



## Economics of Turmeric Production in Sri Lanka: An Empirical Analysis in Major Turmeric Growing Districts

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### Authors' contributions

The principal investigator, Author AASLA involved in study design, data collection, data analysis & interpretation of key results and writing the study outputs. Author AMKRB involved in survey design, questionnaire preparation, conducting interviews, quantitative data analysis and research reporting.

Both Authors AIYL and PRI involved in field level data collection (Key-personnel interviews, and focus-group discussions), quantitative and qualitative data analysis, and reporting results.

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### ABSTRACT

**Aims:** Turmeric occupies a prominent position among the commercially grown spices in Sri Lanka. However, due to various constraints the performance of turmeric production is not to the expected level. The present study attempts to determine the economics of turmeric cultivation and the problems perceived by the growers related to production and marketing of turmeric.

**Study Design:** Multistage sampling design.

**Place and Duration of Study:** The study was conducted in the major turmeric growing administrative districts in Sri Lanka namely Kurunegala, Kegalle, and Kandy during the year 2016-2017.

**Methodology:** Both primary data, mainly from a field survey, and secondary data were utilized in the study. Descriptive statistical methods, seasonal price index, coefficient of variation of price, financial and constraint analysis techniques were used in data analysis.

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**Results:** The average Benefit Cost Ratio of 2.08 and higher net returns indicate that turmeric production was found to be a profitable venture in the study area. The results indicated the existence of higher price variations of turmeric in the study area between the harvest and the lean periods. Moreover, seasonality of turmeric production was identified as a main cause of variation in price of fresh turmeric. The results of the constraint analysis revealed that lack of knowledge on proper agricultural practices, non-availability of labor, price volatility and shortage of quality planting materials were the top four constraints perceived by the farmers.

**Conclusion:** The results of this investigation show that the turmeric production is profitable in the study area, and suggest to offer frequent training and awareness campaigns for all the turmeric growers to facilitate the use of improved cultivation practices.

*Keywords: Economics; garrett's ranking technique; constraints; seasonality; turmeric.*

## 1. INTRODUCTION

Turmeric is one of the multi-use commodities, which has commercial, economic, cultural and medicinal significance across the globe. Cultivation of turmeric was found to be more remunerative and protective [1], due to the great export potential received through the wide-ranging use of various industries. Thus, turmeric occupies a prominent position among the spices produced in Sri Lanka. Mainly, turmeric production in Sri Lanka is concentrated to the wet and intermediate zones of the country and the highest share of production is drawn from Kandy, Kegalle and Kurunegala districts. However, the country's turmeric production is not been efficient over the years leading to production instability. This inefficiency is inseparable from the constraints that occur in managing turmeric farming that are linked to the aspects like input availability, production technology, market price and the delivery of necessary support services [2]. Currently, the turmeric production in Sri Lanka is not self-sufficient and to keep pace with the increased demand, a significant proportion of the local demand is being imported putting a heavy burden on the national reserves. Due to the price gap between native and imported product, the consumers tend to utilize more imported products and eventually the de-motivated local growers encountered a range of complicatedness in selling their products.

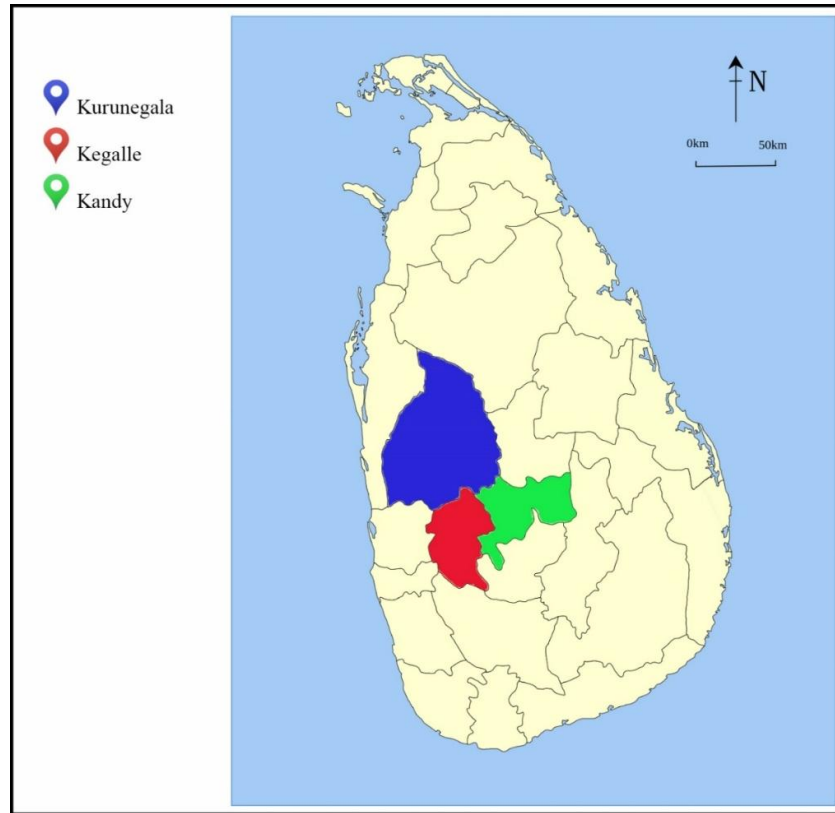
Such a continuing poor performance is intolerable because it will adversely affect the viability and permanence of the production. Since turmeric cultivation offers an array of monetary and social gains to the country, any downturn in its performance would spoil the national

economy too. On the contrary, a resettled and well - functioned turmeric production would play an imperative role to raise the farmers' income, generate employment, alleviate poverty, improve food security and empower the farmers to boost the social development of the country. In order to set up a self-sufficient commercial venture in turmeric cultivation, information on the economies of turmeric production is timely and nationally needed. Hence, the present study was conducted to assess the financial feasibility, variability of price and the constraints associated with production of turmeric, in order to recommend measures for improvement.

## 2. MATERIALS AND METHODS

### 2.1 Study Area and Sample Selection

Three leading turmeric-producing districts in Sri Lanka (7.8731°N, 80.7718° E) namely Kurunegala (6.931970° N, 79.857750° E), Kegalle (6.931970° N, 79.857750° E) and Kandy (6.931970° N, 79.857750° E) were considered for this study. Multistage sampling design was adopted in selection of districts, divisional secretariat divisions (DS) and turmeric growers. In first stage, Kurunegala, Kegalle and Kandy districts were purposively selected as the principal turmeric producing districts of the country. In second stage, two DS divisions from each district namely Pujapitiya and Harispaththuwa from Kandy district, Kegalle and Warakapola from Kegalle district and Malsiripura and Alawwa from Kurunegala district were selected as the foremost turmeric producing DS divisions. In third stage, ten turmeric growers were selected randomly from each DS division, thus drawing sixty turmeric growers for the study.



**Fig. 1. Study locations in Sri Lankan Map**  
 Source: Google Maps, 2017

## 2.2 Data Collection

Both primary and secondary data were utilized in the study. The primary data were collected from the sample respondents mainly through a field survey, and the data was collected concerning production and marketing aspects of turmeric cultivation. Moreover, Key personnel interviews and focus group discussions were performed to acquire detailed information on measured aspects. Secondary data required for the study were extracted from both published and unpublished sources.

## 2.3 Data Analysis

Descriptive statistics such as means, percentages, indices and coefficient of variation, financial analysis and constraint analysis techniques were employed in data analysis.

### 2.3.1 Financial analysis

In determining the profitability, conventional tabular analysis was done by working out per

hectare item wise expenditure in turmeric production, total cost, gross return, net return and the return to cost ratio. All the direct expenses incurred for agronomic operations in terms of hired labour, farm machinery and other input costs plus the value of family labour were considered in deriving the total cost of production. Total revenue was computed by multiplying the total production by the average selling price. Profit or net return was the difference between total revenue and the total cost of production.

The Benefit Cost Ratio (BCR) [3,4] that weighs against the total returns with the total costs was exercised to assess the financial feasibility of turmeric production. Moreover, it can be used to recognize how much costs could rise without making the production financially unattractive. In practice, enterprises with higher benefit-cost ratios or the values greater than one are viewed as being preferable. From the relation,

$$BCR = \frac{\sum_{t=1}^{t=n} \frac{B_t}{(1+i)^t}}{\sum_{t=1}^{t=n} \frac{C_t}{(1+i)^t}} \quad (1)$$

Where,

$B_t$  = benefit in each year,  $C_t$  = cost in each year,  $t$  = 1, 2, ...,  $n$ ,  $n$  = number of years,  $i$  = interest rate

Assuming current prices and annual production [5], the formula applied in calculating the benefit-cost ratio throughout this study only becomes,

$$BC = \frac{B}{C} \quad (2)$$

### 2.3.2 Seasonal Price Index

Seasonal price analysis was performed by using seasonal price index [6] that shows the average relationship of prices in a particular month to the average for the year. Moreover, it offers an indication of the Seasonal Price Patterns for that particular time series. Accordingly, this study expressed the variations in price of turmeric production by means of monthly farm-gate prices of turmeric for the year 2016.

$$SeasonalPriceIndex = \frac{MonthlyPrice}{AveragePriceoftheYear} \quad (3)$$

### 2.3.3 Coefficient of variation of price

The price stability of farm gate prices were figured by using Coefficient of Variation (CV) [6], which points out the percentage variation in the mean as the standard deviation being shaped as the total variation in the mean. The coefficient of variation of price for each year (2012-2016) was worked out to contrast the variability present in the price of fresh turmeric.

$$CV = \frac{StandardDeviation}{Mean} \times 100 \quad (4)$$

### 2.3.4 Constraint analysis

The Garrett ranking technique [4,7,8] was exercised to detect the judgment of the farmers about the constraints faced by them in turmeric cultivation. Consequently, respondents were inquired to assign the rank for all the constraints and the outcome of ranking was converted into percent position by using the following formula.

$$PercentPosition = \frac{100 \times (R_{ij} - 0.5)}{N_j} \quad (5)$$

Where,

$R_{ij}$  = Rank given to  $i^{\text{th}}$  constraint by the  $j^{\text{th}}$  individual

$N_j$  = Number of constraints ranked by the  $j^{\text{th}}$  individual

The percent position estimated was switched into scores by using Garrett's Table [9]. Then for every constraint, the scores of each individual were put in and total value of scores and respective mean values of scores were computed. The constraint having the highest mean value was considered as the most significant factor.

## 3. RESULTS AND DISCUSSION

### 3.1 Financial Analysis

Per hectare item wise costs and returns in turmeric production were estimated and are presented in Table 1. Accordingly, the total cost of production was estimated at Rs. 616,128 comprising a material cost of Rs.164, 795, a machinery cost of Rs.10,833/-, a labor cost of Rs.428,000 and other miscellaneous items of Rs.12,500. The revenue earned by producing turmeric was estimated by multiplying the per hectare total amount of yield (32,000 kg) by its' average market price. Usually the farmers sell their products in fresh form in average market price of Rs.40.00. Even though the cost of production of turmeric was higher, still the gross revenue (Rs. 1,280,000) was also substantially higher resulting in better net returns (Rs.663, 872). This is also reflected in the higher Benefit Cost Ratio.

The average Benefit Cost Ratio (BCR) of 2.08 indicates that turmeric production was found to be a profitable venture in the study area. It implied that one rupee invested in turmeric farming would yield more than double the amount. Moreover, these findings are in conformity with the results attained by other studies [4,6,10,11,12] with regards to efficiency of use of capital in turmeric production. However, the majority of the farmers in the study area were still following conventional means of cultivation that led to the higher cost of cultivation. Hence, it is necessary to instruct the growers to use novel and superior techniques to minimize the cultivation cost. This would make possible in further enhancing profitability of turmeric cultivation.

Among the various items of expenditure, the proportionate share of labor was predominant as 69.5 percent of the total cost of production was

**Table 1. Costs and returns of turmeric production**

<b>Cost Details</b>	<b>Total value</b>	<b>Share (%)</b>
<b>A. Cost of materials (Rs./ha)</b>		
Seeds	90,000	14.61
Seed treatment	2,375	0.39
Agro chemicals	1,600	0.26
Mulching materials	7,500	1.22
Organic fertilizer	50,000	8.12
Inorganic fertilizer	13,320	2.16
Total cost of materials	164,795	26.75
<b>B. Cost of machinery(Rs./ha)</b>	<b>10,833</b>	<b>1.76</b>
<b>C. Cost of labor(Rs./ha)</b>		
Land preparation	112,000	18.18
Seed preparation	47,000	7.63
Crop maintenance	130,000	21.1
Fertilizer application	28,000	4.54
Harvesting	78,000	12.66
Processing	23,000	3.73
Other	10,000	1.62
Total cost of labor	428,000	69.47
<b>D. Miscellaneous costs (Rs./ha)</b>	<b>12,500</b>	<b>2.03</b>
<b>E. Total cost of production(A+B+C+D) (Rs./ha)</b>	<b>616,128</b>	<b>100</b>
Yield (Kg/ha)	32,000	
Cost of production per kg (Rs.)	19.25	
Average selling price (Rs./kg)	40	
<b>F. Gross revenue (Rs./ha)</b>	<b>1,280,000</b>	
<b>G. Net income(F-E) (Rs./ha)</b>	<b>663,872</b>	
<b>H. BCR</b>	<b>2.08</b>	

incurred on this factor. It inferred that the majority of the operations in turmeric farming are labor intensive [6,11,13]. Right from the stage of land preparation (18% of the total cost of production) to the harvesting stage (13%), a lot of manual labor is required. Though the use of machinery was observed limitedly, the majority of the growers rely mainly upon manual labor for land preparation, preparation of planting materials, crop maintenance, application of fertilizer and other agro-chemicals, harvesting and processing of the fresh produce. According to another similar study [14], the output elasticity of human labor was positive and significant for turmeric cultivation. Moreover, it implies that the increased usage of manual labor adds to the gross income. Thus, the labor-intensive operations in the turmeric cultivation would be significantly contributed towards increasing yield and income.

### 3.2 Seasonality of Price

The results indicated a great seasonal variation in the price index of fresh turmeric during the

year 2016, as shown in Fig. 1. Prices trended up seasonally from June and reaching to the peak in October then declined into the late and early months of the year. Accordingly, prices were lowest in March and April owing to the peak arrival season. Generally, the harvesting season begins between end of January and March then start entering into the market by March resulting the peak arrivals season between March and April. Simply, the law of demand applied in, where prices fall during the harvest season and rises during the lean period. These findings are in conformity with the findings of other studies [6, 15] as regards to the relevance of market arrival for turmeric price formation. Moreover, it was identified that the market arrival has a great impact on price formation and it is explained by an inverse relationship between market arrival and price.

The Government should initiate measures of market stabilization policies like allowing the availability of correct market information to both producers and consumers in order to reduce the

seasonal price fluctuations. Weak bargaining strength and very low retention power exist in small and medium scale farmers is becoming a major causative factor behind this peak market arrivals. The attributes like lacking proper storage facilities, low level of income under a disrupted income flow leading to indebtedness, social obligations and lacking proper infrastructure facilities [15] have deprived the farmers from withholding the surplus stock even for a week after harvesting.

### 3.3 Price Stability for Fresh Turmeric

In the study, coefficient of variation (CV) of price was computed to examine the price stability of raw turmeric and the results are presented in Fig. 2. The highest CV values point out price instability and lower values indicate price stability. Consequently, the value of CV varies significantly over time owing to irregular supply of turmeric signifying the price instability [16] of year

wise farm gate prices for fresh turmeric. Within the studied area, supply of turmeric mainly depends on the three factors namely weather factors (seasonal factors), farmer's decision and the government policies. Accordingly, the greater CV values obtained mainly due to weather factors, while at the latter part constructive government policies such as home gardening and subsidizing programs have lessened the price variation.

### 3.4 Constraints Analysis

The ranking of various constraints being faced by the sample turmeric growers were presented in the Table 2 using the Garrett's ranking technique. Accordingly, lack of knowledge, non-availability of labour, price volatility, shortage of quality planting materials and lack of proper information on markets [12] were the top five constraints ranked by the farmers.

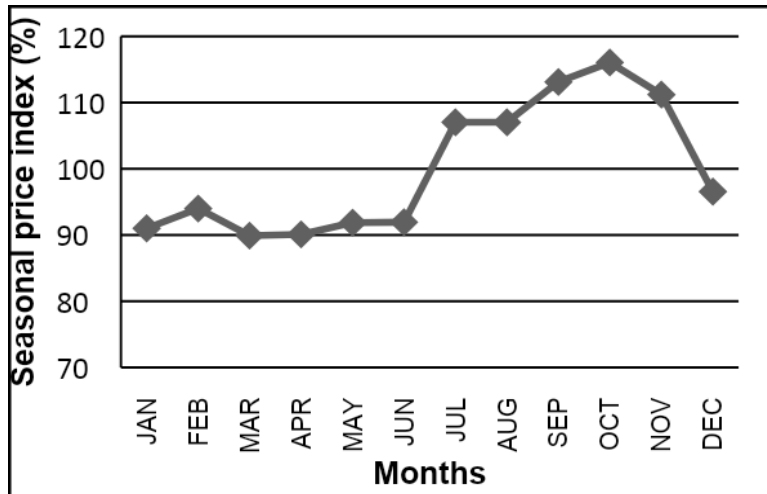


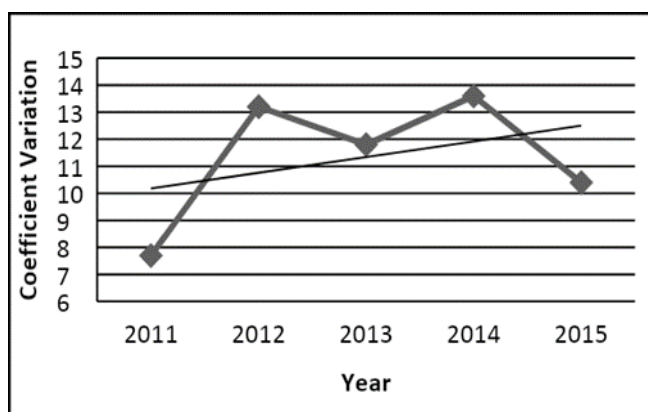
Fig. 2. The seasonal variation in the price index

Source: Author generated, 2018

Table 2. Constraints faced by turmeric farmers

Constraints	Mean Score	Rank
Lack of Knowledge	69.40	1
Non availability of labour	66.75	2
Price volatility	62.20	3
Shortage of quality planting materials	56.17	4
Lacking market information	46.68	5
Missing - established marketing systems	40.30	6
High wage rate	32.87	7
Attack of pest and diseases	25.63	8

Source: Author generated, 2018



**Fig. 3. The variation of CV of price**

Source: Author generated, 2018

The most significant constraint (Mean value= 63.6) was lack of knowledge on farming activities, as the majority of turmeric growers are still using traditional cultivation practices. Therefore, it is timely needed to educate farmers through adult education programs like suitable extension service delivery [8,17], in order to improve the existing productivity and income levels. As per the findings of another study [10], training has significantly reduced the inefficiencies prevailed in the turmeric growers. Thus, it can be suggested to offer frequent training programs and awareness campaigns [18] on new and improved cultivation practices linked to the scientific methods of turmeric cultivation.

Non-availability of labor [8] has been reported as the second major constraint (66.75) faced by the farmers, followed by the existence of volatile prices [12] leading to wide fluctuations of fresh turmeric prices throughout the year. Moreover, the prevailing labor shortage can be addressed mostly by means of low cost machineries and implements where appropriate. The study has disclosed that the continuous use of local seeds and low quality planting materials have made a felt unconstructive impact on turmeric yield. According to another study [14], high quality turmeric rhizomes are essential to boost the profitability of turmeric farming. Hence, the involvement of formal institutions to make available the quality planting materials at affordable rates is timely required.

#### 4. CONCLUSION

It is concluded that the turmeric production is profitable in the study area as estimated by net

returns and benefit cost ratios. As a policy option, frequent training and awareness campaigns should be extended to all the turmeric growers to facilitate the use of improved cultivation practices.

#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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