

## **Cost of the Fertilizer Subsidy for Paddy Farmers: An Empirical Investigation in Sri Lanka**

**H. K. A. P. Hatharasinghe<sup>1</sup>, D. N. T. Jayamanne<sup>2</sup> and W. Athukorala<sup>3</sup>**

<sup>1 & 2</sup> *PGIHS, University of Peradeniya, Sri Lanka*

<sup>3</sup>*Department of Economics & Statistics, University of Peradeniya, Sri Lanka*

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### **Introduction**

The Government of Sri Lanka has introduced a number of policies and programs to increase paddy production since independence (Athukorala, 2016). Paddy cultivation provides livelihood opportunities for more than 1.8 million farmers in the country. Successive governments have provided support to stimulate paddy production by way of large scale irrigation schemes, land development and settlement schemes, free provision of irrigation water, fertilizer subsidies and guaranteed prices. The Government of Sri Lanka has been subsidizing fertilizer for more than five decades. The main objectives of the subsidy scheme is to make fertilizer available as cheaply as possible in order to encourage its wider use; and thereby increase agriculture productivity, achieve national self-sufficiency in rice and support the livelihoods of paddy farmers. A subsidy scheme for the fertilizers nitrogen (N), phosphorus (P), and potassium (K) was initiated since 1962–89 for paddy cultivation. The new political regime which came into the power in 2015 has introduced a major change to the fertilizer subsidy programme, by shifting from the material fertilizer subsidy programme to a cash transfer programme.

In developed countries, it is generally agreed that fertilizer demand is cost inelastic. This may be due to the lack of an economic substitute for chemical fertilizer. Generally, in less developed countries the demand for fertilizer is thought to be more elastic under the assumption of readily available substitutes such as manure and other organic materials.

Ekanayake (2006) investigated the impact of the fertilizer subsidy on paddy cultivation in Sri Lanka and concluded that fertilizer subsidy is not a key determinant of the use of fertilizer in paddy cultivation. Ramli et. al. (2012) investigated the impact of fertilizer subsidy on Malaysia Paddy/Rice Industry using a System Dynamics Approach. Result indicates that fertilizer subsidy does significantly impact the paddy and rice industry. Rodrigo et al. (2015) found that mechanization prevents overuse of fertilizer and a seed paddy subsidy will ensure self-sufficiency in rice production. However, the subsidy scheme has become a politically sensitive issue in Sri Lanka because the majority voters are rural farmers (Thenuwara, 2003; Weerahewa et al., 2010, Jayne & Rashid, 2013). In this context, a clear understanding about the factors that determine the demand for fertilizer is necessary in evaluating the effectiveness of the fertilizer subsidy scheme implemented by the government of Sri Lanka. However to estimate the cost recovering level of output for paddy, an analysis of government expenditure on fertilizer subsidy on paddy production in Sri Lanka has not been investigated and this study focuses on this issue.

## **Objectives**

The main objective of this study is to estimate the maximum tolerable level of output of paddy if we save the money without giving fertilizer subsidy. It shows the effectiveness of the fertilizer subsidy programme on paddy production in Sri Lanka. The calculation is done after estimating cost recovering levels of output for paddy if fertilizer subsidies are removed in the country. It gives the maximum tolerable level of paddy yield without fertilizer subsidies in the country.

## **Methodology**

Secondary data was used to analyze the results of the study covering the period 2014-2018. To analyze the effectiveness of fertilizer subsidy on paddy, the study used total paddy production (Metric Tons), value of total yields (Rs/million) and fertilizer subsidy expenditure (Rs/million), and measured by the following formula:

$$Y = (X_i * (Z_j/100)) * P_k$$

Calculate until:  $Y \geq S_1$

Where,  $Y$  is value of paddy with deduction ratio;  $X_i$  is annual total paddy production (in MT);  $Z_j$  are deduction ratios;  $P_k$  is annual price of paddy (Rs/Kg); and  $S_l$  is Fertilizer Subsidy Expenditure (Rs/million). The data was collected from many sources: total paddy production from Department of Census and Statistics, annual price of paddy (Rs/Kg) and fertilizer subsidy expenditures from Sri Lanka budget reports, and Gross Domestic Product (GDP) from Annual Reports of the Central Bank of Sri Lanka.

### Results and Discussion

Table 1 shows total paddy production from 2009 to 2018 in Sri Lanka. The paddy production shows fluctuations as shown in Figure 1. The fertilizer subsidy is the one of the main factors for the paddy production. The total paddy production in Sri Lanka has shown an increase over history. But according to Figure 1 two major decreases could be seen in 2014 and 2017. Over the years fertilizer subsidy expenditure schemes have been changed according to changes in government (Figure 2). Therefore the amount of allocation for fertilizer from the annual budget has fluctuated.

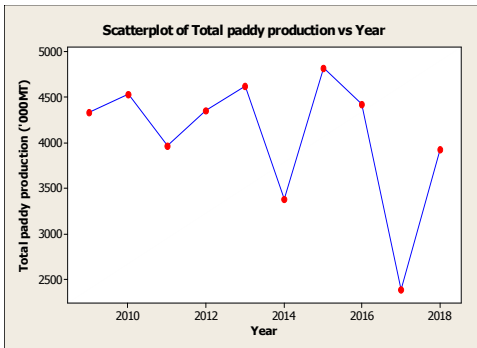


Figure 1: Total paddy production

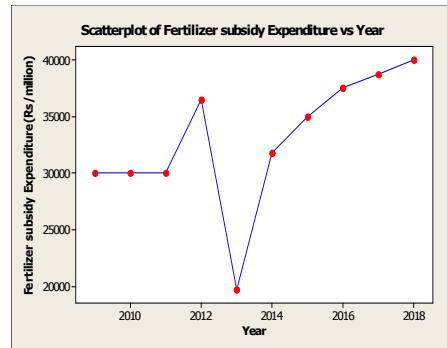


Figure 2: Total subsidy amount

From 2009 to 2018 fertilizer subsidy expenditure as a percentage of the total value of paddy production and GDP are reported in Table 1. In 2017 fertilizer expenditure accounted for 36.13% of the total value of paddy production. It is the highest percentage value during the given period of time and the lowest percentage is 9.48 % in 2013. In 2009 fertilizer expenditure was 0.62% of

GDP, which is the highest value among the considered years. The lowest value is 0.21% in 2013.

**Table 1: Total paddy production, its value and fertilizer subsidy expenditure**

Year	Total paddy production ('000MT)	Total value of paddy production (Rs/million)	Fertilizer subsidy expenditure (Rs/million)
2009	4,336	195,120	30,000
2010	4,528	203,760	30,000
2011	3,970	178,650	30,000
2012	4,353	195,885	36,456
2013	4,620	207,900	19,706
2014	3,381	152,145	31,802
2015	4,819	216,855	35,000
2016	4,420	198,900	37,500
2017	2,383	107,235	38,750
2018	3,930	157,200	40,000

Source: Central bank

We next estimated the maximum ‘tolerable’ level of paddy output which is similar to the cost of subsidies. These estimations are reported in Table 2. According to the analysis (Table 2) in 2014 fertilizer subsidy expenditure met 79 % deduction from the total paddy production. That means with 21% of the total paddy production in Sri Lanka, the government can sufficiently cover their fertilizer subsidy expenditure. When 83 % deducted from the total paddy production in 2015 the Sri Lankan government could carry out the total expenditure of the fertilizer subsidy; i.e. with 17 % of total paddy production the government could cover the financial requirement of the total fertilizer subsidy expenditure. Deduction of 81% from total paddy production in 2016 is sufficient for the government to fulfill their expenditure on the fertilizer subsidy scheme; or 19 % of total paddy production could provide the expenditure requirement of the total fertilizer subsidy.

Table 2: Fertilizer Subsidy Expenditure as a percentage of total value of Paddy production and GDP

Year	Fertilizer subsidy expenditure as percentage of total value of paddy production (%)	Fertilizer subsidy expenditure as percentage of GDP (%)
2009	15.37	0.62
2010	14.72	0.53
2011	16.79	0.42
2012	18.61	0.42
2013	9.48	0.21
2014	20.90	0.31
2015	16.14	0.32
2016	18.85	0.31
2017	36.13	0.29
2018	25.44	0.28

In 2017 there was a considerable fluctuation in ratio of reaching the expenditure of fertilizer. It took a deduction of 64 % from total paddy production to reach the required fertilizer subsidy expenditure. In 2018, the requirement of the fertilizer subsidy was achieved by reducing 74 % from total paddy production; in other words 26 % of total paddy production has satisfied the requirement of covering total fertilizer expenditure.

## Conclusion

In 2014 maximum tolerable level of the gain for the total fertilizer subsidy expenditure is 21% from the total paddy production. This implies that the amount of maximum tolerable level of yields with the absence of the fertilizer subsidies in the country that year was 79 % of the total yield. Accordingly if government does not provide the fertilizer subsidy, its total saving is approximately Rs. 32 billion which is similar to the value of 21 % of total paddy production. This tolerable level of yield is 19 %, 36 % and 26 % in 2016, 2017, and 2018, respectively. It is evident that this level has been significantly different in different years due to changes in the subsidy amount granted and total paddy yield in the country. In general the amount of subsidy granted is mainly determined by the land extent cultivated in each year. Therefore, it is important to take into account the results of this study in order to identify the effectiveness of providing such a subsidy scheme. When

considering the period from 2014 to 2018 the results clearly show the maximum levels of possible yield loss that could be tolerated if the government remove fertilizers subsidies in the country. This results can be used to design necessary policies for the paddy farming sector in Sri Lanka.

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## Appendix

Table 3: Estimating tolerable level of output

2014		2015		2016		2017		2018	
Deduction ratio	Value of paddy with deduct rates (Rs/million)	Deduction ratio	Value of paddy with deduct rates (Rs/million)	Deduction ratio	Value of paddy with deduct rates (Rs/million)	Deduction ratio	Value of paddy with deduct rates (Rs/million)	Deduction ratio	Value of paddy with deduct rates (Rs/million)
10	136,930	10	195,169	10	179,010	10	96,511	10	141,480
20	106,5015	20	173,484	20	159,120	20	85,788	20	125,760
30	1,065,015	30	151,798	30	139,230	30	75,064	30	110,040
40	91,287	40	130,113	40	119,340	40	64,341	40	94,320
50	76,072	50	108,427	50	994,500	50	53,617	50	78,600
60	60,858	60	86,742	60	79,560	60	42,894	60	62,880
70	45,643	70	65,056	70	59,670	63	39,677	70	47,160
78	33,472	80	43,371	79	41,769	<b>64</b>	<b>38,605</b>	<b>74</b>	<b>40,872</b>
<b>79</b>	<b>31,950</b>	<b>83</b>	<b>36,865</b>	80	39,780	65	37,532	75	39,300
80	30,429	84	34,697	<b>81</b>	<b>37,791</b>			80	31,440