

Impact of fertilizer subsidy on paddy cultivation in Sri Lanka

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1. Introduction

Concerning many successive governments in the world, they pushed towards providing subsidies especially for agricultural sector (Mint & Benson, 2009). Successive governments have provided high yielding rice varieties and chemical fertilizers as high yielding rice varieties are more responsive to the fertilizer they used. The Fertilizer subsidy scheme was initiated in 1962 with the invention of High Yielding Varieties parallel to the Green Revolution. There were three main components given under the subsidy program such as urea, triple super phosphate (TSP) and potassium chloride (MOP). The overuse or misuse of fertilizer have impacted disadvantageously to the paddy yield and also to make soil less productive as revealed many researches. The main objective of the study is to explore the impact of Fertilizer Subsidy on paddy cultivation in Sri Lanka in order to make appropriate policy recommendations. The study found that there is a significant positive relationship between use of fertilizer and paddy yield. Hence, it suggests more modifications to the fertilizer subsidy scheme as well as implementing new infrastructure and institutional facilities that are required to increase the productivity and efficiency in paddy cultivation in Sri Lanka.

2. Materials and Methods

Descriptive data has been used for the analysis of the government expenditure for fertilizer subsidy hence it could be evaluated how far the government has emphasized on paddy cultivation as a share of total government expenditure. For the descriptive analysis, secondary data were collected from the Department of Census and Statistics (DCS), Department of Agriculture, The Ministry of Finance, The Mahaweli Development Authority, Department of Agrarian Services and the Central Bank of Sri Lanka related to the paddy cultivation. For the regression analysis data were collected from 1990 to 2018 from Department of Agrarian Services.

The impact of fertilizer subsidy on paddy production has been evaluated through the Multiple Regression Analysis using fertilizer subsidy as dummy variables. Time series data were collected from 1990 to 2018 for the analysis (Bhavan & Maheshwarathan, 2012). The following conceptual framework shows the variables that has included within the model and the organizing of variables.

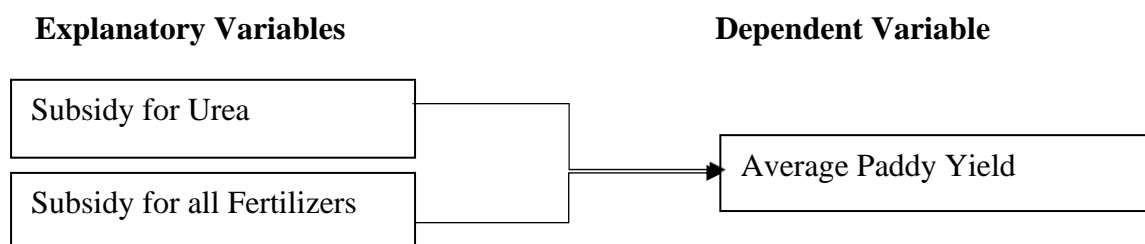


Table 01. Organization of Variables

Descriptive Variables	Regression Variables
Annual Total Usage of Fertilizer	Dependent variable- Average Paddy Yield
Fertilizer Subsidy as a Government Expenditure	Independent variable I-Providing Subsidy only for Urea (1) Otherwise (0)
Impact of fertilizer as a share of Import	Independent variable II- Providing Subsidy for Three Fertilizers (1) Otherwise (0)

Several econometric tools are applied to estimate the regression function in order to analyse the impact of fertilizer subsidy scheme such as Unit Root Test, Normality Test, Multicollinearity Test, Homoscedasticity Test etc.

3. Results and Discussion

Descriptive Statistics

Usage of Fertilizer on Paddy Cultivation and Fertilizer Subsidy as a Total Government Expenditure

In 1961, the usage of fertilizer in paddy sector, was about 10 % while it was increased up to 53 % by 1996. The average use of Urea in 1960s was recorded as 4.3 kg per hectare and it was accounted as 284 kg per hectare in 2005 (Wickramasinghe et al., 2009). The usage of fertilizer was recorded as 457 kg per hectare from 2006 to 2017. The following graph shows that how the expenditure on fertilizer scheme is in cooperated with the years.

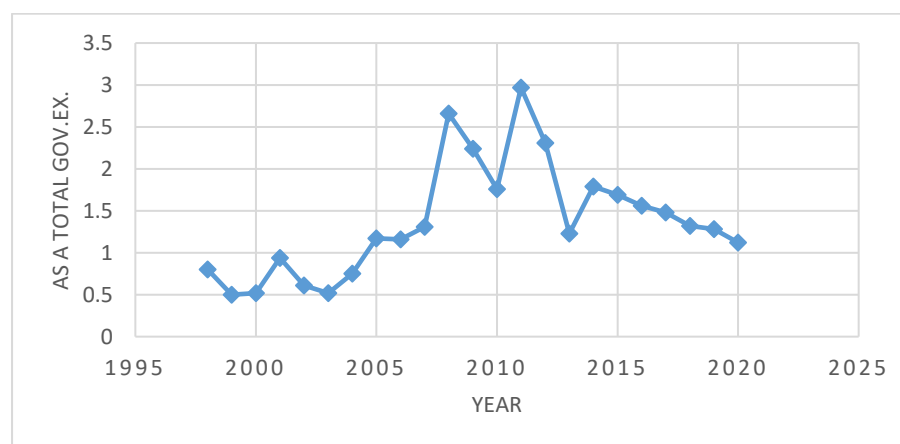


Figure 1. Fertilizer Subsidy as a Total Gov. Expenditure (Source: Central Bank of Sri Lanka (1995-2015))

Average Paddy Yield- There could be seen a gradual increase of the average paddy yield over past few decades in Sri Lanka. It was increased from 1230kg in 1950s to 2735kg in 1980s. In 2018 it was accounted for 4443 kg per hectare compared to 4297 kg per hectare in 2017.

Regression Analysis

$$AVE_YIELD = 3430.4 + 394.82 * SUB_UREA + 815.66 * SUB_ALL$$

$\beta_0 = 3430.4$ means, when no subsidy is given either for Urea or all fertilizers, the average yield is 3430.4kg. In simply, in the period of subsidy removal (1990-1994) the average paddy yield is 3430.4kg per hectare. $\beta_1 = 394.82$ means, considering subsidy is given only for urea rather than removal of subsidy, it increases the average yield by 394.82 units, holding subsidy

providing for all fertilizers constant. $\beta_2=815.66$ means, considering subsidy given for all fertilizers rather than removal of subsidy, it increases the average paddy yield by 815.66 units keeping subsidy provided only for Urea constant. F value (15.6) for the test indicated that the overall model is significant under 5 percent level of significance.

Considering descriptive analysis for expenditure on fertilizer subsidy as a share of total government expenditure, the data provides the implication that, fertilizer subsidy scheme is significantly affected to the average use of fertilizer over the years. Accordingly, it can be stated that, there is a significant relationship between fertilizer usage and average paddy yield over the past five decades. With the increase of fertilizer usage, government burden on fertilizer expenditure has also increased gradually. Average paddy yield has also increased over the time by having a look on past few data. This improvement can be caused by several factors such usage of fertilizer, the impact of fertilizer subsidy program and availability of water resources etc. Hence, it can be stated that both the fertilizer expenditure and paddy yield has increased over the time by indicating a significant involvement from fertilizer subsidy scheme to the paddy yield.

As shown in the statistical analysis (Regression Analysis), it can be stated that there is a positive relationship between two variables. So, the results indicate that the expenditure on providing Urea by 1kg will cause to increase the paddy yield by 394.82 kg per hectare. A similar result can be found in a research by Wanninayake and Semasinghe (2012). According to their model, they also found that a positive relationship between average paddy yield and fertilizer subsidy. According to the study, providing subsidy for three fertilizers would affect to increase the paddy yield largely than providing fertilizer subsidy only for urea. What these results show that fertilizer subsidy contributes to produce relatively a higher average yield in the paddy cultivation. In terms of economic viewpoint, this finding justifies the fertilizer subsidy of paddy cultivation in Sri Lanka. Then, the hypothesis formulated in the study as,

H1: Fertilizer subsidy has a positive relationship with average paddy yield

Can be accepted by reviewing the results of the study.

4. Conclusions

With the analysis of results, it can be concluded that, the involvement for the paddy cultivation is highly affected by the fertilizer subsidy in Sri Lanka. Even though the impact of fertilizer subsidy scheme is positively related to the paddy cultivation, it may cause to decrease the soil productivity and efficiency as many other researchers revealed. Hence, the policy makers should emphasize pros and cons of using chemical fertilizer to paddy cultivation before making a decision. Meanwhile, the government should focus on providing infrastructure and institutional facilities that are required to improve the productivity and efficiency in the paddy cultivation.

5. References

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