

Impact of Regional Infrastructure Facilities on Provincial GDP in Sri Lanka

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Introduction

Infrastructure facilities in a country play a significant role in citizens' daily activities as well as in the overall economy. Transport, petroleum, electricity, port activities, telecommunication, water and sanitation come under economic infrastructure whereas health and education fall under social infrastructure (Amarathunge et al., 2007). An efficient and developed system of economic and social infrastructure across the country is essential for creating opportunities for economic growth, poverty alleviation and employment generation.

As identified by Amarathunge et al. (2007), the physical infrastructure system is the backbone of any nation and a sturdy infrastructure network can increase productivity, reduce the cost of production, increase trade and reduce poverty. On the other hand, Uduporuwa (2007) highlights that lack of infrastructure facilities can create major disasters or can augment the negative effects of disasters. Hence the absence of adequate infrastructure facilities is one of the major barriers for national as well as regional development (Sri Ranjith and Thilanka, 2019).

Regional disparity - uneven and unbalanced distribution of economic development in infrastructure facilities experienced by different districts or provinces is a commonly discussed issue. In the Sri Lankan context, scholars highlight that over the last decade the disparity in provincial Gross Domestic Product (GDP) contribution is relatively high (Sri Ranjith and Thilanka, 2019). Further, infrastructure was identified as responsible for determining the regional GDP contribution (Uduporuwa, 2007). With this backdrop the research problem of this study is as follows: differences in infrastructure

facilities across the provinces have direct and indirect impacts on the regional GDP, which thus create regional disparities. Henceforth, the study examines how differences in key infrastructure facilities may create disparities across regional economies.

Objectives

The main objective of the study is to identify the impact of three key infrastructure sectors namely, transport, energy (electricity) and water on the aggregate level of GDP in Sri Lanka and provincial GDP contribution separately. The sub objective of the study is to identify whether the infrastructure facilities (water and electricity) specifically used for the industrial sector in Sri Lanka have any impact on the industrial sector's contribution to provincial GDP.

Methodology

The study uses secondary data and a panel data set was formed based on annual data with regards to the nine provinces in Sri Lanka from the year 2008 to 2018. Variables are selected based upon existing studies and those variables are in relation to the three infrastructure facilities: water, electricity and transportation (Rohima et al., 2017). The measurement of specific variables used are as follows: Provincial GDP Contribution at current prices (Rs. Millions); Water - Number of total consumers which includes domestic, government and industrial consumers; Electricity - Number of total consumers which includes domestic, religious, industrial, commercial consumers and street lightning; Road - Number of total road kilometres covering all types of roads from type A to D and highways; Government Recurrent Expenditure (Rs. Millions) and Mid-Year Population.

The combined aggregate effect of infrastructure on GDP is explored via a Random Effect Multiple Regression Analysis and the model is specified below:

$$GDP_{it} = \beta_0 + \beta_1 X_{1,it} + \beta_2 X_{2,it} + \beta_3 X_{3,it} + \beta_4 X_{4,it} + \beta_5 X_{5,it} + u_{it} \quad (1)$$

Where, β_0 is the intercept, X_1 is water, X_2 is electricity, X_3 is transportation, X_4 is mid-year population, X_5 is government recurrent expenditure and u is the error term. And provincial effect of infrastructure on provincial GDP is

represented by i ($i = 1, 2, \dots, 9$). Impact of number of industrial consumers on industrial sector GDP contribution is only carried out in the provinces where it shows a significant impact on either water or electricity facilities on provincial GDP.

Based on the Hausman test, Random effect model is used to estimate the equation (1).

Results and Discussion

The Random Effect Model results show that all the infrastructure facilities; water, electricity and transportation as well as the control variables; government recurrent expenditure and mid-year population have a significant impact on the GDP contribution in Sri Lanka (See Table 1). There is a positive relationship between GDP contribution and number of consumers of water, road kilometrages, government recurrent expenditure and mid-year population. Further, a negative relationship can be seen between GDP contribution and number of consumers of electricity.

Table 1: Results of Random Effects Multiple Regression Analysis

<i>Variable</i>	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-Statistic</i>	<i>Prob.</i>
C	-945345.8	154755.4	-6.108645	0.0000
X_1	2.2	0.429454	5.190523	0.0000
X_2	-1.3	0.259107	-5.023101	0.0000
X_3	279.6	67.57900	4.137884	0.0002
X_4	612.1	99.19470	6.171470	0.0000
X_5	2.5	6.264151	0.411830	0.6827

After exploring the combined effect of infrastructure on national GDP the analysis was carried out to assess how provincial infrastructure affects the provincial GDP. Those results lead to the realization that, though as a country overall infrastructure plays a significant role, across the provinces some infrastructure facilities play a greater role than others.

Water has a significant positive relationship with GDP contribution in the Central, Nothern, Uva and Sabaragamuwa provinces. For electricity, Southern and North Central provinces show a positive relationship while Sabaragamuwa province shows a negative relationship with GDP contribution. In North Western province there is a positive relationship

between transportation and GDP contribution while North Central and Sabaragamuwa provinces have a negative relationship.

When considering the analysis done on industrial consumers and industrial contribution to GDP, the number of industrial water consumers in almost all the provinces indicates a significant impact on the provincial industrial contribution of GDP. Northern and Sabaragamuwa provinces show a significant positive relationship whereas Central and Uva provinces show a negative relationship between the number of industrial water consumers and the industrial portion of the provincial GDP.

As argued by D´emurger, (2001), not only the availability and the quantity of infrastructure but the quality should also be considered. Furthermore, equity should be practiced rather than equality when allocating funding and resources for the infrastructure development. Studies emphasize that the existing strategy for infrastructure development in Sri Lanka has not successfully contributed to reduce the regional disparities in terms of infrastructure (Uduporuwa, 2007).

Conclusion

It can be concluded that even though infrastructure plays a significant impact on the GDP of Sri Lanka, the same infrastructure facilities would impact differently for different provinces. Moreover, industrial proportion of the GDP is also significantly impacted by the number of industrial consumers of water and electricity in different regions. This is important in improving the industrial sector GDP contribution. This study directs the policymakers to practice equity when developing regional infrastructure rather than focusing on equality.

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