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Analyzing the Economic Impact of Construction Sector in Pakistan

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ABSTRACT

This study investigates the economic impact of construction sector in Pakistan by using the data from the period 1961 to 2020. In addition to the construction industry, the impact of other industries such as the manufacturing industry, services industry, and agriculture industry on economic growth was also analyzed. The ARDL estimates point out that the variables service sector contribution in GDP, construction industry contribution in GDP, manufacturing value-added, agriculture sector contribution in GDP and GFCF directly impact the economic growth while the variable inflation negatively affects the economic growth in Pakistan although the relationship between manufacturing sector and economic growth is found to be statistically insignificant. Based on the findings of the study it is concluded that the construction sector boosts the economic growth of Pakistan so policies should be designed that encourage construction activities in an economy.

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INTRODUCTION

Economic growth is the fundamental basis for the development of an economy, and policymakers consistently prioritise its enhancement. Researchers have conducted studies on the development and expansion of the economy, focusing specifically on the factors that influence economic growth (Adepoju & Ogundunmade, 2019). Economic growth is a vital factor for a country, as it is the result of an increase in real GDP, which consequently leads to an overall

increase in production. Overall, it has a highly stimulating effect, leading to improvements in living standards and reductions in poverty and unemployment. Economists have consistently advocated for increased economic growth and have examined the feasibility of achieving higher economic growth through the modification of economic policies (Azman-Saini & Law, 2010). It is imperative for an economy to enhance the quality of life of its residents by ensuring their access to healthcare and other educational opportunities through the improvement in the growth of the economy (Iram et al., 2024; Nourzad & Powell, 2003).

The construction industry plays a critical role in the economy as it plays an imperative for capital accumulation, employment growth and household income (Mosenogi, 2016). This sector is widely acknowledged as having a favorable influence on national economies by promoting economic growth. Construction sector is also linked with the other economy's sectors by direct or indirect channels. An increase in the construction activities also enhances the demand and supply of sub-sectors of the economy that are linked to the construction sector. This sector is also helpful in the provision of employment opportunities. In consequence of these advantages governments frequently devote a large percentage of government funding to this sector (Berk & Biçen, 2017). The competitiveness and success of the economy are strongly influenced by the construction industry. Infrastructure that is contemporary and effective is a crucial factor of production and the construction sector plays a significant role in providing physical infrastructure innovatively and cost-effectively. It is also a major factor in ensuring housing and work for a great amount of people with varying levels of education and experience (Ogbebor, 2002).

The construction industry is one of the significant industries in Pakistan. Construction has overtaken agriculture as Pakistan's second-largest sector. The share of the construction industry is 13.4 percent in industry value-added which is mainly driven by construction-related expenditures by industries. Due to an increase in government spending construction industry reordered modest growth of 3.1 percent (Pakistan Economic Survey, 2021-22). As a result, Pakistan's construction sector has been crucial in generating jobs and aiding the country's economic development. Construction sectors play an essential part in a country's economic progress. A nation's economy can increase significantly and a great deal of jobs is created by the construction sector in Pakistan (Habibi & Nasi, 2020). Considering the importance of the construction sector in the economic progress of the country, this study attempts to analyze the economic impact of construction sector in Pakistan. The study results will have significant consequences for understanding the influence of the construction sector on Pakistan's economy and identifying the measures required to enhance the economic impact of the construction sector in the country.

LITERATURE REVIEW

Several studies analyzed the influence of construction sector on economic growth (EG) such as Asghar et al., (2024) used data from SAARC countries from 1996 to 2020 and found that financial development (FD), quality of institutions and human capital were positive determinants of inclusive growth. In contrast, trade openness was observed to be a negative factor of inclusive growth in SAARC countries. Similarly, Mehmood (2022) analyzed the association between the construction sector and EG in Pakistan utilizing data between 1973 and 2017. The outcomes exhibited the direct link between the construction sector and EG. Similarly, Shoukat & Ahmad

(2021) aims to investigate the long-term influence of public physical infrastructure on Pakistan's economic growth. This empirical study was done by utilizing data from 1972 to 2014. The infrastructure index has an optimistic and statistically substantial impact on GDP growth. The findings showed that investing in public physical infrastructure improves economic circumstances by contributing to long-term growth. Ali et al., (2021) used data from 1980 to 2013 to analyze the association between FDI, financial development and EG in Pakistan. The outcomes showed that FDI, FD and trade were positive aspects of the EG. Similarly, Javid (2019) inspected the association between investment in infrastructure and economic development of Pakistan from 1972 to 2015. The results showed that private and public expenditures on infrastructure boost economic development. Public infrastructure investment has a considerable influence on growth of the economy private infrastructure investment is in the majority of situations.

In addition, Owusu-Manu et al., (2019) examined the influence of infrastructure development on Ghana's EG. An ARDL model was exercised to calculate the results. The annual times series data from 1980 to 2016 was used in an analysis. The findings showed that infrastructure development and EG have a statistically significant link. Additionally, the infrastructure was originated to be beneficial influence EG was recognized as electricity-generating capacity. Erol & Unal (2015) explored the linkage between CVA and economic development in Turkey by utilizing the data from 1998 to 2014. The results revealed that the construction sector was not a factor of EG, but rather a follower of macroeconomic swings. The outcomes indicated that the causal link between EG and investment in construction sector changes considerably over the national economy's sub-periods. Farooq et al., (2013) analyzed the influence of important determinants on development of Pakistan, including agricultural, industrial, and services sector production, currency rate, and trade openness by using data from 1975 to 2011. The results showed that services, agriculture and industrial production, exchange rate and trade openness all had positive and substantial effects on real GDP. Industrial production was recognized as the most significant factor affecting real GDP.

Lopes et al., (2011) assessed the link between construction production and the national economy in Cape Verde by using data from the years 1970 to 2008. The findings demonstrated that there was a unidirectional link between GDP and construction production in Cape Verde in the long run, implying that the construction sector's growth was not substantially influenced by the national economy's growth. Khan (2008) examined the effect of CVA on Pakistan's economy. The association between the construction industry and EG in Pakistan was studied using the Granger causality test as well as regression analysis by employing data from 1950 to 2005. The outcomes demonstrated a substantial causal link between Pakistan's aggregate GDP and its construction industry. The two variables, real GDP growth rate, and construction flows have a unidirectional causal connection. It demonstrated a causal connection between the construction industry and Pakistan's economy. The building sector has a substantial impact on Pakistan's overall economy.

DATA AND METHODOLOGY

This analysis is based on the annual time series data of Pakistan from the period 1961 to 2020. To collect data following sources are utilized:

World Development Indicators

Pakistan Economic Survey

The key aim of this analysis is to inspect the role of the construction industry in the EG of Pakistan. In addition to the construction industry, the influence of other industries such as the manufacturing industry, services industry and agriculture industry on economic growth is also analyzed. The following functional form of the model is constructed to attain the objectives of the study:

Economic Growth= f(SVA, CVA, MVA, AGLA, INF, GFCF)

The model is expressed in its econometric form as follows:

$$EG_i = \beta_o + \beta_1 SVA_i + \beta_2 CVA_i + \beta_3 MVA_i + \beta_4 AGLA_i + \beta_5 INF_i + \beta_6 GFCF_i + u_i$$

Where;

EG= Economic growth

SVA= Services value-added

CVA= Construction value-added

MVA= Manufacturing value-added

AGLA= Agriculture value-added

INF= Inflation rate

GFCF= Gross fixed capital formation

This analysis conducted unit root analysis to evaluate the stationarity level of variables. The ADF (Augmented Dickey-Fuller) test is applied to determine if variables are stationary. Similarly, the autoregressive distributive lag model is utilized to evaluate the long-run coefficient of variables. The advantage of the ARDL model is that it also offers a short-run error correction form of the model. ARDL model is applied when some variables are integrated at zero order while some are at first order. The ARDL estimates provide reliable outcomes in the absence of heteroscedasticity and serial correlation in a model.

Table 1: *Variable's Descriptions*

Variables	**Variable's Descriptions**	
	Dependent Variable	
EG	Economic Growth	GDP Per Capita

Independent Variables		
SVA	Services Sector	Percent of GDP
CVA	Construction Sector Value-added	Percentage share in Industrial production
MVA	Manufacturing Sector	Percent of GDP
AGLA	Agriculture Sector	Percent of GDP
INF	Inflation rate	CPI Annual
GFCF	Gross Fixed Capital Formation	Percent of GDP

ANALYSIS

Descriptive Analysis

Table 2 displays the descriptive statistics of variables. The estimates show that the mean, median, maximum, minimum values and S.D of EG are 10.466, 10.558, 11.033, 9.690 and 0.376. The skewness and kurtosis of EG show negatively skewed and platykurtic distribution respectively. Similarly, estimates show that the mean, median, maximum, minimum value and S.D of CVA are 3.541, 3.837, 5.111, 1.965 and 0.932 respectively. The skewness and kurtosis of CVA show negatively skewed and platykurtic distribution respectively.

Table 2: *Descriptive Statistics of Variables*

Variables	EG	SVA	CVA	MVA	AGLA	INF	GFCF
Mean	10.466	45.188	3.541	13.661	47.030	8.034	15.814
Median	10.558	44.291	3.837	13.760	46.899	7.209	16.169
Maximum	11.033	53.855	5.111	15.706	49.955	26.663	21.477
Minimum	9.690	35.508	1.965	10.220	45.670	-0.516	11.330
Std. Dev.	0.376	5.836	0.932	1.330	0.889	5.218	2.022
Skewness	-0.358	0.071	-0.210	-0.740	0.733	1.409	0.119
Kurtosis	2.014	1.649	1.670	2.996	3.524	5.651	3.006

Correlation Analysis

Table 3 portrays the estimates of correlation analysis. The results show that EG as measured by GDP is positively correlated with service value-added (0.943), construction industry (0.658),

inflation (0.135), and gross fixed capital formation (0.149) while negatively correlated with manufacturing value-added (-0.246), agriculture value-added (-0.104).

Table 3: *Correlation Matrix*

Correlations	EG	SVA	CVA	MVA	AGLA	INF	GFCF
EG	1.000						
SVA	0.943	1.000					
CVA	0.658	-0.790	1.000				
MVA	-0.246	-0.474	0.602	1.000			
AGLA	-0.104	-0.043	0.128	-0.305	1.000		
INF	0.135	0.080	0.059	0.396	-0.287	1.000	
GFCF	0.149	-0.195	0.413	0.203	0.107	-0.111	1.000

Unit Root Analysis

This analysis is applied to observe the integration order of variables. For this aim, ADF test is applied and estimates are shown in Table 4. The estimates point out that the variables economic growth, SVA, CVA and MVA are stationary at first difference while the variables agriculture production value-added, inflation and GFCF are stationary at level. The combination of I(0) and I(1) of variables suggests that the autoregressive distributive lag model is a suitable technique for long-run estimation of a model.

Table 4: *ADF Test Estimates*

Variables	Level				1st Difference				Results
	Intercept		Intercept and Trend		Intercept		Intercept and Trend		
	t-stat.	Prob.	t-stat.	Prob.	t-stat.	Prob.	t-stat.	Prob.	
EG	---	---	---	---	-5.155	0.000	---	---	I(1)
SVA	---	---	---	---	-6.670	0.000	---	---	I(1)
CVA	---	---	---	---	-7.217	0.000	---	---	I(1)
MVA	---	---	---	---	-7.892	0.000	---	---	I(1)

AGLA	-4.529	0.000	---	---	---	---	---	---	I(0)
INF	-3.562	0.003	---	---	---	---	---	---	I(0)
GFCF	-3.864	0.004	---	---	---	---	---	---	I(0)

Bound Test Analysis

The bound test approach is used to examine the long-term cointegration of variables. Table 5 displays that the F-statistic value (5.3183) exceeds both the upper and lower-bound critical values, indicating the presence of long-run cointegration between the variables.

Table 5: *Bound Test of Cointegration*

	Value	**K**
F-statistic	5.3183	6
	Critical Bound Values	
Significance	I0 Bound	I1 Bound
10%	2.12	3.23
5%	2.45	3.61
2.5%	2.75	3.99
1%	3.15	4.43

ARDL Long-Run Analysis

ARDL long-run estimates of the influence of the construction industry on the EG of Pakistan are presented in Table 6. The EG as measured by GDPPC is taken as a dependent variable, while the explanatory variables are service sector contribution in GDP (SVA), construction industry contribution in GDP (CVA), manufacturing value added (MVA), agriculture sector contribution in GDP (AGLA), inflation (INF) and gross fixed capital formation (GFCF). The ARDL estimates point out that the variables service sector contribution in GDP, construction industry contribution in GDP, manufacturing value-added, agriculture sector contribution in GDP and GFCF directly impact the EG while the variable inflation negatively affects the economic growth in Pakistan although the association between manufacturing value-added and EG is found to be statistically insignificant.

Table 6: *ARDL Long-Run Estimates*

DV: Economic growth

Variables	Coefficient	S.E.	t-stat.	Prob.
SVA	0.0565	0.0106	5.3567	0.0000
CVA	0.0316	0.0095	3.3379	0.0002
MVA	0.0104	0.0316	0.3306	0.7428
AGLA	0.1125	0.0496	2.2666	0.0292
INF	-0.0183	0.0072	-2.5390	0.0153
GFCF	0.0417	0.0190	2.1960	0.0343
C	2.2645	2.2919	0.9880	0.3294

Considering first the variable SVA, the outcomes specify that the service sector is directly and significantly connected with the EG in Pakistan. The SVA's coefficient specifies as it enhances by one percent the EG also leads to an increase of 5.65 percent. It implies that enhancement in the services sector promotes the income and living standard of people so that can positively contribute to the economic progress of the country. Similarly, the CVA is critical to the country's EG. The results point out that CVA is positively and significantly linked to EG in Pakistan. The CVA's coefficient show that as it is augmented by a percent the EG also increases by 3.16 percent. It indicates that the CVA has a substantial effect on the economy because of the need for goods and services provided by sub-sectors that are directly or indirectly connected, in terms of the resources it uses. EG is widely recognized as a motivating force due to its interconnection with other sectors and its significant contribution to employment (Berk & Biçen, 2017). Similar outcomes were also confirmed in the studies of Ajmair (2014); Hongyu et al., (2002).

The outcomes also display that AGLA is positively and significantly interrelated to EG in Pakistan. The AGLA's coefficient indicates that as it increases by one percent the EG also leads to an increase of 11.25 percent. The agricultural sector serves various roles in a country's economy, such as ensuring food security, reducing poverty, driving industrialization, and promoting EG, especially in developing countries (Shah et al., 2021a; Shah et al., 2021b; Sheikh et al., 2020). Agriculture is the field where the processes of basic and economic reproduction are closely connected. The importance of this sector in the economy can be regarded as providing food for the nation and inputs for local industry; generating foreign exchange; and providing goods and services in domestic industries and the international market (Azam & Shafique, 2017). On the other hand, the study found that the inflation rate (INF) is negatively and significantly interrelated to EG in Pakistan. The INF's coefficient specifies that as it increases by one percent the EG lead to a decline of 1.83 percent. High inflation rates lead to low savings and low purchasing power of the people. Low savings means low investment in a country which leads to a decline in the EG of a country. Lastly, the results show that GFCF is positively and significantly interrelated to EG in Pakistan. The GFCF's coefficient indicates that as GFCF increases by one percent the EG also leads to an increase of 4.17 percent. These results were also confirmed in the studies of Iftikhar et al., (2016); Shah et al., (2020); Taqi et al., (2021); and Asghar et al., (2023).

ARDL Short-Run Analysis

In ARDL short-run analysis, ECM term is key to observe. Table 7 presents the short-run estimates of ARDL. It is found that ECM(-1) is negative and significant. The ECM(-1) result indicates that any short-term disturbances are rectified by approximately 10.35 percent when transitioning from the short-run to the long-run. In the short-run, the variables construction sector, manufacture value-added, agriculture value-added and GFCF positively affect the EG in Pakistan although the effect of the construction sector and manufacture value-added originated to be statistically insignificant.

Table 7: *ARDL Short-Run Estimates*

Variables	Coefficient	S.E.	t-stat.	Prob.
D(SVA)	-0.0043	0.0030	-1.3994	0.1698
D(CVA)	0.0033	0.0064	0.5126	0.6112
D(MVA)	0.0011	0.0034	0.3172	0.7528
D(AGLA)	0.0067	0.0032	2.1076	0.0417
D(INF)	-0.0001	0.0007	-0.1462	0.8845
D(GFCF)	0.0108	0.0023	4.7449	0.0000
EMC(-1)	**-0.1035**	**0.0296**	**-3.4970**	**0.0012**

Source: Author's Calculations

Model Diagnostic Tests

The problem of heteroskedasticity, autocorrelation, residuals normality and model misspecification is analyzed. Table 8 shows that there is no issue of autocorrelation and heteroskedasticity in a model. Similarly, the model used in a study is correctly specified indicated by the Ramsey Reset test and residuals are normally distributed indicated by the Jarque-Bera test.

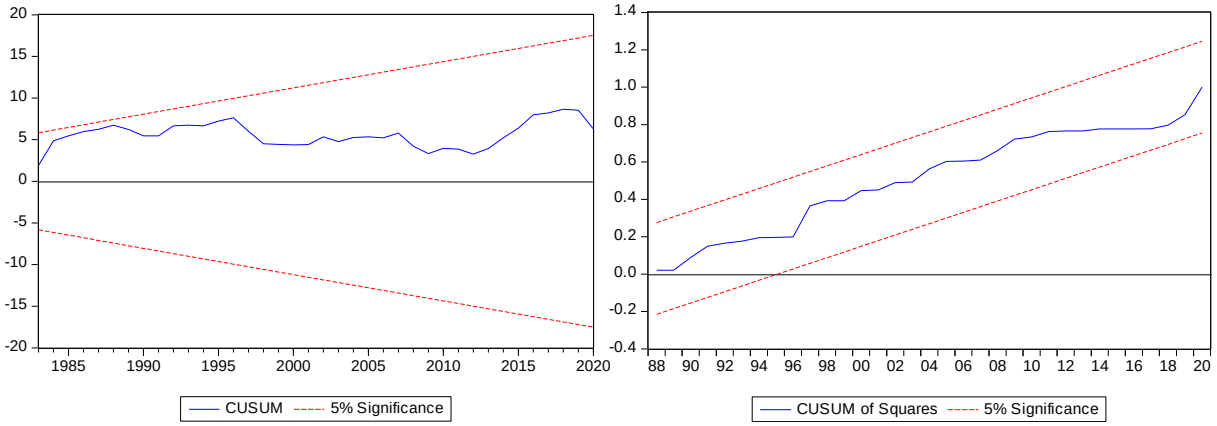
Table 8: *Model Diagnostic Test Estimates*

Problem	Test	Statistic	Prob.	Outcomes
Autocorrelation	Breusch-Godfrey	0.3072	0.7374	Not Exists
Heteroskedasticity	Breusch-Pagan-Godfrey	0.7207	0.7629	Not Exists
Residuals Normality	Jaruqe-Bera	1.8777	0.4540	Normally Distributed

Model Misspecification	Ramsey Reset	1.9391	0.2630	Correctly Specified

Model stability analysis is conducted by using cumulative sum and cumulative sum of square plots. Figure 1 presents the model stability analysis. It is found in both figures that the fitted line is between the critical region lines at 5 percent level so it is concluded that the model used in the study is dynamically stable.

Figure 1: *Model Stability Diagnostic*



Granger Causality Analysis

Granger causality analysis is utilized to assess the linear causation between any two pairs of variables. Table 9 presents the Granger causality estimates. The outcomes point out that there is unidirectional causation between the service sector and EG, unidirectional causation between the construction sector and EG, unidirectional causation between inflation and EG, while no causation is observed between the manufacturing sector and EG, no causation between agriculture sector and EG and no-causation between GFCF and EG.

Table 9: *Granger Causality Analysis*

Null Hypothesis	F-Statistic	Prob.	Result
SVA ↛ EG	2.6415	0.1097	Unidirectional
EG ↛ SVA	4.1180	0.0472	
CVA ↛ EG	0.3434	0.5602	Unidirectional
EG ↛ CVA	4.9656	0.0299	
MVA ↛ EG	1.7952	0.1857	No-Causality
EG ↛ MVA	3.2717	0.0759	

AGLA ↛ EG	2.0418	0.1586	No-Causality
EG ↛ AGLA	0.8162	0.3702	
INF ↛ EG	4.3568	0.0414	Unidirectional
EG ↛ INF	0.0532	0.8184	
GFCF ↛ EG	0.1641	0.6869	No-Causality
EG ↛ GFF	2.3196	0.1334	

CONCLUSIONS

The construction industry is a significant sector in any economy, both in terms of its magnitude and its capacity to contribute to economic growth. More construction activities boost GDP via the multiplier, resulting in a higher demand for construction orders, because the construction sector has traditionally been linked with the national economy. This study considers the economic impact of the construction sector in Pakistan. This study is based on the annual time series data of Pakistan from the period 1961 to 2020. In addition to the construction industry, the impact of other industries such as the manufacturing industry, services industry, and agriculture industry on economic growth was also analyzed. Correlation analysis found that EG is positively correlated with service value-added, construction industry, inflation, and gross fixed capital formation while negatively correlated with MVA and AGLA. Unit root analysis found that the variables economic growth, service sector value-added, construction industry value-added, and MVA are stationary at first difference while the variables agriculture production value-added, inflation and GFCF are stationary at level. The bound test of cointegration found the existence of long-run cointegration between variables. The long-run ARDL estimates point out that the variables service sector contribution in GDP, construction industry contribution in GDP, manufacturing value-added, agriculture sector contribution in GDP and GFCF directly impact the EG whereas inflation adversely impact the EG in Pakistan although the association between MVA and EG is found to be statistically insignificant. Based on the study outcomes it is concluded that the construction sector boosts the EG of Pakistan so policies should aimed at encouraging construction activities in the economy. The study also suggested the following recommendations to encourage construction activities and boost the EG of Pakistan:

The construction sector is found to be a positive factor in the EG of Pakistan so it is recommended to encourage this sector by providing incentives to the investors such as low tax rates on construction materials, and provision of loans for construction activities.

Agriculture value added is also found to be a positive factor of economic growth so it is suggested that new agriculture technologies, provision of loans, high-quality seeds, and pesticides should be ensured to the farmers this not only improves their well-being but also boosts the growth of the economy.

Special incentives for the establishment of industries for the manufacturing of international quality goods may be offered to achieve higher growth. A mechanism for transferring technology to industry for commercialization, as well as promoting industrial growth through export centers.

Investment in infrastructure is also important as gross capital formation is found to be a positive determinant of EG. An increase in infrastructure investment creates employment opportunities for the people and also boosts the GDP growth rate of the economy.

The inflation rate needs to be controlled as inflation negatively affects the purchasing power of the people and discourages savings so the inflation rate should be at a level that not only increases investment but also enhance the GDP of the economy.

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