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IMPACT OF SECTORS (AGRICULTURE, MANUFACTURING, SERVICE & INDUSTRY) ON PAKISTAN'S GDP

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Abstract:

Objective of the study is to check the impact of the Pakistan's sectors on the economic growth. For this purpose, econometric techniques such as Ordinary Least Square (OLS) analysis and Johanson Co-integration analysis are applied for the era of 1972 to 2019. Outcomes of the OLS indicate that AGRI, SRV, DI and LFPR has statistically positive impact on GDP of Pakistan. While, the MNF and IND are insignificant in this research. Results recommend that policy makers and government authorities would pay attention towards the manufacturing and industrial sectors and made those policies in which these sectors could be promoted and work effectively and efficiently and take the part in the development of the Pakistan's economy.

Keywords: GDP, Agriculture, Manufacturing, Service, Industry, DI, LFPR, Pakistan

Introduction:

Every sector of the economy plays very important role in the economic development of the developing and the developed countries. The agricultural sector and its activities control the economic systems of most developing countries, and the advanced industrial sector is subordinate, and the economic development of these countries are closely linked with the agriculture field development (Tadele, F. (2004).). Agriculture sector is the backbone of the Pakistan' economy. Importance of agriculture sector is more than any other sector in Pakistan's economy (Nazish, Iqbal and Ramzan, 2013). According to the Rattso and Stokke (2003), development in the growth of agriculture is very important to increase the growth of many other sectors like industry and manufacturing sectors in Pakistan.

Secondary important sector is manufacturing for the developed nations. Fagerberg and Verspagen (1999) observed that in East Asia and Latin America, manufacturing sector is considered as growth engine for the emerging nations rather than the developed nations.

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Numerous service activities are closely related to the sectors of the agriculture and industry and this contributes to the creation of employment levels (Bhattacharya & Mitra, 1997). Services and agriculture seem not to share a significant amount of complementarity; industry is seen as the most service-intensive. Sustained growth of services also demands a growing industry Hansda, 2001). The sector offers labor for modern economic sectors; that can be a funding source available for investment in non - farm sector and an industrial product destination.

Some researchers observed the impact of the sectors on the economic growth of Pakistan individually but only few researchers investigate the impact of the combined sectors on the economic growth of Pakistan. Pakistan is a developing country and it is facing many problems in this era. So, there is need to get the knowledge about each sector that how they are taking in the part of Pakistan economic development and how to increase the pace of growth that lead to increase its productivity. This research would be giving the support to the government and policy makers.

Objective of the Study

The main objective of this study is to investigate the impact of the Agricultural, Manufacturing, Service and Industrial sectors on the GDP of Pakistan individually and also check the long-run relation among them in the Pakistan's economy and also check the bivariate co-integration among the variables in the study.

Previous Studies

Some researchers examined the effect of the sectors individually on the economic growth of the countries but some checked the combined effect of the sectors on GDP.

Degu (2019) investigated the causality direction among the Sectors of Agriculture, Industry and Service Ethiopian Economy. Johanson co-integration analysis, vector error correction method, granger causality test, impulse response and variance decomposition functions are applied and finding predict that a firm long-run association present among the sectors. Just industry is seen as endogenous to the network suggesting long-run causality run from agricultural and service sectors to industry. Findings of granger causality in short run show, between the sectors of industrial and agricultural, between the sectors of industrial and service bi-directional causality exist.

Sweis, Sabri, Suos (2018) examined the economic sectors' effect on Palestinian GDP for the years of 1995 to 2014 and time series data is collected from the Palestinian Central

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Bureau of Statistics. To get the results descriptive-analytical method and stepwise multiple regression model applied. According to results, effect of sectors is 41% on economy of Palestine that is smallest.

Katircioglu (2018) explored association among the agricultural, industrial and service sectors of North Cyprus. Results show the long-run equilibrium relation exist between the agriculture and economic growth.

Singariya and Naval (2016) observed the casual link among production in India's GDP, rural, service and industrial sector for 1950-51 to 2011-12. By conducting the Johansen's Cointegration test, outcomes indicate that Bidirectional causality appears between agriculture, industry, service and GDP, and the services sector in agriculture and industry. While A unidirectional causality occurs between the agricultural and industrial sectors.

Anwar, Farooqi and Khan (2015) explored the performance of Pakistan's agriculture sector over the period 1975 to 2012. By conducting the Ordinary Least Square (OLS) Method, findings revealed that agriculture, trade and industry have significantly positive impact on Pakistan's economic growth.

Singariya and Sinha (2015) conducted a study in order to identify the causal relationship between GDP, the agricultural sector and the industrial sector in India. Data were used for the period (1970- 2013). The vector error correction model was used. The results of the study showed a long-term relationship between variables and a unidirectional relationship between the industrial sector and GDP on one hand, and the agricultural sector and the domestic output, on the other hand.

Singariya and Sinha (2015) observed the causal association among Indians economic growth, agriculture and industrial sectors over the period of 1970 to 2013. According to the results of Vector Error Correction (VEC) model, long-run association exist among variables, while industrial sector does granger cause the GDP and the agricultural sector does granger cause the domestic output.

Uddin (2015) investigated causality among the Agricultural, Industrial and Services sectors for the economy of Bangladesh over the years 1980 to 2013. Through the cointegration analysis, results predict that all sectors have positively significant effect on GDP of Bangladesh. Findings of Granger causality test show, bi-directional causality relation exists between agriculture and GDP and between industry and agriculture.

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Kohansal, Torabi and Dogani (2013) examined the impact of Agriculture on Iran's economic growth. By applying the Dickey-Fuller GLS (DF-GLS) test and ARDL cointegration test, findings show that long-run relation exist among all variables. and all variables have positive effect on economic growth of Iran.

Kohansal, Torabi (2013) investigated the relationship between the agriculture and economic growth of Iran. By conducting the Johansson cointegration test, results predict that positively long-run relationship of agriculture, industry, services, oil and mine sectors is present with Iran's economic growth.

Hussin and Yik (2012) observed the role of economic segments to economic progress of India and China for the era of 1978 to 2012. According to the outcomes of multiple regression analysis, agriculture, manufacturing and services sectors are positively related with GDP per capita in both countries.

Methodology

Data source is World bank for the era 1972 to 2019 in the context of the Pakistan. Gross Domestic Product (GDP) and Gross Fixed Capital Formation are used as the proxies of the economic growth and Domestic Investment respectively in this model. To check the impact of the sectors on Pakistan economy, Ordinary Least Square (OLS) is applied and also check the long-run relationship between the variables Johnson's Co-integration and Bi-Variate Co-integration are used in this study. The mathematical model of the study is;

GDP=f (AGRI, MNF, SRV, IND, DI, LFPR)

And the econometric model of the study is;

$GDP_t=\alpha_o + \alpha_1 AGRI_t + \alpha_2 MNF_t + \alpha_3 SRV_t + \alpha_4 IND_t + \alpha_5 DI_t + \alpha_6 LFPR_t + \varepsilon$

Details of variable name;

GDP= Gross Domestic Product (annual %)

AGRI= Agriculture, forestry, and fishing, value added (annual % growth)

MNF= Manufacturing, value added (annual % growth)

SRV= Services, value added (annual % growth)

IND= Industry (including construction), value added (annual % growth)

DI= Gross fixed capital formation (annual % growth)

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LFPR= Labor Force Participation Rate (Total)
ε= Error Term

t= Time Series

Result and Discussion

Descriptive Statistics

Descriptive measures are used to examine the correlation between dependent and independent variables and their interaction. It offers average dynamics and data distribution that allows to extend the study period and better forecast potential behavior. Of more research and policy consequences, the expected effects are a valuable help.

Table: 1 Descriptive State

	GDP	AGRI	MNF	SRV	IND	DI	LFPR
Mean	4.864699	8.633855	10.03556	5.55911	10.97608	11.83954	49.2876
Median	4.846451	8.638582	9.970408	5.213368	10.45729	12.13556	50.594
Maximum	10.2157	17.02315	19.707	10.50643	21.56298	27.70113	53.426
Minimum	0.813406	0.013972	0.024022	1.331493	0.093127	0.094453	29.96
Std. Dev.	2.059128	3.278611	3.838822	2.163146	3.674674	6.224454	4.688781
Skewness	0.139939	-0.10533	0.192413	0.410908	-0.05772	0.197093	-2.77893
Kurtosis	2.773233	4.251493	3.36584	2.967169	4.348259	2.969395	10.7649
Jarque-Bera	0.259509	3.221218	0.563859	1.35292	3.662258	0.312638	182.3667
Probability	0.878311	0.199766	0.754327	0.508414	0.160233	0.855286	0.0000
Sum	233.5056	414.4251	481.7068	266.8373	526.8517	568.2978	2365.805
Sum Sq. Dev.	199.2804	505.2165	692.6179	219.9225	634.6517	1820.96	1033.279
Observations	48	48	48	48	48	48	48

Source: Software E-Views 9.0

Above table show that both mean and median are applied to measure the central tendencies of data. The standard deviation indicates the average out of the used data when the larger standard deviation value indicated a wider distribution. Symmetric data pattern is calculated by skewness level. Some variables as GDP, MNF, SRV and DI are positively skewed but some as AGRI, IND and LFPR are negatively skewed. Kurtosis indicate about data distribution whether it is Leptokurtic or Platykurtic. Kurtosis standard

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value is 3, If value is more than 3, then data distribution is leptokurtic while data distribution is Platykurtic when value is less than 3.

Unit Root Test

Unit root test is most popular test that is applied to check the data stationarity (or nonstationarity). The error terms are expressed equally and identically is the basic assumption of the ADF Test. In the error terms, Phillips and Perron use non - parametric arithmetic techniques to take better care of the serial correlation without incorporating lagged terms for changes. Meanwhile, both tests ADF and PP have same asymptotic distribution (Gujarati,2004).

Value of variance should be constant is the second assumption. Moreover, when the data is not become stationary at level, then take the first difference the result could be attain stationarity (Gujarati, 2004).

Table: 2 Unit Root Test

	ADF at Level		PP at Level	
	t-Statistic	Prob.*	t-Statistic	Prob.*
GDP	-5.58509	0.0002	-5.63424	0.0001
AGRI	-8.38523	0.0000	-8.6772	0.0000
MNF	-4.31074	0.0068	-4.34554	0.0062
SRV	-5.23597	0.0005	-5.31813	0.0004
IND	-6.12398	0.0000	-6.13225	0.0000
DI	-5.27911	0.0004	-5.27801	0.0004
LFPR	-7.35434	0.0000	-7.36094	0.0000

Source: Software E-Views 9.0

Table show the outcomes of the both tests ADF and PP, both tests indicate that all variables are stationery at level.

Correlation Matrix

Statistical association among the variables are checked through the correlation matrix. When some two variables are involved, the value increases or decreases together either they have a positive connection or correlated positively. So, if one variable value increases and another declines then variable has negative relationship. The negative and positive association symbol describes the essence of the connection.

Table: 3 Correlation Matrix

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	AGRI	MNF	SRV	IND	DI	LFPR
AGRI	1					
MNF	0.144176	1				
SRV	0.030211	0.551368	1			
IND	0.139799	0.871918	0.535719	1		
DI	0.257144	0.267453	0.258173	0.200712	1	
LFPR	-0.08827	0.2086	0.013211	0.159572	0.049271	1

Source: Software E-Views 9.0

Outcomes indicate that multicollinearity is not exist in the data of the study.

Table: 4 Auto-Correlation

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	0.555836	P. Value	0.5781

Source: Software E-Views 9.0

The Breusch-Godfrey Serial Correlation LM Test is applied and results predict that auto-correlation is not exist in data. F-Statistic is 0.555836. P. Value of the test is 0.5781 that is more than 5%.

Table: 5 Heteroskedasticity Test

Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	0.754287	P. Value	0.6097

Source: Software E-Views 9.0

The Heteroskedasticity test Breusch-Pagan-Godfrey show the results that F-Statistic is 0.754287. P. Value of the test is 0.6097 that is more than 5% and predict, there is no heteroskedasticity in the data.

Regression Analysis

Impact of the independent variables on the dependent variable are checked through the Ordinary Least Square (OLS) method. GDP is dependent variable while the AGRI, MNF, SRV, IND, DI and LFPR are independent variables.

Table: 6 Regression Results of Sectors on GDP

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Variable	Coefficient	Std. Error	t-Statistic	Prob.
AGRI	0.202989	0.057512	3.529518	0.001*
MNF	0.022945	0.083809	0.273781	0.7856
SRV	0.284284	0.100959	2.815824	0.0074*
IND	0.201745	0.135026	1.49412	0.1428
DI	0.071624	0.033202	2.157194	0.0369*
LFPR	0.041926	0.018592	2.255012	0.0295*
R-squared	0.695229	0.945074	F-statistic	15.58785
Adjusted R-squared	0.650628		Prob(F-stat)	0.0000
Durbin-Watson stat	2.235956			

Source: Software E-Views 9.0

Outcomes of the regression indicate that values of coefficient and probability of AGRI are 0.202989 and 0.001 respectively. That show AGRI has statistically positive impact on GDP of Pakistan. This result is similar to the (Uddin, 2015; Kohansal, et al, 2013; Anwar, Farooqi & Khan, 2015; Kohansal, & Torabi, 2013). But the values of coefficient and probability of MNF are 0.058467 and 0.343 respectively. Which predict, MNF is insignificant that means it is not taking the part in the economic growth of the economy. The values of coefficient and probability of SRV are 0.284284 and 0.0074 respectively. That display SRV has statistically positive impact on GDP. This result is similar to the (Uddin, 2015; Kohansal et al, 2013; Kohansal & Torabi, 2013). While, the values of coefficient and probability of IND are 0.201745 and 0.1428 respectively. IND is insignificant that means it is not taking the part in the economic growth of country. The values of coefficient and probability of DI are 0.071624 and 0.0369 respectively. That display DI has statistically positive impact on economic growth of country. This result is similar to the (Ullah, Shah & Khan, 2014; Tang, Selvanathan & Selvanathan, 2008; Choe, 2003).

Moreover, values of coefficient and probability of LFPR are 0.041926 and 0.0295 respectively. That display LFPR has statistically positive impact on economic growth of country.

Co-Integration Analysis

Co-integration in regardless of being individually non-stationary a linear combination of two or more time series could be stationary. Co-integration describes the long-run, or equilibrium, link between the two (or more) time - series data (Gujarati, 2004). But co-integration doesn't inform regarding causality direction (Hendry & Juselius, 2001).

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Table: 7 Trace Statistics

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.744378	189.3412	125.6154	0.0000
At most 1 *	0.556027	126.5947	95.75366	0.0001
At most 2 *	0.538974	89.24306	69.81889	0.0007
At most 3 *	0.45512	53.62525	47.85613	0.013
At most 4	0.205011	25.69454	29.79707	0.1381
At most 5	0.197442	15.14092	15.49471	0.0565
At most 6 *	0.103448	5.023173	3.841466	0.025

Source: Software E-Views 9.0

Table: 8 Maximum Eigenvalue

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.744378	62.74648	46.23142	0.0004
At most 1	0.556027	37.35163	40.07757	0.0983
At most 2 *	0.538974	35.61782	33.87687	0.0307
At most 3 *	0.45512	27.93071	27.58434	0.0452
At most 4	0.205011	10.55362	21.13162	0.6915
At most 5	0.197442	10.11775	14.2646	0.2043
At most 6 *	0.103448	5.023173	3.841466	0.025

Source: Software E-Views 9.0

The findings for the multivariate co-integration analysis for all the series are given in the table. Series show the long-run co-integration among themselves.

Table: 9 Bi-Variate Co-integration

	Eigenvalue	Trace Statistic	0.05 Critical Value	
GDP AGRI	0.439207	32.93614	15.49471	Co-Integrated
	0.128553	6.329586	3.841466	
GDP MNF	0.379505	28.89462	15.49471	Co-Integrated

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	0.140072	6.941691	3.841466	
GDP SRV	0.479929	37.56523	15.49471	Co-Integrated
	0.150278	7.490921	3.841466	
GDP IND	0.621098	52.39673	15.49471	Co-Integrated
	0.155137	7.754732	3.841466	
GDP DI	0.438701	34.47586	15.49471	Co-Integrated
	0.157999	7.910798	3.841466	
GDP LFPR	0.239541	20.07778	15.49471	Co-Integrated
	0.150104	7.481481	3.841466	
AGRI MNF	0.44764	36.41039	15.49471	Co-Integrated
	0.179609	9.106804	3.841466	
AGRI SRV	0.416808	41.69049	15.49471	Co-Integrated
	0.307243	16.88552	3.841466	
AGRI IND	0.469131	43.23675	15.49471	Co-Integrated
	0.264121	14.10772	3.841466	
AGRI DI	0.427573	36.7367	15.49471	Co-Integrated
	0.213964	11.07464	3.841466	
AGRI LFPR	0.41598	36.03545	15.49471	Co-Integrated
	0.217733	11.29572	3.841466	
MNF SRV	0.353404	29.30776	15.49471	Co-Integrated
	0.182163	9.250228	3.841466	
MNF IND	0.44289	35.84106	15.49471	Co-Integrated
	0.176474	8.931388	3.841466	
MNF DI	0.394238	30.06623	15.49471	Co-Integrated
	0.141308	7.007889	3.841466	
MNF LFPR	0.246607	22.3181	15.49471	Co-Integrated
	0.182911	9.292346	3.841466	
SRV IND	0.469761	42.17923	15.49471	Co-Integrated
	0.246112	12.99555	3.841466	
SRV DI	0.48242	38.86315	15.49471	Co-Integrated
	0.169942	8.56797	3.841466	
SRV LFPR	0.330882	31.32687	15.49471	Co-Integrated

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	0.24363	12.84433	3.841466	
IND DI	0.494526	38.76354	15.49471	Co-Integrated
	0.14822	7.379662	3.841466	
IND LFPR	0.322674	28.03435	15.49471	Co-Integrated
	0.197353	10.11266	3.841466	
DI LFPR	0.260106	24.17715	15.49471	Co-Integrated
	0.200958	10.3197	3.841466	

Source: Software E-Views 9.0

If the trace statistics value is more than the critical value, then co-integration exists between the analysed variables. Outcomes indicate that GDP is co-integrated with the AGRI, MNF, SRV, IND, DI, and LFPR in the long-run. Similarly, AGRI is co-integrated with the MNF, SRV, IND, DI, and LFPR in the long-run. Likewise, MNF is co-integrated with the SRV, IND, DI, and LFPR in the long-run. Also, SRV is co-integrated with the IND, DI, and LFPR in the long-run. Moreover, IND is co-integrated with the DI, and LFPR in the long-run. Additionally, DI and LFPR show the existence of co-integration between them.

Conclusion

Objective of the study is to check the impact of the Pakistan's sectors on the economic growth. For this purpose, econometric techniques such as Ordinary Least Square (OLS) analysis and Johanson Co-integration analysis are applied to check the impact and long-run association of the variables respectively in the study. Time series data is used for the era of 1972 to 2019 and collected from the World Bank. Outcomes of the OLS indicate that AGRI has statistically positive impact on GDP of Pakistan. This result is similar to the (Uddin, 2015; Kohansal, et al, 2013; Anwar, Farooqi & Khan, 2015; Kohansal, & Torabi, 2013). The SRV has statistically positive impact on GDP. This result is similar to the (Uddin, 2015; Kohansal et al, 2013; Kohansal & Torabi, 2013). While, the MNF and IND are insignificant that means it is not taking the part in the economic growth of country. The DI has statistically positive impact on economic growth of country. This result is similar to the (Ullah, Shah & Khan, 2014; Tang, Selvanathan & Selvanathan, 2008; Choe, 2003).

Moreover. LFPR has statistically positive impact on economic growth of country. According to the results, policy makers and government authorities would pay attention towards the manufacturing and industrial sectors and made those policies in which these

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sectors could be promoted and work effectively and efficiently and take the part in the development of the Pakistan's economy.

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