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IMPACT OF CONSTRUCTION SECTOR ON ECONOMIC GROWTH. AN EMPIRICAL STUDY OF PAKISTAN

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ABSTRACT

The aim of the study is to determine the role played by construction sector in economic growth of Pakistan. As the construction sector flourish and helps in boosting up other sectors of the economy because of having backward and forward linkages. The research is based on quantitative data investigation on secondary data. Data employ in the study is time series non stationary data. Working of data performed on e-views. Study depicted that co-integration and long run relationship exist among the dependent and independent variables of the explained model. This study postulates that there is positive association of construction sector with economic growth of Pakistan and it has significant effect. Inflation results in reduction in economic growth but significant impact on growth whereas environmental sustainability (carbon dioxide damage) and growth has the inverse and insignificant relationship.

***Keywords**: Construction Industry, Economic Growth, Pakistan. Inflation, Environmental Sustainability.*

INTRODUCTION

"If construction moves everything moves "a popular saying by French. Sector of construction is an imperative all through the world symbolize to a substantial part of many countries' output (GDP) of an economy. The job of this sector is, as a catalyst in growth of an economy beside this the significance of the sector of construction isn't simply about its huge contribution and size yet.

Background of the Study

Construction industry is the key of splendid industries and housing structures and it is the reason behind the growth of Japan/Germany/ Europe economies from the World War II till the present state. At the back of the development of infrastructure where the construction sector rises it enhance the wealth, success and rises the living standard of the people by supplying of goods and services, construction of stores for their easiness. The

Fundamental role of infrastructure is to accomplish the primary advancement targets, for example, maintaining economic development, urbanization, industrialization, water system structures, trade deficit, income inequality, and power generation. The development business, the principle player in the development of houses and infrastructure, ought to also be licensed with quietly propelling national development plans.

Above all, a huge number of employments can be created amid the chain response procedure of development action in the economy and have impacts on other sectors or partnered businesses, for example, iron, cement steel, timber and wood, marbles, tiles and stones, electrical and clean works, glass, paints and varnishes, electricity, power and gas, agricultural sector, transportation, light-substantial development apparatus, plastics, strands, furniture, electrical machines, and some more.

As study indicated by a World Bank (2008a), Construction industry has the multiplier effect of single additional investment as it has the ability to produce income more than five times of the cost of that additional investment. In short it produces more than invested. So, this investment creates many of the new occupations in construction of infrastructure. The sector of housing grows at 14 percent whereas economy grows at 10 percent. (Sherani, Dec 2102).

The basic aim of this investigation is to highlight the importance of the part played by the construction industry in an economic activity.

The forces which stimulate the growth of an economy has been examined by various researchers, examined it from an extensive variation of viewpoints. To accelerate the growth of the developing economies in their undertakings they examine different variables that are basic to growth. Hence, many of such investigations contain different variables into their models. There exist numerous of cross-country examination mostly adopts an endogenous growth model. As according to this model based literature, the endogenous procedure for the growth of an economy are government strategy factors, for example, expenditure, tax financing and alternative financing techniques. Magnificent expenditure done by the governments on infra-structure (roads, flyovers, bridges), providing health facilities by constructing hospitals, clinics and provide educational facility by constructing schools, colleges and universities, in order to provide prosperity to their residents. In a market-based economy, other than participating in public sector services private sector also provide same services.

People look for private sector benefits at market prevailing price and in the process of increasing productivity in the growth progress of an economy many people take part by putting their efforts and increase their income level and living standard. Government provide basic help for the activities of the private sector by giving them capital or infrastructure as it has positive overflow consequences for the private sector. Be that as it may, once they gather total capital stock moves towards large, the augmentations to capital stock may increment at a steady phase, subsequently the effect of extra change in capital on the growth of an economy is unfavorable or inconsiderable and it might give negative impact on the economy if it is not tackle properly with appropriate combinations of different factors of production. So as to take the majority of the variables, a general modeling of macroeconomic is required.

In any case, the present examination in the setting of partial approach explicitly interest just on the revealing of the genuine association among the growth of an economy and the construction industry growth. The basic definition of the capital stock is a stock idea; the construction sector works as concept in stream idea. The construction sector uses few segments of the capital stock (for example certain activities of construction sector) in the end offering increment to the output of the construction sector. Generally, Economies do not have perfect information on the degree of usage of the capital stock in the activities of sector of construction. (Mallick, Hrushikesh&Mahalik, Mantu. 2009)

Hence, the investigation plans to analyze the significance of the sector of the construction produce output and its contribution in economic growth as well as other necessary factors effect this sector like employment, interest rate, inflation, environmental sustainability and investment.

Rational study which is consist of historical growth of Pakistan as well as discuss the growth of Malaysia because it is the country whose policies our prime minister wants to follow and implement in order to increase the growth of the country followed by the objectives, problem statement, limitations of the study.

Growth Achieved by Malaysia

Malaysia is now called as Peninsular comprises of west and region. Currently our Prime Minister Mr. Imran Khan said that he admires the progress and economic growth of Malaysia and try to follow their policies in order to increase the growth of an economy of Pakistan. Malaysia comes

up as the standout nation from the whole of best non-western nations that has gained and achieved an extremely smooth and progressive change to economic development towards the end of twentieth century. Continuously 1990 had the position of Newly Industrialized Country (NIC) accomplished by Malaysia and currently it is the 37th biggest economy in the world at the current costs US dollars according to the total national output (GDP). In February 1990, the leader Tun Dr. Mahathir Mohammad presented his dream for making Malaysia a stabilized economy and a way to make this nation a solid industrialized and a successful economy.

He states that prosperity of a nation is not only in the form of economy but also in the form of political stability, proper law and order situation, norms, values and providing quality of life to a common man.

Malaysia 2020 is the vision presented by him to transform nation into a flourish, productive, aggressive, strong and versatile nation. For this purpose, the sector of construction has played an important role and it has so much potential, effective in nature and grow more in backward and forward linkage with other divisions of economy. Construction sector play a part which is to boost the economy and this sector is the reason for the rise in growth of industries and provide necessary conveniences for example corporate, houses, roads, play areas, flyovers, hospitals, highways, airport, railways, dams, supplying stations and power generation, correspondence utilities, and furthermore the other necessary buildings and structures which are important for the people of the country.

It is unquestionably evident about the direct association between the construction sectors with the achievement of any economy. For developing and developed economies it may be characterized as a type of an economic engine which helps in smooth running of the economy. This sector takes part in prosperity and also rising the living standards of the people of the country. Besides it takes part in creating of tremendous level of employment in the economy.

At the beginning of her independence Malaysia had understood the great importance of the construction sector so it started to build up this part. Nowadays it is one of the most important sector of Malaysian economy. Despite the fact that it contributes in small proportion as compare to other sectors of the economy like agriculture, manufacturing and services. From the past twenty years 1990-2010 the participation in GDP of agricultural sector is 9.3, service

sector is of 48.3 and manufacturing is of 28.2 sectors and the participation of construction sector is of 4.1 percent. It has 12 times lower participation service sector, 2.2 lower than agricultural sector and 7 times lower participation of manufacturing sector in GDP of Malaysia. Regardless of this we cannot ignore the importance of construction sector as it boosts the economy by creating demand through backward and forward linkages *(Raza Ali Khan)*

Rationale of the Study

Contribution of Construction Industry in Pakistan

Currently in Pakistan it is among one of the rapid growing sector. In the year 2018 there is expansion in Gross Domestic Product because of Construction sector in Pakistan Gross domestic product expanded from 320769 PKR Million in 2017 to 343183 PKR Millions of in 2018 from Construction sector in Pakistan Gross domestic product.

In Pakistan the rise in Gross Domestic product found the average value of 247347.62 PKR Million from 2006 until 2018, achieving an untouched height of 343183 PKR Millions in the year of 2018 and a lowest record found in year 2006 of 186380 PKR Million.

In this paper finding out the influence of construction industry on economic growth of Pakistan as well as other variables that triggers the economic growth.

Historical Background

Since freedom 1947 till 1971, at that time there were not many of the private contractors in Pakistan. the Provincial and Central department works for Housing for public sector through contractors, while most of the businessman developed their homes for most of the part with the assistance of inadequate however skilled people. Government had made plans for the huge allocations of land to Housing Building Finance Corporation (HBFC) and easy access of availability of land in the city of Karachi by Karachi Development Authority (KDA) their plans were made after 1971, many of the businessman, sole proprietor, traders, merchants, industrialists, and so on, entered in the sector of construction. Some of them had involvement in structure development while others had sufficiently neither administrative ability nor adequate specialized information. The structure development industry did, be that as it may, get a lift.

With this lift, an association form by the builders and developers with the mission of improving the condition of construction sector for example

"Association of Builders and Developers (ABAD)" just as to provide a proper platform to point out and resolve the several other issues in order to resolving issues such type of agencies face many of the problems house loans, building plans and the prices of sale.

Till 1975 the prime projects such as warsak dam and Indus basin replacement works, these projects are done by foreign contractors. In the year 1975 in order to build confidence and capabilities of domestic contractor government makes policy to assign major projects to them. Pakistan steel Mills Corporation took major decisions related to development and assigned many of the construction projects to domestic contractors. Port Qasim a mega project done by the domestic contractor which restored the confidence of domestic contractors.

The government understood that the few sectors are the spinal of a nation's economy like construction sector and took an essential part in the improvement of the fundamental infrastructure of a nation, resources have been rises to additionally extend the essential foundation of the nation. The impact has started various development projects which have prompted expanded demand of building and development exercises in the nation. In building up the nation's infrastructure is a fundamental objective of maintaining a sustainable growth in an economy recognize by the government in the Economic Survey.

During few years, different budgetary and non-budgetary estimates were taken by the government which is currently producing positive outcomes. Construction sector in Pakistan is blasting; construction sector related materials demand has increased. Various national and international real estates have initiated mega construction projects in Pakistan which has additionally quickened construction sector in the nation. As the construction sector is increasing day by day so there is more requirement related material of construction, this may increase the demand of these materials so there will be more production to full fill this requirement. Now days many of the domestic and international developers are launching their projects in Pakistan. (Farooqui,Ahmed and Lodi)

Problem Statement

In an Economic growth of Pakistan, contribution by the construction industry in this study based on findings how construction sector trigger other variables like economic growth, employment level, interest rate and investments and environment sustainability in Pakistan.

Research Objective

1. To find out the nature and causal association among the construction industry and economic growth through empirical evidence.
2. To find out the role of interest rate and its impact on construction industry of a nation.
3. To enumerate the effectiveness of construction sector in creating the level of employment in the nation.
4. To figure out the contribution of investment in construction industry in order to increase economic growth.
5. To examine the effects of environmental sustainability generated by the construction industry.

To identify the association and effectiveness among the inflation and the construction industry of a nation

Alternative Hypothesis

- The construction industry really helps nation in achieving the sustainable growth of an economy?
- Interest rate plays in a stabilization role in an economy?
- The construction sector helps in uplifting the employment level in both skilled and unskilled labor force??
- Does the growth of an economy can be rise with major part of investment in construction industry?
- The interest rate helps in boosting the construction sector
- construction industry really effects the environment sustainability in a country
- Inflation has the association with the sector of construction in an economy

Research Gap

A significant research gap has been observed in respect of the country Pakistan. On the topic Assessment of Pakistani Construction Industry by (Farooqui, Ahmed and H. Lodi, 2008). As the researcher worked on primary data and took variables of project management, Risk Management while this study caters variables of secondary data.

Limitations

Usually Developed countries use a policy for the conditions when there is reduction in their exports. It is possible to rise economic growth through expanding domestic demand. This practice is known as quantitative easing. Theoretically rise in gross capital formation is also achievable by investments in construction. Expansion in construction sector will both encourage supply and demand for related products used in construction industry, such as building materials and transport services. This economic stimulation practice is done by a country Belarus. To hold up high growth rates during the phase when exports decrease at the cost of investments into construction industry and a social infrastructure. Belarus has tried this strategy by increasing their investments into construction industry, which has adverse effect on the balance of payment and led to unbalance of the balance of payments and external debt increases, and many other negative effects, including high inflation. Small open economy cannot be only depending upon the investment in construction industry which may not lead to balance growth of an economy. (Aliaksei and Tatiana, 2017).

LITERATURE REVIEW

Construction industries have much effect on developing countries because this sector has linkages with other sectors also. Construction industry is also affected by the uncertainty and prosperity of the country as when there is more favorable conditions domestic and foreign both invest in construction industry and foreign direct investment also increase and construction industry will grow more, so the growth of this sector might affect other variables e.g. demand and supply of raw materials, goods and services and environment conditions. So, economic growth of a nation strongly influence by the construction industry has shown evidence by the previous studies.

This sector is highly responsible for environmental sustainability because during production process the emission of carbon dioxide and other toxics which is quite harmful for all human. So, government must take safety measures against it discussed earlier, that construction industry caters sustainable part in the GDP and also helps in flourishing other sectors of the economy. (Bal. M. Bryde. D. Fearon, D. & Ochieng. E., 2013) discussed that the sector of construction can be more sustainable if it provides low cost and quality to its clients with reduction of negative and harmful impact on the environment.

By focusing on environmental sustainability, we will be able to provide better form of world to our next generation, (Stukhart, G., 1982) Investigate

about the Inflation and the construction Industry. Inflation cause to increase in general prices because of which rise in prices of resources used in construction work also increase the cost of construction work. Inflation create uncertainty among the contractors they unable to forecast the cost on the long-term basis to be used in project. Productivity also effects by the inflation.

In line with literature review (Hillebrandt. 1985), investigated about the activities of the construction industry influence almost every part of the economy. Particularly in developing countries this sector is one of the determined factors of the growth of an economy. This sector has broaden span linkages with different sectors, for example, paint, the sector of energy, machinery and finance. It makes effective utilization of capital, other material and human resource in improvement of housing sectors in an economy as the construction sector is a complicated sector.

Benefits from the characteristics of construction industry

We can get many opportunities from the special features and characteristics of this industry

- The performance and productively in an economy must be realized by the industry and understanding its capability to make occupations in most of the sectors of a nation and also encourage the activities of business in different sectors of the country. To make this achievable there is requirement of new strategies.
- Proper infrastructure should be laid of the construction sector activities in many of the developing countries public funds are short so government is unable to make expenditures appropriate strategies for funding must be made in developing countries and a strategy for the investors who can buy, construct or can take ownership so there will be more development project will be constructed.

Establishment of construction development agencies is the initial step of long procedure and quiet motivating step. Besides of many fruitful results in improvements in construction industry many other problems are required to be consider

- Agency must have strong control on all factors and maintain a close connection with the industry.
- The construction sector should, ideally, play a part to carry out task of

the agency in formulation and execution of its plans. At long last, the agency ought to be persistently appropriate. This suggests its policies, approaches, activities, strategies and correspondence channels must to be consistently checked on and make necessary correction where essential.

- Ofori expressed that a visible participation to nations economy output done by the sector of construction. It helps in providing employment and income to the individuals as the flourishing aspect of this industry nurture all aspects of life.

Economic Development in Pakistan

Pakistan is among underdeveloped country at the time of her independence in the year 2018 the population of Pakistan was of 207 million people which is the world's fifth largest and in respect of purchasing power parity(PPP) Pakistan is twenty third largest and in respect of nominal gross domestic product it was forty two times largest, Gross domestic product (GDP) in fiscal year 2018 is $1,641 which is one forty seventh in the world and in the year of 2018 the purchasing power parity (PPP) in respect of GDP per capita was 5,709 which was on 130th position in the world.

During the year of 2007-2008 Pakistan was in the phase of expansion, boom and lots of growth in many sectors of the economy mainly in agriculture, service and industry sectors gave rise to the economy in that growth momentum construction sector contribute 17.2%.it includes construction of domestic houses, high rise buildings and construction of infra-structure did by the public sector e.g. roads, bridges, flyovers, parks etc respond to this expansion employment level also increase and other indicators and economy were also in better position which make the economy and was on the track of wellbeing, (Farooqui, Ahmed and Lodi, 2008).

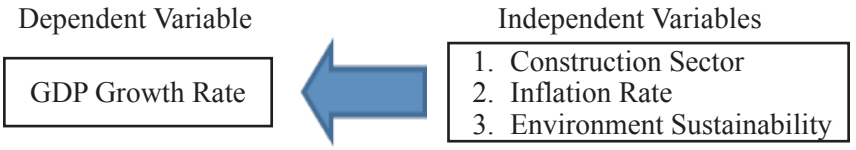
Construction Development in Pakistan

It is published by (emergingpakistan.gov.pk) that in developing countries it is observed that construction sector performs a duty of driver in the growth of the nation. The developing urban populace in Sindh makes a regularly expanding interest for housing. Enormous potential exists for real estate improvement including housing plans for the groups of middle/low income. With a yearly demand of 500,000 units for the coming twenty years the investment in the construction sector has ever been the paradise for investors. The construction sector has been known as a sector for which the Government of Sindh is taking measures and activities for the development of this sector,

particularly in minimal cost of housing. The substantial urban area of Karachi makes countless opportunities for commercial ventures. Currently-the construction sector has shown extraordinary progress by making/ accepting agreement of huge and challenging projects. There is still requirement of advancement in construction sector. Modern technology can enhance and helps in rising the growth of an economy.

Conceptual Framework

The empirical study of the impact of construction sector on Growth rate of the country, I propose to follow a conceptual framework to examine the impact of construction sector on several independent variables taking data from 1973 to 2019 and selected the conceptual frame work from previous research papers.



METHODOLOGY

Introduction

The purpose of the presented investigation is to find out the major role and impact of construction sector on economic growth as well as on other factors of the economy which are mainly affected by this sector or take huge part in Gross domestic product. As this sector of construction has backward and forward linkages mainly with many of the important sectors, it also has positive impact on overall economy according to many researchers.

Presentation and analysis of collected data

The data collected in this investigation is secondary data, which has already been collected, uniform data is available on website of World Bank. So, as in this investigation data has been collected from World Bank website.

This study employ the frame work of time series in order to show the long run influence of construction sector on economic growth of Pakistan. In this study carried out in a frame work of co-integration of time series. If two variables x and y both integrated of order 1 and if there is a linear combination exist between two variables x and y that yield a stationary variable then co-integration is said to be exist between the variables. If we suppose y is the function of x variable in a frame work of simple linear regression model. So,

the equation of this model we can write as:

$$y = u + bx + e$$

Banerjee et al. (1998), formed the Error Correction Model do not consider the mixed variable technique. It is commonly acknowledge that one could find out the relationship of mix variables for instance Banerjee argue that there would be no difficulty or issue in finding a long run relationship as long as having the same order of integration as regressed by some of the linear combination of regressor. This activity would provide persistent outcome included in time series model regardless of the integration of variables. In same way Pesaran and Shin (1998) contend that it is right to find out the relationship between mixed variables as far as residuals are stationary (which represents co-integration) and make a method to test for co-integration and the knowledge of individual variables integration does not required. To test co-integration some question arises about the critical values put on for the t-statistics. Consequently the critical values can be estimated to less than they would be for the case of all variables. This conclude by Pesaran and Shin (1998, 1999) that in scenario of similar techniques and method, which uses the ARDL (Auto Regressive Lag model) rather than ECM which is form of Eagle Granger. In this following research ARDL is use for the co-integration approach to check the vigorous results of the data.

We use ARDL (Auto regressive lag model) to find long run relationship between the variables as according to above variables we regress y upon x.

Model Specification

To forecast the economic performance of Pakistan we use the ARDL and ECM technique. There are four models estimated in this study to check the impact of construction sector on the economic growth of Pakistan time series data we use span from 1973 and 2019

Empirical Assessment of the Impact of construction sector on Economic Growth of Pakistan (GDP)

In the initial model we examine the impact of construction sector on overall economic growth of Pakistan. Total output produce in Pakistan in short GDP is the dependent variable. The overall economic betterment and stability of country plays huge part in the development of various sectors.

Construction of Model

The model use in this investigation of the selected variables which shows

effect of construction industry and other variables, unemployment, interest rate, environment sustainability and investment on economic growth.

Variables including: unemployment, interest rate, investment and environment sustainability and inflation are independent variables whereas the dependent variable is GDP (Gross domestic product).

The first ARDL model (E1) is as follows:

$$GDP_t = B1 + B2\ CS + B3UE + B4\ IR + B5\ ES + B6\ Inv + B5\ INF \Rightarrow E1$$

Whereas the overall output of Pakistan is measured by Gross Domestic Product, (CS) represents the construction sector in Pakistan, (UE) is the level of unemployment in Pakistan, (IR) is the interest rate in Pakistan, (ES) is the Environment Stability which we check through carbon dioxide emission in the environment (INV) is the Investment in sector of construction in Pakistan, Variable (INF) represent the inflation in E1

GDP is the dependent variable whereas CS, UE, IR, ES, INV, INF are the independent variables.

This shows how and to what extent change in construction sector progress affect the output produce and progress in sector of construction also affect variable employment level because rise in construction sector will show positive relationship.

Second ECM model as follows:

$$\Delta ln\ Gdp_t = f(\Delta CS_{t-1}, \Delta\ UE_{t-1}, \Delta\ IR_{t-1}, \Delta\ ES_{t-1}, \Delta\ Inv_{t-1}, \Delta\ I \Rightarrow \text{E2}$$

Here in equation 2…….GDP is a dependent variable is a function of various variable (construction sector unemployment level, interest rate, environment sustainability, investment and inflation) these variable are independent variables in a lag model.

Selected Variables in the Research

Variables chosen in this study are employment level, interest rate, investment, environment sustainability.

Environment sustainability: Environment sustainability is said to be cleanliness and pollution free environment which is the requirement of healthy living. It is affected by the sector of construction as use of more energy plants and production of raw material may create waste in form of carbon dioxide emission in the atmosphere which is harmful for our health.

And state of Pakistan has other health issues also rather than that will even cater this problem seriously.

Investment: in this sector of construction has marvelous impact on the GDP of a nation. As certainty increases domestic and foreign investment increases. This sector contributes a visible part in the growth of an economy and provides positive inflows.

Inflation: is the rises of general price level which reduces the purchasing power of an individual. As the result of inflation cost of production increases which may also cause increase uncertainty and reduce investment in construction sector. Contractors were unable to forecast long-term, forecast of finance, investment and returns.

Time period of collected data

The Time period in this research has been taken from the year 1973 to 2019 mainly because of the structure break. Bangladesh which was known as east Pakistan was separated from Pakistan which was known as west Pakistan in the year 1971 so the data collection of all the variables in this research are actually from the beginning, after separation of Bangladesh which is actually a structure break in this research data.

Collected data type

The data we use in this investigation is of time series data. This type of data is of particular time. The observation of a data consisting of a single variable in different period of time. It Means unit remains same but the duration varies over the period of time.

Source of Data for investigation

The source of collected data of the above define variable and indicators is from World Bank website. Which has quiet refined data.

Hypothesis of the investigation

Null Hypothesis: There is no association between the construction industry and economic growth of a nation.

Alternative Hypothesis: There is an association between the construction industry and economic growth of a nation.

Null Hypothesis represents that the change in construction sector whether its progress or decline/falling has not influence the growth of the economy (not

influence on other sectors of an economy). Whereas Alternative Hypothesis represents that any progress and change in the sector of construction will influence the growth in an economy means there is relationship between construction sector and growth of an economy (change also influence to the other sectors of economy as well).

Summary

As discussed in literature review, there are many linkages of many sectors of the economy with the sector of construction and with the continuous growth of construction industry give rise in the living standards and income of the people so the effects of this industry to economy is enormous.

So, as the improvement of this sector has favorable effects on the level of employment , interest rate influences many of the business, financial and economic activities performing in a country. We human beings need healthy pleasant climate and atmosphere for the well-being as we are healthier, produce more output and it's obvious that the part of investment in this sector plays wider role in economic activity to boost the growth of an economy. As the increase in general population in developing countries increases the demand of houses so there will be more construction of houses will create the demand of labor which will also increase the employment level.

ESTIMATION AND RESULTS

In terms of the evaluation of the relevant literature about the influence of the construction industry on the growth of economy. How the variable of construction sector, inflation and environment sustainability effects the economic growth of Pakistan under the umbrella of previous research theories

Empirical Evidence

It is important to know about the properties of time series data before forwarding towards strict econometric models. Study includes economic data of time series which has the association among casualty and co-integration is examined commonly described as unit root of stochastic process. The table 4.2 below presents the findings of many unit root tests (Table 1). Using the ADF (Augmented Dickey-Fuller) by (Dickey and Fuller, 1979) additional serial co-integration, ECM has been added to the time series econometric application to prevent the erroneous findings in the regression equation.

Unit Root Test

The unit root test is done to evaluate if the data is stationary. Unit root

is applied at constant and linear trend on E-Views. Whereas growth (GR) is a dependent variable, Construction sector (CS) is a core variable and other variables inflation (INF) and Environment sustainability (ENV) are the co-variants. Augmented Dicky fuller method is adopted for unit root for the reason of lag length.

ADF Technique

Table 1

Variables	Calculated value	1% Tabulated value	5% Tabulated value	Probability.*
Gr	-4.897737	-4.170583	-3.510740	0.0013
Δ(Gr)(2)	-10.50046	-4.175640	-3.513075	0.0000
Cs	-1.446655	-4.170583	-3.510740	0.8333
Δ Cs	-6.011422	-4.175640	-3.513075	0.0000
Gdp	-1.244079	-4.170583	-3.510740	0.8890
ΔGdp	-6.732853	-4.175640	-3.513075	0.0000
Inf	-3.285391	-4.170583	-3.510740	0.0815
Δ Inf	-7.322146	4.175640	-3.513075	0.0000
ENV	-1.707431	-4.170583	-3.510740	0.7319
ΔENV	-6.326249	-4.175640	-3.513075	0.0000

By monitoring the above results of unit root method we observed that the variable growth (GR) is stationary at level and t-statistics tabulated value of 1% in support of Augmented Dicky fuller whereas, remaining variables construction (CS), gdp (GDP), inflation (INF) and environment sustainability (ENV) are stationary at first difference and t-statistical tabulated value of 1% in support of Augmented dicky fuller. While log is applied on variable of environment sustainability (ENV)

All variables are integrated at some level and some of them stationary at first difference which is justify to employ the model of Auto regressive lag model so the next stage of the study is to employ ARDL (auto regressive lag model) F-statistics to find whether the long run association among the chosen variables exist for the time period of 1973-2019 of Pakistan. The detailed results of Auto Regressive lag model shown below in table 2.

ARDL Co-integration Analysis

Table 2

ARDL Bound test is employ find the co-integration or long run association or among the dependent and independent variables.

Estimated Model	gdp=f(cs,inf,env)	
Optimal lags structure	(3, 2, 1)	
F-statistics	18. 53659*	
	Significant level	Critical values (T = 40)#
1%	3.65	4.66
2.5%	3.15	4.08
5%	2.79	3.67
	2.37	10%
Diagnostic tests: Chi-Square, LM Version Statistics (Prob. value)		
R^2 = 0.846189, $Ad\text{-}j^2$ = 0.760739, **F-statistic**=9.902697, **D.W Test**=1.929254		
Normal* = 3.230251(0.198866)**, X^2 ***Serial = 0.723736(0.6964)		
X^2 ***Arch*** = 0.985536(0.3208) **White Test** = 17.12488(0.3115)		
X^2 *Norm* is for normality test, X^2 *SERIAL* for LM serial correlation test andfor X^2 *WHITE* heteroscedasticity.		

Source: Summarized and Calculated by Authors.

In Above table 4.3 reason to employ Null hypothesis: there is no association among the variables

Alternative hypothesis: There is association among the variables.

The Auto Regressive lag model outcomes depicts that the value of F-statistics 18.53659 which is greater than 1%,2.5% ,5% and 10% significance level of upper bound (I) value. Which helps to reject null hypothesis that no co-integration or long run relationship exist among the variables. As according to the results shown in above table confirm that co-integration and long run relationship exist among the dependent and independent variables of the explained model

The variable construction sector, inflation and environment sustainability use as the exploratory variables. As shown in result a long run relationship exist between construction sector, growth of an economy, inflation and environment sustainability in the span of 1973-2019(a duration of 46 years) of Pakistan. In support of theory it is quiet understanding that as the construction sector boost it flourishes the economy. On the other hand this sector affects environment of that country as the healthy environment is the need in order to live healthy.

In addition to this the assumption of Classical Linear Regression Model has been satisfied. In this model error term in this model precede the normal distribution. The model of ARDL model does not effect from serial correlation as well as there is no need and use of hetrocidasticity model.

Table-3:

Autoregressive Distributed Lag Estimates, ARDL (2,4,2,4) based on selected Akaike info criterion

Dependent Variable	**Gr_t**			
Regressor	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.***
Gr_{t-1}	-0.400031	0.128626	-3.110025	0.0044
Gr_{t-2}	-0.342605	0.124285	-2.756616	0.0103
Cr	2.55E-05	9.78E-06	2.603139	0.0148
Cr_{t-1}	-4.17E-05	1.32E-05	-3.164402	0.0038
Cr_{t-2}	-1.67E-05	1.48E-05	-1.130181	0.2683
Cr_{t-3}	2.83E-06	1.48E-05	0.190816	0.8501
Cr_{t-4}	4.74E-05	1.19E-05	3.995069	0.0004
Inf	0.003382	0.066830	0.050607	0.9600
Inf_{t-1}	0.093681	0.069764	1.342825	0.1905
Inf_{t-2}	-0.413303	0.067681	-6.106673	0.0000
$ln\ ENV$	19.36131	5.828515	3.321825	0.0026
$ln\ ENV_{t-1}$	-13.73768	7.445562	-1.845084	0.0760
$ln\ ENV_{t-2}$	15.34089	7.442246	2.061326	0.0490
$ln\ ENV_{t-3}$	3.918164	6.594775	0.594132	0.5574
$ln\ ENV_{t-4}$	-25.01600	5.305735	-4.714897	0.0001
Intercept	5.165740	8.710596	0.593041	0.5581
R^2	0.846189		***Adjusted*** R^2	0.760739
DW-statistic	1.929254	F- statistic	9.902697	0.000000
Akaike info criterion	3.153400			

Coefficients in above Table shows the outcome using the Autoregressive Distributed Lag Estimates .This ARDL model is selected on the basis of akaike info criterion. Above examined ARDL regression model table5. exhibits GR (is the dependent variable R-square (R2) of above mentioned model is 0.846189 which basically represents the fitness of the model, Adjusted R-square is 0.760739 F-Statistics of model is 9.902697 with the probability of 0.00000 exhibits the significant impact in model

The relationship between and its own lag is negative and significant at level of 1%. This illustration exhibits that value of 1% lag increases is related with decrease in current lag value of economic growth by 0.400031.

No association found among construction sector () and growth at current construction sector C and first lag value of ,second lag value, third lag value as well as with fourth lag.

A positive association found between inflation and growth and significant at level 1%.it depicts that in existence of inflation economy grow by 5.1691% and has insignificant impact. This is measured by adding up coefficient and

intercept of inflation.

Environmental sustainability (has positive and strong relationship with economic growth () statistically significant at 1% level. These above detailed measures explain that 1% increase in environment sustainability may cause results in 19.36 % rise in economic growth has significant impact but negative relationship with lag (with value of 13.73768 having insignificant impact and ( ) has positive association with dependent value with a value of 15.34089 having significant impact on model third lag also have positive impact.

A question arise that what is the basic Reason behind to opt lag model? It's because to seize the effect of time many of the researchers adopt this lag method.

Table-4:
Estimated Long Run Coefficients using the ARDL Approach (2,4, 2, 4) selected based on Akaike info criterion

Dependent variable				
Repressor	**Coefficient**	**Std. Error**	**t-Ratio**	**prob**
Intercept	5.165740	8.710596	0.593041	0.5581
GR_{t-1}	-1.742636	0.198342	-8.786026	0.0000
CS_{t-1}	1.72E-05	3.51E-06	4.909670	0.0000
INF_{t-1}	-0.316240	0.059689	-5.298086	0.0000
$ln\ ES_{t-1}$	-0.133319	0.385401	-0.345923	0.7321
GR_{t-1}	0.342605	0.124285	2.756616	0.0103
CS	2.55E-05	9.78E-06	2.603139	0.0148
CS_{t-1}	-3.35E-05	1.00E-05	-3.342753	0.0024
CS_{t-2}	-5.02E-05	1.17E-05	-4.284064	0.0002
CS_{t-3}	-4.74E-05	1.19E-05	-3.995069	0.0004
INF	0.003382	0.066830	0.050607	0.9600
INF_{t-1}	0.413303	0.067681	6.106673	0.0000
$ln\ ENV_{1}$	19.36131	5.828515	3.321825	0.0026
$ln\ ENV_{t-1}$	5.756940	6.579646	0.874962	0.3893
$ln\ ENV_{t-2}$	21.09783	5.824922	3.621994	0.0012
$ln\ ENV_{t-3}$	25.01600	5.305735	4.714897	0.0001

The table above postulates the outcomes of Estimated Long Run Coefficients using the ARDL for short. This ARDL model is selected on the basis of Akaike info criterion.

There is no co-integration found between construction sector (Cs), economic growth (Gr), inflation (inf) and environmental sustainability (Es) as the intercept sets as the benchmark in the model statistically above mentioned coefficient is insignificant to postulates the long run impact of

dependent variable (Gr).The biggest deficiency is lack of proper economic policies which helps in stabilizes the sectors.

As shown in above described table no association found between dependent variable Gr_t and independent variable Cr_{t-1} but significant impact and more significant result of Cr_{t-2} and Cr_{t-3}.

Positive relationship has been found between inf with Gr_t but insignificant impact, association among inf_{t-1} and Gr_t having significant impact on model of the study.

ln ENV_1 Has strong and positive relationship with dependent variable Gr_t caters significant impact on the model where as *ln* $\boldsymbol{ENV_{t-1}}$ **has positive association** with Gr_t but caters insignificant impact.. *ln* ENV_{t-2} **has the positive association** with Gr_t having significant impact on model

Table-5:

Estimated Long Run Coefficients using the ARDL Approach

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CS	9.89E-06	1.92E-06	5.140020	0.0000
INF	-0.181472	0.034723	-5.226231	0.0000
LOG(ENVI)	-0.076504	0.222621	-0.343652	0.7338
C	2.964326	5.058725	0.585983	0.5628

Source: Summarized and Tabulated by Authors

Above table of ARDL model illustrate the long run association among the variables. In the above table coefficient postulates the negative or positive relationship among the variables.

As according to this study if there is 1% increase in construction sector the economic growth rise by 0.00000 percent but it has significant. If inflation increases by 1 percent then economic growth decrease by 0.181472 percent and if 1 percent carbon dioxide damage increases then economic growth decrease by 0.076504 percent as shown in result it has insignificant impact and the outcome of intercept in the study shows insignificant impact on the model.

EC = GR - (0.0000*CS -0.1815*INF -0.0765*LOG(ENVI) + 2.9643)

As shown in results Long run relationship has been depicted .The above equation illustrates that growth has no association with construction sector on other hand economic growth has inverse association with inflation as well as with environmental sustainability. But as according to earlier study conducted by (Raza, 2005) that construction sector has strong and casual relationship with economic growth it helps in flourishing the economy in case of Pakistan.

Table 6:

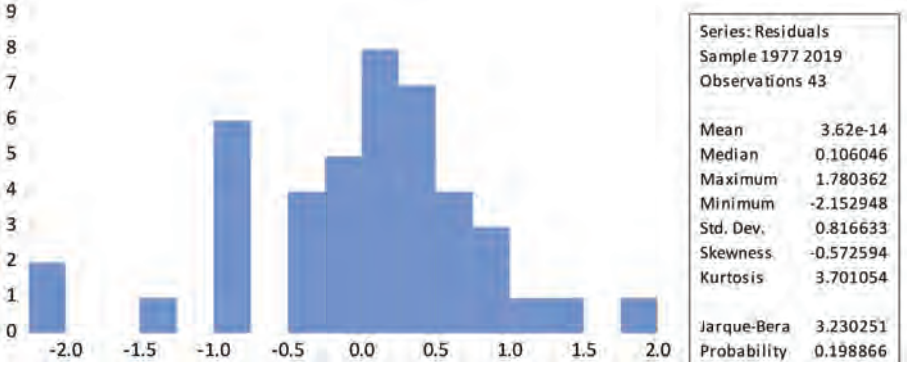
Error Correction Representation for the Selected ARDL Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GR(-1))	0.342605	0.107019	3.201344	0.0035
D(CONSTRUCTION)	2.55E-05	8.18E-06	3.114054	0.0043
D(CONSTRUCTION(-1)	-3.35E-05	7.98E-06	-4.197276	0.0003
D(CONSTRUCTION(-2))	-5.02E-05	1.02E-05	-4.923995	0.0000
D(CONSTRUCTION(-3))	-4.74E-05	1.01E-05	-4.672781	0.0001
D(INF)	0.003382	0.056246	0.060129	0.9525
D(INF(-1))	0.413303	0.055960	7.385736	0.0000
DLOG(ENVI)	19.36131	4.097925	4.724661	0.0001
DLOG(ENVI(-1))	5.756940	4.701453	1.224502	0.2313
DLOG(ENVI(-2))	21.09783	4.849432	4.350578	0.0002
DLOG(ENVI(-3))	25.01600	4.662810	5.365004	0.0000
CointEq(-1)*	-1.742636	0.168930	-10.31571	0.0000

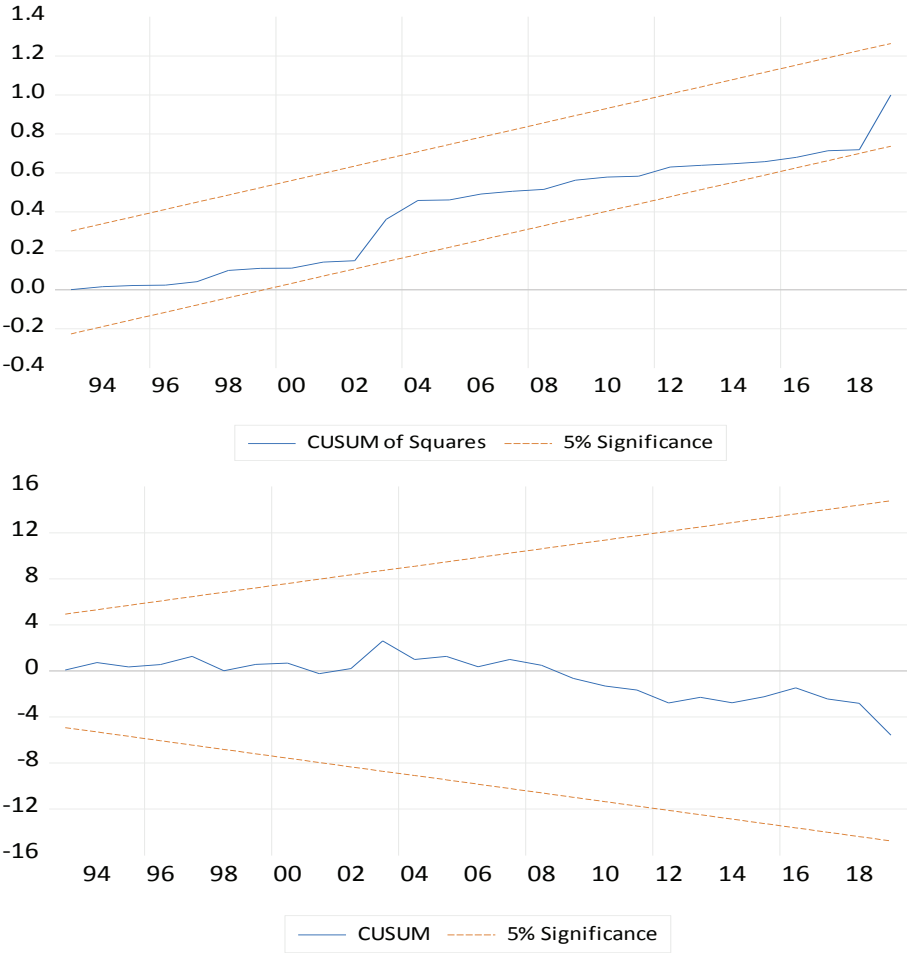
Error correction model is use to estimate the speed at which dependent variable (Gr) return to equilibrium after change in independent variables (Cs,inf and Env). In above table ARDL model shows value of ECT (-1) is negative and significant at 1% level .The figure of error correction term in above mentioned table is 1.742636 which illustrates that disequilibrium is corrected 174.26 % in one year and equilibrium will be achieved by model in 0.574 years and it has significant impact. In Pakistan Construction sector provide effectiveness in economic growth as shown in short term analysis.

Residual Normality Test

The table shows that the residual spread as well as the value of the Jarque-Bera test, whereas the standard level of probability demonstrates that residuals are normally distributed. The results of the test showing the residuals are normally distributed are also supported by the values of skewness and kurtosis. The following numbers illustrate the amount of data variation that still exists.



Plot of Cumulative Sum of Recursive Residual



Source: Summarized and Tabulated by Authors from Eviews

Basically the cusum test helps in finding the stability of coefficients. So, the illustration of cusum test as above mentioned diagram is that at 5% significance level cusum test(shown by blue lines) does not cross upper and lower critical limit(red lines)this concludes that the model is stable.

Serial correlation:

Serial Correlation also known as autocorrelation. Existence of auto correlation problem in time series regression is quiet usual. Existence of autocorrelation refers to observations of error terms follow a pattern. Breusch Godfrey serial correlation test employ to check the autocorrelation. Durbin Watson Test confined or limited to detecting first order autocorrelation,

whereas Breusch-Godfrey (BG) test can detect autocorrelation up to any pre-assigned order.

Table.8

Breusch-Godfrey Serial Correlation LM Test

Breusch-Godfrey Serial Correlation LM Test:			
Null hypothesis: No serial correlation at up to 2 lags			
F-statistic	0.213990	**Prob. F(2,13)**	0.8088
Obs*R-squared	0.723736	**Prob. Chi-Square(2)**	0.6964

As above table postulates,

Null hypothesis: there is no auto correlation.

Alternative Hypothes: there is autocorrelation

More mentioned is above (BG) correlation table that the value of probability is 0.6964 greater than 0.05 so we accept null hypothesis that there is no serial autocorrelation exist in the study.

Heteroskedasticity Test:

Heterosidaticity means scattered differently as according to assumption of classical linear regression model it refers to there is change in mean of error terms. And the scattered plots of errors terms shows different variation depending upon independent variable and in shape of cone whereas inverse of heteroskedasticity is homosesidasticity in which mean of error terms remains constant in disturbance of model mean of errors have same scatter regardless of other variable.

Breusch-Pagan-Godfrey test also known as walt test developed in 1979 it is use to verify heteroskedasticity has only possibility to verify for linear form of heteroskedasticity.

Table 9.

Heteroskedasticity Test: Breusch-Pagan-Godfrey

Heteroskedasticity Test: Breusch-Pagan-Godfrey			
Null hypothesis: Homoskedasticity			
F-statistic	0.985164	**Prob. F(15,27)**	0.4955
Obs*R-squared	15.20990	**Prob. Chi-Square(15)**	0.4364
Scaled explained SS	8.098791	**Prob. Chi-Square(15)**	0.9198

Null Hypothesis: There is no Homosidasticity present is the data.

Alternative Hypothesis: There is Heteroskedasticity present in the data.

If P<0.05 we reject null hypothesis but p-value is 0.4364 which is greater than 0.05 so we accept null hypothesis .Hence there is no Heteroskedasticity exist in the data.

Table 10.

Heteroskedasticity Test: White

Heteroskedasticity Test: White			
Null hypothesis: Homoskedasticity			
F-statistic	1.191291	**Prob. F(15,27)**	0.3350
Obs*R-squared	17.12488	**Prob. Chi-Square(15)**	0.3115
Scaled explained SS	9.118459	**Prob. Chi-Square(15)**	0.8712

Null Hypothesis: There is no Homosidasticity present is the data.

Alternative Hypothesis: There is Heteroskedasticity present in the data

If P<0.05 we reject null hypothesis but p-value is 0.3115 which is greater than 0.05 so we accept null hypothesis .Hence there is no Heteroskedasticity exist in the data

CONCLUSION AND RECOMMENDATIONS

The primary objective of this research is to investigate the influence that Pakistan's construction industry has on the country's overall economic growth. This analysis covers the time period from 1973 all the way up to 2019. In this evaluation, proxies for assigned variables include the percentage of GDP for growth, the percentage of GDP for the construction industry, the consumer price index (CPI) for inflation, and the percentage of carbon dioxide emission for environmental sustainability. The unit root test is used to determine whether or not the data are stationary. For the aim of determining the long run connection between the variables, an autoregressive lag model (ARDL) is used, whilst an ECM model is utilized for determining short run analysis.

As may be seen in the evaluation shown before, level growth has been seen in the building industry. Both inflation and environmental sustainability are stable at the first difference level, which is set at a significance level of 1%. Since one of the variables is stationary at the level, and the other is stationary at the initial difference, i.e. I(0) and I(1), there is sufficient reason to apply an autoregressive lag model.

As shown by the ARDL model's outcome, the F-statistics are 18.53659

higher than the upper limit and lower bound at 1% significance. This demonstrates the validity of cointegration between the chosen variables for the investigation of Pakistan from 1973 to 2019.

As a result of the short-run study, it has been shown that at a significance level of one percent, the ECT value is negative, and the mean ECM converges to equilibrium. The number for the error correction term is 1.742636, which shows that the disequilibrium is corrected by 174.26 percent in one year and that the model will attain equilibrium in 0.574 years. According to the findings that were derived from the data, all of the null hypotheses were found to be rejected, which suggests that:

Construction industry, inflation rate and environmental sustainability have significant impact on economic growth of the country.

There are a few steps that need to be performed in order to ensure the continuous success of the building industry. The absence of appropriate policy and project management, as well as lack of information, tools, skills, and procedures, is the cause of underdevelopment of the construction industry. Due to the fact that it has both backward and forward linkages, which contribute to the economy's fast expansion, this sector need additional focus and attention. The number of individuals investing in Pakistan's construction industry continues to rise, leading to the sector's continuous growth.

Inflation causes increase in cost of construction so government should reduce taxes on raw material in order to increase the output.

More construction explosions and industries contribute in increasing emission rate of carbon dioxide which is quiet harmful for all. Pollution free environment is required for healthy life.

There should be such technology which helps in productivity with pollution free environment.

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