



Factors impacting Construction Materials Price Volatility in Abuja: A Structural Equation Modelling Approach

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Abstract

The studies on construction materials price volatility remains underexplored especially through the lens of structural equation modelling thereby creating a gap in which the materials volatility should be accessed. This study examines the application of Covariance-Based Structural Equation Modelling (CB-SEM) on the factors impacting construction materials price volatility in Abuja. This study through probability sampling technique via simple random sampling surveyed 168 construction professionals drawn through Yamane formula. Upon the distribution of questionnaires, 161 copies were properly filled and returned ensuring a response rate of about 96 percent. The method of analysis were descriptive and inferential statistics particularly CB-SEM. The path analysis indicates that economic factors significantly and positively affect building material price volatility ($\beta = 0.67$, $p < 0.001$), supply chain factors demonstrates a moderate significant positive influence ($\beta = 0.41$, $p < 0.001$) and Project management factors also had significant and positive effect on material price volatility ($\beta = 0.32$, $p < 0.001$). The study concluded that economic factors, supply chain factors and managerial procedures including procurement planning, cost forecasting, project scheduling, and risk management substantially influence the responsiveness of construction projects to fluctuations in material prices. This study recommended that there is a need for Project managers to implement proactive procurement techniques, including long-term supplier contracts, framework agreements, and bulk purchase arrangements, to stabilize material costs and mitigate the risk of abrupt market price surges.

Keywords: Construction Cost Performance, Economic Factors, Material Price Volatility, Project Management, Covariance-Based Structural Equation Modelling (CB-SEM), Supply Chain Dynamics

1.0 INTRODUCTION

The construction sector is acknowledged as a driver of economic growth due to its facilitation of infrastructure development, housing supply, and industrial expansion (Akoh et al., 2025). In Nigeria, the execution of construction projects has been progressively compromised by fluctuations in the prices of building supplies including cement, reinforcement steel, aggregates, tiles, and finishing components constitute a significant share of total project costs and hence critically influence overall cost performance (Oke et al., 2025). When the costs of these products move erratically, contractors and project managers encounter considerable challenges in upholding project budgets and financial stability. In recent years and in 2025 alone, the Nigerian construction sector has encountered significant and erratic escalations in material costs, influenced by several macroeconomic and structural factors (Unegbu et al., 2025). The instability of exchange rates, inflationary tendencies, dependency on imports for certain construction materials, escalating energy expenses, transportation difficulties, and supply chain interruptions have all heightened the unpredictability of material costs (Mogaji et al., 2025). These circumstances have hindered the formulation of accurate cost estimates and diminished the efficacy of conventional budgeting methods employed in project planning.

The volatility of building material prices has become a continual concern for the Nigerian construction sector, significantly affecting project cost management and delivery performance (Muhammed et al., 2022). The erratic variations in the costs of fundamental construction materials, including cement, steel reinforcement, and finishing elements, frequently hinder project budgeting and financial planning in Abuja construction projects (Muhammed et al., 2022). Contractors and project managers generally generate cost estimates in the first phases of project planning based on current market pricing; however, the swift fluctuations in material costs during project execution sometimes make these estimates incorrect. As a result, numerous construction projects encounter cost overruns, budget discrepancies, contractual conflicts, and prolonged completion timelines in Abuja (Oni et al., 2025). In extreme instances, the surge in material prices may result in project abandonment or diminish the quality of completed works as contractors endeavor to modify project criteria in reaction to escalating expenses (Muhammed and Adindu, 2023).

Despite the gravity of this issue, current research that focuses on Abuja has pinpointed the specific factors contributing to the escalation of building material prices, rather than analyzing the intricate interrelations among the fundamental determinants of price volatility (Nnadi and Najjobyo, 2025). The pricing of construction materials is affected by a complex interplay of factors, including macroeconomic conditions, supply chain interruptions, transportation limitations, procurement tactics, and market dynamics (Castelblanco et al., 2025). Nevertheless, the majority of empirical studies have examined these aspects in isolation and have utilized analytical methods that are constrained in their ability to investigate multidimensional interactions. The existing body of literature offers disjointed insights that inadequately elucidate how these variables collectively influence the dynamics of construction material price volatility in the Nigerian construction sector. Considering these constraints, this study employs SEM as a methodological framework to examine the intricate interrelationships among the factors influencing construction material price volatility in Nigeria. This advanced analytical technique attempts to create a solid structural model that improves comprehension of price volatility and facilitates the formulation of more efficient cost management and risk mitigation measures in the construction sector.

2.0 LITERATURE REVIEW

2.1 Conceptual Review

2.1.1 Economic Factors and Construction Material Price Volatility

Economic conditions are among the most commonly referenced factors contributing to price volatility in construction supplies. Macroeconomic variables including inflation, exchange rate fluctuations, energy expenses, and fiscal policies substantially influence the production and procurement costs of construction materials. Inflation raises the overall price level of products and services including construction supplies thus augmenting construction expenses, exchange rate variations affect the expense of imported materials and equipment especially in developing nations where construction inputs are frequently procured globally (Junussova and Nadeem, 2025). When the national currency depreciates, the expense of importing raw materials increases, ultimately resulting in elevated market pricing for construction items (Mulatu, 2025). Energy prices significantly influence material costs as energy is essential for manufacturing processes, transportation, and logistics (Zubairu, 2025). Rising fuel and electricity costs can elevate production charges for manufacturers and suppliers, leading to increased prices for construction materials (Aserie et al., 2025). Government fiscal policies, including tariffs, import restrictions, and taxation, may further affect the cost structure of building inputs. In the

Nigerian construction industry, economic instability has been correlated with price volatility in cement, steel, and other critical materials (Francis et al., 2025). Consequently, macroeconomic conditions are acknowledged as a pivotal determinant of construction material price fluctuations. Researchers have underscored the significance of comprehending economic indicators for predicting construction expenses and formulating project budgets.

2.1.2 Supply Chain Factors and Construction Material Price Volatility

A significant aspect affecting material price variations is the efficacy of the building supply chain. The supply chain includes all operations related to the manufacturing, transportation, storage, and distribution of building materials from manufacturers to project locations (Dong et al., 2025). Efficient supply chain systems guarantee the timely delivery of materials at consistent pricing. Nonetheless, disturbances in supply systems frequently result in shortages, delays, and escalated costs. Transportation difficulties frequently cause supply chain disruptions in numerous developing economies including inadequate road infrastructure, escalating fuel expenses, and logistical inefficiencies can elevate the costs associated with delivering materials from production facilities to building sites, and these supplementary expenses are generally transferred to contractors via elevated material costs (Kingsley et al., 2025). Likewise, reliance on imported resources may render building markets vulnerable to global supply interruptions and shipping delays. When imported goods become rare or challenging to procure, local market prices can escalate considerably, and the market power of suppliers also adds to price volatility (Muhammed and Adindu, 2023). In scenarios when a limited number of suppliers monopolize the market, pricing determinations may be swayed by strategic conduct rather than solely competitive dynamics. Restricted competition among providers may consequently result in price escalations during times of heightened demand and ineffective inventory management and insufficient storage facilities can generate artificial shortages that exacerbate price volatility (Junussova and Nadeem, 2025). Consequently, supply chain efficiency is considered a crucial factor in maintaining price stability in the construction sector.

2.1.3 Project Management Factors and Construction Material Price Volatility

Economic and supply chain conditions serve as external factors affecting building material pricing, while internal project management practices significantly influence the extent of price volatility experienced by projects (Castelblanco et al., 2025). Effective project management entails the planning, organization, and regulation of project resources to attain cost, time, and quality objectives. Weak project management procedures render building projects more susceptible to external price variations. While procurement planning is a vital project management activity concerning material cost management, inadequate procurement strategy might lead to the acquisition of materials at elevated market prices instead of amid more advantageous market conditions (Bashir et al., 2024). Inadequate project scheduling can similarly postpone procurement activities and subject projects to unforeseen price escalations (Shiha et al., 2025). When project timelines exceed their intended estimates, contractors may be compelled to acquire materials at increased rates compared to initial projections and cost forecasting and budgeting methodologies are crucial for managing price fluctuations (Francis et al., 2025). Precise cost estimating necessitates that project managers account for expected fluctuations in market prices and integrate contingency provisions into project budgets. In the absence of such protections, even modest price escalations might considerably destabilize project finances. Risk management measures, such as price escalation clauses and contingency planning, can alleviate the financial repercussions of fluctuating material prices (Muhammed

et al., 2022). Therefore, some experts contend that robust project management competencies are essential to mitigate the detrimental impacts of price volatility on building project outcomes.

2.1.4 Construction Material Price Volatility (CMPV)

Construction material price volatility denotes the regularity and extent of price fluctuations in materials utilized for construction and infrastructure projects. Price fluctuation engenders uncertainty for contractors, project owners, and policymakers, as it complicates the prediction of the final costs associated with building projects (Zhong et al., 2022). Unexpected increases in material prices may render project budgets inadequate to meet procurement expenses and this scenario frequently results in budget excesses, contract modifications, and postponements in project finalization (Okpan et al., 2022). Price volatility impacts long-term financial planning in the construction sector as contractors may find it challenging to formulate competitive proposals if future material costs remain unknown (Nguyen et al., 2025). Investors and government organizations may similarly have challenges in accurately calculating the overall expenses of infrastructure development projects and in severe instances, projects may be halted or discontinued when material costs escalate above sustainable thresholds (Zubairu, 2025). The literature underscores the significance of recognizing the elements that contribute to the volatility of construction material prices. Comprehending the interplay among economic conditions, supply chain dynamics, and project management methods can yield significant insights for enhancing cost forecasting and risk management in building projects in line with this study.

2.2 Theoretical Framework

The Theory of Demand and Supply (TDS) primarily linked to the classical economic theories of Adam Smith and subsequently elaborated by Alfred Marshall, offers a foundational framework for comprehending price determination in markets (Shapiro, 2024). The theory asserts that the price of products and services is predominantly influenced by the interplay between consumer demand and producer supply. When demand for a commodity surpasses its supply, prices often increase; conversely, prices decrease when supply exceeds demand (Akande et al., 2023). The equilibrium price signifies the juncture at which the quantity requested matches the quantity supplied and this idea provides a significant explanation for the variations in building material prices throughout the construction sector including cement, steel reinforcement, aggregates, and finishing materials, are influenced by market dynamics akin to other commercial commodities as emphasized by Moyo et al. (2026). Accelerated growth in construction activities – prompted by infrastructure expansion, urbanization, or housing demand – can substantially elevate the demand for these materials. Shortages arise and prices escalate when production capacity or supply chain infrastructure fails to promptly accommodate heightened demand (Heaton et al., 2022). Conversely, when supply exceeds demand, material prices often stabilize or decrease.

In Nigeria, various structural factors affect the supply and demand of construction materials such as population growth, urban expansion, and extensive infrastructure projects elevate the demand for building materials (Bashir et al., 2024). Production capacity, import limitations, transportation expenses, and energy availability influence the volume of materials provided to the market (Liu et al., 2022). Fluctuations in exchange rates and reliance on imports significantly affect supply costs, especially for commodities dependent on imported inputs (Zhong et al., 2022). Consequently, any disturbance impacting supply networks or production

processes can substantially alter the supply curve, resulting in elevated material prices, and the demand-supply framework thus offers a theoretical basis for comprehending how economic conditions influence the volatility of construction material prices (Rozi et al., 2023). This theory is pertinent to the current study as it elucidates the impact of economic variables, including inflation, exchange rates, and production costs, on the equilibrium pricing of construction materials (Shapiro, 2024). The theory correlates economic conditions with price fluctuations, hence endorsing the integration of economic considerations as a principal predictor of building material price volatility inside the structural model. Thus, the theory offers a conceptual guide for analyzing the impact of macroeconomic conditions on variations in construction material pricing in line with this study.

2.3 Empirical Review

Unegbu et al. (2025), analyzed the principal determinants affecting the adoption of sustainable construction techniques in Nigeria emphasizing environmental, economic, social, policy, and technological issues. A cross-sectional survey involving 400 construction professionals was conducted, and the data were analyzed using Structural Equation Modelling (SEM) to determine causal links among the identified variables. The results indicate that policy regulation, environmental variables, and climate change awareness are the most significant determinants of sustainability adoption. The report emphasizes the necessity for stringent regulatory enforcement, financial incentives, capacity-building initiatives, and the incorporation of advanced construction technology to promote sustainability in Nigeria's built environment.

Muhammed and Adindu (2023), employed the Granger Causality Test (GCT) to examine the impact of Exchange Rate Volatility (ERV) on the cost of chosen building materials for projects in the North-Central geopolitical zone of Nigeria. The analysis used exchange rate volatility (ERV) trends and average price trends (APT) for cement, block, tile, and reinforcement from the first quarter of 2011 to the fourth quarter of 2020. The results indicate the existence of a stochastic trend among the variables, as ERV does not Granger-cause the chosen construction material prices and exhibits a long-run unidirectional relationship with these prices. This study concludes that exchange rate volatility adversely affects each of the selected construction materials with a unidirectional impact, while the reverse is not observed. Additionally, the sensitivity of these materials does not significantly alter their prices, except when combined with various macroeconomic variables.

Muhammed and Adindu (2021), analyzed the trend of exchange rate volatility on construction material prices from 2011 to 2020 in the North Central geopolitical zone, utilizing quantitative exchange rate data sourced from the Central Bank of Nigeria Statistical Bulletins, while prices for cement, blocks, tiles, and reinforcement were acquired through market surveys. The data analysis employed the Ordinary Least Squares (OLS) method. The outcome suggested that exchange rate volatility was statistically significant in predicting the trends of the selected construction material prices. It is advised that the creation and implementation of essential fiscal policies through revenue base diversification will significantly stabilize Nigeria's balance of payments and reduce reliance on imported building materials.

3.0 METHODOLOGY

The study employed a survey research design to examine the usage of SEM on the factors impacting construction materials price volatility in Abuja. This design, using quantitative methods, enabled the collection of extensive data from construction professionals within the Abuja built environment. The quantitative approach proved particularly effective for this research, providing objective measurements of the relationships between the factors considered in this study. The population of the study comprised of 201 construction professionals including Project Managers, Engineers, Quantity Surveyors, Builders, Architects and Procurement Officers, domiciled within the Clients, Consultants and Contractors Organizations conveniently surveyed within Abuja built environment. For the purpose of this study the sample size for this study is determined using Yamane (1973), simplified formula for sample size calculation.

$$n = \frac{N}{1 + N(e)^2}$$

Where; n = sample size, N = population, 201, e² = Margin of error (assumed 5% or 0.05), 1 = unit or constant value

$$\text{Thus, } n = \frac{N}{1 + N(e)^2} = \frac{201}{1 + 201(0.05)^2} = 140$$

A 20% buffer for non-response was added to make the total expected respondents to be **168**.

Table 3.1: Proportionate Distribution of the Respondents

Construction Professionals	Surveyed Respondents	Respondents to Receive Questionnaire	% of Distribution
Project Manager	74	62	36.9
Quantity Surveyor	21	17	10.3
Architects	36	31	17.6
Engineers	18	15	9.1
Site Managers	17	14	8.5
Procurement Officers	18	15	9.1
Builders	17	14	8.5
Total	N = 201	n = 168	100.0

Source: Author's Field Survey, (2025)

A Simple Random Sampling (SRS) technique was adopted to select a representative sample from this population. The choice of SRS reduced potential selection bias, enhancing the generalizability of the findings. Data collection was conducted using a structured survey questionnaire, comprising a series of Likert-scale questions aimed at capturing respondents' views on the factors impacting construction materials price volatility in Abuja. Each item was measured on a five-point Likert scale, ranging from strongly agree to strongly disagree, to capture the extent of respondents' agreement or disagreement with statements relating to the factors impacting construction materials price volatility in Abuja. To ensure consistency and reliability, the survey instrument was pilot-tested with a subset of individuals outside the primary sample. Reliability testing using Cronbach's Alpha yielded coefficients above 0.70 for each variable including .84, .79, .72 and .81 for CMPV, EFIC, SUCF and PMAF respectively, confirming the internal consistency of the survey instrument.

The model specification is expressed as:

$$\text{CMPV} = \alpha + \beta_1\text{EFIC} + \beta_2\text{SUCF} + \beta_3\text{PMAF} + \varepsilon$$

Where:

CMPV = Construction Material Price Volatility

EFIC = Economic Factors Impacting Construction Materials

SUCF = Supply Chain Factors

PMAF = Project Management Factors

$\beta_1, \beta_2, \beta_3$ = Structural path coefficients showing the magnitude and direction of influence

α = Intercept of the model

ε = Error term representing unexplained variation

4.0 ANALYSIS AND DISCUSSION

4.1 Descriptive Statistics

Table 1 shows the respondent's background information. Out of the 168 questionnaires distributed to the requisite construction professionals in Abuja built environment, 161 were properly filled and returned indicating a response rate of about 96 percent. The gender of the respondents denotes 140 Males and 21 Females showing a response rate of 86.9 and 13.1 respectively. The academic qualification shows 16 National Diplomas, 40 Higher National Diploma holders, 74 First Degrees, 24 Masters Degrees and 7 PhD holders at a response rate of 10.0, 25.0, 45.6, 15.0 and 4.4 percent correspondingly. The profession of the respondents shows 57 Project Managers, 17 Quantity Surveyors, 29 Architects, 15 Engineers, 14 Site Managers, 15 Procurement Officers and 14 Builders entailing a response rate of 35.4, 10.6, 18.0, 9.3, 8.7, 9.3 and 8.7 respectively.

Consequently, the experience of the respondents in the construction industry posits 1-5 years (31), 6-10 years (65), 11-15 years (47) and 16 and above years (18) at a response rate of 40.3, 29.5, 19.4 and 10.8 congruently. The organization type of the respondents indicates Contractors Organization (89), Consultancy Firms (48) and Client Organizations (24) at a response rate of 55.50, 29.5 and 15.0 respectively. Furthermore, the experience of the respondents in construct materials survey shows 1-5 years (33), 6-10 years (56), 11-15 years (40) and 16 and above years (32) at a response rate of 20.0, 35.0, 25.0 and 19.70 percent consistently.

Table 1: Respondent's Background Information

Background Information	Frequency	Percent (%)
Number of Questionnaires		
Sent Out	168	100
Received	161	96.0
Gender of Respondents		
Males	140	86.9
Females	21	13.1
Academic Qualification		
National Diploma (ND)	16	10
Higher National Diploma (HND)	40	25
First Degree	74	45.6
Master's Degree	24	15
PhD	7	4.4
Profession of Respondents		
Project Managers	57	35.4
Quantity Surveyors	17	10.6
Architects	29	18.0
Engineers	15	9.3
Site Managers	14	8.7
Procurement Officers	15	9.3

Builders	14	8.7
Experience of Respondents in the Construction Industry		
1-5 years	31	19.4
6-10 years	65	40.3
11-15 years	47	29.5
16 and above years	18	10.8
Types of Organizations		
Contractors Organizations	89	55.50
Consultancy Firms	48	29.5
Client Organizations	24	15
Experience Level of Respondents in Market Surveying		
1-5 years	56	35.0
6-10 years	40	25.0
11-15 years	33	20.3
16 and above years	32	19.70

Source: Author's Field Survey, (2026).

4.3 Measurement Model Evaluation

4.3.1 Reliability and Convergent Validity

Table 2 shows the reliability and convergent validity of constructs. The standard factor loading for this study posits acceptable loading loadings (0.60–0.90) which shows their reliability for making decision and conclusion in this study. The outcome improves model quality, strengthen the results and increase the reliability of the data. From the reliability statistics for this study, Cronbach's Alpha (> 0.70) which was gotten for all the constructs in this study denotes that the constructs are reliability for decision-making. In agreement, the Composite Reliability (CR > 0.70) while the construct tangibility and reliability depict that the construct measuring the same items produce consistent and stable result. The AVE statistics posits (AVE > 0.50) which shows the valid nature of the provided data as it confirmed the construct share a high proportion of common variance.

Table 2: Reliability and convergent validity of constructs

Construct	Range of Loadings	Cronbach's Alpha	Composite Reliability (CR)	AVE
EFIC	0.64 – 0.86	0.88	0.91	0.57
SUCF	0.61 – 0.84	0.86	0.90	0.55
PMAF	0.66 – 0.88	0.89	0.92	0.60
CMPV	0.68 – 0.90	0.91	0.93	0.63

Source: Author's Computation (2026).

4.3.2 Discriminant/Divergent Validity

Table 3 shows the discriminant/divergent validity through Fornell-Larcker criterion by contrasting the square root of the Average Variance Extracted (AVE) for each concept with its inter-construct correlations. Discriminant validity was established when all diagonal AVE square root values surpassed the equivalent off-diagonal correlation values, confirming the empirical distinctiveness of each construct.

Table 3: Fornell-Larcker criterion

Construct	EFIC	SUCF	PMAF	CMPV
EFIC	.755			
SUCF	.52	.742		
PMAF	.48	.56	.775	
CMPV	.61	.58	.49	.794

Source: Author's Computation (2026)

4.3.3 Measurement Model Fit Indices

Table 4 shows the model fit indices for this study. A model is deemed acceptable when the values of these indices reside within the prescribed thresholds. The Chi-square to degrees of freedom ratio (χ^2/df) was 2.14, which is below the suggested threshold of 3.0, signifying a favourable overall model fit. The Comparative Fit Index (CFI) and Tucker–Lewis Index (TLI) registered values of 0.94 and 0.93, respectively, both surpassing the required minimum threshold of 0.90. The results indicate that the proposed structural model efficiently elucidates the covariance structure of the data in comparison to a null model. The Root Mean Square Error of Approximation (RMSEA) value of 0.056 is far below the recommended maximum threshold of 0.08, signifying a strong alignment between the hypothesized model and the population covariance matrix. The Standardized Root Mean Square Residual (SRMR) value of 0.041 is below the permissible threshold of 0.08, indicating negligible discrepancies between the observed and anticipated correlations. The amalgamation of these fit indices indicates that the structural model displays an adequate level of fit, thereby, validating that the suggested relationships among economic factors, supply chain factors, project management factors, and construction material price volatility are statistically substantiated by the data (Nguyen et al., 2024).

Table 4: Model Fit Indices

Fit Index	Threshold	Model Result
Chi-square / df (χ^2/df)	< 3.0	2.14
Comparative Fit Index (CFI)	> 0.90	0.94
Tucker-Lewis Index (TLI)	> 0.90	0.93
Root Mean Square Error of Approximation (RMSEA)	< 0.08	0.056
Standardized Root Mean Square Residual (SRMR)	< 0.08	0.041

Source: Author's Analysis (2026).

4.4 Structural Fit Model

4.4.1 R², Effect Size (f²) and Predictive Relevance (Q²)

Table 5 shows the R², Effect Size (f²) and Predictive Relevance (Q²) statistics for this study. It shows how much changes in the dependent variables are explained by the behavior of the independent variables. Accordingly, EFIC = 0.834 (strong), SUCF = .526 (moderate) and PMAF = 0.637 (moderate). These indicate that economic factor is strongly explained (83.4%), supply chain factor is moderately explained (52.6%) while project management factors strongly explained (63.7%) of the variances in materials price volatility. The model has strong explanatory power, especially for performance.

Consequently, the f² statistics assesses the separate contribution of the each of the independent constructs to the model which shows that EFIC→CMPV large (0.36), SUCF → CMPV moderate (0.18), and PMAF → CMPV moderate (0.29). This means that EFIC made the largest contribution to the variances in CMPV.

Similarly, the Q² statistics entails the determination of whether the model can have predictive capability beyond the data sample of which EFIC = 0.49, SUCF = 0.44 and PMAF = 0.41 show that the factors have a high predictive relevance.

Table 5: Coefficient of Determination (R²) and Effect Size (f²)

Variable	R ²	Interpretation	Path	f ²	Interpretation	Q ²	Interpretation
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EFIC	0.834	Strong	EFIC → CMPV	0.36	Large	0.49	High
SUCF	0.526	Moderate	SUCF → CMPV	0.18	Moderate	0.44	High
PMAF	0.637	Moderate	PMAF → CMPV	0.29	Moderate	0.41	High

Source: Author's Computation (2026)

4.4.4 Structural Path Coefficient and Hypotheses Analysis

H0₁: There is no statistically significant impact of economic factors on construction material price volatility.

H0₂: There is no statistically significant impact of supply chain factors on construction material price volatility.

H0₃: There is no statistically significant impact of project management factors on construction material price volatility.

Table 6 shows the structural path coefficient for this study. It demonstrates that all three constructs exert positive and statistically significant influences on the volatility of building material prices, as evidenced by p-values below 0.001. Consequently, demonstrate that all three proposed links between the independent variables and construction material price volatility are statistically significant. The correlation between economic factors and construction material price volatility exhibited a standardized path coefficient of $\beta = .67$, with a significance level of $p < 0.001$, signifying the rejection of H0₁. The correlation between supply chain factors on construction material price volatility produced a path coefficient of $= .41$ with $p < 0.001$, indicating the rejection of H0₂. A robust correlation was identified between project management variables and the volatility of building material prices, with a coefficient of $\beta = .32$ and $p < 0.001$ posits the rejection of H0₃.

Table 6: Structural Path Coefficients and Hypotheses Testing

Hypothesis	Path	Standardized Coefficient (β)	p-value	Interpretation	Decision
H0 ₁	EFIC → CMPV	0.67	<0.001	Significant positive effect	Rejected
H0 ₂	SUCF → CMPV	0.41	<0.001	Significant positive effect	Rejected
H0 ₃	PMAF → CMPV	0.32	<0.001	Significant positive effect	Rejected

Source: Author's Analysis (2026)

4.5 Discussion of Findings

Table 2 shows the structural path coefficient for this study. The Table demonstrated that all three constructs exert positive and statistically significant influences on the volatility of building material prices, as evidenced by p-values below 0.001. The path coefficient for economic components was $\beta = 0.67$, indicating that macroeconomic conditions like inflation, exchange rate volatility, and energy expenses have the strongest influence on variations in construction material prices agrees with Muhammed and Adindu (2023) and Akoh et al. (2025), that the inconsistencies in the economic performances of the factors of macroeconomic remain largely the most impacting factors of construction materials price volatility. Supply chain factors exhibited a pronounced impact with a coefficient of $= 0.41$, signifying that logistics

disruptions, transportation obstacles, supplier hegemony, and material scarcities substantially affect price volatility in construction materials. This aligns with Ohida et al. (2022) that logistic factors affect productivity and that inconsistencies to the logistics process have attendant consequences on the construction materials prices. Of the analyzed constructs, project management characteristics had the least significant impact on the volatility of building material prices, with a coefficient of $\beta = 0.32$. This study showed that managerial decisions about procurement planning, cost forecasting, scheduling, and risk management significantly influence the impact of price variations on building projects which aligns with Muhammed et al. (2022). Also, although economic and supply chain factors exert external pressures on material pricing, proficient project management procedures are essential in mitigating the effects of these changes on building projects (Ikwueze & Ejiofor, 2024).

5.0 CONCLUSION AND RECOMMENDATIONS

This research that investigated the determinants of price volatility in construction materials within the Nigerian construction sector via CB-SEM concludes that economic factors significantly positively affect building material price volatility, supply chain factors demonstrate a moderate positive influence while project management factors were identified as the least predominant determinant of material price volatility.

Drawing from the findings, the following recommendations have been postulated:

1. There is a need for the government to provide subsidies on construction materials due to poor macroeconomic performances. This will lead to sufficient reduction in the cost of the construction materials while increasingly leading to more output in construction productivity scale.
2. Improvements in transportation infrastructure and supply chain efficiency are essential to mitigate logistical constraints that lead to price volatility. Enhancing the construction supply chain will facilitate reliable material availability and foster price stability throughout the industry.
3. There is a need for Project managers to implement proactive procurement techniques, including long-term supplier contracts, framework agreements, and bulk purchase arrangements, to stabilize material costs and mitigate the risk of abrupt market price surges.
4. There is also a need for the construction companies to integrate market pricing trends, inflation projections, and contingency provisions into project budgets to enhance the precision of cost estimates and mitigate the risk of cost overruns linked to material price volatility.

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