

Constraint Measures of Production and Future Cultivation Decision of Black Pepper Cultivators of Kerala.

Dr Revathi K Sivasdas

Assistant Professor in Economics, Department of Economics, Bharata Mata College, Trikkakka, Ernakulam, India.

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ABSTRACT: *Black pepper, the 'King of Spices', it is the most ancient and important spices exported from the 'Home of Spices', India. Indian black pepper and cardamom occupy an enviable place in the international spices market due to their unique quality, flavour and aroma. India, as in the context of these crops, has enjoyed a comparative advantage in quality and natural monopoly. Globally, India contributes the largest area for these crops. Historically black pepper and cardamom in India, which are export-oriented crops and its contribution is sizable. But currently, in India's production in black pepper has been tiny relative to the area of these crops. As being a perennial crop black pepper faced year to year instability in production and also identified area- production gap became wide in these period. In the spices sector, Kerala is unique and distinct from other major states namely, Karnataka and Tamil Nadu. Kerala accounts 79.7 per cent of pepper production in India. Black pepper production face a lot of challenges and constraints and it categorised into four: cultivation, labour, economic and trade constraints. Because of these constraints, the cultivators are difficult to meet profit condition and it negatively affected future cultivation decision of cultivators on these crops and it analysed through garret ranking and multiple regression method. Thus, regulatory attention is needed for efficient utilisation of available area of spices and it helps to the utilisation of emerging market opportunities under the globalised era.*

Key Words: *Production, black pepper, future cultivation decision, constraints.*

1.1 Introduction

India is known as the "home of spices", and the agro-climatic conditions of India generates a 'natural monopoly' for spices. The historical facts elucidated, India has a deep-rooted historical contextual over 3500 years in the global trade of spices (John, 2003) and it expounds that the rest of the world has intensively demanded the legendary spices wealth of India from the ancestral period. Spices are mainly cultivated for commercial and trade-oriented purpose. Thus it is an important growth - stimulus subsector of the agricultural economy of India in general and Kerala in particular. Black pepper, which is considered as the "King of Spices" is one of the most ancient and important spices exported from India.

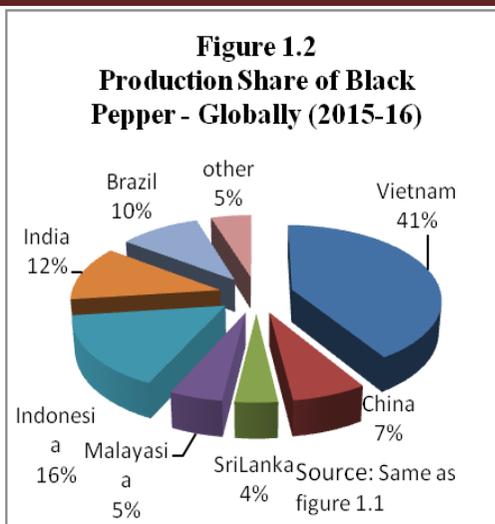
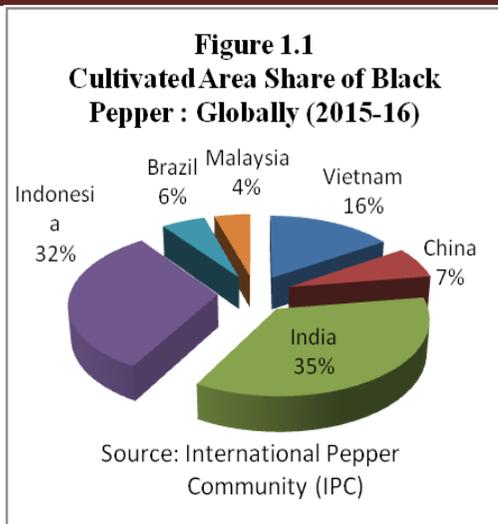
Among the total spices, black pepper contributes the lion's share both domestically and internationally from the time immemorial. India holds the formidable position as a producer of spices in the world and it accounts for 12.98 per cent of the area and 11.5 per cent of aggregate production of horticulture crops. India is producing six million tonnes of spices a year and exporting around 180 spices, over 160 countries in substantial quantities and in good qualities (Spices Board, 2015). In 2015-16, the total area under spices cultivation was 3574000 hectare and production 6988000 tonnes, of which the area under black pepper was 128800 hectare and produced 48500 tonnes. Globally, the spices sector played a noticeable role. In India, these crops are mainly produced in Kerala, Karnataka and Tamil Nadu. Kerala and Karnataka contribute the major portion of the production of black pepper.

Thus the development of this sector helps to increase per capita income, the standard of living of the people and at the same time, it helps to increase the foreign exchange earnings.

1.2 Global Context of Black Pepper

In the global market, Indian black pepper is famous on the basis of its geographical indicators, such as Malabar Pepper. International Pepper Community reported that globally, the total black pepper cultivated area has not shown any sizeable change when considered as a whole.

The contributions of major countries are depicted in Figures 1.1 and 1.2.



Globally, India contributes the highest share in the black pepper cultivated area and is reported as 35 per cent (1, 28,800 hectares), and the second position goes to Indonesia, 32 per cent (116,000 hectares) in 2015-16. At the same time period, the reported cultivated area of Vietnam was 16 per cent (57,000 hectares). As regards the cultivated area, India holds the first place and more than doubles that of Vietnam. But with regard to production, the share of Vietnam is 41 per cent as against India's share of 12 per cent. Indonesia holds the second position in both area and production of black pepper. Major countries production share of black pepper is visualised in Figure 1.2

1.3 Design and Methodological Aspects

In the current global market, Indian black pepper is witnessing the highest contribution in the cultivated area and on the other hand, the share of production this crop decreased dramatically. Thus, the problem is raised and it's mainly related to production facets.

Thus as in the standpoint of black pepper identified that being as a perennial crop, black pepper faced year to year **production instability and deteriorated production growth rate** and also identified that **area - production gap is widened** in the present scenario.

Thus, it is very obvious that, only by identifying the constraints emerged in the production aspects of black pepper current period, the problems can be solved and move towards prosperity. Therefore, here address the production constraints on future cultivation decision of cultivators.

The main **objective** of this study is to find out the effect of production constraints on the future decision of cultivation of black pepper in Kerala. The study **hypothesised (H0)** that the production constraints have no influence on the future decision of black pepper cultivation in Kerala.

The study followed primary data analysis and its nature is empirical and descriptive. The area considered for the study is Idukki and Wayanad Districts in Kerala. Idukki and Wayanad districts are selected on the basis of their contributions to the total area for the cultivation of black pepper. For selecting the suitable respondents of the study, the researcher considered three taluks from Idukki districts, namely, Udumpanchola, Peerumedu and Devikulam and three taluks from Wayanad district such as Manathavady, Sulthanbathery and Vythiri. For the purpose of selecting the sample, the study adopted the Morgan, (1970) table at a confidence level of 95 per cent and 5 per cent margin of standard error and fix the adequate sample size of pepper cultivators as 381. Thus, the sampling technique adopted for the study is the disproportional stratified random sampling method. The primary data were collected from the pepper cultivators using the interview schedule.

The framework of analysis includes various statistical techniques used for data analysis in tune with the objectives of the study which helps to arrive at meaningful conclusions. The collected data was coded using SPSS package and various appropriate statistical tools were used for analysis on the basis of objective such as Descriptive Statistics, Garret ranking, Factor analysis, and Multiple Regression Analysis.

1.4 Production Constraints of Black Pepper Cultivators

Production constraints that work as bottlenecks and it restrict the attainment potential output. This segment mainly focused to explain and analyze the major production constraints of black pepper.

1.4.1 Clustering of production constraints faced by the pepper cultivators: Exploratory Factor Analysis

Table: 1.1
Reliability analysis on the production constraints faced by the pepper cultivators
KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	.783
Approx. Chi-Square	42757.315
Bartlett's Test of Sphericity	Df 378
	Sig. .000

Source: Computed from primary data

Table 1.1 reveals that the selected variables are statistically significant and exhibits a high relationship among the clusters of production constraints faced by the pepper cultivators.

Table: 1.2 Clustering of production constraints faced by the pepper cultivators

Factor	Parameters	Rotated Factor Loadings
Cultivation Constraints 29.51 % of Variance	High cost of cultivation	0.779
	Low Productivity	0.761
	Problems of replanting	0.754
	Lack of finance	0.689
	Destruction of crops due to drought	0.668
	Low Production	0.632
	Lack of access to input	0.621
	Inadequate quality improvement programme	0.604
	Poor genetic trait	0.534
	Climate changes	0.515
Labour Constraints 17.72 % of Variance	Pest and diseases of plant	0.502
	Factor 2:	
	High expenditure on wage	0.772
	Migration of plantation workers to other occupations	0.757
	Out dated plantation labour laws	0.673
	Lack of work culture among labourers	0.624
	Scarcity of agricultural workers	0.584
Trade Constraints 13.15 % of Variance	Low labour productivity	0.531
	Labour unrest and indiscipline	0.496
	Factor 3:	
	Poor selling prices and low margin	0.699
	Seasonality of production	0.627
Problems in the auction system	0.766	
Severe competition from abroad	0.709	
Marketing problem	0.718	
Economic Constraints 7.75 % of Variance	Factor 4:	
	Volatility in general prices	0.763
	Dull & slow economic activity in the spices growing places	0.659
	Mounting indebtedness among spices Cultivators	0.583
	Lack of local market demand	0.537
Lack of price stabilization measures	0.505	
Total Variance Explained : 68.13 % Variance		

As in evident from Table 1.2, out of the 28 parameters of production constraints faced by the pepper cultivators, 4 factors have been extracted and these four factors explain the total variance of production constraints faced by the pepper cultivators to an extent of 68.13 percent. It is identified that the loading patterns of the factors suggest a strong association among the parameters and all these variables are found to be contributing to the production constraints faced by the pepper cultivators.

1.4.2 Production Constraints faced by the Black Pepper Cultivators: Garret Ranking

There are various types of production constraints faced by black pepper cultivators. This segment tries to rank the identified production constraints through the garret ranking method.

Table: 1.3 Descriptive statistics on cultivation constraints faced by the pepper cultivators

Cultivation constraints	Mean	Rank
High cost of cultivation	4.02	5
Low productivity	4.54	1
Problems of replanting	4.14	4
Lack of finance	3.19	7
Destruction of crops due to drought	3.64	6
Low Production	4.21	3
Inadequate quality improvement programme	3.64	6
Poor genetic trait	4.02	5
Climate changes	4.14	4
Pest and Diseases of plant	4.36	2

Source: Computed from primary data

Table 1.3 reveals that the cultivation constraints faced by the pepper cultivators. The stagnant and declining pepper productivity is mainly because of biotic stress i.e. the prevalence of epidemic diseases and pest attacks. The major diseases are foot rot or quick wilt (*phytophthoracapsicoleonian*), pollu disease or anthracnose (*colletotrichumgloeosporioidespenz. and sacc.*), slow wilt or slow decline (*phytophthoracapsici fungi*) and black pepper also faced pest attacks such as, pollu beetle, top shoot borer, leaf gall thrips, mussel scale insects, etc. are increasingly spreading. The productivity reduction influenced cultivators incentive to take care of pepper crop. M. Hema, et.al, (2007), states that the black pepper yield had reduced to one-third and the cultivators in India were hardly able to harvest 282 kg/ha of pepper as compared to other competing countries like Vietnam and Malaysia, where the yield of pepper is more than 1500 kg/ha.

Black pepper is always associated with vulnerable price fluctuations and it harmfully affected the productivity of black pepper (Sabu, 2015). Because of the perennial nature, there is limited flexibility in the production level to market-driven forces and it has been causing a lot of risks faced by cultivators related to income instability, sustainability, living conditions, etc. Automatically, farmers give low attention and low investment or abandoning the cultivation of the crop in many of the years. Finally, the price uncertainty in different ways influences the productivity of this crop. Agricultural trade liberalization is one of the main reasons for price fluctuations of this crop Sabu, (2015).

Table 1.4 Descriptive statistics on labour constraints faced by the pepper cultivators

Labour constraints	Mean	Rank
High expenditure on wage	4.63	1
Migration of plantation workers to other occupatio	3.24	5
Out dated plantation labour laws	1.78	6
Lack of work culture among labourers	4.54	2
Scarcity of agricultural workers	3.85	4
Low labour productivity	4.47	3
Labour unrest and indiscipline	1.21	7

Source: Computed from primary data

The labour constraints faced by pepper cultivators are presented in Table 1.4. Labour is needed for planting, plant protection, application of chemical and fertilizer, plucking of crop, threshing and weeding etc. In the case of black pepper plucking the labour has to climb up on a ladder to pluck the fruits borne in the top of the vines are spread and it is a time taken process and it automatically leads to increasing expenditure on wage. With the high labour expenditure, pepper cultivators faced the problems related to lack of work culture, low productivity and the shortage of labour due to migration. Labour shortage is long-lasting trouble for the farmers as it requires various policies, incentives and perks in order to keep the continuous supply of labour for their farmNRPP, (2012).

Table: 1.5 Descriptive statistics on trade constraints faced by the pepper cultivators

Trade constraints	Mean	Rank
Poor selling prices and low margi	4.74	1
Seasonality of production	4.58	2

Problems in the auction system	3.63	4
Severe competition from abroad	2.24	5
Marketing problem	3.85	3

Source: Computed from primary data

The trade constraints faced by pepper cultivators is presented in Table 1.5. As in the context of trade constraint, the study identified that the pepper cultivators' attained low margin from their production. The low margin is not only related to endogenous variables but also it is linked to exogenous variables. Mainly influenced endogenous variables are high cost of cultivation, pest and diseases attack, poor genetic trait, inferior quality, etc. and the main exogenous variables is that price of the crop. The cultivators of pepper are not satisfied with their attained profit margin because of poor prices of pepper (Thomas, 2009). The domestic prices are falling continuously over the years on account of illegal import to India as well as the decline of international prices. The study conducted by (M. Hema, et.al, 2007) revealed that the production of pepper has become unremunerated due to depressed prices in the domestic and global markets coupled with increasing input costs. The low margin influences the cultivator's decisional parameters related to enlarging area and marginal investment.

Table: 1.6 Descriptive statistics on economic constraints faced by the pepper cultivators

Economic constraints	Mean	Rank
Volatility in general prices	4.85	1
Dull & slow economic activity in the spices growing places	4.58	3
Mounting indebtedness among spices cultivators	4.24	4
Lack of local demand	1.74	5
Lack of price stabilization measures	4.63	2

Source: Computed from primary data

The economic constraints faced by the pepper cultivators are given in Table 1.6. They are many factors influencing price fluctuations like international prices, national and international agricultural policies, demand and supply aspects in both national and global economy, competition, etc. Internationally, the price of black pepper changes more than five percent from one month to another (Chopra. A and Bessler D.A, 2005). In 1989-90, the annual average price of black pepper (Malabar Garbled) in Cochin market was Rs.42 per kilogram and it declined to Rs. 28.50 per KG in 1992-93 and in 2002-03 it increased to Rs. 88.32 but it subsequently declined to Rs.66.44 per KG in 2005-06. Thereafter the price of black pepper showed a growth trend and reached at Rs.140.16 in 2007-08, but it again declined to Rs. 129.30 in 2008-09. After 2009-10, the price of black pepper was continuously rising and reached at Rs. 686.46 in 2014-15. Since 2015-16, it showed a slightly declining trend and it stood at Rs. 655.12 (Spices Board, various issues). Thus, the data clearly show the intensity of black pepper price volatility. Recently, as part of the decline in the domestic price of black pepper due to cheaper import from other competing countries (through various free trade agreements) has created a major concern among pepper cultivators. Black pepper prices have gone down by approximately 35 per cent in one year and it created a lot of uncertainty and risk for pepper cultivators (Business Line, 2017). Thus, the government of India in December 2017 implemented Minimum Import Price (MIP) of Rs.500 per kg on the pepper.

In India, total pepper Kerala contributes major share than Karnataka and Tamil Nadu. Thus, the production constraint of black pepper creates production instabilities that not only affected in Kerala's production but also create all India level production instabilities.

1.5 Future decision of cultivation by pepper cultivators: An Analysis

The study identified that the cultivators faced a lot of production constraints related to the cultivation of black pepper viz., cultivation, labour, trade and economic constraints. This segment concentrated to analyze the influence of production constraints on future cultivation decision. The future decision of cultivators of pepper under production constraints is analyzed on the based five statements as depicted in Table 1.7

Table: 1.7 Future decision of cultivation by pepper cultivators

Future Decision of Cultivation	Percent
Sell away the presently cultivated land	6
Stay on the spices cultivation but no more further investment	29
Shifted to any other alternative crops	18

Stay on spices cultivation but also ready to dispose of the cultivable land	13
Continue spices cultivation and also shift to alternate crops	34

Source: Computed from primary data

It is found that about 34 percent cultivators are willing to continue spices cultivation and also shift to any other alternate crops, about 29 percent are willing to stick on spices cultivation but with no further investment and about 18 percent of pepper cultivators are willing to shift to alternative crops. It is also found that about 13 percent of the cultivators are willing to continue spices cultivation but ready to dispose of the land and only 6 percent of cultivators are willing to sell away the cultivated land.

1.5.1 Influence of production constraints on future decision of pepper cultivation: Multiple Regression Analysis

Multiple regression coefficient measures the relationships between variables, it identifies the effect of independent variables on the dependent variable. It indicates that the prediction of the value of dependent variable changes when any one of the independent variables varied, while other independent variables are fixed (Armstrong & Scott, 2012).

H₀: Production constraints have no influence on the future decision of pepper cultivation

Here the multiple regression analysis for the future decision of pepper cultivation (Y) was performed with 4 independent variables of production constraints like Cultivation constraints (X₁), Labour constraints (X₂), Trade Constraints (X₃), Economic Constraints (X₄)

$$Y = a_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4$$

Where b_i is the Unstandardized beta coefficients of each variable and a₀ is a constant value.

Intercorrelation between the variables of production constraints revealed that all the predictor variables entered simultaneously for regression equation because no multicollinearity exists among the selected 4 predictor variables.

Table: 1.8 Model Summary showing the influence of production constraints on the future decision of pepper cultivation

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.855	.731	.726	.233
<i>Predictors: (Constant), Cultivation constraints (X1), Labour constraints (X2), Trade Constraints (X3), Economic Constraints (X4)</i>				
<i>Dependent Variable: Future decision of pepper cultivation</i>				

Source: Computed from Primary Data

The model summary table shows the overall predictability of the regression model. Adjusted R² value 0.726 states that all the four independent variables of production constraints have 72.6 percent influence on the dependent variable called future decision of pepper cultivation. Thus it is inferred that the production constraints have an effect on the future decision of pepper cultivation.

Table: 1.9 ANOVA of Multiple Regression (Black Pepper)

Model		Sum of Squares	Df	Mean Square	F	Sig.
II	Regression	63.708	4	15.92	265.33	.000*
	Residual	23.479	376	0.06		
Total		87.188	380			
<i>Predictors: (Constant), Cultivation constraints (X1), Labour constraints (X2), Trade Constraints (X3), Economic Constraints (X4)</i>						
<i>Dependent Variable: Future decision of pepper cultivation</i>						

Source: Computed from Primary Data

* 5 Percent level of significance

ANOVA results reveal p-value as 0.000 (F value = 265.33) which is less than 0.05 and it indicates that the regression model is statistically significant. So the null hypothesis is rejected and accepted the research hypothesis. Hence there is a significant relationship between the variables tested in the hypothesis. This shows that the factors of production constraints are closely associated and have an effect on the future decision of pepper cultivation.

Table: 1.10 Coefficients of Multiple Regression Analysis

Model	Variables of production constraint	UC		SC	T	Sig.
		B	SE	Beta		
	(Constant)	-2.642	.107		-18.732	.000*
	Cultivation Constraints	-.735	.037	-.766	-15.839	.001*
III	Labour Constraints	-.666	.041	-.622	-9.840	.000*
	Trade Constraints	-.714	.031	-.735	-12.674	.002*
	Economic Constraints	-.715	.049	-.736	-14.486	.000*

Source: Computed from Primary Data

* 5 Percent level of significance

It is identified from Table 1.10 that, the variables of production constraints like Cultivation Constraints (Beta Coefficient = -0.766 Sig = .001), Labour Constraints (Beta Coefficient = -0.622, Sig = .000), Trade Constraints (Beta Coefficient = -0.735, Sig = .002), Economic Constraints (Beta Coefficient = -0.736, Sig = .000) have significant negative effect on future decision of pepper cultivation, since all the significant values of predictor variables is less than 0.05. It reveals that the cultivation constraint has the highest significant negative effect on the future decision of pepper cultivation.

The multiple regression equation for predicting the future decision of pepper cultivation is as follows:

$$\text{Future decision of pepper cultivation} = -2.642 + (-.735 \times \text{Cultivation Constraints}) + (-.666 \times \text{Labour Constraints}) + (-.714 \times \text{Trade Constraints}) + (-.715 \times \text{Economic Constraints})$$

Hence it is concluded that production constraints have a significant negative effect on the future decision of pepper cultivation.

1.6 Conclusion

Black pepper cultivators face various types of production constraints related to cultivation, labour, trade and economic. The study result revealed that significant association between production constraints and future cultivation decision of cultivators. Thus, on the basis of the statistical result, the study rejected the null hypothesis and accepted the research hypothesis. In the current scenario, the cultivators face internal and external constraints, price instability, uncertainty and high risk etc. However, owing to perennial nature and geographical features sudden and complete shutdown of cultivation is not easily possible, thus, in this situation the producer also oscillating their attention on this crop on the basis of market conditions. Thus, there is formed high instability in the production of black pepper. The production instabilities would be automatically influenced export market.

1.7 References

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