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An Assessment of Construction Value Added and Its Economic Impact on GDP and Other Sectors Across Global North and Global South Countries

John Annor, MS[1], Francois Jacobs, PhD[1], Ahmed Abdelaty, PhD[1], and Theodore Haupt[1]
[1]University of Wyoming

This paper examines construction value added (VA) across developed and developing countries, aiming to understand its productivity, economic impact, and cross-sectoral dependencies. By comparing construction VA with agriculture and manufacturing sectors across income groups, this study identifies distinct roles of construction in both high- and low-income contexts. In high-income countries, construction VA demonstrates a weak positive correlation with GDP growth, suggesting a stable yet modest impact, aligned with mature infrastructure and economic diversification. In contrast, lower-middle-income countries exhibit a moderate positive correlation, where construction significantly supports GDP growth through infrastructure development and urban expansion. Low-income countries rely on construction for foundational economic functions, though limited productivity and resources constrain its broader impact on growth. The ANOVA test reveals statistically significant differences in construction VA across income groups, highlighting the varying contributions of construction based on income level and economic structure. These findings underscore the need for policy differentiation: high-income countries may prioritize sustainable infrastructure, while developing economies should focus on construction investment to boost productivity and support growth. This study offers a nuanced view of construction's role globally, providing valuable insights for policymakers aiming to optimize construction's contribution to economic development across diverse income levels.

Keywords: Construction Value Added (VA), Economic Growth, Income Groups, Cross-Sectoral Dependencies, Infrastructure Development

Introduction

The construction sector is a vital driver of economic development, fostering essential infrastructure, generating employment, and supporting other industries such as manufacturing and services (Fei et al., 2021). This sector's contribution to GDP is substantial, yet using GDP alone as a metric often overlooks specific dynamics within construction that are crucial for effective policy-making (Singh, 2024). Construction value added (VA) offers a more precise metric, capturing the net economic output after accounting for inputs like materials and labor, providing valuable insights into productivity and economic contribution (Kirchberger, 2020).

Construction VA is a useful indicator of sectoral performance, especially for evaluating productivity gains and inefficiencies. It is also crucial in understanding how construction stimulates economic growth by enabling the expansion of infrastructure, which in turn supports sectors like agriculture, manufacturing, and services (Alaloul et al., 2022). Public investment in infrastructure often boosts construction VA, with noticeable impacts during periods of economic growth or recession. This dependency highlights the sector's sensitivity to policy changes and economic cycles (Gümüşburun Ayalp & Metinal, 2024).

The role of construction differs significantly across developed and developing nations. In countries like the USA and Germany, advanced technologies and strong governance promote steady growth in construction VA. In contrast, developing nations face challenges such as limited financing, skill shortages, and informal labor structures that result in more volatile construction VA (Gümüşburun Ayalp & Metinal, 2024). Construction in developing countries, while essential for job creation, struggles with productivity issues, often due to public infrastructure delays and funding gaps (Alaloul et al., 2022).

Furthermore, analyzing construction VA alongside agriculture, manufacturing, and services provides a nuanced view of economic development. Construction acts as a catalyst for agriculture by building essential infrastructure like irrigation systems and storage, supports manufacturing with factories and logistics, and enables the growth of services through urban development. Understanding these interdependencies is essential for grasping the sector's broader economic role (Kirchberger, 2020; Constantinescu et al., 2015).

This paper aims to explore construction VA across both developed and developing nations, examining differences in productivity and economic impact. By comparing construction VA with other sectors, it seeks to uncover how infrastructure development supports broader economic growth and identify trends that shape construction's influence on GDP.

Literature Review

The construction sector plays a pivotal role in economic development by supporting infrastructure growth, facilitating industrial production, and creating employment opportunities (McKinsey & Company, 2017). However, focusing solely on GDP provides an incomplete view of the sector's economic impact. Construction value added (VA) offers a more detailed metric by capturing the net output generated by the sector. This section explores the concept of construction VA, its importance, and how it compares with other sectors, such as agriculture, manufacturing, and services. Additionally, it examines regional variations and sustainability efforts that shape sectoral performance.

The Concept of Construction Value Added

Value added reflects a sector's net output, accounting for the resources utilized during production (OECD, n.d.). For construction, VA includes contributions from infrastructure projects, housing developments, and public-sector initiatives, making it a key measure of productivity and economic impact (Alaloul et al., 2022). Unlike GDP, which aggregates across sectors, construction VA isolates the sector's unique contributions, revealing both productivity gains and inefficiencies. This helps policymakers target improvements in resource efficiency, contributing to sustainable growth (Kirchberger, 2020). Emphasizing VA allows policymakers to accurately gauge construction's economic role, offering insights into the sector's efficiency in transforming materials and labor into

productive output. Nations achieving high VA with fewer inputs demonstrate superior productivity, which enhances economic resilience (Kirchberger, 2020).

Construction VA as a Catalyst for Economic Growth

Several studies highlight that construction VA plays a catalytic role in promoting economic growth by enabling other sectors to thrive. Infrastructure development supports manufacturing by building industrial zones and logistics networks, while modern housing projects promote the services sector by creating office spaces and retail hubs (Gümüşburun Ayalp & Metinal, 2024). This makes construction VA a critical enabler for broader economic development. The construction sector also contributes to GDP by stimulating domestic demand. Large-scale projects, such as roads, bridges, and airports, generate demand for building materials and equipment, boosting related industries. Furthermore, construction VA influences investment cycles, as both public and private investors allocate resources to infrastructure projects. As a result, fluctuations in construction VA often serve as early indicators of broader economic trends (Alaloul et al., 2022).

Regional Disparities in Construction VA

Developed and developing regions differ significantly in construction VA performance. In the Global North, countries like the USA, Germany, and Japan maintain steady growth in construction VA through advanced project management, technological adoption, and robust governance frameworks (Meisels et al., n.d.). These nations benefit from well-regulated markets and sustainable practices, such as Building Information Modelling (BIM) and green building initiatives, enhancing productivity and boosting VA (Kirchberger, 2020). Additionally, public-private partnerships (PPPs) drive infrastructure investments, as seen in the UK's National Infrastructure Plan, which has attracted private financing for green construction and improved VA (Gümüşburun Ayalp & Metinal, 2024).

Conversely, construction in the Global South faces volatility in VA due to challenges such as insufficient funding, governance inefficiencies, and skill shortages (UN.ESCAP, 2020). Public projects often suffer from delays, cost overruns, and quality issues, limiting productivity. Many developing nations also rely on labor-intensive construction methods, with limited access to advanced technology or formal training (Alaloul et al., 2022). Despite these obstacles, the sector remains vital for employment in low-income countries; in India, construction accounts for over 9% of the workforce, though productivity is hindered by informal labor practices (Gümüşburun Ayalp & Metinal, 2024).

Cross-Sector Comparisons: Construction, Agriculture, Manufacturing, and Services VA

Examining construction VA alongside agriculture, manufacturing, and services provides a comprehensive perspective on sectoral interdependencies and economic transitions. In agriculture, construction supports productivity by establishing irrigation, storage, and rural infrastructure (Kirchberger, 2020). However, agricultural VA is often susceptible to seasonal and climate-related variations, which limits its stability as an economic driver (Shah et al., 2021).

Manufacturing VA tends to follow cyclical patterns driven by trade, technology, and market demand (Constantinescu et al., 2015). Construction complements manufacturing by creating industrial zones, transport networks, and logistics hubs, but its importance may decrease in economies transitioning to service-based sectors (Gümüşburun Ayalp & Metinal, 2024). Meanwhile, the services sector dominates the GDP of many developed nations, facilitated by construction's role in urban

infrastructure development, which sustains high-value industries in knowledge-based economies (Alaloul et al., 2022).

Sustainability and Construction VA

Sustainability practices are transforming the construction industry, particularly in high-income countries. The adoption of energy-efficient building technologies and waste reduction practices has improved construction VA by reducing costs and enhancing productivity (Danish et al., 2019). Developed countries are increasingly embracing circular economy principles, which promote the recycling and reuse of construction materials. These practices not only enhance construction VA but also contribute to long-term economic resilience (Kirchberger, 2020).

In developing countries, however, the adoption of sustainability frameworks remains limited. Financial constraints, weak governance, and lack of technical expertise prevent the widespread implementation of green construction practices. International organizations, such as the World Bank, are working with governments to promote sustainable construction, but progress has been slow (Gümüşburun Ayalp & Metinal, 2024).

The literature reveals that construction VA is a critical indicator of sectoral performance, offering insights beyond GDP. It highlights the importance of sector-specific productivity, cross-sectoral linkages, and sustainability initiatives. Developed countries benefit from stable construction VA driven by advanced technologies and well-regulated markets. In contrast, developing economies face challenges related to funding, governance, and skill development, resulting in volatile construction VA.
The comparative analysis of construction, agriculture, manufacturing, and services VA underscores the inter-dependencies among sectors, with construction playing a pivotal role in enabling economic growth. The integration of sustainability practices offers opportunities to enhance construction VA globally, but developing countries must overcome structural barriers to realize these benefits

Methodology

This study employs a comparative research design using a mixed-methods approach to analyze trends in construction value added (VA) and its economic impact across countries of the Global North and Global South. The methodology integrates quantitative data analysis, and sectoral comparisons, providing a comprehensive understanding of how construction VA supports economic growth.

Research Design

The study applies a comparative framework across income levels (high-, middle-, and low-income countries). This design captures macro-level trends using time-series data. It aims to:

1. Identify growth patterns in construction VA across countries.
2. Examine cross-sectoral dependencies (agriculture, manufacturing, and services).

This approach ensures both sector-specific and inter-sectoral insights are critical for policymakers.

Sampling Method and Country Selection

To ensure balanced representation, stratified sampling was used. Countries were grouped based on World Bank income classifications, and representative countries were selected purposively to reflect

regional diversity and infrastructure significance. Table 1 below shows the countries that were selected for the study and some justifications for their selection.

Table 1: Selected countries for analysis

Income Group	Countries Selected	Justification
High-Income (Global North)	USA, Germany, Australia	Stable construction VA, advanced technology, and green policies
Upper-Middle-Income	Brazil, South Africa	Moderate VA; growth potential hindered by political instability
Lower-Middle-Income	India, Egypt	Labor-intensive construction; urbanization efforts
Low-Income (Global South)	Ghana, Kenya	Volatile VA, reliant on public and foreign infrastructure funds

Justification for Stratified Sampling:

- Availability of Data: Ensures consistent time-series data from 2010–2022.
- Regional Representation: Covers Africa, Asia, Latin America, and Europe.
- Economic Significance: Focuses on countries where construction contributes substantially to employment and GDP.

Data Sources and Key Variables

The study relies on secondary data from internationally recognized databases, complemented by national reports and case studies.

Table 2: Data sources

Data Source	Data Collected
World Bank	Construction VA, sectoral VAs (agriculture, manufacturing, services)
IMF	GDP growth rates

Key Variables Analyzed:

1. Construction VA: Sectoral contribution as a percentage of GDP.
2. Sectoral VAs: Agriculture, manufacturing, and services contributions for cross-sector comparisons.

Data Collection Period and Standardization

The study covers the 2010–2022 period, which provides insights into both pre- and post-pandemic trends in construction VA.

- Annual Data: Collected to track year-over-year trends in sectoral performance.
- Standardization: Data points were expressed as percentages of GDP for comparability across countries.
- Handling Missing Data: Where necessary, interpolation was used to fill minor gaps, ensuring consistent datasets for time-series analysis.

Analytical Techniques

The study employs a combination of descriptive statistics, correlation analysis, and ANOVA to analyze construction VA trends.

Table 3: Analytical techniques

Technique	Purpose
Descriptive Statistics	Summarizes construction VA trends and sectoral performance across income groups
Correlation Analysis	Identifies relationships between construction VA and GDP
ANOVA	Tests whether differences in construction VA across income groups are statistically significant

Ethical Considerations

The study adheres to ethical research practices by using publicly available data and maintaining data privacy. All data sources are properly cited, and transparent descriptions of the analytical techniques are provided to ensure replicability.
Despite its comprehensive approach, the study acknowledges certain limitations:

- Data Gaps: Some countries have missing or inconsistent data, affecting trend accuracy.

This methodology uses quantitative analysis to provide a comprehensive understanding of construction VA trends across income levels. The stratified sampling method ensures that the study captures regional and economic diversity.

Analysis and Results

Construction Value Added Trends by Income Group

The trends in construction VA were analyzed across high-, upper-middle-, lower-middle-, and low-income countries, using descriptive statistics to capture variability in sectoral performance.

Table 4: Average construction value added (2000 – 2022)

Income Group	Countries Selected	Average VA (% of GDP)	Standard Deviation (%)
High-Income (Global North)	USA, Germany, Australia	5.48	1.7
Upper-Middle-Income (Global South)	Brazil, South Africa	4.09	1.2
Lower-Middle-Income (Global South)	India, Egypt	6.6	1.9
Low-Income (Global South)	Ghana, Kenya	5.5	1.7

The results shown in table 1 indicate that Construction VA varies across income groups, with lower-middle-income countries leading in terms of GDP contribution (6.6%), highlighting the sector's role in supporting infrastructure and economic development. High- and low-income groups display similar averages, but for different reasons: stability in high-income countries due to advanced economies, and dependency in low-income countries as construction supports essential infrastructure needs. The upper-middle-income group has the lowest average construction VA, reflecting their diversification into other sectors as they transition towards more developed economic structures

Trend Analysis of Construction Value Added, Agriculture Value Added and Manufacturing Value Added

High-Income Countries

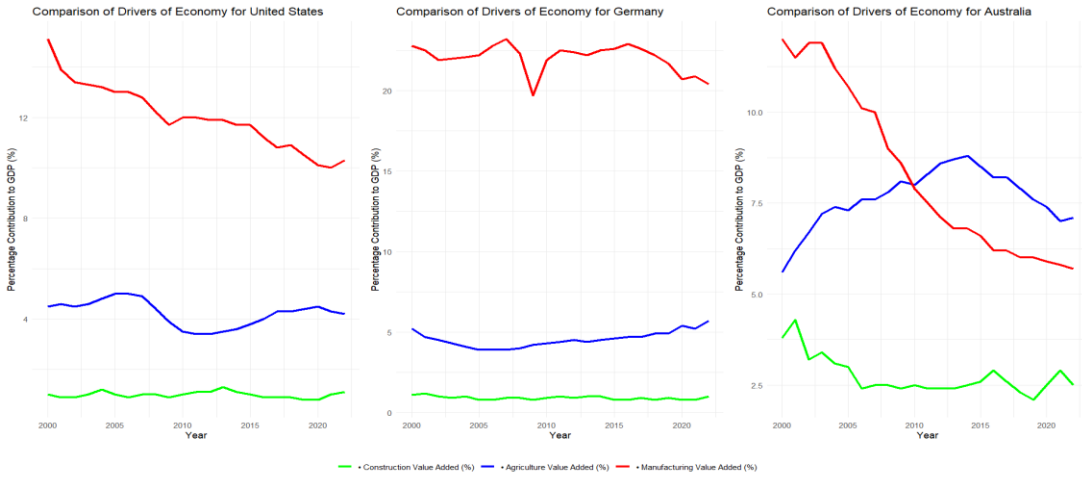

Figure 1. Trend Analysis of Construction VA, Agriculture VA and Manufacturing VA (High Income)

In high-income countries, manufacturing VA represented by the red curve generally shows a declining trend (especially notable in the U.S. and Australia), reflecting a shift away from manufacturing dependence, possibly towards services and technology sectors. Construction VA, represented by the green curve, remains relatively stable across all three countries, highlighting its consistent role in GDP contribution. Agriculture VA, represented by the blue trend line, is uniformly low, indicating minimal contribution to GDP in high-income nations. Figure 1 effectively demonstrates that in developed economies, construction maintains a steady presence, while manufacturing faces a gradual decline, and agriculture remains a minor economic driver. This analysis provides insights into sectoral trends, emphasizing the economic shift away from manufacturing in favor of other sectors in high-income countries.

Upper-Middle-Income Countries

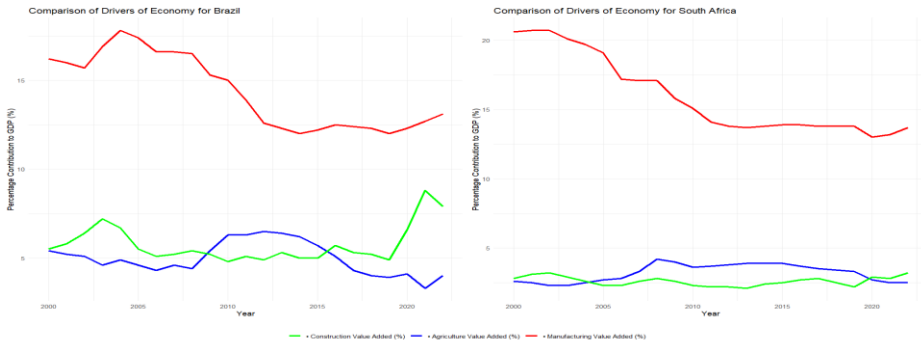

Figure 2. Trend Analysis of Construction VA, Agriculture VA and Manufacturing VA (Upper-Middle Income)

Frome figure 2 above it can be said that in upper-middle-income countries like Brazil and South Africa, manufacturing VA (i.e., red trend line) shows a clear downward trend, reflecting potential challenges in the manufacturing sector or economic diversification. Construction VA (i.e., green curve) exhibits more variability in Brazil, likely responding to economic cycles or government spending, whereas it remains steady but low in South Africa. Agriculture VA, represented by the blue trend line, is stable but contributes modestly to GDP in both countries, aligning with the trend of low agricultural contributions in middle-income economies. These trends suggest that upper-middle-income countries may face economic shifts, with decreasing reliance on manufacturing and potential but limited roles for construction and agriculture in GDP contributions. This analysis highlights the dynamic nature of sectoral contributions, particularly in response to economic and policy changes in upper-middle-income economies.

Lower-Middle-Income Countries

In lower-middle-income countries like India and Egypt, construction VA, shown by the green trend line, contributes steadily to GDP, with strong growth in India in 2020 driven by urbanization, while Egypt shows stable contributions and dropping from about 14% to 11% in 2010. Manufacturing VA (i.e., red trend line) has declined in India but remains steady in Egypt, possibly reflecting different industrial policies. Agriculture VA (i.e., represented by the blue trend line) shows upward trends in Egypt, emphasizing its ongoing importance for employment and economic resilience.

In summary, lower-middle-income economies rely on construction for urban growth and infrastructure, with agriculture playing a vital role in supporting rural economies, while manufacturing faces varying challenges.

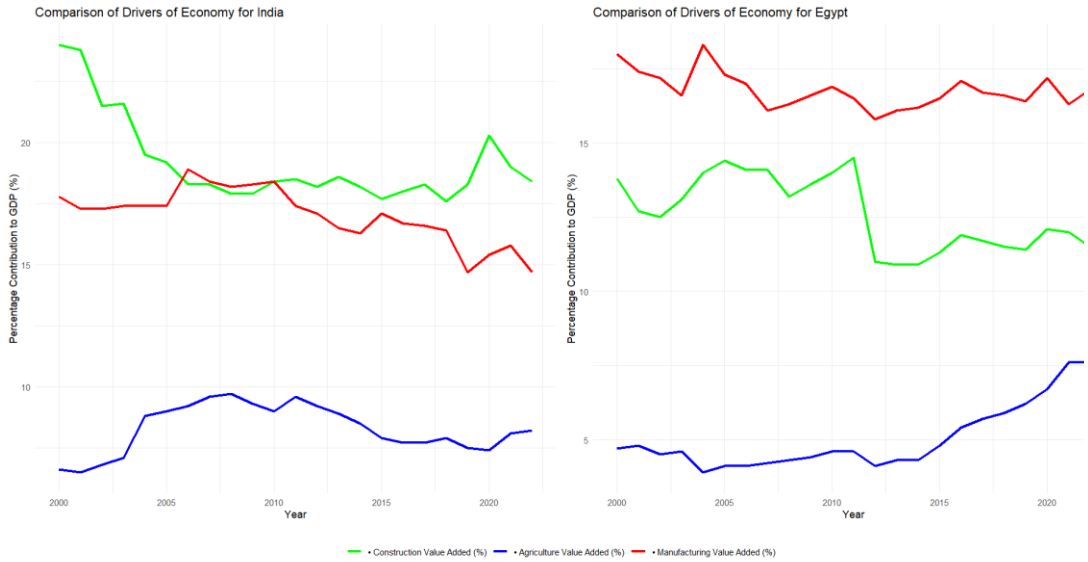

Figure 3. Trend Analysis of Construction VA, Agriculture VA and Manufacturing VA (Lower-Middle Income)

Low-Income Countries

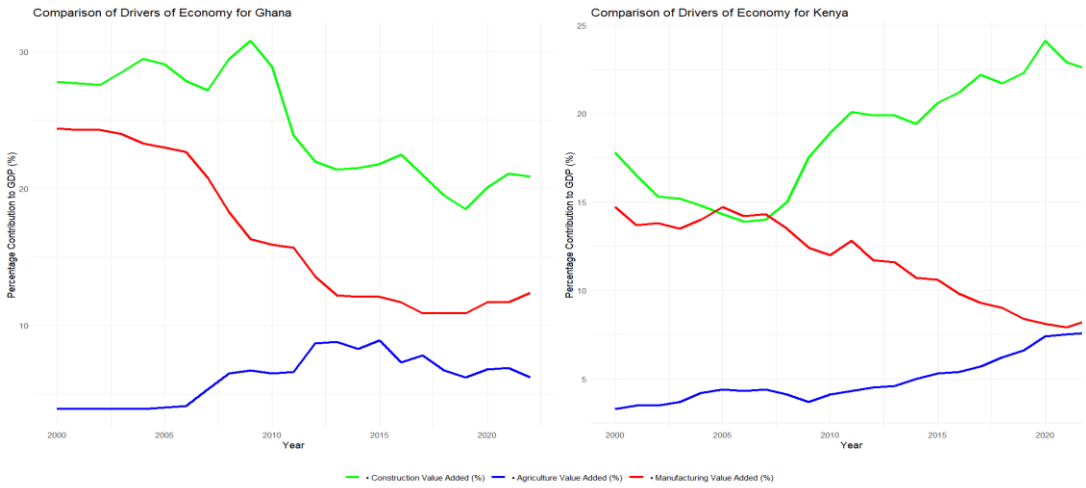

Figure 4. Trend Analysis of Construction VA, Agriculture VA and Manufacturing VA (Low-Income)

The trend depicted in Figure 4 illustrates the varying contributions of different sectors to GDP in low-income countries such as Ghana and Kenya. In both countries, agricultural value added (VA) plays a significant role, with a notable difference between the two. In Kenya, agricultural VA shows a consistent increase over time, whereas in Ghana, it exhibits a steady decline starting from 2012. Manufacturing VA, on the other hand, demonstrates a steady decline in both countries, contributing less to GDP over time, which could be attributed to limited industrial growth. Meanwhile, construction VA shows a slight but gradual increase, particularly in Kenya, where it rises from approximately 14% in 2007 to about 24% by 2020, indicating an emerging yet slow-growing sector in the economy. This suggests that, in low-income economies like Kenya, agriculture remains a dominant contributor to GDP, while the construction sector begins to show moderate growth, and manufacturing continues to struggle to maintain its share.

Correlation Analysis: Relationships Between Variables

The correlation analysis reveals varying relationships between construction VA and GDP growth across income groups. While construction remains an important source of employment, its contribution to GDP growth and productivity differs by income level (see table 6)

Table 6: Correlation analysis

Variables Compared	**Correlation Coefficient (r)**	**Interpretation**
Construction VA vs. GDP Growth	0.233 (High-Income)	Weak positive correlation: Minimal positive dependency between GDP growth and construction value added
	-0.067 (Upper-Middle Income)	Weak negative correlation: Minimal inverse dependency between GDP growth and construction value added.

	0.403 (lower-Middle Income)	Weak positive correlation: Minimal positive dependency between GDP growth and construction value added.
	0.187 (Low-Income)	Moderate positive correlation: Some positive dependency between GDP growth and construction value added.

The analysis shows varying correlations between construction value added (VA) and GDP growth across income groups. High-income countries have a weak positive correlation (r = 0.233), while upper-middle-income countries exhibit a weak negative correlation (r = -0.067). Lower-middle-income countries show a weak positive correlation (r = 0.403), and low-income countries display a moderate positive correlation (r = 0.187). Overall, the relationship between construction VA and GDP growth strengthens as income levels decrease, with low-income economies showing a more noticeable positive connection.

ANOVA Test: Differences in Construction VA Across Income Groups

To test the statistical significance of differences in construction VA across income levels, an ANOVA (Analysis of Variance) was conducted.

Table 8: ANOVA test

Test	**F-Statistic**	**p-Value**	**Interpretation**
ANOVA (VA Differences)	40.54	< 2e-16	Significant difference between income groups

The ANOVA test for construction value added (VA) differences between income groups yielded an F-statistic of 40.54 and a p-value of less than 2e-16, indicating a statistically significant difference in VA across income levels. This result suggests that economic factors related to income group influence the contribution and magnitude of construction VA, highlighting that income level plays a significant role in determining the role of construction VA in the economy.

Discussion

This study examined the impact of construction value added (VA) across income groups, highlighting differences in productivity and economic contribution. The findings show that construction's role in GDP growth varies significantly by income level. In high-income countries, construction VA has a weak positive correlation with GDP growth, reflecting a mature stage of infrastructure development where construction sustains the economy rather than drives growth. In upper-middle-income countries, construction's weak negative correlation with GDP suggests a shift towards other sectors, as these economies diversify and reduce dependency on construction.

Lower-middle-income countries show a moderate positive correlation, indicating that construction is crucial for growth, driven by urbanization and infrastructure needs. In low-income countries, the weak positive correlation and gradual increase in construction VA underscore its foundational role in providing employment and essential infrastructure, though limited by productivity and resource constraints. The ANOVA results confirm significant differences in construction VA across income groups, suggesting that economic development levels influence the sector's role in GDP. This highlights the need for tailored policy approaches to optimize construction's contribution based on each income group's unique economic structure.

Conclusion

This study reveals that construction's contribution to GDP growth differs by income level, with a stable role in high-income countries, a transitioning role in upper-middle-income nations, and a more dynamic role in lower-middle and low-income countries where construction supports essential growth and infrastructure. Policy implications suggest high-income countries should focus on sustaining and upgrading infrastructure, while developing nations prioritize investments to boost productivity in the construction sector. This nuanced understanding can guide policymakers in maximizing construction's impact on economic growth and development based on the unique needs of each income group.

Future research should explore specific factors influencing construction VA, such as government spending, technology, and regional conditions, to deepen understanding of the sector's role in sustainable economic growth.

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