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The Effect of Construction Cost Index, Investment, and Regional Budget Realization on The Performance of Indonesia's Construction Sector

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Abstract. The construction sector plays a vital role in Indonesia's economic development, contributing significantly to national GDP and employment. However, the sector's performance has exhibited fluctuating trends in recent years, influenced by various macroeconomic and fiscal factors. This study aims to analyze the influence of the Construction Cost Index, Investment, and Regional Budget Realization on the performance of the Indonesian construction sector. The research employs a quantitative approach using panel data regression analysis. The sample comprises 20 provinces in Indonesia, observed over the period 2018 to 2023. The data utilized were sourced from Statistics Indonesia (BPS) and the Ministry of Finance. The results of the panel data regression analysis indicate that the Construction Cost Index, Investment, and Regional Budget Realization simultaneously have a significant effect on the performance of the construction sector. Partially, each independent variable also demonstrates a positive and significant influence. These findings suggest that increases in construction costs, investment flows, and the realization of regional government budgets are key determinants in driving the growth and performance of the construction sector across Indonesian provinces. The study underscores the importance of consistent and targeted fiscal policies to maintain the sector's momentum as a crucial engine of the national economy.

Keywords: Construction Cost Index; Construction Sector Performance; Investment; Panel Data Regression; Regional Budget Realization.

1. INTRODUCTION

The construction sector is a critical and multifaceted component of the Indonesian economy. This sector serves as a genuine economic driver, generating substantial multiplier effects on its upstream and downstream industries, including the construction materials industry, financial services, logistics, and labor, in addition to serving as the primary support for gross fixed capital formation (PMTB). Its consistent contribution to the Gross Domestic Product (GDP) of over 10% reinforces its status as a fundamental component of national economic expansion. Consequently, the construction sector's performance is frequently employed as a metric for the health and acceleration of a nation's development.

The research period of 2018-2024 was selected due to its significance and dynamic nature in the annals of Indonesia's development. This time frame encompasses the policy transition from the conclusion of President Joko Widodo's first term to the implementation of his second term, with a particular emphasis on the completion of national strategic projects that were initiated from the outset. In addition, this period encompasses the transition from relatively stable global economic conditions to the disruptions of the global pandemic, and the subsequent era of recovery and new geopolitical challenges. Therefore, examination of the construction sector's performance during this period offers a comprehensive understanding of the sector's adaptability and resilience.

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Indonesia's construction sector is currently in a state of consolidation as it transitions into the years 2023-2024. The construction of the Trans Sumatra and Trans Java toll roads, renewable energy infrastructure, and the IKN are all examples of strategic projects that are making progress. The challenge of global material inflation is beginning to subside slightly; however, it continues to necessitate meticulous management. The government's attention is beginning to transition from the construction of new physical infrastructure to the maintenance of infrastructure assets that have already been constructed. The construction industry has experienced an extraordinary transformation for years. The landscape that we observed a decade ago has undergone a significant transformation, as a result of factors such as the increasing inflation, the economic downturn, and COVID-19. Nevertheless, the industry has demonstrated resilience and consistent growth in spite of these obstacles. The construction industry is anticipated to experience substantial development, particularly in Asia-Pacific countries such as China, India, Singapore, and Indonesia, as a result of the rapid advancement of technology. Furthermore, the demand for local infrastructure and the growing migration to developed regions like the United States and Europe will serve to further stimulate market expansion in these regions.

The IKN project and supporting infrastructure in East Kalimantan province drove the highest project value growth at +25.6 percent. Central Java province followed at +13.8 percent, driven by industrial and housing growth, and East Java at +12.5 percent, driven by the development of special economic zones. Nevertheless, the Jakarta province experienced a contraction of -2.1% as a result of property saturation and oversupply, despite Jakarta being the largest contributor to the Construction GDP at 18.5 percent. West Java, East Java, East Kalimantan, and Central Java followed at 16.8 percent, 14.2 percent, and 12.1 percent, respectively.

National Strategic Projects (PSN) such as the IKN project in East Kalimantan, the Jakarta-Bandung High-Speed Rail project, and industrial area development in West Java, the Trans Java Toll Road project, and port development in East Java, and the industrial and energy area expansion project in Banten province, support the substantial value of construction projects in numerous provinces. One of the factors that influence the performance of the construction sector is the Construction Cost Index. The Construction Cost Index (CCI) is an economic indicator that measures changes in construction costs over time. Several construction and construction economics experts define the Construction Cost Index. (Skitmore, M., & Lo, 2016) explain the CCI as an index number that measures changes in construction input costs (materials, labor, overhead) against overall construction price changes, thereby allowing for

adjustments in project cost estimates from the past to the present or future. (Diekmann, 2023) emphasizes that the CCI is essentially a "basket of goods" index that weighs the components of construction costs to convert known costs at one point in time into estimated costs at another point in time. In Asia, (Orazalin, 2022) emphasize CCI as an important tool in construction cost management to monitor cost fluctuations over time and used as a basis for updating project cost estimates. Meanwhile, (Cao, S., & Ashuri, 2020) view the CCI (and its derivative, HCCI) as a weighted aggregate index that integrates price changes of fundamental construction cost elements to estimate the costs of new projects in the future.

The IKN project's high demand for materials and labor in East Kalimantan (+49.3 percent) was the primary factor driving the highest increase in CCI. DKI Jakarta (+47.2 percent) and the Riau Islands (+46.8 percent) followed in that order. The construction sector is experiencing substantial inflationary pressure, as evidenced by the national average cumulative increase of 36.8 percent over a four-year period. Provinces with the greatest and lowest CCIs exhibit a substantial disparity. Central Java's CCI is 131.6, while DKI Jakarta, the capital city, has a CCI of 147.2 in 2024, a 15.6-point disparity. This suggests that there are disparities in material accessibility, operational costs, and purchasing power among different regions. East Kalimantan experienced the most significant increase in 2023-2024 (from 136.7 to 149.3) as a result of the overheating demand from the IKN project. This phenomenon corroborates the economic theory that the concentration of large projects over a brief period can generate substantial local inflationary pressures on labor and materials.

The subsequent aspect affecting the performance of the construction sector is investment. The execution of construction investment significantly influences the overall success of the construction sector. Construction investment is defined not only as the spending for erecting physical structures but also includes long-term aspects such as economic rewards, hazards, and its effect on national productivity. Malleson (2024) describes construction investment in his economic study as the allocation of capital resources to physical fixed assets with a useful life exceeding one year, wherein the construction process acts as a catalyst for regional economic growth. Dell'Isola, A. J., & Kirkham (2023) underscore the importance of cost management, asserting that construction investment constitutes a strategic decision entailing a substantial initial financial commitment to realize the future utility value of the structure, hence necessitating an exhaustive life cycle cost study.

In the realm of public policy, Flyvbjerg (2024) characterizes construction investment in his megaproject analysis as a speculative endeavor prone to optimism bias and purposeful deception, frequently resulting in cost overruns. Ofori (2023) asserts that in developing nations,

construction investment transcends basic physical production, serving as a crucial mechanism for employment creation and the alleviation of infrastructural deficits. Winch (2024) defines it as a process of converting financial capital into physical capital through a complicated supply chain, where success is significantly influenced by the efficacy of project management in regulating costs, quality, and time. Abidin, N. Z., & Pasquire (2023) incorporate sustainability considerations, characterizing construction investment as a means of generating sustainable value that must account for financial returns as well as environmental and social effects throughout the asset's existence.

The execution of construction investment from 2021 to 2024 exhibits considerable growth disparity among provinces. East Kalimantan experienced the most significant increase (+28.7 percent annually), propelled by the expedited development of the Nusantara Capital City (IKN) and its ancillary infrastructure projects. Simultaneously, DKI Jakarta had an average decline of -6.5 percent annually, attributed to market saturation in the property industry and a redirection of investment towards peripheral regions like Banten and West Java. The investment increase in regions beyond Java-Sumatra, shown by South Sulawesi (+10.7 percent), signifies the onset of integrated equitable development.

An examination of funding sources indicates differing degrees of reliance across provinces. Provinces with national priority projects, like as East Kalimantan and South Sulawesi, are predominantly funded by APBN investment (50 percent and 55 percent, respectively), but industrial regions like West Java and Banten depend on private sector investment (70-80 percent). The heightened significance of foreign direct investment (FDI) is seen in Bali (25 percent) and East Kalimantan (30 percent), reflecting the allure of foreign capital in the tourism and infrastructure sectors.

The execution of the regional revenue and expenditure budget (APBD), especially the allocations for housing and public infrastructure, substantially enhances the performance of Indonesia's construction sector. The implementation of the APBD for housing and public facilities serves as a regional budgetary tool that demonstrates the local government's dedication to delivering essential infrastructure for the community. According to Pamungkas & Sutarti (2025) the Budget Realization Report (LRA) is a report that provides information on the realization of revenue, expenditure, transfers, surplus/deficit, financing, and excess/less financing of the budget in a single period, as compared to its budget. Ermayanti et al., (2025) further substantiate this definition by asserting that budget realization is the ultimate outcome of the budget absorption and planning processes, which are employed to assess the government's performance in accomplishing its established objectives and vision. The regional

budget (APBD) is conceptualized by Herdiyansyah et al., (2022) as the implementation of budget policies in physical development within the context of infrastructure construction. This process encompasses the disbursement of funds, the procurement of goods/services, the monitoring, evaluation, and accountability for fund usage to the public and authorities.

Numerous research voids are discernible in this investigation. The first limitation of research that simultaneously integrates the three variables is as follows. Previous research has tended to examine these factors in isolation. The study conducted by (Akbar & Sihaloho, 2019) exclusively examined the impact of Village Funds on the value of completed construction, whereas the study conducted by Al Fath et al., (2024) exclusively examined the aspect of sustainable procurement in government projects without connecting it to the construction cost index. Secondly, the absence of research that utilizes the most recent CCI data with national coverage. The Construction Cost Index (IKK) data for all provinces and regencies/cities has been published annually by the Central Statistics Agency (BPS). The most recent publication, Construction in Figures 2024, was released in December 2024. The General Allocation Fund (DAU) is also calculated using this IKK data, which is a critical component. Nevertheless, empirical research that employs IKK data to evaluate the national construction sector's performance is still exceedingly scarce.

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2. RESEARCH METHODOLOGY

The objective of this investigation is to evaluate the impact of the Regional Revenue and Expenditure Budget (APBD), investment, and the Construction Cost Index (CCI) on the performance of the Indonesian construction sector. The population in this study is comprised

of all provinces in Indonesia that have comprehensive data regarding the four research variables during the observation period. Purposive sampling is the sampling method employed, in which the sample is chosen based on specific criteria that are pertinent to the research objectives. The primary criterion employed is the total cumulative value of construction undertakings from 2018 to 2024, spanning a seven-year period. The 20 provinces with the highest cumulative valuation of construction projects were selected based on this criterion. The 2018-2024 period was chosen to provide a more comprehensive understanding of the construction sector's performance dynamics, as it encompasses the period prior to, during, and following the COVID-19 pandemic, as well as the availability of consistent and pertinent data.

The performance of the Indonesian construction sector is the dependent variable in this study. It is represented by the value of the regional gross domestic product (RGDP) of the construction sector at constant prices for each province. Meanwhile, the independent variables utilized are composed of three primary variables. Initially, the Central Statistics Agency (BPS) publishes the Construction Cost Index (CCI) or Indeks Kemahalan Konstruksi (IKK) as a measure of the construction cost level in a given region. Secondly, the realization value of Foreign Direct Investment (FDI) and Domestic Direct Investment (DDI) in the construction sector is used as a proxy for investment. Third, the Regional Revenue and Expenditure Budget (APBD) was implemented with an emphasis on capital expenditures for infrastructure and construction in each province.

The Panel Data Regression analysis technique is employed in this study to evaluate the impact of independent variables on the dependent variable. The panel data regression model is chosen for its capacity to accommodate the characteristics of data that combine the cross-sectional dimension (20 provinces) and the time series dimension (7 years), thereby delivering more efficient estimates and the capacity to manage heterogeneity among individuals (provinces). The following stages of analysis are involved: (1) hypothesis testing using the coefficient of determination (R^2) test, simultaneous test (F-statistic), and partial test (t-statistic), and (2) testing the selection of the best model between the Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM). The EViews 13 statistical software was employed to conduct all data processing.

One of the factors that influence the performance of the construction sector is the Construction Cost Index. The Construction Cost Index (CCI) is an economic indicator that measures changes in construction costs over time. Several construction and construction economics experts define the Construction Cost Index. Skitmore, M., & Lo (2016) explain the CCI as an index number that measures changes in construction input costs (materials, labor,

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dimension (20 provinces) and the time series dimension (7 years), thereby delivering more efficient estimates and the capacity to manage heterogeneity among individuals (provinces). The following stages of analysis are involved: (1) hypothesis testing using the coefficient of determination (R^2) test, simultaneous test (F-statistic), and partial test (t-statistic), and (2) testing the selection of the best model between the Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM). The EViews 13 statistical software was employed to conduct all data processing.

3. RESULTS AND DISCUSSION

Chow Test

In order to ascertain the most suitable estimation model for the panel data regression analysis of this study, a Chow Test was implemented to compare the Common Effect Model (CEM) and the Fixed Effect Model (FEM). The Hausman Test will be conducted to ascertain whether the Random Effect Model (REM) or the FEM is the most effective in elucidating the impact of CCI, construction investment, and APBD realization on the performance of Indonesia's construction sector. The results of the Chow Test will serve as the foundation for this determination.

Table 1. Chow Test.

Correlated Random Effects - Hausman Test			
Pool: DATAPOOL			
Test cross-section random effects			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	37.258389	5	0.0000

Source: Data Processed by Eviews 13.

The probability (Prob.) value of 0.0000 for the Cross-section F and 0.0000 for the Cross-section Chi-square is demonstrated by the Chow test results, which are used to determine the most suitable model between the Common Effect Model (CEM) and the Fixed Effect Model (FEM). Both probability values are significantly less than the defined significance level (α = 0.05 or 5%). The presence of significant intercept differences among provinces in this study is also confirmed by the F-test statistic value of 8.016957 with degrees of freedom (18,132).

Consequently, it can be inferred that the Fixed Effect Model (FEM) is a superior model to the Common Effect Model (CEM) for the purpose of examining the impact of the Construction Cost Index (CCI), construction investment, and APBD realization on the performance of the Indonesian construction sector. Subsequently, additional testing, specifically the Hausman Test, is necessary to ascertain whether the FEM model is more suitable than the Random Effect Model (REM).

Hausman Test

The Hausman Test was conducted to ascertain the optimal model between the Fixed Effect Model (FEM) and the Random Effect Model (REM) after the Chow Test determined that the Fixed Effect Model (FEM) was more appropriate than the Common Effect Model (CEM). The Hausman Test results will be the final foundation for the selection of the most optimal panel data regression model to analyze the performance of Indonesia's construction sector in relation to CCI, construction investment, and APBD realization.

Table 2. Hausman Test.

Correlated Random Effects - Hausman Test			
Pool: DATAPOOL			
Test cross-section random effects			
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Source: Data Processed by Eviews 13.

The Hausman test results, which were conducted to ascertain the optimal model between the Fixed Effect Model (FEM) and the Random Effect Model (REM), indicate a Chi-Square statistic value of 37.258389 with 5 degrees of freedom (d.f.) and a probability (Prob.) value of 0.0000. The probability value is significantly lower than the defined significance level ($\alpha = 0.05$ or 5%). Thus, the null hypothesis (H0) that the Random Effect Model (REM) is the most suitable model is refuted, while the alternative hypothesis (Ha) that the Fixed Effect Model (FEM) is more suitable is accepted. The results of this study suggest that the independent variables (CCI, construction investment, and APBD realization) and individual effects (cross-section) in the model are correlated. This correlation enables FEM to manage the heterogeneity between provinces that is not accounted for by REM. Consequently, it can be

inferred that the Fixed Effect Model (FEM) is the most suitable and optimal panel data regression model for examining the influence of the Construction Cost Index (CCI), construction investment, and APBD realization on the performance of the Indonesian construction sector.

Panel Regression Fixed Effect Model

The Fixed Effect Model (FEM) has been chosen as the most suitable model for analyzing the impact of independent variables on the dependent variable in this study, as indicated by the results of the Chow Test and the Hausman Test. FEM is selected due to its ability to regulate heterogeneity among provinces by presuming that each province possesses distinct but time-invariant characteristics or intercepts. In addition, the coefficient of determination test (R^2), simultaneous test (F-statistic), and partial test (t-statistic) will be employed to interpret the estimation results of the FEM model in order to ascertain the extent of the collective and individual impact of CCI, construction investment, and APBD realization on the performance of the Indonesian construction sector.

Table 3. Regression of Fixed Effect Model Test.

Dependent Variable: CONSTRUCTION?

Method: Pooled Least Squares
Date: 04/09/26 Time: 12:49
Sample: 2015 2024
Included observations: 10
Cross-sections included: 11
Total pool (balanced) observations: 110

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.355099	0.047609	7.458723	0.0000
CCI?	-0.042853	0.014781	-2.899200	0.0044
INVESTMENT?	0.001169	0.000105	11.11581	0.0000
BUDGET?	0.011424	0.005346	2.137024	0.0344

Prob(F-statistic)	0.000000	Adjusted R-squared	0.743666
Durbin-Watson stat	1.775897		

Source: Data Processed by Eviews 13.

The performance of Indonesia's construction sector is substantially influenced by the Construction Cost Index (CCI), Construction Investment, and APBD Realization variables, as demonstrated by the panel data regression estimation conducted using the Fixed Effect Model (FEM) approach. This is demonstrated by the low Prob(F-statistic) value of 0.000000, which

is significantly lower than the significance level of α = 0.05 (5%). This three independent variables can account for 74.37% of the variation in the performance of the construction sector, as indicated by the Adjusted R-squared value of 0.743666. The remaining 25.63% is accounted for by variables outside the model.

The construction sector's performance is positively and significantly influenced by the Construction Investment variable, as evidenced by a coefficient of 0.001169 and a probability value of 0.0000 (< 0.05) in a partial t-test. In the same vein, the Regional Budget Realization variable exhibits a positive and significant effect, with a coefficient of 0.011424 and a probability value of 0.0344 (< 0.05). In contrast, the construction sector's performance is significantly and negatively impacted by the Construction Cost Index (CCI) variable, with a coefficient of -0.042853 and a probability value of 0.0044 (< 0.05). This implies that, in reality, the performance of the construction sector will decline with each increase in the CCI (construction cost index), whereas an increase in investment and Regional Budget Realization will promote an improvement in the sector's performance. The model is immune from autocorrelation issues, as indicated by the Durbin-Watson stat value of 1.775897, which is nearly 2.

4. CONCLUSIONS AND RECOMMENDATIONS

The performance of the Indonesian construction sector is significantly influenced by the three independent variables, namely the Construction Cost Index (CCI), Construction Investment, and Realization of the Regional Budget (APBD), as indicated by the results of the panel data regression using the Fixed Effect Model (FEM) approach. This demonstrates that the construction sector is a multifaceted industry that is influenced by a variety of macroeconomic and fiscal factors. The performance of the system is not predicated on a single variable, but rather on the interaction between the allocation of regional government expenditure, the availability of investment capital, and the cost of construction inputs. The results of the significant simultaneous test confirm that these three factors collectively constitute significant determinants in the explanation of the fluctuations in the GDP of the construction sector across various provinces in Indonesia.

The construction sector's performance was partially determined to be positively and significantly influenced by the variables of Construction Investment and Realization of the Regional Budget (APBD). This suggests that capital injections from both the private sector (PMA/PMDN) and the government (APBD) expand production capacity, finance new infrastructure projects, and generate a multiplier effect on employment and material

consumption. Development economics theory posits that an increase in capital expenditure and direct investment will stimulate growth in the real sector output, which includes construction. This is consistent with this. Conversely, the construction sector's performance is significantly and adversely affected by the Construction Cost Index (CCI) variable.

The scientific argument is that a high CCI indicates that the costs of construction inputs, including materials, labor, and apparatus, are high. Contractors are subjected to increased financial stress as a result of the rise in input costs. This can result in the reduction of project size, the postponement of construction implementation, or the cancellation of projects. The construction sector's competitiveness and profitability are diminished by the high construction cost index in the long term, which impedes the development of construction GDP. This discovery substantiates the notion that the construction sector's optimal performance is contingent upon the effective management of input costs. We are grateful to the Rector, Director of Postgraduate Studies, and Head of the Doctoral Program in Economics of Borobudur University in Jakarta for granting us the opportunity to participate in this International Conference.

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