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# India's Export Performance of Agricultural Commodities to the SAARC Countries

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**Abstract**

*Agriculture is the back bone for increasing GDP in all South Asian countries as about 60 per cent of the population is dependent on agriculture. Agricultural trade plays an important role in achieving food security and meeting deficit domestic demand and stabilizing prices. The present paper depicts that Nepal, Pakistan, Bangladesh and Afghanistan had stable markets for India's agricultural commodities whereas Bhutan, Maldives and Sri Lanka were highly unstable importer of India's agricultural commodities among SAARC countries as they retain zero per cent of their previous market share. Bangladesh had a stable market for all five commodities such as cereals, cotton, dairy products and bird eggs, coffee, tea, mate & spices and sugar and honey reflected by retention probabilities 78.93, 37.83, 39.02, 37.96 and 41.66 per cent respectively among SAARC member countries. India has week Revealed Comparative Advantage (RCA) only in dairy products and bird eggs before and after SAFTA while India enjoyed comparative advantage in export of cotton after formation of SAFTA. The study suggested that India should focus on export promoting policies such as increase participation in international trade fares and improve quality of product to be competitive in international market.*

**Keywords**: Trade, Transitional Probability Matrix, Balassa Index, Stability

**JEL Classification:** F1, C1, C4

## Introduction

International trade improves the welfare of a country by allowing higher levels of consumption and investment. More employment and higher wage rates generated by international trade had positive implications for income allocation and poverty, thereby, raising the level of social welfare in labor surplus country like India. The fact that global trade plays an important role in the development of an economy is universally agreed. The increase in world trade is the effect of deepening economic integration. Trade within the region i.e. intra-regional trade and expansion in this trade is one of the most direct forms of regional economic cooperation. A number of advantages can be listed due to intra-regional trade, such as transfer of technologies, comparative advantage, economies of scale as a result of expansion in the market, better use of entrepreneurial capabilities etc. Regional integration has developed as an alternative to the policy of free trade. To achieve the benefits of economic integration with South Asia, Bangladesh proposed a regional cooperative body of South Asian Association for Regional Cooperation (SAARC) leaders in 1980, which then led to the establishment of the SAARC region in the year 1985. The SAARC is an economic and geopolitical organization of eight countries of South Asia, namely Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka. South Asian Free Trade Area (SAFTA) agreement came into force on 1 January 2006 (Akram *et al,*2014). The regional trade in South Asia is dismally low, at four per cent as compared to the regional trade of the European Union at 67 per cent, the North American Free Trade Agreement at 62 per cent, the Association of South

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East Asian Nations at 26 per cent, the Common Market for Eastern and Southern Africa at 22 per cent, Gulf Cooperation Council at eight per cent, Latin America and Caribbean at 22 per cent. The only reason for such a low trade rate in South Asia is bilateral differences among these countries. SAARC, as a multinational regional forum, has immense potential, but this potential of regional cooperation cannot be realized without strong bilateral linkages. So, there is a need for mutual trust and willingness among the SAARC member countries to resolve and overcome bilateral differences and apprehensions for the people's welfare of this region.

The performance of agricultural export has always attracted policy maker's attention as it is an important source of foreign exchange earnings, driver of crop diversification and farm income improvements (Suresh *et al,* 2016). According to Shivaraya (2000), UAE and Malaysia were the reliable and stable markets for the Indian onion. In case of potato, Sri Lanka and Nepal were found to be the most reliable markets whereas; Bangladesh and Nepal were the most stable importers of Indian fresh tomatoes. On the other hand, India enjoys comparative advantage in exports of cotton, cereals, fish and tea, while Pakistan has a greater comparative advantage in export of cotton and cereals (Saxena *et al*, 2015). India's share in world export has increased from 1970 to 1994 of rice (0.6 to 6.6%), feeding stuffs for animals (1.6 to 3.1%) and cereals (0.1 to 0.9 %). Similarly, the share of fruits and vegetables increased from 1.2 per cent in 1974 to 1.7 per cent in 1994 (Gupta 1998). Therefore, regional cooperation and integration will allow the SAARC states to benefit from international investment, technology and trading opportunities (Kher, 2012). Formation of SAFTA has raised intensive debates on the welfare gains and losses from the free trade agreement among the countries (Ali and Talukder, 2009).

Keeping this in view, the present study aimed to examine agricultural trade performance of India with other south asian countries and ways to promote agricultural trade between India and SAARC nations.

## Data Sources and Methodology

Secondary data on India's export import for the year 2005-06 to 2014-15 have been compiled from the export-import data bank website maintained by Ministry of Commerce govt of India (www.commerce ministry.nic.in).The data were analyzed using functional analysis. To know the instability in export performance of five major agricultural commodities, Cuddy Della Valle indices were computed. The other analytical tools used were Balassa index for revealed comparative advantage and Markov Chain Analysis for knowing direction of trade, respectively.

## Instability index

Instability index is an analytical technique to work out the fluctuation in a time series data. Instability index formula recommended by Cuddy-Della Valle was applied to calculate instability, which was used as a measure of instability from 2006 to 2015. This method corrects the Coefficient of variation (CV) if data are scattered around the negative or positive trend line. The Cuddy-Della Valle Index is given follows.

Instability index i.e. $CV^* = CV \times (1-R^2)^{0.5}$

Where, CV is defined as the ratio of sample Standard Deviation (SD) to its mean and $R^2$ is the corrected coefficient of determination of the log linear trend function that fits the time series. If the F-test is significant at 5 per cent, then the Index is calculated by using $R^2$. When test statistics is not significant or $R^2 < 0$, then CV is chosen to measure instability index.

## Balassa Index

Balassa index is used to determine whether that commodity has comparative advantage for export or not.

Balassa Index is defined as:

$$RCA_{ki} = \frac{X_{ki} / X_{ti}}{X_{ksa} / X_{tsa}}$$

Where,

$X_{ki}$ = value of country i's export of item k to world

$X_{ti}$ = value of country i's total exports to world

$X_{ksa}$ = value of SAARC exports of item k to world

$X_{tsa}$ = value of SAARC total exports (all items) to world

The RCA of country 'i' in the trade of product 'k' is calculated by that item's share in country's exports relative to its share in the SAARC exports. The numerator in equation shows item k's share in country i's exports, whereas the denominator represent item k's share in SAARC exports.

## Markov Chain Analysis

Export data for the period 2005-06 to 2014-15 was used to analyze the direction of trade and changing pattern of exports of selected Indian items. The seven SAARC member countries viz., Afghanistan, Bangladesh, Bhutan, Maldives, Nepal, Pakistan and Sri Lanka were selected for the analysis, while rest of the world was considered as other countries. The trade directions of items exports were examine using the Markov Chain Approach (MCA). Central to MCA is the calculation of the transitional probability matrix P. The probability of retaining the previous period market share is interpreted by studying the diagonal elements of transitional probability matrix. Transitional probability matrix was obtained for the study period by using the actual proportion of exports to importing SAARC member countries. The elements of the matrix P shows the probability that export of item might shift from j to i country with time. The probability that the export share of a country will be retained is studied by diagonal elements of the matrix. In this study, transitional probabilities were derived as a random process with selected eight importing countries. The exports to a specific country can be shown as

$$E_{it} = \sum_{i=1}^{n} E_{jt-1} * Pji + e_{it}$$

Where,

$E_{it}$ = Exports from India to country during the year t i.e. current year.

$E_{it-1}$ = Exports to country during the period t-1 i.e. previous year.

$P_{ji}$ = Probability that the exports will change from country to country.

$e_{it}$ = statistically independent error terms of.

t = time period

n = number of countries

The transitional probability Pji which can be arranged in a [c x r] matrix has following properties

$$0 \leq Pji \leq 1$$

$$\sum_{i=1}^{n} Pji = 1$$

The diagonal elements of the matrix 'P' indicate the probability that the export share of a particular country will remain the same from one period to another. The diagonal element or transitional probabilities, on the other hand, indicate the probability that the share of exports in a particular country will shift to another over time, thus the export share of a country during the period can be obtained by multiplying the actual exports in the previous period (t-1) by the transitional probability matrix. In this study, Minimum Absolute Deviations (MAD) calculation method was used to calculate the Pji. The linear programming method was applied as below:

Mini op* + ie

Refer to,

xp* + v = y

gp* = i

p* ≥ o

Where,

o - is the vector of zeroes.

p* - is the vector in which probability are set.

i - is an apparently dimensioned vector of area.

e - is a vector of error (1 u 1).

y - is the vector of export to every country.

x - is the block diagonal matrix of lagged values of y

v - is the vector of errors

g - is the grouping matrix to add the row elements of p arranged in p* to unity.

After calculating the transitional probability matrix, the expected shares of export were calculated by

$$y_{it} = \sum_{i=1}^{n} y_{jt-1} \times p_{ji} \quad i=1, 2, 3 \ldots n$$

Where,

$y_{it}$ = Estimated proportions of $i^{th}$ country's share at time t.

$y_{jt-1}$ = Observed proportion of $j^{th}$ country share at time t-1.

$p_{ji}$ = Predicted transitional probability matrix.

The calculated values in the have interpretations according to their place in the matrix. The diagonal elements highlight the probability of retention of the prior year values i.e. the previous market share in export of that particular commodity by that importing country, whereas values in columns indicate probability of gain of a specific country from other countries, values in rows shows probability that a country will lose to other countries in respect of a specific item exports.

India has enjoyed a comparative advantage in tea

exports but has depicted a declining trend over the years. However, Sri Lanka has shown a far better advantage in comparison to India and other countries. A similar pattern has been observed in coffee exports also, where India has been found losing its comparative advantage to other coffee exporters like Vietnam and Indonesia. A gradual decline in India's comparative advantage has been depicted for exports of spices and cashew also. In nut shell, India's comparative advantage in most of the important agricultural exports has been found to be eroding and losing out to other Asian competitors in certain commodities during the period after economic reforms (Shinoj and Mathur, 2008). Balassa index ranged 0 and 1 while the comparative advantage was bound to be more than one. Balassa Index can be divided into 4 groups which are interpreted as:

Index value (no comparative advantage): $0 < RCA \leq 1$;

Index value (weak): $1 < RCA \leq 2$;

Index value (medium): $2 < RCA \leq 4$; and

Index value (strong ): $RCA > 4$

## Results and Discussion

### Instability in Export of Five Major India's Agricultural commodities

India's agricultural exports witnessed a great degree of volatility among other SAARC nations. The instability in export of five major agricultural commodities from India to South Asian countries was analyzed by calculating the Cuddy Della Valle index and the results were presented in Table 1. It was observed from the table that, the export of cereals in terms of value to Sri Lanka, Afghanistan and Nepal was relatively unstable compared to other countries as indicated by their instability index of 193.8 per cent, 189.8 per cent and 101 per cent respectively, whereas on other hand export of cereals to Maldives was most stable 37.3 per cent followed by Bhutan with 43.5 per cent co-efficient of variation noticed to other countries. The value earned by the exports of cotton from India was unstable for Bhutan with index of 179.8 per cent. The instability in case of dairy products was the highest in case of Bhutan (140.7 per cent) followed by Bangladesh and Pakistan. Similarly, coffee, tea, mate & spices exports to Bhutan were unstable with a variability value of 140.7 per cent.

### Balassa index

For analyzing RCA in agricultural export Balassa index was used. Balassa Index is useful for measuring whether a country has comparative advantage for export of that commodity or not. RCA provides a ranking of commodities by degree of comparative advantage and identifies a binary type demarcation of commodities based on the comparative advantage (Balance et al, 1987).

The Balassa index was purposively calculated for two years, 2000 and 2013, to compare the trade indices before and after SAFTA. SAFTA came into force on Jan 1, 2006. A number of studies had shown that export performance of India in SAARC has increased after the formation of SAFTA i.e. the trade witnessed remarkable growth in SAARC after SAFTA agreement. The perusal of Table 2 revealed the RCA of five major agricultural commodities among SAARC member countries by comparing results of the year 2000 and 2013. Afghanistan can concentrate on the production of export of cotton in the region because this product displayed strong index value while in case of coffee, tea, mate, spices RCA came out to be from no comparative advantage (0.44) to weak comparative advantage (1.91). The index depicts that India has week RCA only in dairy products & bird eggs before and after SAFTA while India enjoy comparative advantage in export of cotton after formation of SAFTA but in case of cereals, coffee and sugar & honey India had comparative disadvantage. In case of Nepal coffee, tea, mute, & spices have strong comparative advantage in 2013. The Balassa index of sugar & honey increased from medium to strong index whereas for cotton the index decreased from strong to weak grade after SAFTA in Pakistan. Sri Lanka enjoyed comparative advantage in export of coffee, tea, mute, spices in SAARC region and the index of 12.81 revealed that export of coffee increased after SAFTA agreement.

### Direction of Trade

The dynamic of export trend is an important aspect in evolving export oriented programs in order to enhance or sustain current export trends. Hence, the knowledge of changing export trade across the destinations is important. The dynamics of changes in the export trade of selected Indian agricultural commodities such as Cereals, Cotton, Dairy product eggs, coffee, tea, mate and spices and Sugar& honey was studied by estimating transitional probability matrix. The seven SAARC member countries viz., Afghanistan, Bangladesh, Bhutan, Maldives, Nepal, Pakistan and

**Table 1. Instability in export of five major agricultural commodities from India to SAARC countries from 2006 to 2015, ($ US Million)**

| SI. No. | Country | Export of Cereals | | Export of Cotton | | Export of Dairy products and eggs | | Export of Coffee, Tea, Mate and Spice | | Export of Sugar and honey | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Average value | Co-efficient of variation (%) | Average value | Co-efficient of variation (%) | Average value | Co-efficient of variation (%) | Average value | Co-efficient of variation (%) | Average value | Co-efficient of variation (%) |
| i | Afghanistan | 6.5 | 189.8 | 2.5 | 41.4 | 10.7 | 66.7 | 5.3 | 78.8 | 3.4 | 172.0 |
| ii | Bangladesh | 429.1 | 71.1 | 883.3 | 60.3 | 29.9 | 100.7 | 49.9 | 56.1 | 94.5 | 81.5 |
| iii | Bhutan | 2.9 | 43.5 | 0.0 | 179.8 | 1.9 | 140.7 | 1.9 | 140.7 | 1.3 | 60.4 |
| iv | Maldives | 7.6 | 37.3 | 0.2 | 38.1 | 2.8 | 54.8 | 2.8 | 54.8 | 2.5 | 67.4 |
| v | Nepal | 91.4 | 101.0 | 34.3 | 38.1 | 8.7 | 46.6 | 22.5 | 39.0 | 11.3 | 51.6 |
| vi | Pakistan | 15.3 | 69.6 | 272.0 | 62.2 | 11.7 | 95.1 | 55.4 | 53.5 | 83.9 | 169.6 |
| vii | Sri Lanka | 50.6 | 193.8 | 175.8 | 32.1 | 2.3 | 69.7 | 63.9 | 33.3 | 113.0 | 73.4 |
| viii | Other countries | 4670.4 | 66.2 | 4894.7 | 40.1 | 258.9 | 44.1 | 1852.1 | 37.3 | 804.1 | 65.3 |

*Source: Estimated from commerce.nic.in/eidb/default.asp*

**Table 2. Revealed Comparative Advantage of Five Agricultural Commodities in SAARC, 2000 and 2013**

| Commodity | Afghanistan | | Bangladesh | | Bhutan | | Maldives | | Nepal | | Pakistan | | Sri Lanka | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2000 | 2013 | 2000 | 2013 | 2000 | 2013 | 2000 | 2013 | 2000 | 2013 | 2000 | 2013 | 2000 | 2013 |
| Cereals | 0.00 | 0.00 | 0.00 | 0.00 | 0.41 | 0.12 | 0.87 | 1.00 | 0.00 | 0.02 | 2.82 | 2.54 | 0.01 | 0.12 |
| Coffee, tea, mate spices | 0.44 | 1.91 | 0.12 | 0.02 | 0.48 | 1.17 | 0.81 | 0.74 | 0.31 | 5.62 | 0.06 | 0.22 | 4.97 | 12.81 |
| Dairy products and eggs | 0.00 | 0.05 | 0.01 | 0.01 | 0.04 | 0.10 | 1.38 | 1.04 | 0.99 | 0.77 | 0.23 | 1.96 | 0.28 | 0.19 |
| Sugar and honey | 0.00 | 0.00 | 0.00 | 0.14 | 0.00 | 0.00 | 1.00 | 0.79 | 0.64 | 0.06 | 2.19 | 5.04 | 0.04 | 0.06 |
| Cotton | 22.22 | 3.85 | 0.01 | 0.00 | | | 0.11 | 1.14 | 0.00 | 0.00 | 6.06 | 0.69 | 0.01 | 0.00 |

*Note: Blank cells indicate that this commodity was not exported from India to other south-asian countries*

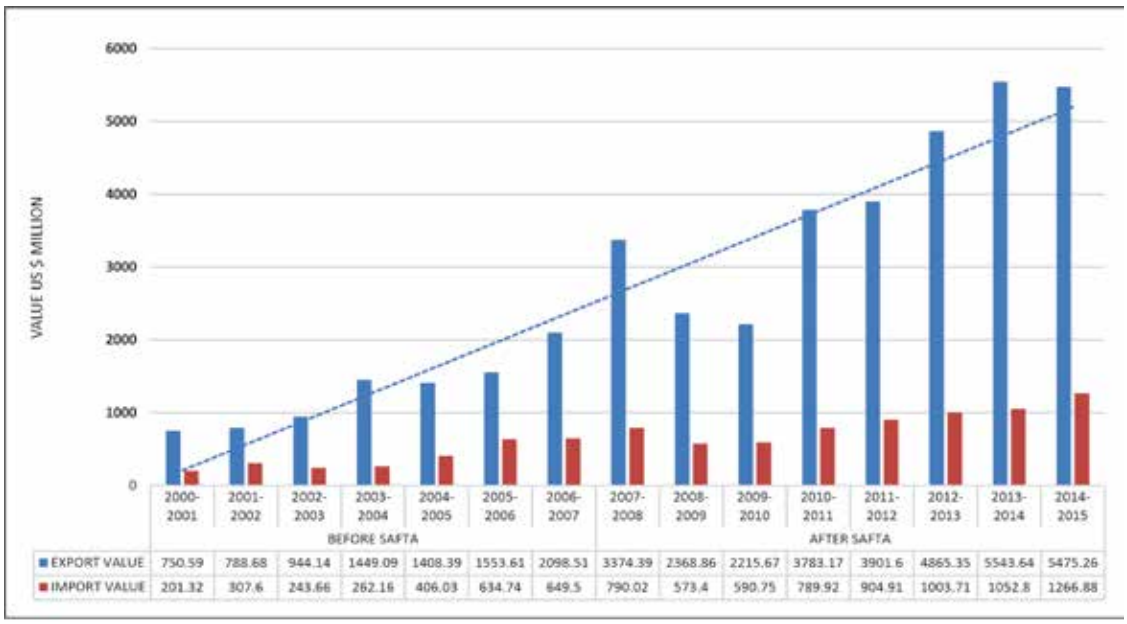


**Fig. 1. Export and import of agricultural commodities between India and saarc countries before and after SAFTA**

Sri Lanka were selected for the analysis, while rest of the world was considered as other countries. The time period considered for the analysis was 2005-06 to 2014-15. The probability of retaining the previous period market share is interpreted by studying the diagonal elements of transitional probability matrix. Transitional probability matrix was obtained for the study period by using the actual proportion of exports to importing SAARC member countries.

### Transitional probability for export of agricultural commodities

Bhutan, Maldives and Sri Lanka were highly unstable importer of India's agricultural commodities among SAARC countries as they retain zero per cent of their previous market share. Nepal had stable market for India's agricultural commodities as compared to others SAARC countries. Bhutan lost its cent per cent market share to Nepal. Bhutan gained 1.02 per cent share from Bangladesh. Afghanistan probably will retains 1.65 per cent of its previous market share and it might lost its 6.8 per cent market share to Maldives, 20.39 per cent to Nepal and 71.07 per cent will lose to Pakistan. Nepal will retain 43.03 per cent market share of previous year, it might lost 56.97 per cent market share to Pakistan and will gain 100 per cent market share from Bhutan and 20.39 per cent from Afghanistan. Other countries retained 94.24 per cent market share of previous years i.e. other countries are more stable as compared to SAARC members.

**Table 3. Transitional Probability Matrix for India's export of agricultural commodities, 2001 to 2013**

| Destination | Afghanistan | Bangladesh | Bhutan | Maldives | Nepal | Pakistan | Sri Lanka | Others countries |
|---|---|---|---|---|---|---|---|---|
| Afghanistan | **0.0165** | 0.0000 | 0.0000 | 0.0689 | 0.2039 | 0.7107 | 0.0000 | 0.0000 |
| Bangladesh | 0.0071 | **0.2517** | 0.0102 | 0.0085 | 0.0000 | 0.0000 | 0.2905 | 0.4320 |
| Bhutan | 0.0000 | 0.0000 | **0.0000** | 0.0000 | 1.0000 | 0.0000 | 0.0000 | 0.0000 |
| Maldives | 0.0000 | 1.0000 | 0.0000 | **0.0000** | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Nepal | 0.0000 | 0.0000 | 0.0000 | 0.0000 | **0.4303** | 0.5697 | 0.0000 | 0.0000 |
| Pakistan | 0.0156 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | **0.3394** | 0.0000 | 0.6450 |
| Sri Lanka | 0.0000 | 1.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | **0.0000** | 0.0000 |
| Other countries | 0.0028 | 0.0309 | 0.0000 | 0.0009 | 0.0066 | 0.0097 | 0.0068 | **0.9424** |

**Table 4. Transitional probability matrix of India's commodity exports for cereals, 2006 to 2015**

| Destination | Afghanistan | Bangladesh | Bhutan | Maldives | Nepal | Pakistan | Sri Lanka | Others countries |
|---|---|---|---|---|---|---|---|---|
| Afghanistan | **0.0000** | 0.0000 | 0.0000 | 0.0000 | 1.0000 | 0.0000 | 0.0000 | 0.0000 |
| Bangladesh | 0.0000 | **0.7893** | 0.0027 | 0.0094 | 0.1416 | 0.0000 | 0.0256 | 0.0315 |
| Bhutan | 0.0000 | 0.0000 | **0.3773** | 0.0102 | 0.0000 | 0.0000 | 0.6126 | 0.0000 |
| Maldives | 0.0000 | 1.0000 | 0.0000 | **0.0000** | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Nepal | 0.0000 | 1.0000 | 0.0000 | 0.0000 | **0.0000** | 0.0000 | 0.0000 | 0.0000 |
| Pakistan | 0.0588 | 0.0000 | 0.0067 | 0.1867 | 0.0000 | **0.4575** | 0.0000 | 0.2903 |
| Sri Lanka | 0.0000 | 0.0337 | 0.0000 | 0.0794 | 0.0000 | 0.5611 | **0.3105** | 0.0152 |
| Other countries | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0033 | 0.0000 | 0.0000 | **0.9967** |

### Transitional Probability for Export of Cereals

It was evident from the table 4, that Afghanisthan, Maldives and Nepal are highly unstable as reflected by their zero transition probability value. A major share of other countries' cereals imports from India was retained to the tune of about 99.67 per cent during the reference period however it loses 0.33 its market share to Nepal. Other countries gained 3.15, 29.02 and 1.52 per cent market share from Bangladesh, Pakistan, and Sri Lanka respectively. Bangladesh was second major importer of cereals during the reference period. A major share of Bangladesh's cereals imports from India was retained to the tune of about 78.93 per cent during the reference period however it lost 0.27 per cent market share to Bhutan, 0.94 per cent to Maldives, 14.16 per cent to Nepal, 2.56 per cent to Sri Lanka and 3.15 per cent to other countries. Bhutan lost its 1.02 per cent and 61.26 per cent market share to Maldives and Sri Lanka respectively. Bhutan gained its 0.27 per cent share from Bangladesh, 0.67 per cent share from Pakistan. Afghanistan lost its 100 per cent market share to Nepal. Nepal lost its 100 per cent share to Bangladesh. Though, the cereals export to Bhutan and Maldives was low these can be emerging market for the Indian cereals. Perhaps the increase in export of cereals to rest of the world could be due to increase in level of expectance and high export competiveness of Indian cereals.

### Transitional probability for export of cotton

It is evident from the table 5 that among the SAARC countries Bangladesh had stable market for Indian cotton among the importing countries as indicated by high retention probability of 37.83 per cent. Rest of the world had a probability of retaining 78.62 per cent of import trade in Indian cotton. India could not retain its previous export share with Afghanistan, Bhutan, Maldives, Nepal, Pakistan and Sri Lanka, depicting that these countries are unstable importers of India cotton.

**Table 5. Transitional probability matrix of India's commodity exports for cotton, 2006 to 2015**

| Destination | Afghanistan | Bangladesh | Bhutan | Maldives | Nepal | Pakistan | Sri Lanka | Others countries |
|---|---|---|---|---|---|---|---|---|
| Afghanistan | **0.0000** | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0775 | 0.0000 | 0.3838 |
| Bangladesh | 0.0000 | **0.3783** | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.6217 |
| Bhutan | 0.0000 | 0.0000 | **0.0000** | 0.0000 | 0.0000 | 1.0000 | 0.0000 | 0.0000 |
| Maldives | 0.0000 | 0.0000 | 0.0000 | **0.0000** | 0.0000 | 1.0000 | 0.0000 | 0.0000 |
| Nepal | 0.0000 | 0.0000 | 0.0000 | 0.0000 | **0.0000** | 0.0000 | 0.0000 | 1.0000 |
| Pakistan | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0233 | **0.0000** | 0.1616 | 0.8151 |
| Sri Lanka | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | **0.0000** | 1.0000 |
| Other countries | 0.0002 | 0.1176 | 0.0000 | 0.0000 | 0.0051 | 0.0630 | 0.0279 | **0.7862** |

**Table 6. Transitional Probability Matrix of India's commodity exports for Dairy product &Bird eggs, 2006 to 2015**

| Destination | Afghanistan | Bangladesh | Bhutan | Maldives | Nepal | Pakistan | Sri Lanka | Others countries |
|---|---|---|---|---|---|---|---|---|
| Afghanistan | **0.5072** | 0.1569 | 0.0000 | 0.0932 | 0.1372 | 0.0930 | 0.0126 | 0.0000 |
| Bangladesh | 0.0000 | **0.3902** | 0.0342 | 0.0013 | 0.1793 | 0.3745 | 0.0204 | 0.0000 |
| Bhutan | 0.0000 | 1.0000 | **0.0000** | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Maldives | 0.0000 | 0.8697 | 0.0000 | **0.1244** | 0.0000 | 0.0059 | 0.0000 | 0.0000 |
| Nepal | 0.4736 | 0.5033 | 0.0000 | 0.0000 | **0.0000** | 0.0000 | 0.0231 | 0.0000 |
| Pakistan | 0.0000 | 0.4040 | 0.0000 | 0.1729 | 0.4231 | **0.0000** | 0.0000 | 0.0000 |
| Sri Lanka | 0.8223 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | **0.1777** | 0.0000 |
| Other countries | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | **1.0000** |

## Transitional Probability for export of dairy product &bird eggs

Table 6, shows that Afghanistan, Bangladesh, Sri Lanka and Maldives had a stable market for Indian dairy product & bird eggs as is market share among the importing countries in the ten years period. Bhutan, Nepal and Pakistan are highly unstable as reflected by their zero transition probability value. The table reveals that there is a probability that other countries (rest of the world) will retain 100 per cent of their importing share i.e. agricultural trade in dairy product & bird eggs with India. Afghanistan will retain 50.72 per cent of its previous market share; it will loose 15.56 per cent market share to Bangladesh, 9.32 per cent to Maldives, 13.72 per cent to Nepal, 9.30 per cent to Pakistan, 1.26 per cent to Sri Lanka. It gained 47.36 per cent market share from Nepal, 82.23 per cent market share from Sri Lanka. Bangladesh retained 39.02 per cent of its previous market share. Bangladesh lost 3.42 per cent market share to Bhutan, 17.93 per cent to Nepal, 37.45 per cent to Pakistan and 2.04 per cent share market to Sri Lanka. Also it gained 15.69 per cent market share from Afghanistan, 100 per cent from Bhutan, 86.97 per cent from Maldives, 50.33 per cent from Nepal and 40.40 per cent market share from Pakistan.

## Transitional Probability for Export of Coffee, Tea, Mate &Spices

A perusal of table 7, reveals that Afghanistan, Bhutan, Maldives and Nepal were highly unstable as reflected by their zero transition probability value. During the study period other countries i.e. trade with rest of world is having highest probability that India its export with them to the line of 98.63 per cent. It lost 0.84 per cent market share to Nepal and 0.52 per cent market share to Sri Lanka. Other countries gained 24.38 per cent market share of Pakistan, 17.87 from Bangladesh and 8.41 per cent share from Sri Lanka.

**Table 7. Transitional Probability Matrix of India's commodity exports for Coffee, tea mate & spices, 2006 to 2015**

| Destination | Afghanistan | Bangladesh | Bhutan | Maldives | Nepal | Pakistan | Sri Lanka | Others countries |
|---|---|---|---|---|---|---|---|---|
| Afghanistan | **0.0000** | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 1.0000 | 0.0000 |
| Bangladesh | 0.0190 | **0.3796** | 0.0222 | 0.0324 | 0.0009 | 0.3081 | 0.0591 | 0.1787 |
| Bhutan | 0.0000 | 1.0000 | **0.0000** | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Maldives | 0.0000 | 0.0000 | 0.0000 | **0.0000** | 0.0000 | 1.0000 | 0.0000 | 0.0000 |
| Nepal | 0.0000 | 0.0000 | 0.0000 | 0.0000 | **0.0000** | 0.0000 | 1.0000 | 0.0000 |
| Pakistan | 0.0000 | 0.5575 | 0.0000 | 0.0131 | 0.0000 | **0.1855** | 0.0000 | 0.2438 |
| Sri Lanka | 0.0303 | 0.0000 | 0.0000 | 0.0114 | 0.0874 | 0.4497 | **0.3371** | 0.0841 |
| Other countries | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0084 | 0.0000 | 0.0052 | **0.9863** |

**Table 8. Transitional Probability Matrix of India's commodity exports for Sugar and honey, 2006 to 2015**

| Destination | Afghanistan | Bangladesh | Bhutan | Maldives | Nepal | Pakistan | Sri Lanka | Others countries |
|---|---|---|---|---|---|---|---|---|
| Afghanistan | **0.0000** | 1.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Bangladesh | 0.0000 | **0.4166** | 0.0248 | 0.0347 | 0.1382 | 0.0000 | 0.2262 | 0.1595 |
| Bhutan | 0.0000 | 0.0000 | **0.0000** | 0.0000 | 0.0000 | 1.0000 | 0.0000 | 0.0000 |
| Maldives | 0.0000 | 0.0000 | 0.0000 | **0.0000** | 0.0000 | 1.0000 | 0.0000 | 0.0000 |
| Nepal | 0.0000 | 0.0000 | 0.0000 | 0.0000 | **0.0000** | 1.0000 | 0.0000 | 0.0000 |
| Pakistan | 0.0276 | 0.0154 | 0.0000 | 0.0000 | 0.0000 | **0.6873** | 0.2698 | 0.0000 |
| Sri Lanka | 0.0000 | 0.4949 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | **0.1901** | 0.3150 |
| Other countries | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0460 | **0.9540** |

Bhutan, Maldives and Nepal were highly unstable importer of Indian coffee, tea, mate and spices as they could retain zero per cent of their previous market share. Maldives lost its cent per cent market share to Pakistan.

## Transitional probability for export of sugar &honey

The data given in Table 8, depicted that Pakistan, Bangladesh and Sri Lanka had a stable market for sugar & honey as compared to the SAARC other nations i.e. Afghanistan, Bhutan, Maldives and Nepal which were highly unstable as reflected by their zero transition probability value. Other countries denote trade with rest of the world, world minus SAARC region together retained 95.40 per cent of their previous market share. Other countries gained 31.50 per cent market share from Sri Lanka and 15.95 per cent share from Bangladesh. Pakistan retained 68.73 per cent of its previous market share. It lost 26.98 per cent market share to Sri Lanka, 2.76 per cent to Afghanistan and 1.54 per cent to Bangladesh. Pakistan gained 100 per cent market share of Bhutan, Maldives and Nepal. Bangladesh retained 41.66 per cent of its previous market share. While, losing its 22.62 per cent market share to Sri Lanka, 15.95 to the other countries, 13.82 per cent to Nepal, 3.47 to Maldives and 2.48 per cent market share to Bhutan.

## Conclusion and Policy Implications

The probability of retaining the previous period market share is interpreted by studying the diagonal elements of transitional probability matrix. Transitional probability matrix was obtained for the study period by using the actual proportion of exports to importing SAARC member countries. Afghanistan can concentrate on the production of export of cotton in the region because these products displayed strong index value. In case of India has week RCA only in dairy products & bird eggs before and after SAFTA while India enjoy comparative advantage in export of cotton after formation of SAFTA and after this agreement. The Balassa index of sugar & honey increased from medium to strong index whereas for cotton the index decreased from strong to weak grade after SAFTA in Pakistan. Sri Lanka enjoyed comparative advantage in export of coffee, tea, mute, spices in SAARC region and the index of 12.81 revealed that export of coffee increased after SAFTA agreement. Bhutan, Maldives and Sri Lanka were highly unstable importer of India's agricultural commodities among SAARC countries as they retain zero per cent of their previous market share whereas Nepal had stable market for India's agricultural commodities as compared to others SAARC countries. Nepal will retain 43.03 per cent market share of previous year, it might lost 56.97 per cent market share to Pakistan and will gain 100 per cent market share from Bhutan and 20.39 percent from Afghanistan. Other countries retained 94.24 percent market share of previous years i.e. other countries are more stable as compared to SAARC members. Bangladesh is a stable market for all five commodities such as cereals, cotton, dairy product & bird eggs, coffee, tea, mate & spices and sugar & honey reflected by retention probabilities 78.93, 37.83, 39.02, 37.96 and 41.66 per cent respectively among SAARC member countries. In case of cereals Bangladesh lost 0.27 per cent market share to Bhutan, 0.94 per cent to Maldives, 14.16 per cent to Nepal, 2.56 per cent to Sri Lanka and 3.15 per cent to other countries. The study suggest that export

of major agricultural commodities from India is highly competitive in the International markets. India may focus on export promoting policies like to support export oriented firms for arranging and attending international trade fares to promote their product in international market, encouraging them to improve their quality of product as good quality product was always desirable in foreign markets, and opting for insurance policies to protect Indian exporter from commercial and political risks.

## References

Ali E and Talukder D K 2009. Preferential trade among the SAARC countries: Prospects and challenges o regional integration in South Asia. *Journal of Administration and Governance*, **4**, 47-59.

Akram H W, Ciddikie D and Khan M A 2014. India's trade relationship with SAFTA Countries: A review. *Journal of Indian, Research,* **2**: 46-58.

Balance RH, Forstner H and Murray T 1987 Consistency tests of alternative measures of comparative advantage. Review of Economics and Statistics, **69**: 157-161.

Deepeka N 2008. South Asian studies: India' s exports and export policy in the1960s. Cambridge University press HF3784.N39 382'.6'0954 75-46206.

Gupta M 1998. Trends in indian agricultural exports. *Bihar Journal of Agricultural Marketinng* **6**: 171-178.

Kher P 2012. Political Economy of Regional Integration in South Asia. UNCTADURL: http:// u n c t a d. o r g / P u b l i c a t i o n s L i b r a r y /ecidc2013misc1_bp5. pdf.

Saxena R, Paul R K, Rana S, Chaurajia S, Palk Z and Joshi D 2015. Agricultural trade structure and linkage and SAARC: An empirical investigation. *Agricultural Economics Research Review,* **28**: 311-328.

Shinoj P and Mathur V C 2008. Comparative Advantage of India in Agricultural Exports vis-á-vis Asia: A Post-reforms Analysis. *Agricultural Economics Research Review,* **21**: 60-66.

Shivaraya B 2000. Economic performance of production, marketing and export of vegetable in north Karnataka. *PhD Thesis,* University of Agricultural Science, Dharwad (India).

Suresh A and Mathur V C 2016 Export of agricultural commodities from India: Performance and prospects. *Indian Journal of Agricultural Science,* **867**: 776-83.

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