SUPPLY RESPONSE OF VEGETABLE PRODUCERS IN SRI LANKA: AN EXPLORATORY ANALYSIS*

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Vegetables occupy a significant place in domestic food production and consumption sectors in Sri Lanka. However, various estimates suggest that the quantity of vegetables available for consumption has decreased during recent years. Thus, there is a necessity for enhancing the production of vegetables to meet the consumers' requirements of the same. In the formulation of effective policies to increase the production of vegetables, the knowledge of the working of demand and supply forces is of utmost significance. However, the current knowledge of the supply and demand conditions are very limited due to lack of studies on the subject. This paper is an attempt to present an analytical framework and make empirical estimations of factors determining the producers' supply response of five selected vegetables, within the limitations of available data. Since the analysis is of an exploratory nature, the supply response to changes in price variable only is studied. The analysis uses acreage as the dependent variable and as proxy of quantity supplied.

1. INTRODUCTION

Vegetables form a very important part of the daily diet of the majority of the people in Sri Lanka. Of the average monthly household expenditure on food, about 10 per cent is on vegetables. Next to rice this accounts for the second largest category of food expenditure (Central Bank of Ceylon; 1953, 1963 and 1973). Moreover, vegetables also occupy a significant place in the domestic food production sector. It is estimated that annual production of vegetables in Sri Lanka amounts roughly to about 600,000 tons. On an average about 300,000 acres of land is devoted to vegetable cultivation in this country. In the absence of reliable statistics on the farming population who are engaged mainly in vegetable cultivation, it is safer to assume that a significant proportion of the farming population is dependent upon vegetable cultivation for their living. However, the performance of the vegetable production sector has not been satisfactory, especially during recent years. The available estimates suggest that the current percapita consumption levels are far below the levels

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recommended by nutritionists and that the quantity available for consumption has decreased during recent years. (Department of Census and Statistics; 1973, 1974, 1975, Central Bank of Ceylon; 1973).

Since the increased production of vegetables has desirable effects for economic growth and welfare of the people in the country, the government of Sri Lanka places considerable emphasis on the production of vegetables in its annual crop production programmes. The policy of the government in this respect has been described as follows:—

".....The problem of development of vegetable production is not to increase the area under cultivation, but to stabilize the existing areas of production, to change the pattern of production to ensure a better balance in the supply of different types of vegetables throughout the year.....". (Ministry of Agriculture and Food; 1966—70).

In their efforts to increase the production of vegetables, the policy makers have to design effective policies regarding production and marketing. Among the economic factors that affect production and marketing, the working of supply and demand forces has to be given due consideration prior to the formulation of such policies. This is very important since these market forces still play a key role in the allocation of resources at the producers', middlemen and consumers' levels.

On the supply side, the producers' response to changes in price, technology and other relevant variables has to be considered. It is also important to know as to how quickly the producers respond to changes in economic conditions, if for example, the objective of the policy is to introduce producer incentives in order to increase the production and the marketable surplus of vegetables. However, the current knowledge of the supply response of vegetable producers in Sri Lanka is very limited due primarily to the lack of research on the subject. The absence of research may be partly attributable to the general thought that the studies of supply response of highly perishable commodities such as vegetables and fruits are of limited use because, in the very short-run, supply is fixed (Jain; 1971). Theoretically this is a valid point. Nevertheless, studies of supply response of such commodities are relevant for policy and planning purposes especially when a longer time period is considered. Another reason for the absence of such research may be the lack of adequate, accurate and consistent data on the relevant variables which are needed to be considered in such studies. However, at this stage what we need is a basic methodological framework within which the supply response can be analysed. Although some agencies such as the Department of Census and Statistics and the Marketing Department maintain regular records of the quantities and the prices of vegetables, no attempts have so far been made to use such data in any rigorous analyses of supply response.

In view of the above, this paper attempts to present an analytical framework and make empirical estimations of factors determining the producers' supply response of vegetables in Sri Lanka within the limitation of available data. As such the findings of it are regarded suggestive and it is hoped that they will provide research bases from which other studies can be undertaken when some of the data limitations are removed.

This analysis concentrates on a selected and a manageable number of vegetables in view of the informational constraints. **The selected vegetables are beans, cabbage, cucumber, redpumpkin and snake gourd.** The first two vegetables are selected as representative of exotic vegetables while the last three are selected as representative of indigenous vegetables.

The analysis uses annual time series data in relation to the five selected vegetables. The period covered is 10 years, i.e., from 1965 to 1974 inclusive.

2. REVIEW OF LITERATURE:

Numerous studies have been conducted on the supply response of farm products in different countries of the world. A detail review or even the citation of those studies will be a very lengthy task, and outside the scope of this paper. Nevertheless, some of the pioneering studies of supply response in under-developed agriculture such as those of Raj Krishna (1963), Falcon (1964) Behrmen (1968) and Cummings (1975) have to be mentioned in this context. Almost all of the studies mentioned above tested and lent support to the hypothesis that the farmers in underdeveloped countries respond positively, rationally and fairly quickly to the changes in prices and other economic variables.

Most studies of supply response in underdeveloped agriculture have concentrated on food grains, agricultural raw materials (e.g. Cotton, Jute) and some other annual crops (David Lim Lin Shu, 1975). As far as supply response studies on vegetables in underdeveloped countries are concerned, there are extremely few studies — perhaps as a result of the paucity of relevant data. Of course, several studies have been conducted on supply response of vegetables in developed countries. Selected aspects of methodology and major findings of one such study are discussed below to provide the background to the present analysis.

Nerlove and Addison (1958) analysed the supply response in relation to 20 vegetables produced in the U.S.A. The period taken into consideration varied from Crop to Crop. In some cases the base year varied from 1919 to 1929, while all the data series had the same terminal year, viz. 1955. Both static and dynamic (adjustment-lag) models were employed in the analysis. The current acreage under the crop was the dependant variable.[1] The explanatory variables were price lagged one year, acreage lagged one year, and the time-trend. The major objective of this analysis was to test the comparative efficiency of the adjustment-lag model vis-a-vis the traditional (static) model in the estimation of supply response. The authors concluded that the adjustment lag model was more efficient because it reduced the presence of serial correlation of disturbances, resulted in more significant price coefficients and was able to cope with the long-run adjustment problem of supply, Thus, the model was also able to estimate long-run price elasticities of supply. It was also found that the producer's supply response was positive and that compared to the long-run, the short-run supply was relatively inelastic.

Among the major vegetables considered, lettuce had the lowest short-run and long-run price elasticities of supply (0.03 and 0.16); Cabbage exhibited the highest short-run price elasticity (0.36); Green peas had the highest long-run price elasticity of supply (4.4).

1. Acreage was used as a proxy for quantity supplied.

3 SUPPLY RESPONSE ANALYSIS:

The majority of studies of supply response has used the acreage (or area cultivated) as proxy for quantity supplied (David Lim Lin Shu 1975). There are two major reasons for this. First, the total output cannot be controlled by the producers, because it is subject to variations beyond the producer's control, such as the climatic factors; producers usually have more control over units of land (say, acres) than over the output. Second, the measurement of acreage is easier and subject to less errors than the measurement of output. In view of these, our analysis also uses the acreage as the dependant variable as proxy of quantity supplied. However, aggregated annual acreage statistics also have a limitation because these do not take cropping intensity within a year into account.

3.1 ASSUMPTIONS:

Supply response of selected vegetables is analysed here on a national scale on the basis of annual aggregate data. Hence, seasonality of supply and regional differences in supply response are not taken into account. Thus, for the purpose of this analysis, two simplifying assumptions are made on the above factors. These are: (1) the various regions producing a particular vegetable possess homogenous characteristics and the nature of the producer's supply response everywhere in the country would be the same, and (2) the seasonality of supply of vegetables in any given year has been similar to that in any other year, so that the seasonal variation in supply occurred in a similar fashion throughout the period under consideration.

3.2 THE MODEL AND THE HYPOTHESES:

Considering the exploratory nature of this analysis and the extent of data availability the simplest form of the Nerlove's partial adjustment model will be employed in the estimation of supply response functions. (Nerlove, 1958; Nerlove and Addison; 1958).

The quantity supplied of a certain vegetable is assumed to be a function of its own price in the previous time period; so is the acreage planted with a certain vegetable. The supply, hence the acreage presumably is not related to the current price because of the time lag in the production process. Assuming a linear relationship between price and supply, the equation for supply response can be written as follows:—

$$A_{it} = a + b\,P_{it-1} + ut \quad \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Where, A_{it} + Current acreage planted with i^{th} vegetable

P_{it-1} = Price of i^{th} vegetable in time $t - 1$

ut = error term

However, the above static model has a limitation because, among others, it assumes instantaneous adjustment of supply to change (s) in economic variable (s), while the fact is that supply of agricultural products generally takes time to adjust to the changes in economic conditions. Such adjustment

delay is taken into account by the adjustment lag model (Nerlove, 1958; Nerlove and Addison, 1958), This model, as considered for the purpose of the present analysis, is presented below:

$$A_{it} = a + b\, p_{it-1} + u_t \quad \ldots\ldots(2)$$

$$A_{it} - A_{it-1} = r\,(A^*_{it} - A_{it-1}) \quad \ldots\ldots(3)$$

$$A_{it} = A + B\, P_{it-1} + C A_{it-1} + V_t \quad \ldots\ldots(4)$$

Where, $A = ar$, $B = br$, $C = 1 - r$, $V_t = r u_t$, $O \leq r \leq 1$

A_{it} = Actual acrrage planted with i^{th} vegetable in time t

A^*_{it} = Desired or planned acreage of i^{th} vegetable in time t

P_{it-1} = Price of i^{th} vegetable in time t-1

A_{it-1} = Actual acreage planted with i^{th} vegetable in time t-1

U_t = error term

r = Coefficient of adjustment

According to the above specified model, the following simplifying equation is used to estimate the supply response, assuming a linear relationship between the specified variables:

$$A_{it} = b_o + b_1 P_{rt-1} + b_2 A_{it-1} + U_t \quad \ldots\ldots(5)$$

And, in the double-log form (log-linear form) the model is,

$$\text{Log } A_{it} = \text{Log } b_o - b_1 \text{ Log } P_{rt-1} + b_2 \text{ Log } A_{it-1} + U_t \quad \ldots\ldots(6)$$

Where, P_{rt-1} = relative price lagged one year (cts/lb)

A_{it-1} = acreage planted with i^{th} vegetable lagged one year

U_t = error term

b_o = Constant

b_1, b_2 = Un known Coefficients to be estimated

The Hypotheses:

The major hypothesis postulated here is that the vegetable producers in Sri Lanka respond positively to relative price changes. It is also hypothesised that the short-run price elasticity of supply is fairly low.

Recall the supply response equation (6)

The hypotheses are, (a) $b_1 > o$,

(b) $b_1 > o$,

and combining (a) and (b) together, the values of the price elasticity coefficients are hypothesised to be: $0 < b_1 < 1$

3.3 VARIABLES AND DATA:

(a) **Acreage** (2)

Data on acreages of selected vegetables were obtained from the Sri Lanka Department of Census and Statistics. The data are based on the figures received from the village officials in respect of their administrative units. These are not measured levels of the acreage planted or harvested, but represent rather rough estimates based on rule-of-thumb techniques used by the officials at various levels.

(b) **Relative Price:**

The price of the ith vegetable relative to other competing vegetables (relative price) is used in this analysis in order to overcome the problem of multicollinearity and to preserve the degrees of freedom for statistical testing purposes.

Assuming that the producers base their production decisions on expected price, lagged price rather than current price has been used in many supply response studies. The most recent past price (post harvest price) is considered as the most important determinent of expected price (Dean, 1965). Thus in the present analysis, the price of previous year ((Pt—1) is used as proxy of expected price because the length of the available time series is only 10 years. Even the usage of one year lagged price reduces the number of observations to nine.

Since data on prices actually received by the producers were not available, the annual average of retail prices are used as proxy of producers' price. This, of course, assumes that the prices at farm level and retail level are highly correlated or the distributive margins are fixed at a certain percentage, over time. This is not an unreasonable assumption because it has been found that, in developing countries, marketing margins are relatively stable (3) (Allen, 1959). Furthermore, prices prevailing at Colombo Central market are used

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(2.) Although the acreage data were available for 19 years, i.e. from 1956 to 1974, the price data were available only for 10 years, i.e. from 1965 to 1974. Therefore, the analysis had to be limited for the period 1965 to 1974.

assuming that the prices in Colombo and other markets of the country are highly correlated and the inter-market price differentials are generally consistent with the transport costs. (4)

The relative prices were obtained by deflating the price of ith vegetable by a linear index of prices of competitive vegetables. The most important competitive crops for any one vegetable would be the vegetables that can be grown in the same area. Hence, in the construction of price indices for competitive vegetables for the five selected vegetables, the prices of the following vegetables were considered:

	Vegetables selected for the analysis	Competitive Vegetables
Exotic	1. Beans	Beetroot, cabbage, carrots, leeks, tomatoes,
	2. Cabbage	Beetroot, beans, carrots, leeks, tomatoes
Indigenous	3. Cucumber	Redpumpkin, snakegourd, luffa, okra, ashplantains.
	4. Redpumpkin	Snakegourd, cucumber, luffa, okra, ashplantains.
	5. Snake gourd	Redpumpkin, cucumber, luffa, okra, ashplantains.

First, the average prices of the five competitive vegetables for each of the selectee vegetables were calculated. Subsequently, a linear index of those average prices were constructed for each of the selected vegetables separately by taking 1965 as the base year (see appendix 1.1 to 1.5).

Retail prices used in this analysis were obtained from the published Administration Reports of the Commissioner for Marketing Development of Sri Lanka and also from the Research Unit of the Marketing Department. Price data collected by the Marketing Department can be regarded as fairly accurate since the officials regularly visit the urban retail and wholesale markets and record the prices. This applies particularly to prices prevailing at the markets in Colombo.

(3.) Mostly, it has been found that retailers' relative margins are stable. However, wholesalers' margins are also found to be stable in the case of vegetables in Sri Lanka. Majority of wholesalers retain a 10 per cent sales margin (Abeysekera and Senanayake, 1974)

(4.) This is a reasonable assumption to make since the major proportion of vegetables marketed is first transported to Colombo and then distributed to the other main urban markets in the country. Thus prices prevailing in Colombo largely influence the prices elsewhere in the country. Ad hoc studies of vegetable marketing in Sri Lanka have supported this proposition.

> ".....there are three main centres of price formation occurring as a result of supply and demand, i.e., Colombo, Kandy and Jaffna.....Of these the most important centre, the prices of which influence the price prevailing at other two centres, is Colombo **(Report to the Minister of Foreign and Internal Trade on the Role of the Marketing Department and the All Ceylon Producers Union, 1971).**

3.4 RESULTS AND DISCUSSION:

Since it is difficult to decide a **priori** the appropriate functional form by which the supply response of vegetables can be estimated, both the linear and double-log functional forms were adopted in this analysis. The analysis employed multivariate regression techniques suggested in standard econometric text books such as Johnston; 1963; Kenenta, 1971; and Wonnacott and Wonnacott, 1970.

3.4.1 PERFORMANCE OF THE MODEL:

The estimated supply response functions with lagged relative price and lagged acreage are presented in tables 1 and 2, adopting linear and double-log forms respectively.

TABLE 1. Supply Response: Estimated Regressions According to linear model

Vegetable	Constant	Regression Coefficients		R^2	D.W.
	b_o	$b_1 P_{rt-1}$	$b_2 A_{it-1}$		
Exotic					
1. Beans	7816.02	6421.37 (10116.32)	—0.14 (0.40)	0.04	1.79
2. Cabbage	619.77	20147.64 (a) (7628.78)	0.6 (0.29)	0.62	2.72
Indigenous					
3. Cucumber	295.54	14081.82 (25788.46)	0.45 (b) (0.28)	0.32	1.92
4. Red pumpkin	2504.90	19103.77 (a) (7364.15)	0.51 (b) (0.30)	0.55	1.14
5. Snakegourd	243.09	16155.09 (b) (9887.09)	0.48 (a) 0.24	0.72	1.29

NOTES :

Figures in Parenthesis are standard errors.

(a) **Significant at 5 per cent level**

(b) **Significant at 10 per cent level.**
All the regressions have 6 degrees of freedom.

TABLE 2. Supply Response: Estimated Regressions According to Double-Log Model

Vegetable	Constant Log b_0	Regression b_1 Log P_{rt-1}	Coefficients b_2 Log A_{it-1}	R^2	D.W.
Exotic:					
1. Beans	4.59	0.26 (0.51)	0.13 (0.41)	0.05	1.84
2. Cabbage	4.15	1.00 (a) (0.38)	0.04 (0.30)	0.62	2.61
Indigenous:					
3. Cucumber	2.04	0.51 (0.74)	0.55 (a) (0.26)	0.43	1.90
4. Red pumpkin	1.99	0.30 (a) (0.11)	0.57 (b) (0.30)	0.57	1.16
5. Snakegourd	2.31	0.54 (b) (0.34)	0.49 (a) (0.25)	0.71	1.49

NOTES :

Figures in parenthesis are standard errors.

(a) Significant at 5 per cent level

(b) Significant at 10 per cent level

All the regressions have 6 degrees of freedom.

In the context of the present analysis, the performance of the supply response models in estimation can be looked at in two ways, namely, the statistical performance of the estimators, and their consistency with the underlying economic theory. Statistical significance of the estimated coefficients can be tested by employing conventional "students"t test, while the over all efficiency of estimators can be judged by such conventional methods as the value of the coefficient of determination (R^2), and F test and the test for serial (auto) correlation of the disturbances. As far as the statistical performance is concerned, the tables are self-explanatory.

In the estimation of regression coefficients, both the linear and the double-log functional forms performed equally well. Relative price coefficients were positive for all the vegetables. However, the price coefficients were not statistically significant in case of two out of five selected vegetables namely, beans and cucumber. It is proposed that either the price effect on supply of these two vegetables is negligible or the data used in respect of these are deficient. However, the analysis generally validates the hypothesis that the vegetable producers in Sri Lanka response positively to changes in relative prices.

Lagged acreage was an important explanatory, variable only in case of three indigenous vegetables, namely, cucumber, redpumpkin and snakegourd. In fact it was more important than price in case of cucumber and snakegourd. This shows that, in the short-run, the land devoted to these vegetables is not easily shiftable to another vegetable, depending on the relative price changes. Compared to the intensively grown exotic vegetables, the production of these indigenous vegetables are mostly not pre-planned and not completely market-oriented. (Ministry of Agriculture, 1958). Therefore, one can accept that the supply of these vegetables depends not only on relative prices but also more significantly, on the acreage already devoted to cultivation.

3.4.2 SHORT-RUN PRICE ELASTICITIES OF SUPPLY:

In general the analysis shows that the short-run supply of selected vegetables is inelastic with respect to relative price. However, Cabbage shows a remarkably high price elasticity of supply. Apart from this exception, the estimated price elasticity coefficients by both the linear and the double-log models generally validate the hypothesis that their values are greater than zero and less than one (table 2 and 3).

TABLE 3. Derived short-run Price elasticities of Supply from the results of the Linear Model (Calculated at the mean values* of relative price and acreage)

Vegetable	Short-run Price elasticities of Supply
Exotic:	
1. Beans	0.34
2. Cabbage	1.03
Indigenous:	
3. Cucumber	0.46
4. Redpumpkin	0.30
5. Snakegourd	0.53

* Mean values of :

	Relative Price $(\bar{P})$	Acreage $(\bar{A})$
1. Beans	0.51	9688.89
2. Cabbage	0.30	5863.11
3. Cucumber	0.20	6105.51
4. Redpumpkin	0.20	12846.56
5. Snakegourd	0.25	7546.11

3.4.3 COEFFICIENTS OF ADJUSTMENT AND LONG-RUN PRICE ELASTICITIES OF SUPPLY:

The regression analysis resulted in significant coefficients for the lagged dependent variable, i.e. the lagged acreage for three out of five selected vegetables. Accordingly, this discussion on some aspects of long-run adjustment of supply by the vegetable producers is based on these results.

The coefficient of adjustment (r) is derived by subtracting the statistically determined coefficient of the lagged dependent variable from one (Nerlove and Addison, 1958).

Recall the supply response equation (5),

$$A_{it} = b_o + b_1 P_{rt-1} + b_2 A_{it-1} + U_t$$

The coefficient of adjustment (r) is,

$$r = 1 - b_2 \quad (A_{it-1}) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (7)$$

The long-run price elasticity is then derived by dividing the short-run price elasticity coefficient by the coefficient of adjustment.

The estimated coefficients of adjustment and long-run price elasticities for three of the selected vegetables are presented in table 4. There are no marked differences between the coefficients derived from the linear model and those derived from the double-log model.

TABLE 4. Estimated Coefficients of Adjustment and Price Elasticities of Supply for Three Selected Vegetables*

Vegetable	Coefficient of Adjustment		Short-run price elasticity		Long-run price elasticity	
	Linear model	double-log model	linear model**	double log model	Linear Model	double log model
Cucumber	0.55	0.45	0.46	0.51	0.84	1.13
Redpumpkin	0.49	0.43	0.30	0.30	0.61	0.69
Snakegourd	0.52	0.51	0.53	0.54	1.02	1.06

NOTES * Coefficients for other two vegetables were not calculated because the coefficients of the lagged acreage were statistically non-significant.

** Calculated at the mean values of relative price and acreage (see table 3).

Nerlove and Addison (1958) found out that many of the vegetables studied in their analysis had very low coefficients of adjustment. Some examples are given below:—

Vegetable	Coefficient of adjustment
Spinach	0.04
Green lima Beans	0.06
Green peas	0.07
Cucumber	0.13
Cabbage	0.29
Eggplant	0.47

Although the present analysis is very limited, the findings of it are roughly comparable with the findings of Nerlove and Addison as given above,

in the sense that the coefficients of adjustment are between 0 and 1(5). This type of low coefficients imply that the length of the time period required for a complete adjustment of supply is quite long (Nerlove and Addison, 1958).

As revealed by the coefficients of adjustment given in table 4, the vegetable producers are somewhat tardy in adjusting the supply in response to changes in relative prices. This is further reflected in the fairly low long-run price elasticities of supply. This time-lag in adjustment or the "adjustment delay" may be attributable to several characteristics of the resources used in the cultivation of vegetables and the marketing system for vegetables in Sri Lanka.

Some of the major factors are very briefly discussed below; The adjustment of acreage cultivated under a particular vegetable depending on the relative price changes is retarded by the rigidities of land use itself. Shifting to a new vegetable in the long-run requires certain amount of new inputs, e.g. new management skills. Even if these requirements can be met in the long-run the land itself may not be ecologically suitable for the cultivation of the new vegetable. The slow adjustment could also be due to the imperfections prevailing at product and factor markets (Behrmen, 1968). Availability of prompt information on prices of vegetables is essential for the producers to make adjustment in supply according to relative price changes. But the imperfections in the vegetable marketing system in Sri Lanka inhibit the flow of price information from consumers to producers (Abeysekera and Senanayake, 1974).

4. CONCLUDING REMARKS:

The present analysis lent support to the hypothesis that vegetable producers in Sri Lanka respond positively to the changes in relative prices. The presence of positive supply response and slow adjustment in the long-run emphasize the need for an efficient marketing system for vegetables. The marketing system should also be able to convey the price information promptly, from the consumers to producers. Already, the Government of Sri Lanka, through the Marketing Department, provides such information to the producers. But still the majority of the vegetable producers rely on peers and private traders and there is no guarantee about the reliability of the price information.

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(5) Theoritically, the value of the coefficient of adjustment can be greater than or equal to zero and less than or equal to one. If the coefficient of adjustment is more than 1 an over adjustment by the producers is evident. If the coefficient is 1, then there exist a perfect adjustment by the producers implying that the actual supply is just equal to desired or expected supply (Behrman, 1968). Conversely, the zero value of the coefficient of adjustment implies an infinite long run price elasticity with a finite short-run price elasticity (Nerlove and Addison, 1958). The above propositions are rather dubious in view of the existence of finite time lags in the adjustment of supply of many agricultural commodities. Therefore, for the practical purposes of the present analysis, the 0 and 1 values of the coefficient of adjustment were rejected. Instead, a partial or moderate adjustment was expected. Hence the value of the coefficient of adjustment (r) was postulated to be between 0 and 1; that is. $0 < r < 1$.

The presence of positive supply response further emphasizes the need to improve the efficiency of the input supply system, along with the implementation of price support policies for the producers.

Our analysis was confined to the aggregate supply response at the national level. Clearly, it would also be necessary to study the supply response at district or provincial level using semi-annual or quarterly data. Such data was not available for the present analysis. This analysis also indicates that the characteristics of supply vary from one vegetable to another. Therefore, it is proposed that more intensive analyses should be conducted separately for important individual vegetables.

However, the major limitation of future studies of supply response would be the lack of sufficient and accurate data regarding the relevant variables, as it was in the present analysis. Although the data on production, acreage and prices of vegetables are collected regularly by the agencies such as the Department of Census and Statistics and the Marketing Department, it is not published in a consistent manner. If data are recorded properly and published regularly it would be very much helpful for researchers and policy makers. Administrative costs of maintaining the consistency and the accuracy of the data would of course be higher than it is at present. For example, it would be more advisable to employ the officials of the Department of Census and Statistics for the task of collection of data regarding production, acreage and prices received by the producers, even though it would be costly. Availability of consistent time series data on producer prices is of utmost importance for the studies on the aspects of Producer's supply response.

It is very important to have a proper system for collection of these data. Maintaining records of production, acreage, and prices of all the vegetables produced and consumed in Sri Lanka, is a difficult task. Instead, the data pertaining to the most important vegetables should be maintained. The most important vegetables can be selected in accordance with several criteria. Some of these would be: (a) the relative size of the areas cultivated under different vegetables; (b) the relative profitability of producing different vegetables; (c) the relative quantities of vegetables marketed in a given time period, and (d) consumer's preference for different vegetables. This kind of selection itself would induce research into the various aspects of production, marketing and consumption of vegetables in Sri Lanka.

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APPENDIX

Appendix 1.1 Data used in the Analysis: Beans

Year	Acreage	Own price (cts/lb) (one year lagged)	Price Index of competing vegetables 1965 — 100 (one year lagged)
1965	9014	—	—
1966	9746	56	100.00
1967	7656	55	102.16
1968	9105	55	111.64
1969	11155	59	117.15
1970	8578	55	112.44
1971	9613	64	157.46
1972	9348	67	140.94
1973	11831	72	132.98
1974		79	150.98

Appendix 1.2 Data used in the Analysis: Cabbage

Year	Acreage	Own price (cts/lb) (one year lagged)	Price Index of competing vegetables 1965 — 100 (one year lagged)
1965	6050	11	—
1966	7162	38	100.00
1967	8002	35	103.14
1968	5369	34	112.73
1969	5547	35	119.12
1970	5319	35	113.10
1971	5250	41	158.32
1972	5339	38	143.54
1973	5622	39	138.45
1974	5158	45	156.43

Appendix 1.3 Data used in the Analysis: Cucumber

Year	Acreage	Own price (cts/lb) (one year lagged)	Price Index of competing vegetables 1965 — 100 (one year lagged)
1965	9333	—	—
1966	7132	20	100.00
1967	6690	19	101.94
1968	8908	23	110.56
1969	6238	24	123.76
1970	5377	23	107.94
1971	5428	28	114.61
1972	4977	24	120.88
1973	5344	27	137.64
1974	4856	26	143.65

Appendix 1.4 Data used in the Analysis: Red Pumpkin

Year	Acreage	Own price (cts/lb) (one year lagged)	Price Index of competing vegetables 1965 — 100 (one year lagged)
1965	13263	—	—
1966	12710	16	100.00
1967	12641	17	97.65
1968	13155	21	107.31
1969	14211	24	115.26
1970	12064	17	110.69
1971	11434	22	114.11
1972	12175	26	112.88
1973	13719	32	125.61
1974	13510	31	130.65

Appendix 1.5 Data used in the Analysis: Snakegourd

Year	Acreage	Own price (cts/lb) (one year lagged)	Price Index of competing vegetables 1965 — 100 (one year lagged)
1965	8188	—	—
1966	8097	26	100.00
1967	8204	28	97.36
1968	8245	30	110.48
1969	7551	32	123.91
1970	7130	27	110.40
1971	6941	29	119.30
1972	7117	31	121.53
1973	6992	35	138.21
1974	7638	35	143.73