campus. The new ICT requires institutions, teachers, and researchers to reconsider the relationship between physical settings and student learning experiences.

All aspects of the research results above are relevant if they are placed in the context of research on college campuses. In connection with this research, at least there are several important points, namely: (i) showing a novelty because it puts these aspects in an integrated manner in the concept of building performance with academic performance, and (ii) the correlation is related to building performance funded by PPLN loans.

2. Method

This study used a quantitative approach, with a combination of two methods: Post Occupation Evaluation (POE) for building performance variables, as well as comparative descriptive research methods to compare building performance levels and academic performance, and correlational descriptive to see the impact or effect of the building on academic performance.

Regarding the use of POE, there are at least three categories of POE, the implementation of which depends on the type and size of the building, the client's objectives, and the expected depth of evaluation. Preiser et al. (2018), mentioning POE as indicative, investigative, and diagnostic. Each consists of three phases covering: planning, implementation, and application as described below.

Level 1: Indicative POE, giving an indication of failure or major success of building performance. This type of POE is usually done over a very short time span, from two or three hours to a day or two. Indicative POE generally uses four data collection techniques: archive and document evaluation, brief field observations, evaluation questions, and select interviews.

Level 2: Investigative POE, takes more time; more complicated, and requires more resources than the indicative POE. Often a POE investigation is conducted when an indicative POE has identified a major problem, requiring a more detailed study. The evaluation criteria are explicitly stated before the building is evaluated. Spending more effort and time in the field. Setting evaluation criteria involves at least two types of activity: up-to-date literature, and comparison with the most recent, up-to-date comparison of similar facilities.

Level 3: POE diagnostics is a comprehensive and in-depth investigation. Made at a high level of effort. Usually, it follows a multi-method strategy, including questionnaires, surveys, observations, physical measurements. It may take several months to a year or more to complete. The POE diagnostic results are intended to increase facility specificity and complexity in building types.

This research is at level 2 and 3, namely the Investigative and Diagnostic POE category, with the aim of evaluating the extent to which the performance of the college campus buildings built by PPLN funds, which then looks at the effect on higher education academic performance. However, because this research was likely conducted during the Covid-19 pandemic, data collection techniques such as field observations and physical measurements of buildings and the environment cannot be carried out (Anggraeni et al., 2020). Therefore, this study uses two data collection techniques, namely, online questionnaires and documentation studies. That is, POE is carried out based on the user's subjective perception.

This study focuses on two variables, namely the independent variable (X) is the building performance and the dependent variable (Y) is the academic performance of the university. Building performance is measured by the POE method with data collection techniques using online questionnaires. The questionnaire was used after being tested and met the validity and reliability requirements. Academic performance is analyzed from documentation studies, in the form of assessment and clustering of Higher Education by the Ministry of Research, Technology and Higher Education.

The number of samples determined in this study was 160 respondents. Distribution of the sampling instrument was conducted using the Google Form given the constraints of the COVID-19 pandemic. The distribution time is approximately 60 days, however, until the data collection deadline, there were only 115 filled questionnaires. After a review of the data obtained, only 102 questionnaires from the research respondents could be processed.

With the purposive unit sampling technique, as well as ordinal data types, it is assumed that the sample is not normally distributed. Data processing is performed using MS Excel and SPSS software, and using non-parametric statistical formulas, for independent samples.

Descriptive data analysis technique through analysis of mean is used to obtain the achievement value of building performance (Nkb) and then compared with the building performance criteria: 0-20 (Very Poor); 21-40 (Poor); 41-60 (Satisfactory); 61-80 (Good); 81-100 (excellent).

The value of institutional performance is obtained from existing data in the clustering of each university, which displays the achievement of scores which include the values

of Input, Process, Out Put, and Outcome. The weighting of the scores is on a scale of 1-4 so the achievement of the total score of each university is compared to the maximum score multiplied by the value of 100 so the final score and position of the higher education institutions can be obtained in the clustering of higher education performance in 2020. Institutional Academic Performance Criteria: 0- 20 (Very Low); 21-40 (Low); 41-60 (High Enough); 61-80 (High); 81-100 (Very High).

Hypothesis testing in this study is conducted by regression analysis. This is due to the determination of sampling carried out purposively and in-unit sampling. Then the type of data used is ordinal data and the determination of respondents is not done randomly. Furthermore, for testing is done with the formula of the Pearson product-moment correlation technique.

Correlation techniques are used to determine the effect of independent variables on the dependent variable, by looking for a simple linear correlation coefficient (Pearson Product Moment). Furthermore, the percentage contribution of the independent variable (building performance) to the dependent variable (universities academic performance) is done by calculating the coefficient of determination.

The difference test analysis parameter is aimed at strengthening the research results by looking at the performance comparison of each university, especially differentiating between state universities that have not received and have received PPLN. In this study, the Independent Sample T-Test is conducted using SPSS software. The significance value is obtained from Levene's Test for Equality of Variances and the interpretation of the output is guided by the "equal variances assumed" table and it can be concluded whether Ho is accepted and Ha is rejected.

3. Results and Discussion

Being based on the amount of performance and its categorization, it shows that there are insignificant values, and concluded the same based on the calculation of the difference test. Based on the SPSS output, the Levene Statistic is 2.308 with a significance or probability (Sig) of 0.081 because the significance of 0.081> 0.05, it can be concluded that the variants of the four campus buildings performance data are the same or homogeneous. Based on the ANOVA output, it is known that the Sig value is 0.474> 0.05, so it is concluded that the average performance of the four campus buildings is significantly equal.

POE based on subjective perceptions is a weakness of this study because field observations and measurements cannot be conducted. The disparity in building performance seems to be influenced by differences in the level of user satisfaction (lecturers and university leaders) in Java and outside Java. On the other hand, although universities have received PPLN, respondents feel that the campus building performance still does not meet the expected performance optimization standards. The existence of a gap value (35% and 36%), raises the need for better campus development and increases again to approach the value of campus building performance perfection (100%).

Higher education institutional performance data is obtained from a documentation study, via the https://klasterisasi-pt.kemdikbud.go.id page, which started the activated on 1 August 2020. The assessments conducted include achievements in the performance of input, process, output, and outcome with weighting on each performance. The final result is in the form of a total score, placing the university's position in the order and clustering it nationally.

Based on the data obtained from the clustering that shows the level of performance of higher education institutions as well as the total score achievement of institutional performance.

Based on the amount of performance, position, and clustering, it shows that there are significant differences in values. This can also be seen in the category criteria that the academic performance conditions of lecturers categorized into the reasonably high category.

The measurement of the correlation coefficient of building performance cannot be constructed for each university because the parameters are different. However, by looking at the position of building performance and institutional performance, it can be seen that the amount of the building performance contribution have quite high performance.

Based on the data, the results of the calculations, it is found that the r count value in the correlation between the X variable (Building Performance) and the Y2 variable (PT Institutional Performance) is 0.47. This value is in the range of 0.400 - 0.599. So, it can be concluded that the correlation between variable X and variable Y2 is included in the sufficiently strong category.

The results of the coefficient of determination calculation on variable X (building performance) against variable Y2 (institutional performance) using the formula KD = r2 x 100%, the coefficient of determination is KD = 0.472 x 100% = 22%. So, it can be concluded that the contribution given by building performance to the overall higher education institutional performance variable is 22%. The remaining contribution value of 78% is determined by variables or other factors.

Research findings indicate that building performance contributes to around 22% of the achievement of higher education academic and institutional performance. Needless to say, policies and programs that can improve academic and institutional performance are needed. Another opinion is expressed by Barret et al. (2019) that there is a growing evidence that the best ways to ensure that the design and layout of schools support the pedagogy are as follows:

i. Striving to create innovative spaces for learning while also respecting the professionalism of the educationalists involved and their current traditions, skills, and constraints.
ii. Creating schools that are spatially flexible so over the long term they can support rather than obstruct any changes or developments in pedagogical practice.

iii. Implementing any innovations in educational practice by ensuring that there is a consistent "fit" between the vision behind the innovation, teachers' capabilities and motivations, and the characteristics of the spaces that are available.
iv. Where necessary, increasing the flexibility of existing schools by using new furniture and fittings as well as by investing in alterations and extensions.

In achieving academic and institutional performance of higher education, apart from the provision of educational infrastructure, it must also be accompanied by other programs that re-reinforce the vision, mission, and objectives of the institution which is able to elaborate all potential resources by providing space for innovation and flexibility in implementing programs. Education, research, and community service.

4. Conclusion

Based on the results of the research and discussion above, several conclusions can be formulated. First, that based on the subjective perceptions of lecturers, whether the tertiary institutions. This means that the average building performance of the four campuses is significantly the same.

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