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SUBJECT III
AGRICULTURAL TRADE WITH SPECIAL REFERENCE TO
PLANTATION CROPS AND INTERNATIONAL
TRADE AGREEMENTS

Performance and Determinants of Exports of Coffee from India: A Post-WTO Scenario

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ABSTRACT

Coffee is an important plantation crop and has high export potential. About 70 per cent of total coffee produced in India is exported. India ranks fifth in total coffee exports in the world. The share of coffee export in total agricultural exports, depict a decreasing trend in recent years. To analyse the performance of coffee in post-WTO era, the time series data was divided into three periods, i.e., Period I (1995-96 to 1999-00), Period II (2000-01 to 2008-09) and Period III (2009-10 to 2018-19). Except in Period II, the quantity of export was showed positive and significant growth rate, instability of value of export and unit value of export was higher in Period II as compared to period I and III. Russian Federation, Italy, Germany, Spain, Belgium, Poland are the major export destinations of Indian coffee. Transition Probability Matrix was estimated to examine the retention probability of export share of Indian coffee among the major importers for the aforementioned periods. Markov chain process was used to forecast the share of export of Indian coffee among major importers for 2019-20 to 2024-25. The international price of coffee, exchange rate between rupees and dollars and lagged production of coffee were the few determinants of export of coffee.

Keywords: Coffee, Export, Instability, Markov Chain, Transition Probability Matrix.

JEL.: F13, F17, Q11, Q17

I

INTRODUCTION

The Western Ghats in India is the hub of coffee cultivation. The major coffee producing states in India are Karnataka, Kerala and Tamil Nadu, which together contribute about 97 per cent of India's coffee production. Coffee is predominantly an export-oriented commodity and 65 per cent to 70 per cent of coffee industry earns a foreign exchange to the tune of about ₹4,000 crores (Gurusamy and Yamakanith, 2015). The two main varieties of coffee viz., Arabica and Robusta are grown in India. Arabica has more market value than robusta coffee due to its mild aromatic flavour. Robusta mainly used in making various blends due to its strong flavour. Cool and equitable temperature, high altitude and temperature ranging between 15°C to 25°C, is favourable for arabica cultivation.. On the other hand hot and humid climate with

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temperature ranging from 20°C to 30°C is suitable for robusta cultivation. Harvesting of Arabica coffee takes place between the months of November to January, while December to February month is suitable for harvesting of robusta coffee.

India is one of the founder members of World Trade Organization (WTO). The establishment of WTO in 1995, helped from providing a major stimulus for liberalisation of the agricultural sector in our country. India undertook several policy measures to reform its farm sector, in order to fulfil its obligation under WTO Agreements on Agriculture (AoA). Market access, domestic support and export subsidies were the three broad areas of obligation under WTO for India. Reduction of export subsidies has increased the international price of the agricultural commodities, which also provided a golden opportunity for India to boost its exports by making it more competitive in international market. Coffee is an important plantation crop for export, besides the industry has low input intensity and high employment potentiality. The present study has focused mainly to assess the export performance of Indian coffee, discuss the prospects of coffee exports in future and also understand the factors affecting the export of coffee from India.

II

DATA AND METHODOLOGY

The present study is based on export quantity, value of export and unit value of export of coffee from India to major importing countries by compiling the data for 23 years (1995-96 to 2018-19). For the analysis, the total period is sub-divided into three periods, viz., Period I (1995-96 to 1999-2000), Period II (2000-01 to 2008-09) and Period III (2009-10 to 2018-19). The data on export quantity, value of export, unit value of export and production of coffee was collected from *Indiastat.com* website. Data on international price of coffee was collected from FAOSTAT and data on exchange rate was collected from RBI's publications.

Growth and Instability Indices

Compound annual growth rates estimated by using following exponential growth function,

$$y = ab^t$$

where,

y= Dependent variable for which the growth rate was estimated

a and b= parameters of exponential regression

T= Time variable

Compound growth rate was estimated from the fitted exponential regression parameter b

Average annual compound growth rate was calculated as:

Compound growth rate= $\text{antilog}(\log b - 1) * 100$

Significance of growth was judged by student's t-test.

Coefficient for Variation and Instability

In order to study the variability, coefficient of variation and "Cuddy and Della's instability index" was used as the measures of variability.

Coefficient of Variation (CV)

The coefficient of variation (CV) was calculated by the formula

$$C.V(\%) = \left(\frac{\sigma}{\bar{x}} * 100\right)$$

$$\text{Standard deviation } (\sigma) = \sqrt{\frac{\sum(x-\bar{x})^2}{n}}$$

\bar{x} = Arithmetic mean

n = Number of observation

Cuddy and Della Index

Coefficient of variation defined above does not take trend components prevailing in time series data. In order to have a meaningful measure of instability the formula suggested by Cuddy and Della (1978) was used to compute the degree of variation around the trend. The formula suggested by Cuddy and Della (1978) was used to compute the degree of variation around the trend.

$$\text{Index of Instability} = C.V * 100 * \sqrt{1 - \text{adj}R^2}$$

where,

Adj R² = Adjusted R² of the trend equation

Analysing Trade Directions

The trade directions of export were analysed using the first order Markov chain approach. Central to the Markov chain analysis is the estimation of transitional probability matrix P_{ij}. The elements P_{ij} of the matrix P indicates the probability that export will switch from i-th country to the j-th country with the passage of time (Dent, 1967; Lee *et al.*, 1970; Gillet, 1976). The diagonal elements of the matrix measure the probability that the export share of a country will be retained. Hence, the examination of the diagonal elements will indicate the preference of an importing country for a particular country's exports.

In the context of the present study, the structural changes were treated as a random process with selected importing countries. The average export to a particular

country was considered to be a random variable which depended only on the past exports to that country, and can be denoted algebraically by Equation (1):

$$E_{jt} = \sum_{i=1}^r E_{it-1} P_{ij} + e \quad \dots(1)$$

where, E_{jt} denotes exports from India to the j -th country during the year t , E_{it-1} denotes exports from India to the i -th country during the period $t-1$, P_{ij} is the probability that exports will shift from the i -th country to the j -th country, e_{jt} is the error- term which is statistically independent of E_{it-1} , t is the number of years considered for the analysis, and r is the number of importing countries. The transitional probabilities P_{ij} which can be arranged in a matrix($c \times r$) have the following properties:

$$0 \leq P_{ij} \leq 1$$

$$\sum_{j=1}^r P_{ij} = 1 \text{ for all 'i'}$$

The minimum absolute deviation (MAD) estimation procedure was employed to estimate the transitional probability, which minimises the sum of absolute deviations (Fisher, 1967; Wagner, 1959). The conventional linear programming technique was used, as this satisfies the properties of transitional probabilities of non-negativity restrictions and row sum constraints in estimation. The linear programming formulation is stated as:

$$\text{MinOP}^* + Ie$$

$$\text{Subject to, } XP^* + V = Y, GP^* = 1, P^*e \geq 0$$

where,

0= Vector of zeroes,

P^* = Vector in which probability P_{ij} is arranged,

I= Appropriate dimensioned column vector of unit,

E= Vector of absolute error ($|U|$),

Y= Vector of export to each country,

X= Block diagonal matrix of lagged values of Y,

V= Vector of errors, and

G= Grouping matrix to add the row elements of P as arranged in P^* to unity.

After calculating the transitional probability matrix, the expected shares of export were calculated by equation (2):

$$Y_{jt} = \sum_{j=1}^r y_{it-1} * P_{ij} \quad (j = 1,2,3 \dots \dots r) \quad \dots (2)$$

where, Y_{jt} is the predicted proportions of the j-th country's share at time 't', Y_{t-1} is the observed proportion of the i-th country's share at time 't-1', and P_{ij} is the estimated transitional probability matrix.

Thus, the expected export shares of each country during period 't' were obtained by multiplying the export to these countries in the previous period (t-1) with the transitional probability matrix. Multiple regression analysis was carried out, using ordinary least square (OLS) estimation procedure, in the statistical software E-Views.

Determinants of Exports

The factors affecting the exports of coffee were identified using log-log linear type of function:

$$\ln QT = b_0 + b_1 \ln INTT + b_2 \ln INTC + b_3 \ln ER + b_4 \ln PCC + b_5 \ln P + \mu \quad \dots (3)$$

where,

QT= total coffee export from India ('000 t),

INTC= international price of coffee (\$/kg),

ER= exchange rate with dollar (₹/\$)

PCC= per capita consumption of coffee(gm)

P= production of coffee('000 tonnes),

μ = error-term, and

b_1, \dots, b_5 are the regression coefficients and b_0 is a constant.

III

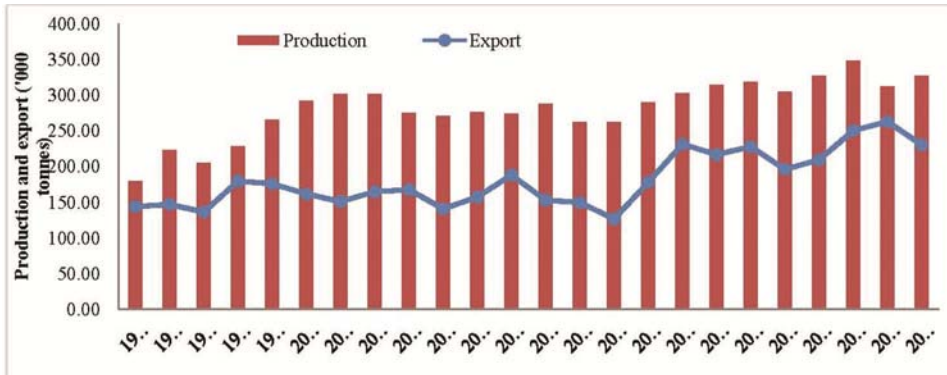
RESULTS AND DISCUSSION

India's Coffee Production and Export Scenario

India ranks seventh in coffee production and fifth in coffee export in the world. In 2017-18, India produced 326 thousand tonnes of coffee (Figure 1). Out of this, 70 per cent, i.e., 229 thousand tonnes was exported. Coffee production in India is dominated in the hill tracts of south Indian states, with Karnataka accounting for 71 per cent, followed by Kerala with 21 per cent and Tamil Nadu with 5 per cent of total production (Indiastat.com).

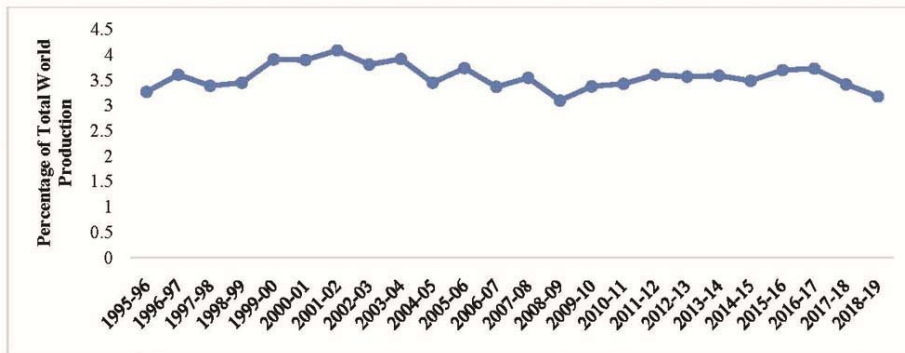
India's share in world's coffee production has almost remained the same during post- WTO period. It was 3.26 per cent in 1995-96 and 3.17 per cent in 2018-19 (Figure 2).

India stands in fifth position in total coffee export of the world (3.02 per cent) after Brazil (23.92 per cent), Vietnam (21.18 per cent), Colombia (9.35 per cent), Indonesia (3.64 per cent) and Honduras (5.64 per cent) (Figure 3).



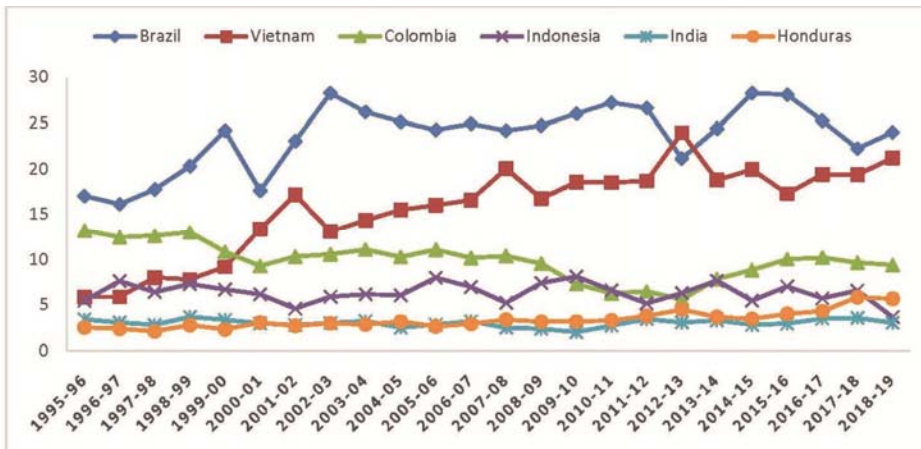
Source: FAOSTAT.com

Figure 1. India's Production and Export of Coffee during 1995-96 to 2018-19.



Source: FAOSTAT.com

Figure 2. India's Share in Total World Coffee Production.



Source: FAOSTAT.com

Figure 3. Share of Major Countries in World Export of Coffee (in Percentage of Total).

The value of coffee exports had increased four-fold from ₹ 1,527 crore to ₹ 6,159 crore in 2017-18, however in the subsequent year it has decreased to ₹ 5,814 crore due to reduction in export quantity (Table 1). The share of coffee exports to total agricultural exports had decreased almost threefold from 7.48 per cent in 1995-96 to 2.12 per cent in 2018-19. The reason behind this was higher exports of agricultural products other than coffee.

TABLE 1. SHARE OF INDIAN COFFEE EXPORT TO TOTAL AGRICULTURAL EXPORTS DURING 1995-96 to 2018-19

Year (1)	Total coffee export		Unit value (₹/tonne) (4)	Agricultural export (in ₹ crore) (5)	Per cent share of total coffee export in agricultural export (6)
	Quantity ('000tonnes) (2)	Value (in ₹ crore) (3)			
1995-96	170	1,527	89,314	20,397.74	7.48
1999-2000	244	1,901	77,619	25,131.66	6.87
2009-10	196	2,071	1,05,645	89,341.50	2.32
2014-15	275	4,905	1,78,146	2,39,681.04	2.04
2015-16	310	5,060	1,63,109	2,15,396.55	2.34
2016-17	346	5,477	1,58,332	2,26,651.91	2.41
2017-18	392	6,159	1,57,205	2,51,563.94	2.45
2018-19	353	5,814	1,64,451	2,74,571.28	2.12

Source: Indiatat.com

Growth and Instability of Coffee Exports from India

The compound annual growth rate of India's coffee exports from 1995-96 to 2018-19 is presented in Table 2. During Period I (1995-96 to 1999-2000) export quantity increased at a higher rate (9.13 per cent) than value of export (6.34 per cent), which caused negative growth rate in unit value of export (-2.55 per cent). However growth rate of export quantity turned out negative (-1.09 per cent) during Period II (2000-01 to 2008-09), value of export and unit export value of coffee showed a positive and significant growth rate of 9.16 and 10.41 per cent per annum, respectively. In Period III (2009-10 to 2018-19), growth rate of quantity of export turned into positive and significant (2.47 per cent) and growth rate of both value of export and unit value of export reduced to 5.87 per cent and 3.36 per cent respectively. The exports of agricultural and allied products registered an increasing trend during recent period due to the factors such as adaption of National Agriculture Policy (NAP) by the Government of India, establishment of Agri Export Zones (AEZs), Vishesh Krishi Gram Udyog Yojna (VKGUY) and opening of agriculture under WTO (Sahni, 2014).

Instability of export quantity increased with time, it was 6.64 per cent in period I, 7.34 per cent in period II and 9.64 per cent in period III. This was due to variability in export quantity. However, instability in value of export increased from 4.61 per cent in period I to 17.77 per cent in period II. Similar trend has been observed in case of unit value of export which increased from 8.36 per cent to 12.86 per cent. This was due to volatility in world prices and political situation in international markets. In

Period III, instability of value of export and unit value of export reduced to 5.30 and 5.26 per cent, respectively, due to more stable trade policies initiated by the Government of India.

TABLE 2. GROWTH, COEFFICIENT OF VARIATION AND INSTABILITY ANALYSIS ON EXPORT OF COFFEE IN INDIA

Particulars (1)	Parameters (2)	Export quantity (‘000 tonnes) (3)	Export value (₹ crore) (4)	Unit value (₹ /tonne) (5)
Period I (1995-2000)	CGR	9.13**	6.34***	-2.55***
	CV (per cent)	15.51	10.50	8.37
	Instability index	6.64	4.61	8.36
Period II (2000-2010)	CGR	-1.09***	9.16***	10.41***
	CV(per cent)	7.58	31.92	33.09
	Instability index	7.34	17.77	12.86
Period III (2010-2019)	CGR	2.47***	5.87***	3.36***
	CV (per cent)	11.44	11.49	6.84
	Instability index	9.64	5.30	5.26

Note: ***, **, * showed significance at 1, 5 and 10 per cent level respectively.

Major Export Destinations of Indian Coffee

Indian coffee is mainly exported to Italy (20.09 per cent), Germany (8.78 per cent), Russian Federation (7.78 per cent), Belgium (5.60 per cent), Poland (3.80 per cent) and Spain (1.88 per cent) (Table 3).

TABLE 3. SHARE OF COFFEE EXPORT FROM INDIA TO MAJOR COUNTRIES DURING 2013-14 to 2018-19
(values in ₹ crore)

Year (1)	Russian Federation (2)	Italy (3)	Germany (4)	Spain (5)	Belgium (6)	Poland (7)	Others (8)	Total (9)
2013-14	272.22 (5.85)	1074.80 (23.11)	469.90 (10.10)	79.20 (1.70)	298.36 (6.42)	36.25 (0.78)	2455.84 (52.03)	4650.31 (100)
2014-15	372.47 (7.59)	1007.47 (20.54)	472.95 (9.64)	92.46 (1.88)	249.12 (5.08)	78.16 (1.59)	2711.48 (53.68)	4905.96 (100)
2015-16	440.16 (8.70)	1113.02 (22.00)	481.31 (9.51)	82.28 (1.63)	297.57 (5.88)	92.40 (1.83)	2645.37 (50.46)	5059.71 (100)
2016-17	479.05 (8.75)	1168.40 (21.33)	552.79 (10.09)	123.31 (2.25)	353.77 (6.46)	155.30 (2.84)	2800.14 (48.29)	5477.46 (100)
2017-18	452.68 (7.35)	1120.66 (18.19)	631.06 (10.25)	137.63 (2.23)	372.98 (6.06)	217.66 (3.53)	3444.21 (52.39)	6159.23 (100)
2018-19	452.62 (7.78)	1167.95 (20.09)	510.40 (8.78)	109.60 (1.88)	325.73 (5.60)	221.05 (3.80)	3248.29 (52.06)	5814.59 (100)

Source: Indiatat.com.

Note: Figures in parentheses indicate per cent to total.

Trade Direction of Coffee Export from India

The direction of trade of coffee to different destination for various periods was examined by estimating transitional probability matrix (TPA) in Table 4. There are five major countries, which are importing coffee from India, rest of the countries are

pooled under other countries. The diagonal elements in the TPM provide information on the probability of retention of trade, while row elements indicate the probability of loss in trade on account of competing countries. The column elements indicate the probability of gain in trade from the competing countries.

For the period I (1995-96 to 1999-00), Italy showed highest probability of retention of 0.574, which means Italy had retained 57.4 per cent of share of India's coffee export. This was followed by Spain (44 per cent), Russian Federation (39.5 per cent) and Germany (11.8 per cent) in retaining the share of India's export of coffee. During this period the highest gainer among major importing countries was Spain, which was obtaining 59 per cent of Belgium's share and 6.2 per cent Germany's share of import of coffee from India and also retained its own 44 per cent share of import.

TABLE 4. TRANSITION PROBABILITY MATRIX OF COFFEE EXPORT FROM INDIA
FROM 1995-96 to 1999-2000

Countries (1)	Russian Federation (2)	Italy (3)	Germany (4)	Poland (5)	Belgium (6)	Spain (7)	Others (8)
Russian Federation	0.395	0.024	0.156	0	0	0	0.424
Italy	0	0.574	0.425	0	0	0	0
Germany	0	0	0.118	0	0.228	0.062	0.592
Poland	1	0	0	0	0	0	0
Belgium	0	0	0	0.409	0	0.59	0
Spain	0	0	0	0	0.558	0.44	0
Others	0.151	0.15	0.088	0.062	0	0	0.567

During period II highest retention was depicted by Italy (38 per cent), followed by Russian Federation (36.6 per cent), Belgium (18.9 per cent) and Germany (1.7 per cent) (Table 5). Highest gainer during this period was Germany, which had a transfer of probability of 0.283 from Russian federation, 0.91 from Poland, 0.601 from Belgium, 0.131 from Spain and retained its own transition probability of 0.017.

TABLE 5. TRANSITION PROBABILITY MATRIX OF COFFEE EXPORT FROM INDIA
FROM 2000-01 TO 2008-09

Countries (1)	Russian Fed (2)	Italy (3)	Germany (4)	Poland (5)	Belgium (6)	Spain (7)	Others (8)
Russian Federation	0.366	0	0.283	0	0.12	0.233	0
Italy	0	0.38	0	0	0	0	0.619
Germany	0.736	0	0.017	0	0.231	0.015	0
Poland	0	0	0.91	0	0.092	0	0
Belgium	0	0.128	0.601	0.011	0.189	0.072	0
Spain	0.189	0.679	0.131	0	0	0	0
Others	0.004	0.278	0	0.013	0.022	0.02	0.66

During Period III, Italy showed the highest retention of 14.5 per cent of its import for India's coffee, followed by Russian Federation (13.6 per cent) (Table 6). Highest gainer among major importing countries was Italy, which had obtained 53.3 per cent

share of Russian Federation and 44.1 per cent of Spain's share of India's export of coffee and also retained 14.5 per cent of its own share.

TABLE 6. TRANSITION PROBABILITY MATRIX OF COFFEE EXPORT FROM INDIA
FROM 2009-10 to 2018-19

Countries (1)	Russian Fed (2)	Italy (3)	Germany (4)	Poland (5)	Belgium (6)	Spain (7)	Others (8)
Russian Federation	0.136	0.533	0.186	0	0.094	0.05	0
Italy	0.242	0.145	0.346	0	0.027	0.087	0.153
Germany	0	0	0	0.039	0	0	0.961
Poland	0	0	0	1	0	0	0
Belgium	0	0	0	0	0	0	1
Spain	0.441	0	0.069	0	0.49	0	0
Others	0	0.332	0	0	0.054	0	0.614

Actual and Estimated Shares of Indian Coffee Export to Importing Countries

The actual and estimated shares of coffee exported from India to different countries (in percentage terms) have been given in Table 7. A comparison of this proportion during the study period revealed that the observed proportions of export shares were consistent with the estimated shares of export, which were derived from the Markov chain process. However, differences have been observed in some years, which could be due to limitation of the model that the present estimates depend only on the previous years' observations and the exports also depend on sudden policy changes, leading to abrupt increase or decrease in the exports to a country.

Projection of Indian Coffee Exports to Major Importing Countries

Table 8 revealed that the export of Indian coffee to different countries which was computed using the transitional probability matrix. It was projected that during 2019-20, the major markets for Indian coffee would be Italy (23.46 per cent), followed by Germany (9.65 per cent), Russian Federation (7.66 per cent), Belgium (5.00 per cent), Poland (4.67 per cent) and Spain (2.42 per cent). Russian Federation, Germany and Poland has shown increasing trend in percentage share of India's coffee export during 2019-20 to 2024-25. It may be due to the fact that these countries were able to retain their shares in India's coffee export. Markov chain predict export quantity of the future years based on past data, this may be the reason for predicting increasing trend for these countries' shares in the export of Indian coffee.

Determinants of Coffee Exports from India

In Table 9 the factors determining coffee exports from India were studied by using multiple regression of log-log form where quantity exported was regressed against international price of coffee (own price), exchange rate, per capita consumption of coffee and lagged production of coffee. The data used for regression analysis were for 23 years (1995-96 to 2018-19).

TABLE 7. ACTUAL AND ESTIMATED SHARES OF COFFEE EXPORT FROM INDIADURING 2009-10 to 2018-19

Year (1)	Russian fed		Italy		Germany		Poland		Belgium		Spain		Other countries	
	Actual (2)	Estimated (3)	Actual (4)	Estimated (5)	Actual (6)	Estimated (7)	Actual (8)	Estimated (9)	Actual (10)	Estimated (11)	Actual (12)	Estimated (13)	Actual (14)	Estimated (15)
2009-10	27482 (14.02)	-	47065 (24.01)	-	13171 (6.72)	-	1426 (0.73)	-	6680 (3.41)	-	6169 (3.15)	-	94010 (47.96)	-
2010-11	29978 (10.00)	28464 (9.49)	80653 (26.90)	68814 (22.96)	33371 (11.13)	34232 (11.42)	2747 (0.92)	4046 (1.35)	18236 (6.08)	17039 (5.68)	11043 (3.68)	8534 (2.85)	123750 (41.28)	138665 (46.26)
2011-12	33112 (9.94)	27618 (8.29)	71010 (21.31)	79174 (23.76)	38138 (11.45)	31647 (9.50)	4492 (1.35)	5977 (1.79)	18919 (5.68)	19883 (5.97)	13451 (4.04)	7849 (2.36)	154100 (46.25)	161093 (48.34)
2012-13	24814 (8.29)	24637 (8.23)	75748 (25.31)	72014 (24.06)	24874 (8.31)	31271 (10.45)	3485 (1.16)	4453 (1.49)	19907 (6.65)	15343 (5.13)	6650 (2.22)	7848 (2.62)	143810 (48.05)	143736 (48.03)
2013-14	16103 (5.37)	23007 (7.67)	75456 (25.16)	69581 (23.20)	21507 (10.51)	29489 (9.83)	2516 (0.84)	3743 (1.25)	17895 (5.97)	14460 (4.82)	5799 (1.93)	7388 (2.46)	150603 (50.22)	152227 (50.76)
2014-15	21135 (7.67)	19845 (7.21)	60173 (21.85)	68686 (24.94)	25222 (9.16)	25119 (9.12)	4805 (1.74)	5787 (2.10)	12092 (4.39)	14141 (5.13)	5464 (1.98)	6306 (2.29)	146499 (53.20)	135522 (49.21)
2015-16	25506 (8.16)	24938 (8.04)	77361 (24.94)	74751 (24.10)	28286 (9.12)	31896 (10.28)	6493 (2.09)	7594 (2.45)	15909 (5.13)	15620 (5.04)	6295 (2.03)	8013 (2.58)	150554 (48.53)	147407 (47.52)
2016-17	27808 (8.04)	28473 (8.23)	84789 (24.51)	80928 (23.39)	32554 (9.41)	35151 (10.16)	9907 (2.86)	11174 (3.23)	19561 (5.65)	18214 (5.27)	9460 (2.73)	8787 (2.54)	161852 (46.79)	163237 (47.19)
2017-18	26345 (6.72)	27098 (6.92)	79024 (20.17)	93815 (23.94)	39128 (9.99)	32917 (8.40)	13709 (3.50)	15232 (3.89)	18106 (4.62)	20506 (5.23)	9960 (2.54)	8210 (2.10)	205524 (52.46)	194039 (49.53)
2018-19	22292 (6.30)	24911 (7.05)	76452 (21.62)	83730 (23.68)	31818 (9.00)	31115 (8.80)	14056 (3.98)	15295 (4.33)	18486 (5.23)	17711 (5.01)	7663 (2.17)	7784 (2.20)	182809 (51.70)	173048 (48.94)

TABLE 8. PROJECTION OF INDIAN COFFEE EXPORTS TO MAJOR COUNTRIES DURING 2019-20 to 2024-25

Years (1)	Russian Fed (2)	Italy (3)	Germany (4)	Poland (5)	Belgium (6)	Spain (7)	Others (8)
2019-20	27,082 (7.66)	82,940 (23.46)	34,128 (9.65)	16,506 (4.67)	17,689 (5.00)	8,550 (2.42)	1,66,717 (47.15)
2020-21	27,524 (7.78)	81,879 (23.15)	34,311 (9.70)	17,835 (5.04)	17,909 (5.06)	8,589 (2.43)	1,65,583 (46.82)
2021-22	27,344 (7.73)	81,584 (23.07)	34,029 (9.62)	19,171 (5.42)	17,881 (5.06)	8,518 (2.41)	1,65,121 (46.69)
2022-23	27,217 (7.70)	81,292 (22.99)	33,889 (9.58)	20,496 (5.80)	17,796 (5.03)	8,484 (2.40)	1,64,492 (46.51)
2023-24	27,114 (7.67)	80,973 (22.89)	33,762 (9.55)	21,815 (6.17)	17,726 (5.01)	8,452 (2.39)	1,63,842 (46.32)
2024-25	27,009 (7.64)	80,656 (22.80)	33,630 (9.51)	23,130 (6.54)	17,657 (4.99)	8,419 (2.38)	1,63,202 (46.14)

TABLE 9. DETERMINANTS OF COFFEE EXPORTS FROM INDIA

Particulars (1)	Coefficients (2)	Standard error (3)
Constant	-8.32***	3.59
International price of coffee	0.122*	0.072
Exchange rate	0.438*	0.237
Per capita consumption	-0.225	0.304
Lagged Production of coffee	1.005***	0.369
R-squared		0.815
F statistics		19.81

Note: ***, **, * showed significance at 1, 5 and 10 per cent level, respectively.

The study revealed that the international prices of coffee are significant with high positive elasticity, which indicates that international price has a positive impact on exports of coffee from India. This may be due to the fact that when international price of coffee increases, the importer shifts towards Indian coffee due to price advantage, indicating the role of government to set price just below international price of coffee, in such a way that price becomes competitive in the international markets.

The exchange rate has a positive impact on coffee export from India and is significant at 5 per cent level. When the exchange rate of rupee with dollar increases (devaluation of rupee occurs), then the exports from India become cheaper for the importing countries, and hence export increases. Thus, a positive impact of exchange rate is assumed on the coffee exports from India. Haleem *et al.* (2005), Kumar *et al.* (2008), Shende *et al.* (1999) and Adhikari *et al.* (2016) have also revealed the positive and significant effect of exchange rate.

The coefficient of lagged production has been found positive and statistically significant. This means that coffee export is more influenced by the previous year's production. The positive and significant influence of lagged production has been observed not only on the export of rice (Gangwar and Rai, 1995; Sekhar, 2003) but also on the exports of onion, banana and black pepper (Hema and Kumar, 2007), indicating increase in the export earnings with increase in production.

IV

CONCLUSION

About seventy per cent of coffee produced in India is exported to different countries around the world. India accounts for 3.26 per cent of world's coffee production and 3.02 per cent of world's coffee export and ranks seventh and fifth in coffee production and export, respectively. Due to increasing number of export of commodities other than coffee, the share of coffee in total agricultural export is decreasing. During Period I, export quantity increased at a higher rate than value of export, which caused negative growth rate in unit value of export. However the trend was reversed as growth rate of export quantity turned into negative during period II, while value of export and unit export value of coffee showed a positive and significant growth rate. Higher instability of value of export and unit value of export was due to volatility in world prices and political situation in international markets.

Italy, Russian Federation, Germany, Poland, Belgium and Spain are the major export destinations for Indian coffee. The study indicated that Italy had the maximum percentage of retention of export share of Indian coffee throughout the study periods. During period I, II and III major gainer were Spain, Germany and Russian Federation respectively. It was predicted that Russian Federation, Germany and Poland has showed increasing trend in percentage share of India's coffee exports during 2019-20 to 2024-25. This was mainly attributed to the fact that these countries were able to retain their shares in India's coffee export.

Positive and significant coefficient of international price of coffee indicated the proactive role of government to set price just below the international price of coffee to make the price competitive in the international markets. Positive and significant coefficient of exchange rate depict the fact that as the exchange rate of rupee with dollar increases (devaluation of rupee occurs), then the exports from India would become cheaper for the importing countries, and hence export increases. Finally positive and significant coefficient of lagged production of coffee means that coffee export is more influenced by the previous year's production.

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