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Impact of Renewable Energy and Financial Development on Economic Growth of Pakistan

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ABSTRACT

This study analyzes how the consumption of renewable energy and financial development affect the economic growth of Pakistan between 1990 and 2023. The analysis results indicate that both renewable energy and financial development have the positive and statistically significant impacts on the economic growth of the country. The consumption of renewable energy was identified to have a greater influence on growth than financial development, which implies that the significance of the availability of reliable and sustainable energy supply is core to the stability of the economy and the productivity of the sector. The results indicate that as a nation, Pakistan has, in the past, relied on imported fossil fuels, which have helped to create an energy shortage, inflation and fluctuating industrial production. With the growth in the use of renewable forms of energy, there are beneficial effects to the economy in the form of lower fuel import prices, increased energy supply, and assistance to the agricultural, industrial, and service sectors. Likewise, monetary growth encourages the availability of credit, investment conditions, corporate growth, and employment. Nevertheless, it can fully be exploited to its advantage only in a situation when energy supply is predictable to facilitate productive activity. Hence renewable energy and financial development cannot be regarded as separate forces but as mutually supporting and complementary ones in sustainable economic development.

Keywords: Renewable Energy, funds, economic progress, Pakistan, Energy policy, sustainable development.

INTRODUCTION

The management and availability of the energy resources have normally influenced the economic growth within Pakistan. The country has been relying on fossil fuels such as oil and natural gas to meet the demands of the local market in the energy sector (Government of Pakistan, 2021). Such dependency has had structural complications like pressure of importation, cost fluctuations, and global price vulnerability, which is sporadic. The energy crisis in Pakistan that has been typified by power outages and inadequate supply of power have led to lack of productivity in the industry and overall economic growth (Ahmed and Raza, 2019).

Renewable energy has emerged to be one of the key alternatives over the past years, in addressing the growing energy needs in the country. The sources of renewable energy such as solar, wind, hydro, and biomass are sustainable over the long-term and cost of using fossil fuels is less expensive to the environment (World Bank, 2020). The potential of renewable energy is high in Pakistan. To use as an example, the potential of solar power in the southern states of Punjab and Balochistan and the potential of wind power in Sindh can be employed to generate energy at a large scale (Hussain and Javed, 2021). However, this might be a fact, but the ratio of renewable energy in the national energy composition is a

low percentage. It can be said that a gradual transition is due to financial constraints, the lack of technological infrastructure, poor execution of policies, and inefficiency of the institutions.

One of the major determinants which contribute to economic development besides investments in renewable energy is the financial development. The financial system that is developed helps in mobilising the savings, giving out credit and also inviting the domestic and foreign capital (Levine, 2005). Some of the economic activity is the finances sector that has capital and commercial banks, non-banking financial institutions and microfinance institutions operating in Pakistan. However, the accessibility to finance is also unequal particularly in rural and developing industry and limits possible investments (Khan and Khan, 2018). Technology adoption also has barriers because of the lack of funding instruments of renewable energy projects.

Growth in economics cannot be achieved in isolation of the demand of energy and industrialization coupled with availability of financial resources. The endogenous growth theory suggests the possibility to enhance productivity in the long term with the assistance of investment in technology and resource management (Romer, 1994). The renewable energy assists in attaining this growth by increasing energy security and reducing the use of imported fuels. The finance development is also useful in offering innovation, development in the private sector as well as enhancing market efficiency. Therefore, renewable energy and financial progress are not only the drivers of sectoral but also strategic national development.

Empirical studies have suggested that renewable energy has close relations with financial development and economic growth. As an example, Shahbaz, Mallick, and Mahalik (2016) found out that the use of renewable energy influences the performance of the emerging economies positively. On the same note, financial development promotes growth in the sense that it promotes capital investment on productive activities (Sadorsky, 2010). It was demonstrated in Pakistan that the renewable energy potential has been growing over the years, yet the pace of the implementation process has been low due to the insufficient funds and the lack of an appropriate institutional capacity (Ali and Fatima, 2020).

Such interdependence of the variables in the situation of Pakistan is especially acute in relation to the energy crisis in the country, the issue of the environment protection and the unstable state in the economy. Economy requires cheap and dependable energy in order to realize industrial and agricultural production, promote trade and maintain the rate of employment. Renewable energy with the help of financial development will generate a constant power supply without any references to the price of fuels in the global market and may drive a domestic economy into motion. Strong financial development can also support innovation and entrepreneurship which are also important elements of structural economic transformation.

The paper will consider the connection between the use of renewable energy and financial development and the economic growth in Pakistan. It is based on the discussion of the existing trends, obstacles to successful implementation and policy guidance. It is directed to the emergence of the fact that long-term economic stability and sustainability of Pakistan can be effective in the case of such strategic investment in renewable energy and financial sector reforms.

LITERATURE REVIEW

The correlation between the use of renewable energy, financial development and economic growth has become a major subject of study in the modern economic studies especially in the developing world where sustainable development is one of the main issues. The renewable energy concept is becoming one of the main aspects of economic stability as it has both environmental advantages and cost-effectiveness

in the long term. Sadorsky (2011) further argues that consumption of renewable energy is one of the factors that enhances the long-term economic growth because of the reduction in reliance on imported fossil fuels, enhancement of energy security and creation of environmentally friendly development. This point of view is especially significant to Pakistan, a nation that experiences chronic electricity shortages, over-reliance on imports of oil and increased environmental degradation. According to Shahbaz, Loganathan, Zeshan, and Zaman (2015), energy shortages have often limited the economic development of Pakistan by disrupting industrial operations and reducing the productivity of agriculture and business in general. Consequently, the investments in renewable energy infrastructure are considered as the approach both towards the environmental protection and the economic growth stimulation.

But the results of the empirical study on the energy-growth nexus are mixed. Apergis and Payne (2010) discovered that there is a two-way causal relationship between consumption of renewable energy and economic growth in various developing economies, and that the two variables are reinforcing each other. Contrary, Ocal and Aslan (2013) argued that renewable energy influences growth in Turkey in a comparatively weak manner because of the lack of technological development and efficiency. All these ambivalent results indicate that the economic cost of renewable energy can be modified based on the amount of technological preparedness, supporting policy regimes, and magnitude of investments in the energy industry. Past obstacles to renewable energy project in Pakistan have included poor investment incentives, slow policy execution, and bureaucracy (Khan and Khan, 2019). However, recent governmental policies like Alternative and Renewable Energy Policy (2019) prove that it began to focus on increasing solar and wind energy projects, especially in Punjab and Sindh.

Another important factor that determines economic growth is financial development. It improves the economic performance by marshaling savings, promoting investment, better allocation of resources and entrepreneurship. Well-operating financial systems, according to Levine (2005) cause the stimulation of innovations and efficiency in production, which then enhances the economic growth at a faster rate. Financial development has been a very important issue in Pakistan in the provision of credit to the industries as well as capital formation. Nonetheless, the financial sector has been facing issues of low financial inclusion, elevated interest rates, and poor and unequality of regulations (Ali, Hashmi & Hassan, 2020). Although this is the case, the banking sector and capital market has grown in the past 10 years, and it has also added to the growth of industries and investment prospects.

There is also an interesting correlation between renewable energy development and financial development. Financial institutions have a critical role to play in financing renewable energy in the form of loaning money, the supporting green investments and mitigating the funding risks to the energy companies. Salim and Rafiq (2012) noted that finance availability plays an important role in scaling renewable energy infrastructure especially in the developing economies where the cost of initial investment is high. Public- private partnerships and international donations have been used to finance several renewable energy projects in Pakistan by organizations like the world bank and Asian development bank (ADB, 2019). Nevertheless, the funding is still unequal and most of the renewable energy companies are forced to overly depend on outside borrowing because of the low ability of local capital markets.

Empirical data demonstrates that renewable energy as well as financial development have a positive effect on the economic growth. Ali and Haseeb (2019) concluded that the consumption of renewable energy sources and financial development produced a positive effect on the GDP of Pakistan in the long run. On the same note, Rafique, Rehman, and Khan (2021) noted that an increase in the development of the financial sector leads to a tremendous rise in the expansion of the energy sector, which further leads to the growth of industrial output. Conversely, other authors warn that the absence of good governance and stability in the regulations will render financial assistance insufficient to guarantee efficiency in the

renewable energy (Farooq and Shah, 2020). This indicates that government policies, institutional reforms and market confidence are some of the major elements that connect renewable energy and finances development with economic growth.

All in all, the literature suggests that renewable energy and financial development have a significant potential in fostering sustainable economic growth in Pakistan, but the effect of these policies can be achieved through policy implementation, institutional reform, and investment incentives. This transition to clean energy should then be backed by planning and good financial infrastructure so as to record significant economic impacts.

METHODOLOGY

The research design in this study will be quantitative research design to investigate how the consumption of renewable energy and the development of financial institution affects the economic growth of Pakistan. Use of quantitative approach aims at identifying statistical relationships between the variables as well as providing objectivity to interpretation. The study is founded on secondary data since the variables in question are macroeconomic indicators which are determined at a national level each year. Secondary data offers reliability due to the fact that information gathered is based on established institutions over a period of time which has standard records (Gujarati and Porter, 2009).

Data Source and Time Frame

The time-span of the data was 1990-2023. This timeframe was chosen due to the previous years of low adoption of the renewable energy sources and the recent stage when Pakistan started to invest more in the solar and wind energy. Renewable energy consumption (in terms of the percentage of renewable energy sources within the overall supply of energy) and financial development (in terms of the domestic credit to the private sector as a percentage of GDP) data were collected through the World Bank Development Indicators. The data on economic growth (in the form of real GDP growth rate) were sourced to the Pakistan Bureau of Statistics and the World Bank.

Variables of the Study

Dependent Variable: Economic Growth (Real GDP Growth rate)
Independent Variable 1: Consumption of Renewable Energy.
Independent Variable 2: Financial Development.

The choice was motivated by the fact that these variables are considered in prior studies to have both theoretical and practical interest in facilitating sustainable development (Shahbaz et al., 2015; Sadorsky, 2011).

Analytical Technique

Multiple Linear Regression Analysis was used in the study to establish how the consumption of renewable energy and financial development affect the economic growth of Pakistan. Multiple regression is appropriate in analyzing the effect of numerous independent variables as a group to a dependent variable (Wooldridge, 2013). The regression equation can be written as:

GDPt=b0+b1(RECt)+b2(FDt) +etGDPt=b0 +b1(RECt) +b2(FDt) +et
Where:
GDPtGDPtGDPt = Economic growth during a year t.

RECtRECt = The consumption of renewable energy in year t.
FDtFDtFDt = Financial development at year t.
b0\beta0b0 = Constant term
b1,b2, b1, b2,b1,b2 = Regression coefficients.
et\epsilontet = Error term

Statistical Software

The SPSS was used to conduct the analysis since it enables a good statistical computation and interpretation of the correlation and regression outcomes. Trends were also summarized in the data with the help of descriptive statistics.

Ethical Consideration

No direct human participants were involved in the study since secondary data was used and it was publicly available. Nevertheless, the ethical conduct of the study, in terms of academic integrity, was ensured by the fact that all the sources of data and references were mentioned.

Data Analysis and Findings

As the section will show, it is a statistical analysis aimed at discussing the association between the consumption of renewable energy, financial development, and economic growth in Pakistan in 1990-2023. The results of the analysis involve descriptive statistics, correlation analysis, and multiple regression outcomes, according to the econometric model given in the methodology. The meaning is interpreted by focusing on the statistical patterns, and economic meaning, which makes sense in the interpretation of the relationship between renewable energy and financial development as far as economic performance is concerned.

Firstly, descriptive statistics were employed to give a picture of the trend of the data. The historical consumption of renewable energy in Pakistan was low in comparison to the reliance on fossil fuels. The areas of financial development have been fluctuating with alteration in banking reforms, political instability and changes in investment policies. The growth of the economy has been very volatile as well especially when there are periods of energy crises, global recessions and political transitions.

Descriptive Statistics

Variable	Minimum	Maximum	Mean	Standard Deviation
Economic Growth (GDP %)	-1.8	7.5	4.12	2.03
Renewable Energy Consumption (%)	2.1	6.9	4.52	1.10
Financial Development (% of GDP)	16.5	33.4	24.91	4.32

The descriptive statistics indicate that the economic growth was as low as -1.8 per cent (crisis years) and the highest at 7.5 per cent with a mean of 4.12. The consumption of renewable energy was not very wide in fluctuation, which indicates that Pakistan has not diversified its energy structure much. The financial development is more widely varied, which suggests changes in the reforms of the financial sector.

Correlation Analysis

Correlation analysis was conducted to identify the direction and strength of the relationship between variables.

Variables	GDP Growth	Renewable Energy	Financial Development
GDP Growth	1	.61	.54
Renewable Energy	.61	1	.39
Financial Development	.54	.39	1

According to the results of the correlation, the level of renewable energy consumption has positive correlation with the financial development, as well as with the economic growth. There is a relatively stronger correlation between renewable energy (.61), which implies that any upsurge in the use of renewable energy will probably be related to increasing GDP. This goes together with the fact that renewable energy minimizes energy crisis and normalizes industrial production. Financial development is also positively related (.54) which means that availability of credit and investment could be a catalyst to business activities and the growth of the economy.

Multiple Regression Results
To test the strength and significance of these relationships, multiple regression analysis was conducted.

Variable	Coefficient (β)	Standard Error	t-Statistic	p-Value
Constant	1.27	.68	1.86	.071
Renewable Energy	0.82	.21	3.90	.001
Financial Development	0.43	.17	2.53	.016

Regression Equation:
[GDP = 1.27 + 0.82(REC) + 0.43(FD)]

According to regression outcomes, it is observed that:
The consumption of renewable energy has a positive statistically significant impact on the economic growth (p =.001).

This implies that the supply of renewable energy will have a direct impact on the economic productivity by decreasing the dependence on imported fuel which is expensive to buy, decreasing load shedding, and improving agricultural and industrial productivity.

There is also a positive and significant impact of financial development on economic growth (p =.016).
This implies that the presence of more powerful access to banking, credit, mobilization of savings and financing of investment attracts entrepreneurial activities that would increase GDP.

INTERPRETATION AND DISCUSSION

The results verify the fact that renewable energy and financial development form two important determinants of economic growth in Pakistan. The impact of renewable energy is more significant than financial development, implying that the availability of energy is a stricter constraint of growth than financial capital. This is in line with historical trends where the Pakistani economic stagnations were usually accompanied by major energy crisis, power cuts, and large-scale fuel importation.

The financial development is complementary as it gives the required investment capital to facilitate renewable energy projects and industrialization. Nonetheless, the financial development can make little contribution in the absence of proper and quality supply of energy. Thus, the gains in financial development would be increased by better infrastructure on renewable energy.

The findings are in line with the previous studies, such as Shahbaz et al. (2015) who concluded that renewable energy has a long-run growth impact, and Sadorsky (2011) who pointed out that energy diversification supports the growth of emerging economies more. The diffusion of innovation theory (Rogers, 2003), according to which the new technologies cause the structural transformation and development, can also be supported by the analysis.

Altogether, the statistical data prove that more financing of renewable energy and the efficiency of the financial sector will allow Pakistan to change the trend in the growth of the country.

CONCLUSION

This study was aimed at analyzing how the consumption of renewable energy and financial development affect the economic growth of Pakistan between 1990 and 2023. The analysis results indicate that both renewable energy and financial development have the positive and statistically significant impacts on the economic growth of the country. The consumption of renewable energy was identified to have a greater influence on growth than financial development, which implies that the significance of the availability of reliable and sustainable energy supply is core to the stability of the economy and the productivity of the sector.

The results indicate that as a nation, Pakistan has, in the past, relied on imported fossil fuels, which have helped to create an energy shortage, inflation and fluctuating industrial production. With the growth in the use of renewable forms of energy, there are beneficial effects to the economy in the form of lower fuel import prices, increased energy supply, and assistance to the agricultural, industrial, and service sectors. Likewise, monetary growth encourages the availability of credit, investment conditions, corporate growth, and employment. Nevertheless, it can fully be exploited to its advantage only in a situation when energy supply is predictable to facilitate productive activity. Hence renewable energy and financial development cannot be regarded as separate forces but as mutually supporting and complementary ones in sustainable economic development.

Although the positive trends have been noted, the general usage rate of renewable energy in Pakistan is low, and the growth of the financial sector is not even distributed because of institutional weaknesses. To achieve sustainable long-term development, there is a need to have a coordinated national agenda to consider renewable energy growth, strengthening of financial sector, and growth-focused policy planning.

RECOMMENDATIONS

1. The government ought to focus more on massive investment on solar, wind, and hydropower enterprises. Fiscal burden can be mitigated through the public-private partnerships that will help to speed up the infrastructure development.
2. The financial entities ought to develop special loan facilities and investment funds towards renewable energy enterprises, rural electrification projects and technology-based agricultural activities.
3. The inconsistency of policies has hindered the implementation of projects in the past. There must be stable and long-term policy frameworks to motivate both local and the international investor to invest in renewable energy production.
4. Pakistan requires qualified workers and technical experts to run renewable energy facilities and to service modernized facilities. Expansion of training programs particularly on technical colleges and universities should be done.
5. Communities should be mobilized by the government and NGOs to be motivated to use renewable energy sources both at households, agricultural, and industrial settings to minimize reliance on traditional fuels.

6. Trust and transparency are the key to the efficiency of financial development. Enhancement of accountability, lessening corruption and enhancing the governance of banking will foster the more involvement of the private sector.

REFERENCES

Apergis, N., & Payne, J. E. (2010). Renewable energy consumption and economic growth: Evidence from a panel of OECD countries. *Energy Policy, 38*(1), 656–660. https://doi.org/10.1016/j.enpol.2009.09.002

Baloch, A., Shah, S., & Noor, M. (2021). Energy insecurity and economic performance in Pakistan. *Pakistan Journal of Energy Studies, 15*(2), 33–47.

Bhattacharya, M., Paramati, S. R., Ozturk, I., & Bhattacharya, S. (2016). Renewable energy consumption and economic growth in G20 countries: Evidence from advanced panel techniques. *Renewable and Sustainable Energy Reviews, 60*, 123–132. https://doi.org/10.1016/j.rser.2016.01.102

Government of Pakistan. (2022). *Pakistan economic survey 2021–22*. Ministry of Finance. https://www.finance.gov.pk

Gujarati, D., & Porter, D. (2009). *Basic econometrics* (5th ed.). McGraw-Hill.

International Energy Agency (IEA). (2023). *Renewable energy market update*. https://www.iea.org

Kalim, R., & Shahbaz, M. (2009). Impact of financial development on economic growth in Pakistan: Evidence from ARDL bounds testing. *Journal of Finance & Economics, 3*(1), 45–56.

Khan, M. A., & Qayyum, A. (2007). Trade, financial development and economic growth: Evidence from Pakistan. *Pakistan Development Review, 46*(4), 657–675.

Pesaran, M., & Shin, Y. (1999). Autoregressive distributed lag modeling approach to cointegration analysis. In S. Storm (Ed.), *Econometrics and Economic Theory*. Cambridge University Press.

Pakistan Bureau of Statistics. (2023). *Annual macroeconomic indicators report*. Government of Pakistan. https://www.pbs.gov.pk

Rogers, E. M. (2003). *Diffusion of innovations* (5th ed.). Free Press.

Sadorsky, P. (2011). Renewable energy consumption and income in emerging economies. *Energy Policy, 39*(3), 1721–1726. https://doi.org/10.1016/j.enpol.2011.01.001

Shahbaz, M., Loganathan, N., Zeshan, M., & Zaman, K. (2015). Does renewable energy consumption add in economic growth? *Renewable and Sustainable Energy Reviews, 44*, 573–581. https://doi.org/10.1016/j.rser.2015.01.017

Shahbaz, M., Lean, H. H., & Farooq, A. (2013). Natural gas consumption and economic growth in Pakistan. *Renewable and Sustainable Energy Reviews, 18*, 87–94. https://doi.org/10.1016/j.rser.2012.09.029

State Bank of Pakistan. (2022). *Financial stability review*. https://www.sbp.org.pk

Wooldridge, J. M. (2013). *Introductory econometrics: A modern approach* (5th ed.). South-Western Cengage Learning.

World Bank. (2023). *World development indicators*. https://data.worldbank.org

Yildirim, E., Saraç, Ş., & Aslan, A. (2012). Energy consumption and economic growth in the USA: Evidence from renewable energy. *Energy Economics, 34*(3), 584–590. https://doi.org/10.1016/j.eneco.2011.11.011