

# **STUDY ON EXPORT PERFORMANCE OF ONION FROM INDIA**

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**2022**

## **DECLARATION**

I, **Ms. KOTNI VANI KEERTHANA**, hereby declare that the thesis entitled “**STUDY ON EXPORT PERFORMANCE OF ONION FROM INDIA**” submitted to the Acharya N. G. Ranga Agricultural University for the degree of **MASTER OF SCIENCE IN AGRICULTURE** is the result of original research work done by me. I also declare that no material contained in the thesis has been published earlier in any manner.

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This is to certify that the thesis entitled “**STUDY ON EXPORT PERFORMANCE OF ONION FROM INDIA**” submitted in partial fulfillment of the requirements for the degree of **MASTER OF SCIENCE IN AGRICULTURE** of the Acharya N.G. Ranga Agricultural University, Lam, Guntur, is a record of the bona fide original research work carried out by **Miss. KOTNI VANI KEERTHANA** under our guidance and supervision.

No part of the thesis has been submitted by the student for the award of any other degree or diploma. The published part and all assistance received during the course of the investigations have been duly acknowledged by the author of the thesis.

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## LIST OF SYMBOLS AND ABBREVIATIONS

%	:	Per Cent
₹	:	Rupee
APEDA	:	Agricultural and Processed Food Products Export Development Authority.
BDT	:	Bangladesh Taka
CGR	:	Compound Growth Rate
CIF	:	Cost, Insurance and Frieght
CV	:	Coefficient of Variation
et al.,	:	and other people
etc.	:	And so on
FAO	:	Food and Agriculture Organization of the United Nations
FOB	:	Free on Board
FY	:	Financial Year
GDP	:	Gross Domestic Product
MEP	:	Minimum Export Price
MT	:	Metric Tones
NAFED	:	National Agricultural Cooperative Marketing Federation of India
NHRDF	:	National Horticultural Research and Development Foundation
NPC	:	Nominal Protection Coefficient
SD	:	Standard Deviation
SER	:	Stable Exchange Rate
UAE	:	United Arab Emirates
USA	:	United States of America
USD	:	United States Dollar
Viz.,	:	Namely
WTO	:	World Trade Organization

## ABSTRACT

Author of the manuscript : **KOTNI VANI KEERTHANA**  
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India is the second largest producer of onion after China. Onion is exported from India to 38 countries in varying quantities. There is a lot of demand for Indian onion in the world. The present investigation entitled “study on export performance of onion from India” was undertaken to analyse the growth of export of onion from India, to analyse the export competitiveness of Indian onion and to study the direction of trade of onion from India.

The study is mainly based on Secondary data. Quantity and value of onion exports, domestic price, marketing costs, international price etc., for the period of 1995-96 to 2019-20 were collected from various issues National Horticulture Board, APEDA, AGMARKNET, FAOSTAT, year book of Agricultural statistics of Bangladesh and other published sources. Compound growth rates, coefficient of variation, Nominal Protection Coefficient and Markov chain model were used as analytical tools.

The compound growth rates of quantity and value of exports for the period of 1995-96 to 2019-20 were estimated as 8.54 per cent and 14.60 per cent, respectively. The country had experienced a high variability in exports of onion both in quantity and value (56.04%, 78.42%) during the period from 1995-96 to 2019-20. Nepal had shown highest growth in onion exports both in terms of export quantity (39.59%) and export value (49.53%) followed by Bangladesh (12.15%, 18.78%), others (10.80%, 16.70%), Malaysia (6.48%, 12.18%), Srilanka (5.79%, 12.40%) and UAE (5.38%, 11.40%) respectively.

The competitiveness of the onion exports from India were calculated by finding out the Nominal Protection Coefficients for the years 2017 to 2019. The NPC observed was 0.81 in 2017, 0.88 in 2018 and 0.64 in 2019.

The direction of trade of the Indian onion was calculated by 1<sup>st</sup> order Markov chain analysis which gave a result that Nepal is the most loyal country to India.



# *Chapter – 1*

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## *Introduction*



## Chapter I

# INTRODUCTION

Agriculture sector occupies an important position in India. It contributes nearly 11.76 per cent (2018-19) to the Gross Domestic Product [GDP] and provides employment to around two-thirds of nation's population. Indian agriculture continues to be the backbone of our society and it provides livelihood to nearly 58 per cent of our population. India is supporting 17.84 per cent of world's population, 15 per cent of livestock population with merely 2.4 per cent of world's land and 4 per cent water resources. India is currently ranked tenth amongst the major exporters globally as per WTO trade data for 2019. India's share in global exports of agriculture products has increased from 1.7 per cent a few years ago, to 2.1 per cent in 2019.

World agricultural trade has been relatively stagnant in the last five years (2015-2019) due mainly to fall in global prices. The sharp drop in oil prices was a major contributor to softening of global agricultural commodity prices. Due to effect of fall in global prices and back-to-back to drought during 2014-15 and 2015-16 India's agricultural export increased by 2.3 per cent CAGR from US\$ 32.1 Billion in Financial year 2016 to US\$ 35.1 Billion in Financial year 2020. However, with normal production in year 2016-17 India's agricultural exports have recovered significantly despite tight global market situation. A comparative analysis of India's ten-year agricultural exports reveals an encouraging picture. Indian agricultural exports grew at 5.3 per cent compound annual growth rate compared to China (4.6%), Brazil (2.7%) and US (2.1%) between 2010 and 2019. Main objective of Indian agricultural export policy is to double agricultural exports from present US\$ 30+ Billion to US\$ 60+ Billion by 2022 and reach US\$ 100 Billion in the next few years thereafter, with a stable trade policy regime. (Agriculture export policy,2021, APEDA)

The onion (*Allium cepa* L.), also known as the bulb onion or common onion. Referring to the history of onion, as onions are small and their tissues leave little or no trace, there is no conclusive opinion about the exact location

and time of their origin. Many archaeologists, botanists, and food historians believe onions originated in central Asia. Other research suggests onions were first grown in Iran and West Pakistan.

Traces of onions recovered from bronze age settlements in China suggest that onions were used as far back as 5000 BC, not only for their flavour, but the bulb's durability in storage and transportation. Ancient Egyptians revered the onion bulb, viewing its spherical shape and circle within a circle as symbols of eternal life. Onions were used in Egyptian burials, as evidenced by onion traces found in the eye sockets of king Ramesses IV. Onions were taken to North America by the first European settlers.

Onions may be among the vegetables that will be prized not only for their addition to our cuisine, but for their value-added health characteristics. Onions are high in vitamin C, a good source of dietary fiber and folic acid. They also contain calcium, iron and have a high protein quality. Onions are low in sodium and contain no fat. Onions contain quercetin, a flavonoid which is one category of antioxidant compounds. Onions contain organosulfur compounds that may offer unique health benefits. (National Onion Association)

In India, as early as in sixth century the famous medical treatise *Charaka-samhita* celebrated the onion as medicine a diuretic good for digestion, the heart, the eyes and the joints.

### **Global scenario of onion**

Onion is mainly grown in Asia, Africa and north America. The biggest onion producing countries include China, India and United states of America. In 2019, the global area under onion was reported by FAO to be 6321576 hectares, with a production of 124.93 million tonnes ([www.faostat.fao.org](http://www.faostat.fao.org)).

China is indisputably the largest producer of onion in the world, producing 24.96 million tonnes in 2019 alone, a figure that was approximately 20 per cent of the total amount produced in the world that year. India is the second largest world producer of onion which produced 22.81million tonnes in the same year, USA took the third position and it recorded a total production of

3.17million tonnes, Egypt came fourth producing a total 3.08 million tonnes in the same year. Other countries producing onion include Turkey, Pakistan, Sudan and Bangladesh among others.

The average annual onion consumption estimated to approximately 13.67 pounds of onions per person across the world. Libya has the highest consumption of onions with an astounding average per capita consumption of 66.8 pounds.

### **Onion in India**

Onion is a popular vegetable in India, consumed by all class of people, ranging from low income to middle income and high income. It is an inevitable item in all Indian kitchens. Onion is one of the second most important commercial crops of India next to Potato. India is the second largest onion growing country in the world. Indian onions are famous for their pungency and are available round the year. The Major onion producing states are Maharashtra, Karnataka, Madhya Pradesh, Gujarat, Bihar, Andhra Pradesh, Rajasthan, Haryana and Telangana. Maharashtra ranks first in onion production with a share of 28.32 per cent. It is produced for both domestic consumption as well as exports.

India ranks first in the world accounting for the world area, planted to onion. Globally, the country occupies the second position, after China, in onion production with a production share of 22.83 per cent. Indian onion productivity is low as compared to Netherland, USA, China.

Indian onions have two crop cycles, first crop harvesting starts in November to January and the second crop harvesting from January to May. Systematic breeding programme was started as early as 1960 at Pimpalgaon Baswant, Nashik and later at IARI, New Delhi. The programme was further strengthened under a coordinated project by institutes of the Indian Council of Agricultural Research at National Horticultural Research and Development Foundation and State Agricultural Universities (SAUs). Consequently, 45 varieties of onion (including two F1 hybrids and 6 varieties of multiplier onion) have been developed and released. India produces all varieties of onion - pink, red, yellow and white, big or small.

The major varieties found in India are Agrifound Dark Red, Agrifound Light Red, NHRDF Red, Agrifound White, Agrifound Rose and Agrifound Red, PusaRatnar, Pusa Red, Pusa White Round. There are certain varieties in yellow onion which are suitable for export in European countries Tana F1, Arad-H, Suprex, Granex 55, HA 60 and Granex 429.

### **Status of onion export**

Production and trade of agricultural commodities are crucial to the economic progress of the developing countries, particularly for India since agriculture continues to be the predominant livelihood source for large share of its population. Ever Since the economic reforms came into existence, international boundaries open up for our country for providing more opportunity for export. India is a traditional exporter of fresh onion. Immediately after Independence in 1947, in 1951-52 the country was exporting over 5,000 tonnes of onion per year. Exports of onion started expanding rapidly during the sixties. There are, however, apparent wide fluctuations in exports from year to year. India has experienced robust growth in export of fresh and processed agricultural products over the last decade.

Onions have been in use for centuries with history indicating that they were widely used in ancient China, Egypt and Persia. China, India and United States of America are the world's leading onion producing countries. Onion is exported from India to 38 countries in varying quantities. There is a lot of demand of Indian onion in the world, the country has exported 2.18 million MT of fresh onion to the world for the worth of Rs. 3467.06 crores/ 497.94 USD Millions during the year 2018-19. Major export destination (2018-19): Bangladesh, Malaysia, U Arab Emts, Sri Lanka and Nepal. ([www.APEDA.gov.in](http://www.APEDA.gov.in)).

The rapidly growing global population and shrinking farmlands, coupled with changing socio-economic, agro-climatic and dietary patterns, have challenged scientists and policymakers to reconsider how we grow and feed 7.5 billion global citizens. Production of onion has fluctuated widely of late due to spoilsport played by weather aberrations like droughts and floods. These supply

shocks combined with absence of proper policy interventions results in onion price surge (Nayyar, 2011). Though there is always a surplus production, fluctuating domestic and export demand often creates demand supply mismatch leading to spiral effect on the prices of onion. The prices sometimes fall below cost of production making it uneconomical for the farmers. Government of India uses minimum export price (MEP) as a tool to ensure regulated exports so that there is an adequate supply of onion in the domestic market. Effective crop planning and creation of post-harvest management infrastructure for onion will go a long way to solve the issues related to onion supply chain. (Sohan, 2017)

Major constraints by the wholesaler and retailer in marketing of onion were high marketing charges/taxes and poor infrastructure respectively. Onion is export worthy commodity and exporter faced several constraints during export. Export policy uncertainty (MEP or subsidy) was found major constraint experienced by exporters. The study indicates that there is need to call from Government and policy makers to pay attention on effective planning that would overcome the constraints experienced by intermediaries in marketing of onion. (Kumud, 2019). This suggests the need for better management of the commodity since both the farmers as well as the consumers, struggle with the varying prices due to chain malfunctioning, and lack of awareness and decision making. Under these circumstances, the “Study of export performance of onion from India” has been undertaken with the following objectives;

#### **OBJECTIVES OF THE STUDY:**

1. To analyse the growth of export of onion from India.
2. To analyse the export competitiveness of onion from India.
3. To study the direction of trade of onion from India.

#### **SCOPE OF THE STUDY**

The structure of global trade had changed drastically due to factors such as globalisation, liberalisation of trade policies, changing consumer preference, value addition in onion products, inflation, weakening of currencies etc. In this context, the analysis of growth and stability in export of Indian onion were made

by using the data for 25 year from 1995-96 to 2019-20. This study therefore provides information on how the trend in onion production and export has been. This information is necessary for the farmers, processors, exporters, various government agencies among other players to plan the production and marketing appropriately. This information is further strengthened through examination of competitiveness of onion in the global markets arena. Moreover the direction of trade analysis will identify the destinations which are stable importers and those which are likely to absorb more Indian onion in future so that the traders may focus on these markets.

### **LIMITATIONS OF THE STUDY**

The present study is based on secondary data with regard to production, prices and volume of exports collected from various published as well as unpublished sources.

### **STRUCTURE OF THESIS**

This thesis is presented in five chapters as follow:

- Introduction: This chapter deals with importance, objectives, scope and limitations of the study.
- Review of literature: This chapter describes the review of available and relevant literature.
- Materials and Methods: This chapter deals with the methodology which includes nature and sources of data together with analytical tools employed.
- Results and Discussion: This chapter entails a critical analysis and discussion of the results.
- Summary and Conclusions: This final chapter, presents the summary and conclusions of the study.

# *Chapter – II*

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## *Review of Literature*



## Chapter -II

# REVIEW OF LITERATURE

This chapter attempts a brief review of the relevant literature that has been accumulated on the areas related to the present study. Keeping in view of the objectives of the study the review is presented under the following sub-headings.

1. Studies on the growth rate
2. Studies on the export competitiveness
3. Studies on the direction of trade

### 1. STUDIES ON THE GROWTH RATE

Sujatha *et al.*, (2003) studied the growth of mango exports from India. They reported that the compound growth rates for fresh mango in terms of quantity and value of exports were 7.92 per cent and 12.26 per cent during post-WTO, whereas in pre-WTO it was 6.81 and 11.62 per cent, respectively. For the overall period of study, India's mango exports increased by 7.71 and 9.35 per cent per annum respectively with respect to quantity and export earnings. In contrast, it was evident that the growth rate of mango pulp decreased during post-WTO (13.65%) compared to pre-WTO period (15.34%) in terms of quantity, similarly in terms of value there was a decrease from 29.29 per cent in pre-WTO to 20.18 per cent in post-WTO

Shivaraya and Hugar (2005) examined the export growth of tomatoes from India for a period of twenty years. They estimated the compound growth rates (CGR) by employing the exponential function in both pre-liberalization and post-liberalization periods. The study established that there was 77.85 per cent growth per annum in quantity during pre-liberalization and 74.18 per cent 15 per annum in terms of value. In the post-liberalization period, the growth in quantity and value were 29.87 and 24.48 per cent respectively. For the overall period, the growth was found to be 3.83 and 3.42 per cent in terms of quantity and value respectively. All these growths were found to be significant.

Ramanathan (2011) found that the growth of area, production, productivity and exports of turmeric from India exhibited a positive value over time (1990-91 to 2005-06). Area and production of turmeric had shown an annual growth rate of 2.09 and 3.76 per cent per annum respectively. The export quantity and value had an annual compound growth rate of 6.52 per cent and 12.72 per cent respectively.

Kulkarni *et al.*, (2012) made growth rate and instability analysis was used to study the growth in area, production, productivity and export of onion. The share of export in the production has also increased from 7.27 per cent (343.26 thousand tones) during 2000 to 12.45 per cent (1664.92 thousand tones) in 2010. India is presently exporting onion to mainly Gulf countries, Far East countries, Bangladesh and Sri Lanka where there is not much scope to increase the quantity as some countries have also started their own production. The scope, however, exists for diversifying the market to European countries and Japan as these countries do not prefer strong and pungent onions. In these countries, yellow onions having mild pungency, bigger bulb size with thick fleshy layers are preferred.

Hilal (2012) studied the growth rate of tea from India, China, Sri Lanka and Kenya. He reported that there was an upward trend of tea exports from Sri Lanka, Kenya and China. The analysis revealed that India exhibited a downward trend since it had a negative slope. The compound annual growth rates for Sri Lanka, India, China and Kenya were estimated at 0.58, -0.39, 4.6 and 6.7 per cent, respectively. It was concluded that Kenya had the highest annual increase in tea exports as it had the highest annual growth rate.

Ashoka *et al.*, (2013) found that the growth rate of chilli exports from India in terms of quantity recorded 16.98 per cent per annum, whereas there was a great growth in export value to the extent of 24.59 per cent per annum and the annual growth in export price was found to be as high as 8.70 per cent per annum.

Gummagolmath (2013) used Compound Annual Growth Rates (CAGR) for area, production, and productivity for a period from 1974-75 to 2011-12. It

was revealed that the area under onion cultivation has grown by 1.84 per cent in the case of Tamil Nadu to a high of 6.12 per cent per annum in the case of Karnataka. The growth in area in the case of major onion producing states has been encouraging. However, there was a decline in growth of onion in the case of Odisha. Rajasthan has shown impressive growth in onion production over the years (9.78%) due to higher growth in yield during the same period (3.62%) Similar trend was observed in the case of Andhra Pradesh wherein production of onion increased despite decline in yield during recent decade. However, in the case of Karnataka, the growth in yield was moderate for the period considered under the study.

Kappakondal (2014) undertaken the study to find out the growth rate of area, production and productivity of onion crop in Andhra Pradesh. Time series data on onion crop area, production and Productivity in Andhra Pradesh (1992-93 to 2011-12) has been utilized for the present study. In this study the simple statistical tools were adopted. It was observed that the compound annual growth rate of onion in terms of productivity is negative (-1.84%) during the 2007-08 to 2011-12 period, even though the area under the cultivation of onion crop and its production was positive.

Koujalagi *et al.*, (2014) in their study estimated the growth trends in area, production, productivity and export of pomegranate in Karnataka. The data were analyzed through growth rate and co-efficient of variation techniques to study the growth in area, production, productivity and export of pomegranate in Karnataka. The production of pomegranate showed a significant growth of 2.60 per cent per annum at one per cent level of significance followed by growth in area with 2.29 per cent at 5 per cent level of significance for Karnataka. The significant increase in growth in area (24.00%) and production (25.35%) for Koppal district was due to implementation of National Health Mission and National Horticulture Board schemes by the Govt. of India.

Shrabanti and Maumita (2015) studied the growth of tea exports from India to different countries using the data for the period from 1992-93 to 2011-12. They reported that there was a decreasing trend in the growth rate in the

entire period for all the importing countries. It was noted that the growth of tea exports from India showed a significantly declining and negative trend. The exports of tea to Germany were declining at -21.79 per cent, to Iran -13.77 per cent, to Japan -30.78 per cent and to Poland -28.37 per cent per annum and for other countries also it showed a declining trend.

Adhikari *et al.*, (2016) analyzed the growth of rice exports from India. The annual compound growth rates for exports of rice in terms of quantity for the period from 1980-81 to 2012-13 was found to be 10.87 per cent and in terms of value, the annual growth rate was 17.74 per cent. In unit value terms, the growth rate was 6.20 per cent per annum. These growth rates were seen to be positive and significant.

Kiran and Sivakumar (2016) in their study on growth of trade of Indian grapes, found that the compound annual growth rates of export of fresh grapes from India (2005-06 to 2014-15) was 8.69 per cent in terms of area and 4.00 per cent in terms of production, both exhibited positive growth, while productivity of grapes was found to be negative (-4.31%). The growth of value of exports was increasing at 25.57 per cent per annum and quantity of export was increasing at 11.67 per cent per annum. The study concluded that the export was growing positively and significantly.

Kale *et al.*, (2016) worked out the compound growth rates for area, production and productivity of onion. The area under onion in Maharashtra has increased by 44.69 per cent over the base year and it has increased at Maharashtra region while it has significantly declined in Konkan region. The production of onion in Maharashtra 80.06 per cent and it has increased at the rate of 8.67 per cent. The production of onion in Western Maharashtra and Marathwada regions has increased drastically and in Konkan region, it has declined. The productivity of onion has increased from 13.27 to 16.51 tons/ha. and it has increased at the rate of 1.63 per cent during a period of last six years.

Audichy *et al.*, (2017) analysed the growth and instability of groundnut export from India. The results revealed that groundnut export registered a

positive and significant growth rate of 15.89 per cent per annum in terms of quantity

Kumareswaran *et al.*, (2018) attempted to quantify the changing structure of Indian tea exports. Data for analysis was taken for a period of 30 years from 1985 to 2015. Compound growth rate (CAGR) was used for analyzing the growth in tea area, production, yield, export quantity and export value over the years. The study revealed that the growth rate the area, production and yield, export quantity, export value of tea showed 1.5 per cent, 2.2 per cent, 0.6 per cent, 1 per cent, 2 per cent, respectively in study period.

Deepa (2019) studied growth rates in area, production, productivity and export of onion in India and world during 1980-2016. Study revealed a significant increase in area, production, productivity and export of onion in India during the period 1980-2016 with compound growth rates of 5.13, 6.72, 1.47 and 7.62 per cent per annum respectively. While significant increase with compound growth rates 3.54, 4.21 and 0.18 per cent per annum was also observed in area, production and productivity at the world level for the period 1980 to 2016.

Lakshmi and Muthuswamy (2019) they analyzed the growth rate of export and import performance of Cocoa in India. This study is mainly based on a secondary data that has been collected for the years 2013-14 to 2018-19. Trend analysis and the Compound Growth Rate were calculated to understand the changes during the study periods. The compound annual growth rates for total exports were 2.50 per cent, for cocoa products exports 29.89 per cent showing a significant and consistent growth performance.

Ajaruddin and Maman (2020) applied growth rate technique and instability index to analyze the data collected from 2006-07 to 2017-18. Quantity of onion exports registered a growth rate of 3.14 per cent per annum and in terms of value 9.09 per cent per annum which is non-significant. The variability in exports and value of exports is due to high fluctuations in the domestic prices whenever the scarcity is felt.

## 2. STUDIES ON THE EXPORT COMPETITIVENESS

Jayesh (2001) used Nominal Protection Coefficient (NPC) technique to analyse the export competitiveness of Indian pepper. Under the exportable hypothesis, the NPC values were found to be less than unity (0.849) in Calicut and (0.817) in Sirsi markets, indicating that the Indian pepper was competitive in the international market and thus is an efficient export-oriented commodity

Ranjit *et al.*, (2001) analysed the performance of exports of agricultural commodities from India. They examined the competitiveness by using Nominal Protection Coefficients (NPC) under exportable hypothesis. The results revealed that rice exports were competitive all through the period as the NPC varied from 0.71 to 0.91. The NPC of wheat exceeded one until the year 1992-93 meaning that its export was not competitive. NPC of soybean remained higher than one which means the export had competitive disadvantage. NPC of mangoes was less than one (0.81) suggesting moderate export competitiveness. NPC of grapes was 0.64 indicating high competitiveness.

Hyma *et al.*, (2003) analysed the export performance of onion and potato from India. They estimated the Nominal Protection Coefficients to ascertain competitiveness of onion and potato. The NPC values of onion exports for the period of 1996-97 to 1999-2000 was found to be 0.8 suggesting moderate export competitiveness. For potato exports in the very period, the NPC value was 0.63 which indicated that Indian potato was highly competitive.

Shivaraya and Hugar (2005) assessed the competitiveness of tomato exports from India by using nominal protection coefficient (NPC). They found the NPC value to be less than one (0.60) over the study period indicating high competitiveness of tomato from India in the international market. It was concluded that tomato was a good export commodity from India as it depicted competitive advantage under exportable hypothesis.

Banakar *et al.*, (2012) studied the competitiveness of sugarcane jaggery in Karnataka by using NPC under exportable hypothesis. The results showed that the NPC was less than one (0.57) which implied that jaggery was a good export

product. It was concluded that there was a competitive advantage for export of jaggery from India.

Thumar *et al.*, (2012) analysed the export competitiveness of selected seed spices grown in India by estimating Nominal Protection Coefficients (NPC) for the year 2007-08 under exportable hypothesis. Their findings showed that export of coriander was moderately competitive to Canada (0.57) and less competitive to South Africa (1.00). The export of cumin was moderately competitive to Japan (0.57), less competitive to Netherlands (0.93) and non-competitive to Bangladesh (1.46). The export of fennel was found non-competitive indicating that fennel exported from India was not profitable. The export competitiveness for the fenugreek indicated that the NPC values were between 0.75 and 1.00 thereby concluding less profitable export of fenugreek.

Ashwini *et al.*, (2015) used the export performance ratio (EPR) and nominal protection coefficient (NPC) has been estimated to examine the export competitiveness of Indian onion. The study has revealed that the existence of high instability in export of onion. However, stability in export from India is more in case of Singapore, Sri Lanka, U.A.E., Saudi Arabia and Mauritius. Also, more instability in export was observed for Bangladesh, Kuwait, Nepal, Qatar, Oman and U.K

Kanaka and Chinnadurai (2015) studied the export competitiveness of groundnut from India for the period from 1999-2000 to 2008-09, by employing the Nominal Protection Coefficients (NPCs). In this regard NPC, the estimate ranged from 0.80 in 2009-10 to 1.21 in 2003-04 with an average of 1.05 for the study period under exportable hypothesis. Groundnut showed a clear-cut competitive disadvantage in the pre-WTO period because NPC was more than one. In the post-WTO period, the competitiveness of groundnut improved significantly as supported by the estimates of NPC, which turned out to be less than one.

Devi *et al.*, (2016) undertook a study on export competitiveness of Indian chillies by calculating the Nominal Protection Coefficients (NPCs). The results revealed that during the study period, i.e., 2006-07 to 2010-11 under the

exportable hypothesis, the estimated NPCs varied between 0.46 and 0.69 indicating that Indian chillies were price competitive in the global market.

Makama *et al.*, (2016) assessed the export competitiveness of Indian rice by calculating NPC. They estimated the average value of NPC for the years 2010, 2011, 2012 and 2013 and found the value to be less than unity (0.47) which was a clear indication that the domestic prices received by the farmers in the country were below the international prices. The results proved that rice had a high degree of competitive advantage in the international markets under exportable hypothesis. Rice was therefore said to be a good commodity for export.

Audichy *et al.*, (2017) examined the competitiveness of groundnut export from India by using NPC technique for the period from 2009-10 to 2013-14. It was found that Indian groundnut was moderately competitive to Indonesia, Malaysia, Philippines, UAE, Thailand, Ukraine, Singapore, UK and China while Pakistan was found to be the only country to which export of Indian groundnut was less competitive. The NPC values for the study period revealed that not a single country was highly competitive.

Udeshna and Hazarika (2017) studied the export competitiveness of Indian tea in the world market by using Nominal Protection Coefficient (NPC). It was found the NPC ranged between 0.66 and 0.74 which suggested that Indian tea was an efficient export commodity. NPC was less than unity during the study period. It was noted that there was an increasing trend in the value of NPC

Meena *et al.*, (2018) examined export competitiveness of Indian groundnut during the period from 1996-97 to 2013-14 using Policy Analysis Matrix (PAM). Results revealed that export of groundnut from India is highly competitive and has great potential in international market. The measured values of NPC, EPC and ESC have been less than unity throughout the period. DRCR also remains below unity pointing towards efficient utilisation of domestic resources in groundnut cultivation. Positive social profit all through the years reveals social welfare gain. Groundnut export is found generating resources to the Indian economy as the measured total policy transfer is negative

Kshirsagar *et al.*, (2020) studied export competitiveness for major spices viz., chilli, black paper, turmeric, coriander and cumin. The computation of nominal protection coefficients has indicated that chilli and coriander were competitive for exports to several countries and India should encash this comparative advantage by developing modern infrastructure. The black pepper, turmeric and cumin were moderately competitive for exports to all the continents.

Wasnik *et al.*, (2020) studied the trend of tobacco export in domestic and international prices and export competitiveness during the period from 1987-88 to 2016-17. The domestic price and international price of tobacco were showing exponential trend of growth with increasing at increasing rate. The NPC value of tobacco showed the average value as 0.40 per cent and 0.46 per cent in period I and period II, respectively and the NPC value for overall period was 0.43 per cent. It indicates highly competitiveness in international market. Result shows that the export of tobacco from India is highly competitive

### **3. STUDIES ON THE DIRECTION OF TRADE**

Mahadevaiah *et al.*, (2005) applied Markov chain to study the direction of trade of cotton export from India for the period from 1981-82 to 1998-99. They found that China had been the only stable importer of Indian cotton as reflected by a high probability retention that increased from 0.0832 during pre-reforms period (1981-82 to 1990-91) to 0.3155 during the post-reforms period (1991-92 to 1998-99). Japan and Korea depicted low retention probability of 0.0979 and 0.2026 respectively during the pre-reforms which reduced to zero during post-liberalization period. Bangladesh, Germany, Indonesia and the UK had 'zero' retention probability in both the periods thus they were the most unstable countries.

Pramod *et al.*, (2006) made an attempt to study the changes in composition and direction of onion exports and estimation of export demand for onion. The Markov chain analysis was done to estimate the market share for the period 2009. It was estimated that Bangladesh would account for highest share of onion fresh exports followed by Malaysia, United Arab Emirates (UAE),

Singapore, etc. With the enforcement of Free Trade Agreement (FTA) with Sri Lanka, the declining trend in exports to Sri Lanka is expected to be reversed. There is a need to expand the export market of onions and also to look for avenues where higher price realization is possible. There is also a need to have long term and stable policy towards export of onion. The supply of onion for exports could be increased through increased production and by way of reduction in post harvest losses. An adequate policy support is needed to take the available technology to the farmers.

Reddy (2008) studied the changing direction of Indian soymeal export during the period of 2000 to 2007. The Markov chain analysis was used to estimate the transitional probability matrix in order to find out probability of retention. The major importing countries considered for the analysis were Indonesia, Korea, Thailand, China, Japan and Vietnam. It was found that Indonesia is a stable market followed by Vietnam with the probability retention 0.7449 and 0.2946 respectively.

Mendhe and Degaonkar (2010) examined the direction of trade of Indian chilli for the period of 1990 to 2007. The Markov chain results revealed that Malaysia, Sri Lanka, Singapore, USA, UK and 'other countries' had a huge scope to absorb Indian chilli in future. They had significant percentage of retention probabilities. China, Spain and South Korea were found to be unstable markets of Indian chilli as they were unable to retain their previous year's shares.

Vaishali *et al.*, (2011) studied the direction of trade of major Indian agricultural commodities for the period from 2001-02 to 2008-09 by using Markov chain analysis. The study established that 'other countries' were a stable market of Indian rice as they retained 76.77 per cent of their previous share, Maldives retained 41.54 per cent, and Bangladesh retained 22.86 per cent of its previous market share. Afghanistan, Bhutan, Nepal, Pakistan and Sri Lanka were highly unstable importers of Indian rice among SAARC countries as their retention was 'zero' per cent of their previous market shares. 'Other countries' were also the most stable importers of Indian wheat with 62.51 per cent retention. The study concluded that India has an edge to export rice, wheat,

mangoes and onions to Bangladesh, Nepal and Sri Lanka. There was poor performance in the case of Bhutan, Maldives, Pakistan and Afghanistan.

Samaya and Vijayachandra (2012) studied the direction of trade of Indian coffee by using Markov chain analysis. The results showed that Italy, Germany, Russia and Belgium were more stable coffee importers from India as indicated by probability retention of 69.8, 58.2, 48.8 and 48.0 per cent respectively. Spain on the other hand was found to be less stable since it had only 6.8 per cent probability of retaining coffee imports from India.

Ashoka *et al.*, (2013) analysed the direction of trade of Indian chilli by using Markov chain approach. The results depicted that Malaysia was the most stable importer of Indian chillies as it could retain its original share of 87.77 per cent which was the highest among the importing countries. Sri Lanka was found to be another stable market with 27.56 per cent retention of its share while losing major share of 72.44 per cent to USA, Malaysia, UAE, Indonesia and 'other countries' category. Other stable importers were UAE and 'other countries' category with the retention of previous shares of 30.13 and 55.31 per cent respectively.

Kusuma and Kumara (2014) examined the direction of trade of Indian onion exports by calculating the transitional probabilities through Markov chain analysis for the annual export onion data for the period from 2001-02 to 2010-11. It was established that Bangladesh was one of the most stable importers of Indian onion since it could retain 100 per cent of its share. UAE and Sri Lanka had 'zero' retention probability. Malaysia retained 71 per cent, Singapore had 51 per cent retention and 'other countries' retained 9 per cent of export during the study period. Malaysia and Singapore were found to be moderately stable markets while Sri Lanka and UAE were the most unstable importers.

Sivasankari and Rajesh (2014) in their study applied Markov chain analysis for estimating direction of trade of Indian black pepper. Markov chain analysis revealed that the major Indian black pepper export markets, were categorized as stable market (USA, Germany, UK, Italy, Canada and other category) based on the magnitude of transition probabilities. The data regarding

country-wise export of black pepper has showed that the previous export share retention for Indian black pepper has been high in minor importing countries (pooled under others category) (85 %), followed by USA (78 %), Germany (41 %), Italy (33%), Canada (16%) and UK (11 %).

Deepika *et al.*, (2015) analysed the stability of Indian spices by using Markov chain approach. It was revealed that the markets which gained their share in export of major spices and shown loyalty were Canada for black pepper (19.44%), UK for chilli (98%), 'other countries' for turmeric (99.3%), UAE for cumin (32.42%) and Malaysia for coriander (23%). The transitional probability matrix indicated that India was likely to lose most of its export shares in its traditional markets which had come out to be the most unstable importers such as Germany and USA for black pepper, Bangladesh for chili, UAE and UK for turmeric, Japan, Nepal and Malaysia for cumin and Singapore and UK for coriander.

Devi *et al.*, (2016) studied the direction of trade of chillies by Markov chain analysis and has shown that USA is the most stable market of chilli, followed by UAE and Sri Lanka, while Malaysia, Bangladesh and Pakistan are the unstable importers. The study revealed that during 2011-12, the major markets for Indian chilli were Malaysia (24.83%) and Sri Lanka (14.70%). The estimated NPCs have indicated that the Indian chilli was price competitive during the study period 2006-07 to 2010-11. A comparison of competitiveness of Indian chilli against Chinese red chilli has revealed that Indian red chilli is globally price competitive for three years in the study period of five years, 2006-07 to 2010-11.

Sharma *et al.*, (2017) made an attempt to analyze the international trade potential of Indian onion. The study also focused on identifying the direction of onion exports by using stationary form of the first order Markov chain model and suggested a diversification of trade markets. Bangladesh is the most stable and favourite export destination since it retained its original share of 47 percent over the period followed by Malaysia (28%), Nepal (26%), Sri Lanka (12%). UAE and Pakistan are not stable.

Shree *et al.*, (2017) undertaken study to analyze the pattern of export, import and balance of trade of natural honey in India by tabular analysis. The results revealed that the export performance of natural honey showed increasing trend whereas the imports of natural honey showed up and down trend for past ten years. The study was also undertaken to find out the direction of trade of natural honey from 2007-08 to 2012-13 using Markov Chain Analysis which revealed that India's natural honey export to the USA market was retained to the level of 34 per cent and remaining 66 per cent was diverted to other countries category. India's natural honey export to the Yemen Republic market was retained to the level of 45 per cent and remaining 55 per cent was diverted to USA alone. India could not retain its previous import of natural honey to China and Australia. India's natural honey import from the Malaysia market was retained to the level of 7.3 per cent and remaining 92.7 per cent was diverted to China (85.5 %) and other countries (7.2 %)

Bisth and Singh (2017) attempted to analyze changes in trade destinations using Markov chain approach. Sri Lanka was found the most stable and loyal market for potatoes from India. Malaysia, Nepal, Mauritius and UAE were other major importer of Indian potato. Therefore, it was suggested that the attention should be focused on the market requirement and specifications of stable markets

Sanjay *et al.*, (2017) calculated compound and simple growth statistics and by developing separate transitional matrix for exports and imports. The import transition matrix also brought forward Canada and Myanmar as most trusted and Australia & USA as most unstable suppliers of Indian pulses imports. In conclusion, the growth in production (3.63 %) of the world's largest producer was far behind the simultaneous growth in import quantity (17.12 %).

Tulsiram and Alagumani (2018) examined the direction of trade of tomato exports for a period of 10 years from 2004–05 to 2013–14. The transitional probability matrix revealed Pakistan as the loyal market. Further the projected value of exports also revealed that majority of the exports would be confined to neighboring countries alone. Hence efforts are needed to improve the efficiency

of production and quality in order to stabilize the markets and also to make the product acceptable and price competitive in European countries

Prabhakar (2019) studied the direction of trade by using transitional probabilities of Markov chain analysis. The results revealed that the probability retention of the present quantity of Indian fish exports to USA was 47.50 per cent, Middle East countries 36.9 per cent and Japan 30.6 per cent. The probability of shifting export from South East Asian countries to Japan was 37.00 per cent, Middle East countries to USA was 25.00 per cent and South East Asian countries to Middle East countries was 26 per cent. The results showed that if the trend continued, in future 16.52 per cent of Indian fish export would go to Japan, 21.60 per cent to USA, 2.23 per cent to European Union, 2.07 per cent to South East Asian countries, 7.62 per cent to China, 11.61 per cent to Middle East countries and 38.69 per cent to other trading partner countries.

Mehazabeen and Srinivasan (2020) identified major banana destinations were UAE, Saudi Arabia, Iraq and Nepal. It is evident that UAE had one of the most stable market among the major importers of Indian banana as reflected by higher probability of retention. The steady state probability showed that in future 45 per cent of Indian banana export would go to UAE and other 39.41 per cent would go to other banana importing countries

Yamini *et al.*, (2020) in their assessed the transition probabilities for major cotton markets for 12 years i.e., 2004-05 to 2015-16. The major Indian cotton export markets were categorized as stable markets (China, Bangladesh) and unstable markets (Italy, Thailand, Indonesia) based on the magnitude of transition probabilities. The major export markets for Indian cotton are China (79 per cent and 77 per cent) and Bangladesh (66 per cent and 78 per cent) respectively in terms of quantity and value. The increasing share of other countries clearly shows the need to explore and exploit the market potential of other countries.

# *Chapter – III*

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*Material and Methods*



## Chapter III

# MATERIALS AND METHODS

This chapter discuss the research design and research methodology employed in study of the objectives. The broad objective of the study was to study the export performance of onion from India. This chapter further describes in detail the sources of data, nature of data and analytical techniques which are used in the analysis. These are presented under the following headings.

3.1 Description of the study area

3.2 Collection of the data

3.3 Analytical techniques

### 3.1 SELECTION OF THE MARKETS

The study was carried out at all India level. However nominal protection coefficient of onion was estimated for Nashik (Maharashtra) market purposively as Maharashtra is leading producer of onion in India.

### 3.2 COLLECTION OF THE DATA

The study was based on secondary data on various aspects of onion international trade of India with different countries. To study the growth rates of the onion exports from India, quantity and value of the exports for a period of 25 years i.e., from 1995-96 to 2019-20 were collected from Agricultural and Processed Food Products Export Development Authority (APEDA).

To calculate nominal protection coefficient of onion exports from India, the data were collected from the exporters of Nashik market.

To study the direction of trade of onion exports from India quantities of exports to various countries were collected from APEDA for a period from 2010-11 to 2019-20.

### 3.3 ANALYTICAL TECHNIQUES

Based on the nature and extent of data availability, the following analytical tools and techniques were adopted to analyse the data and draw suitable conclusions:

#### 3.3.1 Compound annual growth rate analysis

#### 3.3.2 Nominal protection coefficient

#### 3.3.3 Markov chain analysis

#### 3.3.1 Analysis of Growth and Instability

The growth of onion in India was estimated for area, production and productivity. Also growth of onion exports were calculated for quantity, value and unit value. Percentage changes over the previous year was estimated. Further, instability of onion exports quantity, value and unit value were calculated by using coefficient of variation and Cuddy-Della Valle instability index.

##### 3.3.1.1 Percentage Change Over the Previous Year

Percentage change over previous year was taken as a measure of annual fluctuations for quantity, value and unit value of onion exports.

The per cent change of the previous year for  $t^{\text{th}}$  year is defined as;

$$\% \text{ change} = \frac{E_t - E_{t-1}}{E_{t-1}} * 100$$

Where;

$E_t$ ,  $E_{t-1}$  represent the quantity of onion exported, value and unit value in  $t^{\text{th}}$  and  $(t-1)^{\text{th}}$  period respectively

##### 3.3.1.2 Compound annual growth rate analysis

Growth of any economic variable signifies its past performance. In present study the growth in quantity and value of onion exports were analysed using the exponential growth function. It is given in the form

$$Y = ab^t$$

Where,

Y = Dependent variable i.e. quantity, value and unit value of onion exports

a = Intercept or constant

b = Trend coefficient (slope)

t = Time variable (Years)

The function takes the form of a linear equation in a logarithmic and becomes log-linear as shown below:

$$\text{Ln } Y = \text{Ln } a + t \text{ Ln } b + \mu$$

Where 'Ln Y' is natural logarithm of Y, 'Ln a' and 'Ln b' are similarly defined.

The compound growth rate was then computed by using the relationship given as;

$$\text{Compound Growth Rate (CGR)} = [\text{Antilog } (b) - 1] * 100$$

The significance of the regression coefficient (Ln b) was tested by t ratio output.

### **3.3.1.3 Analysis of Instability**

Instability in exports earnings adversely affects the economy of a country. The instability in export of onion in terms of quantity of export, value of export and unit value was worked out by using coefficient of variation and Cuddy-Della Valle instability index.

### **3.3.1.4 Coefficient of variation**

Coefficient of variation around the mean was used as a measure of instability in the quantity of onion exported, export earnings in value terms and the unit value. The coefficient of variation (CV) was calculated by using the following formula;

$$CV = \frac{\text{Standard deviation } (\sigma)}{\text{Mean}(X)} \times 100$$

### 3.3.1.5. Cuddy-Della Valle instability index

Although coefficient of variation (C.V) is the simplest measure of instability, it actually overestimates the level of instability in time series data which are characterized by long-term trends. The Cuddy-Della Valle Index detrends the annual price and shows the exact direction of the instability (Cuddy and Valle, 1978). Thus, it is proven to be a better measure to study instability in agricultural production as well as prices. A lower value of this index indicates low instability in prices and vice-versa is true. The Cuddy-Della Valle index corrects the CV and it is defined as follow:

$$\text{Cuddy - Della Valle Instability Index (\%)} = C.V * \sqrt{1 - R^2}$$

### 3.3.2 Nominal protection coefficient

Traditionally, price is one of the most important indicators of competition as it is a reflection of consumer appreciation of quality and indirect indicator of relative efficiency of the production process. Hence a price based measure like NPC has been accepted as a standard measure of competitiveness. Nominal protection coefficient is a direct measure of comparative advantage enjoyed by a commodity in the context of free trade. Although NPC measures only the deviation of domestic prices relative to world prices, the conclusion drawn regarding the policy environment facing agricultural production activity are essentially the same as those drawn from any other robust calculations. The coefficients shed light whether the country has comparative advantage in the production of that commodity or not. NPCs of Indian onion export were estimated in order to examine its export competitiveness in the world market. NPC is defined as the ratio of the domestic price to the world reference price of the commodity under consideration.

$$\text{Symbolically, NPC} = \frac{P_d}{P_e}$$

Where,

$NPC$  = Nominal protection coefficient.

$P_d$  = Domestic price of onion adjusted for handling/marketing charges and transportation cost.

$P_e$  = Export price or FOB price/ what the farmer would have received in the context of free trade.

The domestic price used in this computation is normally the wholesale market price of commodity in the selected market adjusted for handling/marketing charges and transfer cost. Estimation of world reference price entails adding freight charges, insurance charges, trading margins, transportation costs etc. The resulting international price is compared with domestic price.

A decision criterion is, if  $NPC$  is less than one, then the commodity is export competitive (under exportable hypothesis, and it is worth exporting). If  $NPC$  is greater than one, the commodity is not export competitive (not a good export product).  $NPC$  helps in measuring the divergence of domestic price from the international price and thus determine the degree of protection (incentive) or dis-protection (disincentive) of the commodity in question.

$NPC$  can be estimated under two scenarios i.e., importable hypothesis or exportable hypothesis. In the present study  $NPC$  was calculated under exportable hypothesis.

To calculate the  $NPCs$  for the present study, Wholesale prices were obtained from Nasik market. FOB prices was calculated by adding wholesale price, transportation charges, marketing margin of exporter, port clearance and handling charges, certification charges. Landed price was calculated by adding FOB price, freight charges and insurance premium. CIF prices were obtained by dividing landed cost with exchange rates.  $NPCs$  were calculated by dividing CIF prices with reference prices of Bangladesh. Reference prices of Bangladesh were collected from the year books of Agricultural statistics of Bangladesh.

To study the competitiveness of onion from India, the FOB prices and domestic wholesale prices that prevailed in the major market were collected.

### 3.3.3 MARKOV CHAIN ANALYSIS

To examine the direction of trade and changing patterns of exports of onion, first order Markov chain approach was used. The Markov chain process is a particular type of stochastic process characterized by the way in which “the outcome” of an experiment at time depends solely on the outcome of the experiment at time  $t-1$ , and independent of the history of the experiment before  $t-1$ . Markov chain analysis provides a probability approach in broadly unraveling the changes. Estimation of transitional probability matrix is central to Markov chain analysis. The row elements in the transitional probability matrix provide the information on the probability of retention in the volume of trade and extent of loss in trade on account of competing countries. The column elements indicate the probability of retention of trade and the gains in the volume of trade from other competing countries. The diagonal elements indicate the retention of exports to a particular country. This econometric analysis not only helps to know the trend in sustaining existing market, but also the shift in shares from one country to another over a period of time. The model is a stochastic process which describes the finite number of possible outcomes,  $S_i$  ( $i=1, 2, \dots, r$ ) which is a discrete random variable,  $X_{it}$  ( $t=1, 2, \dots, t$ ) and which assumes that (a) the probability that item  $t^{\text{th}}$  trial depends only on outcome of the preceding trial, and (b) this probability is constant for all time periods. Since estimation of the transitional probability matrix  $P$  is the corner stone in Markov chain process, the element  $P_{ij}$  of this matrix indicates the probability that exports will switch from country ‘ $i$ ’ to country ‘ $j$ ’ with the passage of time. The diagonal element  $P_{ii}$  measures the probability that the export share of a country will be retained. Thus, an examination of the diagonal element indicates the loyalty of an importing country to a particular country's exports.

In the context of the current application, the five major countries which were considered importers of Indian onion were Bangladesh, Malaysia, United Arab Emirates (UAE), Srilanka and Nepal. The export to remaining countries

was pooled under the category of ‘others’. There is a growing awareness of the usefulness of this technique for analysis in many areas including exports, particularly when the process is constant but has a gradual change. The average Onion export quantity to a particular country was considered to be a random variable which depends only on its past exports to that country and which can be denoted algebraically as follows;

$$E_{it} = \sum_{j=1}^r E_{it-1} P_{ij} + e$$

Where,

$E_{jt}$  = Exports of onion from India to  $j^{\text{th}}$  country during the year  $t$

$E_{it-1}$  = Exports of onion from India to  $i^{\text{th}}$  country during the period  $t-1$

$P_{ij}$  = Probability that the onion exports will shift from  $i^{\text{th}}$  country to  $j^{\text{th}}$  country

$e$  = The error term which is statistically independent of  $E_{it-1}$

$t$  = Number of years considered for the analysis

$r$  = Number of onion importing countries.

Each unit of interest can belong to one and only one item at a given time and moves successfully from one country to another, with each move being termed as step.  $P_{ij}$  is a conditional probability and is assumed to exist for every pair of countries. Matrix notation provides a neat and convenient way of expressing the necessary information pertaining to any particular Markov chain process. The transitional probabilities  $P_{ij}$  which can be arranged in a  $(c * r)$  matrix have the following properties:

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

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

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.

## Estimation of the $P_{ij}$

There are various approaches to estimate the transitional probabilities of Markov chain model such as un-weighted restricted least squares, weighted restricted least squares, Bayesian maximum likelihood among others. In the 41 present study, Minimum Absolute Deviations (MAD) estimation procedure was employed to estimate the transitional probability, which minimizes the sum of absolute deviations. 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:

$$\text{Min } OP^* + Ie$$

Subject to,

$$XP^* + V = Y$$

$$GP^* = 1$$

$$P^*e \geq 0$$

Where,

$0$  = vector of zeros

$P^*$  = vector in which probability  $P_{ij}$  are arranged

$I$  = appropriate dimensioned column vector of units

$e$  = vector of absolute errors ( $|U|$ )

$Y$  = vector of export to each country

$X$  = block diagonal matrix of lagged values of  $Y$

$V$  = vector of errors

$G$  = 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:

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

Where,

$Y_{jt}$  = Predicted proportions of  $j^{\text{th}}$  country's share at time  $t$

$Y_{t-1}$  = Observed proportion of  $i^{\text{th}}$  country share at time  $t-1$

$P_{ij}$  = Estimated transitional probability matrix.



# *Chapter – IV*

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## *Results and Discussion*



## Chapter-IV

# RESULTS AND DISCUSSION

This chapter presents the results of the study along with the discussion under the following headings.

- 4.1 Growth rates of onion exports
- 4.2 Export competitiveness of onion
- 4.3 Direction of trade of onion exports

### **4.1 GROWTH RATES OF ONION EXPORTS**

The share of onion exports from India in total national production of onion and world's total exports of onion were computed to know the importance of onion exports from the point of country and world. The pattern of changes in the quantity, value and unit value of onion exports from India were estimated with the help of percentage change over previous year. The compound growth rates were calculated for exports of onion from India for quantity, value and unit value. Further an attempt was made to assess the instability in export quantity and export value to know the variability extent in onion export.

#### **4.1.1 Onion Exports from India**

From the Table 4.1 it was revealed that production of onion in India was increased from 4.08 million MT to 22.81 million MT for a period from 1995-96 to 2019-20. The growth in national onion production was calculated by using exponential form and the CAGR was 9.13 which indicated that there was positive growth in production of onion in the country. Export of onion in terms of quantity and value was increased from 3.50 lakh MT to 1.11 million MT and 230.74 crores to 2320.70 crores respectively for the same period. Further growth in Indian onion exports in terms of quantity and value was estimated for the same period and the results indicated that there was 8.54 and 14.60 per cent growth in onion exports from the country. Share of Indian onion exports in national onion production was estimated and the results indicated that the share was 8.60 in 1995-96 and 4.89 in 2019-20. The growth in share percentage was -0.54.

**Table 4.1. Onion export from India, its share (%) to national production and world export.**

Year	Production (MT)	Export (MT)	Value (Rs.crores)	Share in production (%)	World export of onion(MT)	Share in worlds export (%)
1995-96	4080000	350989.17	230.74	8.60	4505829	7.79
1996-97	4180000	427011.78	265.21	10.22	4472245	9.55
1997-98	3200000	333348.95	202.46	10.42	4127152	8.08
1998-99	5331900	215693.63	176.06	4.05	4815553	4.48
1999-00	4899500	260475.27	202.72	5.32	4705228	5.54
2000-01	4721100	343253.69	276.19	7.27	4392935	7.81
2001-02	5252100	441849.60	332.42	8.41	4823937	9.16
2002-03	4209500	588449.75	361.58	13.98	5531896	10.64
2003-04	6267600	859938.75	715.89	13.72	6884427	12.49
2004-05	7760600	870196.86	644.14	11.21	6946240	12.53
2005-06	9432500	959276.32	708.17	10.17	7305251	13.13
2006-07	10847000	1377005.03	1,163.30	12.69	8261072	16.67
2007-08	13900000	1008413.57	1,035.74	7.25	8588665	11.74
2008-09	13565000	1670160.28	1,827.52	12.31	9163738	18.23
2009-10	12158800	1651968.22	2,319.44	13.59	9276257	17.81
2010-11	15118000	1164030.92	1779.26	7.70	10773285	10.80
2011-12	17511090	1290938.98	1723.03	7.37	10770200	11.99
2012-13	16813000	1616354.21	1966.67	9.61	9865470	16.38
2013-14	19299000	1461521.93	3169.63	7.57	11392754	12.83
2014-15	19401680	1223338.36	2300.57	6.31	11017488	11.10
2015-16	18927000	1360884.87	3097.19	7.19	11216302	12.13
2016-17	20931000	2371439.86	3106.08	11.33	11792762	20.11
2017-18	22427000	1543379.60	3088.79	6.88	12147719	12.71
2018-19	23262000	2122091.22	3468.83	9.12	12343606	17.19
2019-20	22819000	1114828.57	2320.70	4.89	13919105	8.01
Growth (%)	9.13	8.54	14.60	-0.54	5.43	2.95
C.V	56.99	56.04	78.42	31.05	36.87	33.81

Source: Production, World Export data from FAOSTAT and Export data from APEDA

world onion exports during 1995-96 was 4.50 million MT and in 2019-20 it was 13.91 million MT and the growth percentage was 5.43 per cent. Share of Indian onion exports in world onion exports were calculated and the results indicated that the percentage was 7.79 in 1995-96 and 8.01 in 2019-20 and CAGR was 2.95 per cent. (Fig.4.1)

It confirms the increase in the exports on par with the increase in production but the share of Indian onion exports in national production over the period was declining which indicated the scope for further increasing the Indian onion exports, it also confirmed the increased preference of Indian onion in the

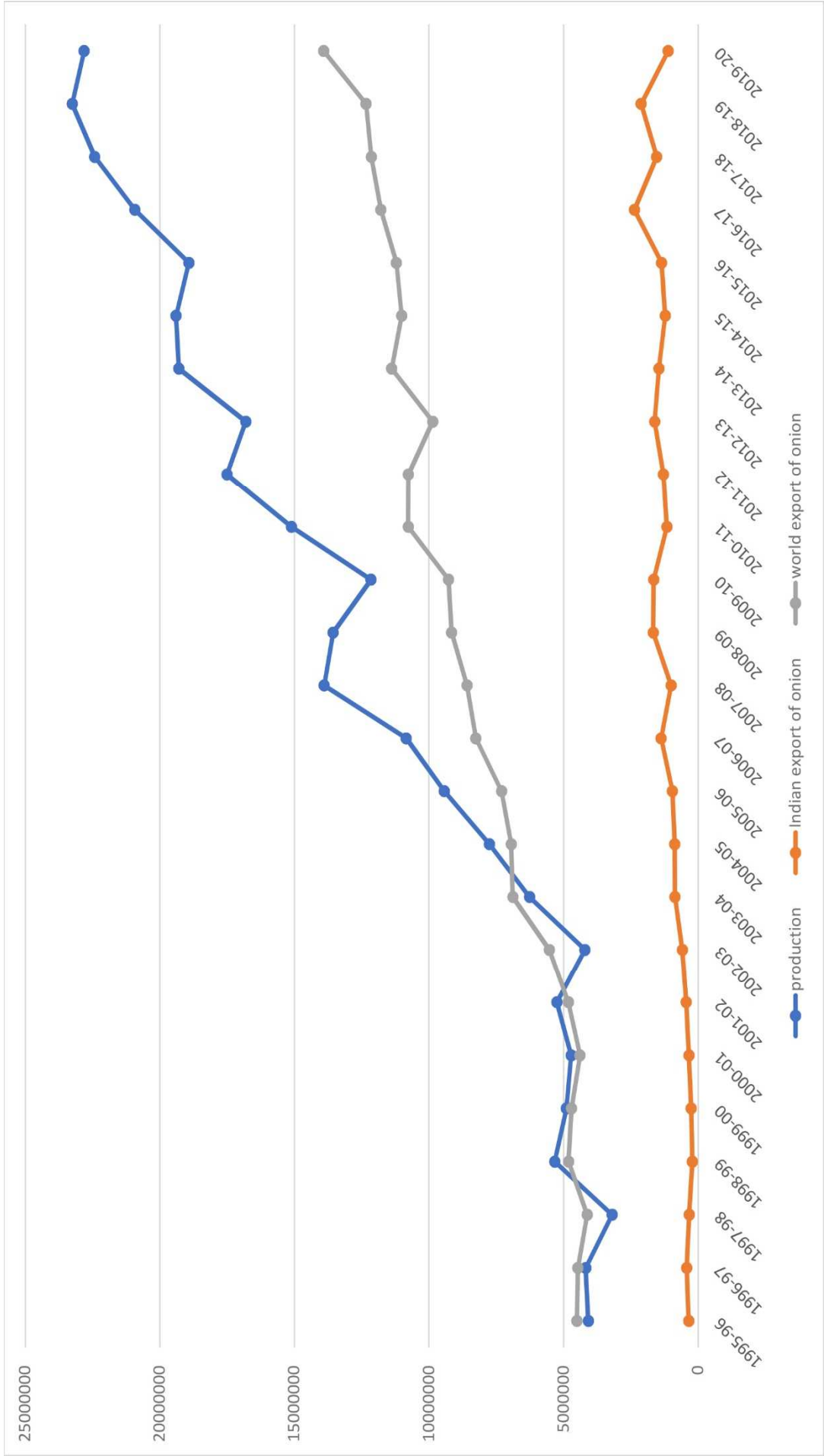


Fig 4.1. Indian onion production, Indian exports of onion and world exports of onion in quantity terms.

global market. A close look at the results revealed that share of Indian onion exports in world exports was increasing from 1995-96 to 2018-19, but it was drastically decreased in 2019-20 the reason was ban in the exports of onion from September 14<sup>th</sup> 2019 to January 1<sup>st</sup> 2020 after a bad crop crimped output causing domestic onion prices to show signs of firming up.

From the Table 4.2 it was found out that out of the 25 years data analysed, 9 years had shown negative change over the previous years for quantity of onion exports. The export value of onion and unit value realization had shown a negative change over the previous years for 8 and 11 years respectively and the remaining years had shown a positive change over previous years.

In the year 2016-17, the percentage change over previous year had registered the highest percentage (74%) change over previous year in export quantity because the quantity exported increased from 1.36 million MT in 2015-16 to 2.37 million MT in 2016-17 followed by 2008-09, where the percentage change over previous year was 66 per cent. Highest negative percentage change in export quantity was observed in 2019-20 (-47%) followed by -35 per cent change in 2017-18. In export volume, the highest percentage change over previous year was observed in 2008-09 i.e., 76 per cent. Second highest per cent change was observed in 2013-14 and the change was 61 per cent. Highest negative change (-33%) was observed in 2019-20 followed by 2014-15 (-27%). In the case of unit value realization of onion exports, the highest percentage change (78%) over the previous year was observed in 2013-14 followed by 53 per cent change in 2017-18. Largest negative change (-42%) in unit value was observed in 2016-17 followed by 2018-19(-18%).

**Table 4.2. Onion exports from India (1995-96 to 2019-18) showing the percentage change over the previous year.**

Year	Export Volume (MT)	percentage change over previous year	Total export Value in rupees (Cr.)	percentage change over previous year	Unit value (Rupees per MT)	percentage change over previous year
1995-96	350989.17	-	230.74	-	6573.992012	-
1996-97	427011.78	22%	265.21	15%	6210.835682	-6%
1997-98	333348.95	-22%	202.46	-24%	6073.515456	-2%
1998-99	215693.63	-35%	176.06	-13%	8162.503455	35%
1999-00	260475.27	21%	202.72	15%	7782.696607	-5%
2000-01	343253.69	32%	276.19	36%	8046.235424	3%
2001-02	441849.60	29%	332.42	20%	7523.37447	-6%
2002-03	588449.75	33%	361.58	8.8%	6144.619825	-18%
2003-04	859938.75	46%	715.89	98%	8324.895232	35%
2004-05	870196.86	1%	644.14	-10%	7402.233099	-11%
2005-06	959276.32	10%	708.17	10%	7382.335884	0%
2006-07	1377005.03	43%	1,163.30	64%	8448.044667	14%
2007-08	1008413.57	-27%	1,035.74	-11%	10270.98435	22%
2008-09	1670160.28	66%	1,827.52	76%	10942.18335	7%
2009-10	1651968.22	-1%	2,319.44	27%	14040.46381	28%
2010-11	1164030.92	-29%	1779.26	-23%	15285.3328	9%
2011-12	1290938.98	10%	1723.03	-3%	13347.10646	-13%
2012-13	1616354.21	25%	1966.67	14%	12167.32068	-9%
2013-14	1461521.93	-10%	3169.63	61%	21687.18741	78%
2014-15	1223338.36	-16%	2300.57	-27%	18805.67205	-13%
2015-16	1360884.87	11%	3097.19	35%	22758.6482	21%
2016-17	2371439.86	74%	3106.08	0%	13097.86536	-42%
2017-18	1543379.60	-35%	3088.79	0%	20013.15814	53%
2018-19	2122091.22	37%	3468.83	12%	16346.28129	-18%
2019-20	1114828.57	-47%	2320.70	-33%	20816.65345	27%

The results revealed that the highest increase in export quantity during 2016-17 was due to higher share of production for exports, availability of storage facilities to brought the previous years bulb to the market, export subsidy and zero Minimum Export Price (MEP). In 2007-08 there were delayed rains in kharif season in Maharashtra forced the farmers to reduce the area under onion, but the delayed rains increased the area under rabi season. Hence there was a highest production in rabi season, because of the fall in prices for rabi onion crop the farmers kept their produce in storage go downs. In the year 2008-09 when the domestic and export market prices rise for onion the farmers brought the produce to market, as the stored onions have longer shelf life the exporters preferred them hence there was a record onion exports in the country during 2008-09. Further this was the reason for highest change in export value in 2008-09. The second highest percentage change in export value was observed in 2013-14 was observed even though there was negative change in export quantity over previous year. This could be due to highest unit value realised in the export market. The highest decline in export quantity and value was witnessed in 2019-20 and this could be attributed to ban in exports of onion from September 14<sup>th</sup> 2019 to January 1<sup>st</sup> 2020 due to increased domestic prices in that season.

#### **4.1.2 Compound growth rates**

The study was attempted to examine the performance of Indian onion exports with respect to area, production, productivity, export quantity, export value and unit value for a period from 1995-96 to 2019-20. Log-linear model was employed to know the growth rates.

Further importing country wise growth in exports of onion were calculated for the same period. The five countries which were considered as the major importers of Indian onion were Bangladesh, Malaysia, UAE, Srilanka and Nepal. The exports to remaining countries were pooled under the category of “others” for the purpose of this study.

#### 4.1.2.1 Compound Growth Rate of Quantity, Value and Unit Value of Onion Exports from India

From the Table 4.3, Fig.4.2 it was evident that over all there was 8.54 per cent growth in export quantity of onion, 14.60 per cent in export value and 5.57 per cent in unit value during the period from 1995-96 to 2019-20 and these growth rates were significant at 1 per cent level.

Bangladesh which is the largest importer of Indian onion had shown 12.15 per cent growth in export quantity, 18.78 per cent growth in export value and 5.90 per cent in unit value for the above said period. Malaysia the second largest importing country had 6.48 per cent, 12.18 per cent and 5.36 per cent growth in export quantity, value and unit value. 5.38 per cent, 11.40 per cent and 5.71 per cent growth in export quantity, value and unit value was observed in the case of United Arab Emirates. Nepal had observed highest growth in export quantity (39.59), value (49.53) and unit value (7.11). Others countries had 10.80 per cent, 16.70 per cent and 5.32 per cent growth in export quantity, value and unit value respectively. The compound growth rates of onion exports in terms of quantity, export value and unit value realization for all the countries were significant at 1 % level of significance.

**Table 4.3. Country wise Growth in Exports of Onion from India (1995-96 to 2019-20)**

S.No	Country	Export quantity		Export Value		Unit Value (Rupees per MT)	
		Coefficient	CAGR	Coefficient	CAGR	Coefficient	CAGR
1	Bangladesh	0.114*** (0.017)	12.15	0.172*** (0.018)	18.78	0.057*** (0.005)	5.90
2	Malaysia	0.062*** (0.009)	6.48	0.114*** (0.008)	12.18	0.052*** (0.006)	5.36
3	UAE	0.052*** (0.009)	5.38	0.107*** (0.009)	11.4	0.055*** (0.004)	5.71
4	Srilanka	0.056*** (0.007)	5.79	0.116*** (0.007)	12.4	0.060*** (0.006)	6.24
5	Nepal	0.333*** (0.100)	39.59	0.402*** (0.040)	49.53	0.069*** (0.008)	7.11
6	Others	0.102*** (0.010)	10.8	0.154*** (0.011)	16.7	0.051*** (0.005)	5.32
7	Total	0.081*** (0.009)	<b>8.54</b>	0.136*** (0.009)	<b>14.6</b>	0.054*** (0.005)	5.57

Note:\*\*\* denotes significance at 1 per cent level.

Figures in the parenthesis show the standard error.

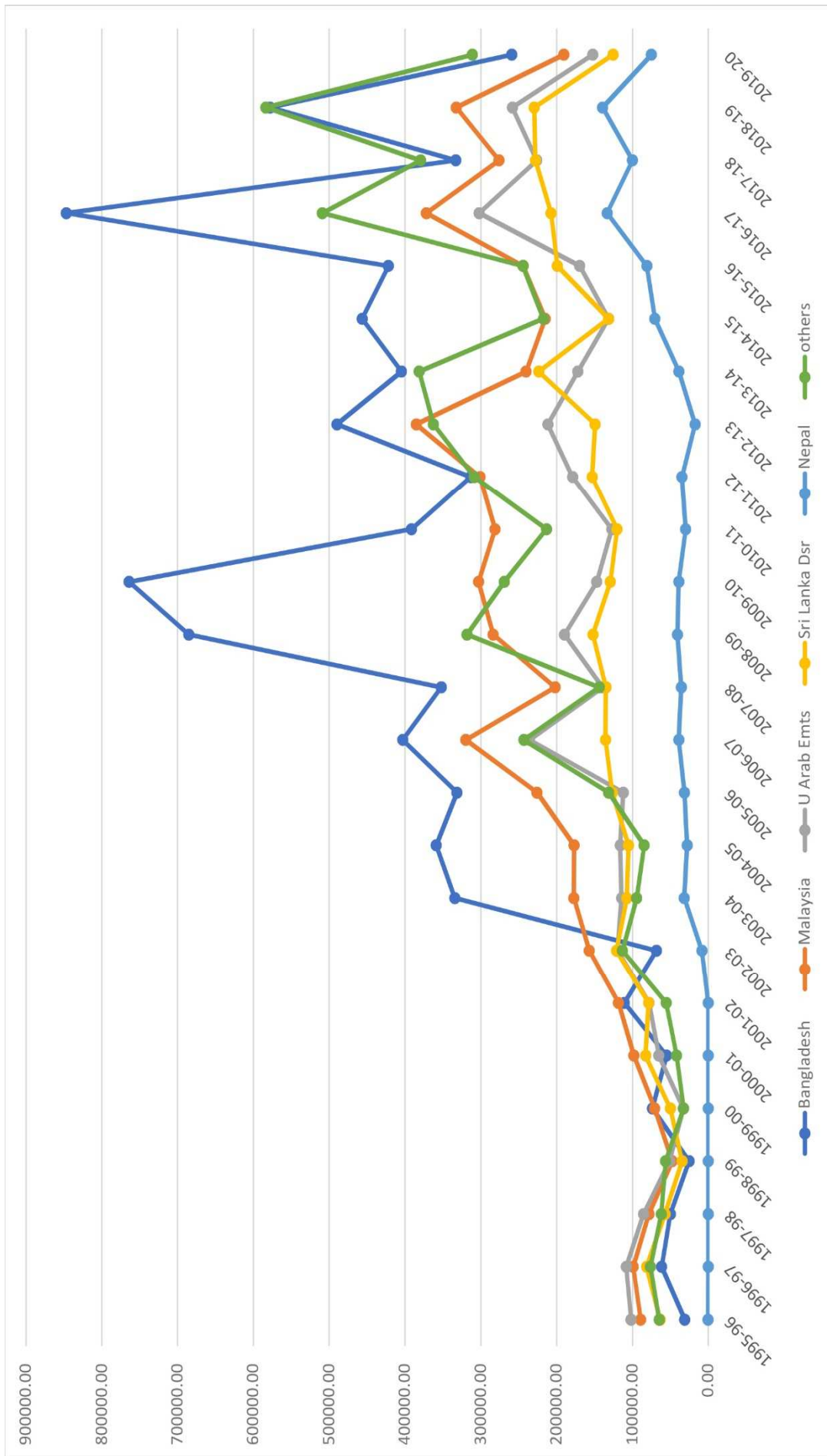


Fig 4.2. Trends in exports of onion to various countries.

From the Table 4.3 it was revealed that overall there was an increasing trend in the quantity, value and unit value of exports of onion from the country. The results were in line with the result of Kulkarni et al., (2012), Deepa (2019) and Ajaruddin and Maman (2020).

#### 4.1.2.2 Compound Growth Rate of Area, Production and Productivity of Onion in India

The compound growth rate of area, production and productivity of onion for a period from 1995-96 to 2019-20 were worked out and furnished in Table 4.4, Fig 4.3.

**Table.4.4. Compound growth rate (GGR) of area, production and productivity of onion in India (1995-96 to 2019-20).**

	Area	Production	Productivity
Coefficient	0.059*** (0.003)	0.087*** (0.004)	0.027*** (0.002)
<b>CAGR</b>	6.12	9.13	2.83

Note: \*\*\*indicates significance at 1 per cent level  
Figures in the parentheses show the standard errors

Regarding the production of onion for a period from 1995-96 to 2019-20 had high growth rate of 9.13 per cent, followed by 6.12 per cent growth in area and 2.83 per cent growth in productivity and also significant at 1 per cent level.

The results indicated that there was a steady increase in the area under onion cultivation. This increase was witnessed due to increased demand for onion and the formation of NHRDF (National Horticultural Research Development Foundation) on 3<sup>rd</sup> November, 1997 to help the farmers and exporters for improving the productivity and quality of horticultural crops especially onion.

### 4.1.3 Analysis of Instability:

Even though India is the major onion exporting country in the world, the exports were not stable during the study period to various countries. Hence an attempt was made to know the instability in exports of onion. Co-efficient of variation was employed to know the instability in exports of onion in terms of quantity, value and unit value. Cuddy-Della Valle instability index was used as an index of instability. The data was analysed and presented in Table 4.5.

**Table. 4.5. Country wise instability in exports of onion from India (1995-96 to 2019-20)**

S.No	Country	Coefficient of variation (1995-96 to 2019-20)			Cuddy-Della Valle Instability Index		
		Export quantity	Export value	Unit Value	Export quantity	Export value	Unit Value
1	Bangladesh	71.06	83.92	48.17	43.38	38.99	20.66
2	Malaysia	46.72	68.75	47.18	28.40	23.77	23.51
3	UAE	45.44	71.45	44.73	30.66	27.41	17.61
4	Srilanka	43.07	84.35	51.89	23.35	25.44	22.79
5	Nepal	103.58	126.17	66.08	55.47	55.58	35.32
6	Others	72.36	93.96	44.35	32.54	37.72	21.87
7	Total	56.04	78.42	45.61	28.48	24.32	19.47

#### 4.1.3.1 Coefficient of Variation (CV):

Overall, the country had experienced 56.04 per cent, 78.42 per cent and 45.61 per cent variation in export quantity, export value and unit value of onion during the period from 1995-96 to 2019-20. The coefficient of variation for export quantity, value and unit value realization of Indian onion to various countries were Bangladesh (71.06%, 83.95% and 48.17%), Malaysia (46.72%, 68.75% and 47.18%), UAE (45.44%, 71.45% and 44.73%), Sri Lanka (43.07%, 84.35% and 51.89%), Nepal (103.58%, 126.17% and 66.08%) and others (72.36%, 93.96% and 44.35%) respectively during the period from 1995-96 to 2019-20.

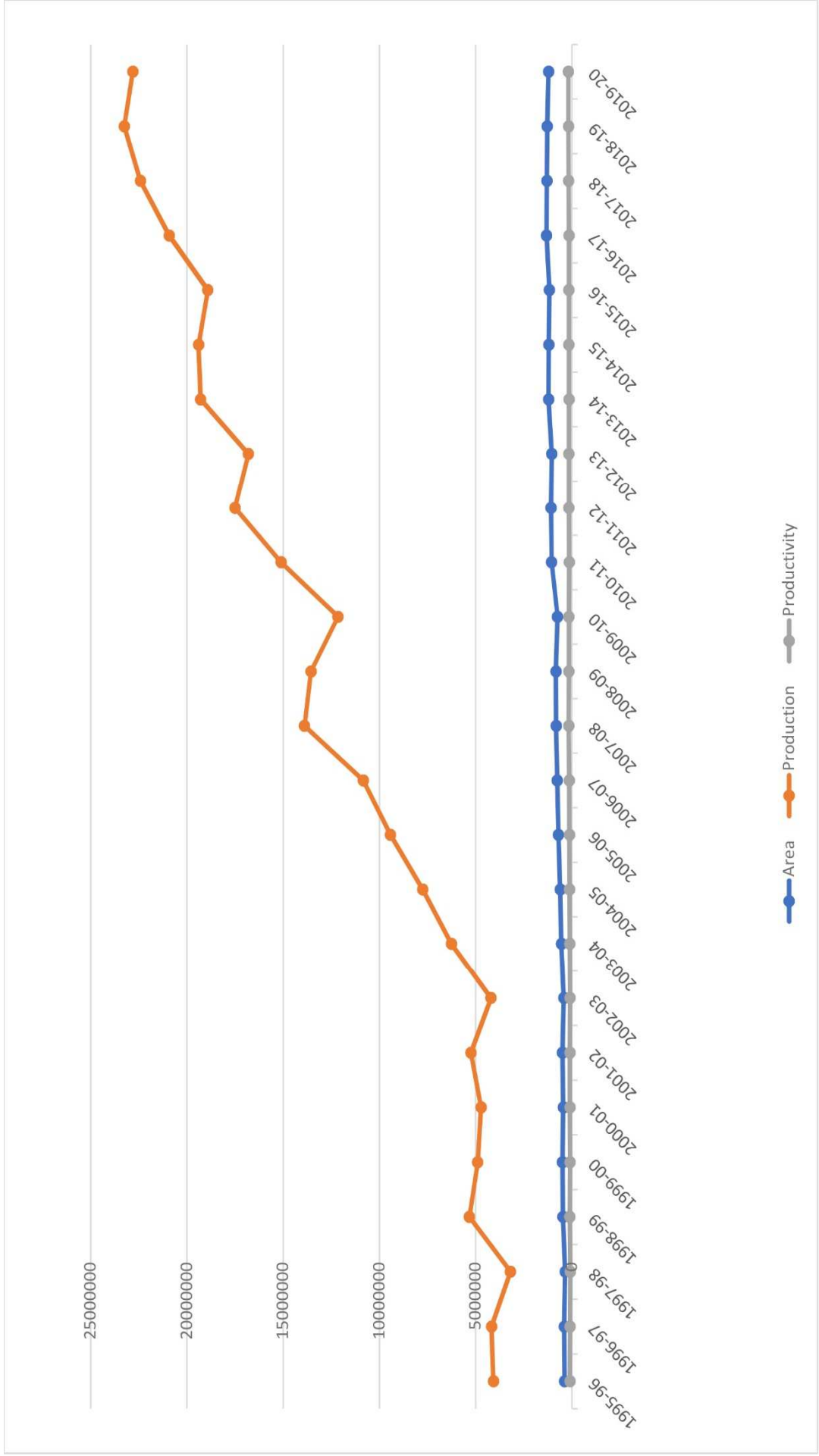


Fig 4.3. Trends in Area, Production and Productivity of Indian Onion.

The study revealed that, the coefficient of variation was less for unit value compared to the quantity of onion exports and export value. The value of onion exports was found to be the most unstable, this could be due to the instability in export quantity.

#### **4.1.3.2 Cuddy-Della Valle Instability Index:**

Cuddy-Della Valle Instability indices were calculated and presented in Table 4.5. It is evident that overall export quantity of onion had recorded highest instability index (28.48) followed by export value (24.32) and unit value realization (19.47). Country wise instability indices for Bangladesh (43.38, 38.99 and 20.66), Malaysia (28.40, 23.77 and 23.51), UAE (30.66, 27.41 and 17.61), Srilanka (23.35, 25.44 and 22.79), Nepal (55.47, 55.58 and 35.32) and others (32.54, 32.72 and 21.87) were calculated for export quantity, value and unit value realization respectively. In most of the countries instability index was highest for export value followed by export quantity and unit value. This could have been further insisting that instability in export value was mainly due to instability in export quantity.

From the results it was revealed that although there was an increasing trend in the quantity and value of Indian onion exports, it had subjected to wide fluctuations from year to year. This may be due to the fact that onion exports were canalized in 1974 and NAFED was the only export agency till 1999. Subsequently, 12 STE's (State Trading Enterprises) along with NAFED were designated as the canalizing agencies for export of onion. These agencies are regulating the export of onion considering the domestic scenario. During 2014, the export of onion has made free, as there was a strong demand from exporters and growers to remove canalization. Now anyone can export onions. Further the export of onion was regulated by reduction or enhancement through Minimum Export Price (MEP). MEP was regulated from time to time based on the domestic onion price fluctuation in the country.

## 4.2 EXPORT COMPETITIVENESS OF ONION UNDER EXPORTABLE HYPOTHESIS (2017,2018 and 2019)

The competitiveness of Indian onion was examined using nominal protection coefficient (NPC). Nominal Protection Coefficients were computed to determine the extent of competitive advantage enjoyed by the commodity in the context of free trade. The coefficients had highlight on whether a country has comparative advantage in the export of that commodity in the free trade scenario or not. (Guledgudda *et al.*, 2014)

The NPC value of less than unity indicates global competitiveness of the commodity under consideration, the NPC value less than 0.5 denotes high competitiveness and from 0.5 to 1.0 indicates moderate competitiveness (Jayesh, 2001).

NPC's were estimated to Bangladesh as it is the major importer under exportable hypothesis for a period of three years (2017 to 2019) as discussed below.

**Table 4.6. Nominal protection coefficients of Indian Onion to Bangladesh (2017 to 2019).**

S. No	Particulars	Units	2017	2018	2019
1	Wholesale price in Nashik market	₹/Qtl	1303.83	1824.72	1723.50
2	Transportation charges	₹/Qtl	160.00	190.00	200.00
3	Market margin(5%) of the whole sale price	₹/Qtl	59.22	53.34	94.15
4	port clearing and handling charges	₹/Qtl	100.00	100.00	100.00
5	Fumigation charges	₹/Qtl	100.00	100.00	100.00
6	Certification charges	₹/Qtl	0.00	0.00	0.00
7	FOB prices	₹/Qtl	1723.05	2268.06	2217.65
8	Frieght charges from India to Bangladesh	₹/Qtl	300.00	350.00	400.00
9	Insurance(2%)	₹/Qtl	23.68	21.33	37.65
10	Landed price	₹/Qtl	2046.73	2639.39	2655.30
11	Exchange rate	1BDT=₹	0.873	0.814	0.834
12	CIF price	BDT/Qtl	2344.48	3242.49	3183.81
13	Reference price of Bangladesh	BDT/Qtl	2899.00	3677.00	4943
14	NPC		<b>0.81</b>	<b>0.88</b>	<b>0.64</b>

The NPC calculated by taking the wholesale prices of onion which were considered from the Nasik market because it is having the major exports of onion from the nation to major destination Bangladesh. The wholesale prices from (Nasik) India were calculated by taking the average monthly wholesale prices of onion from AGMARKNET. Table 4.6 shows estimated NPCs of onion exports to Bangladesh over a period of three years. The NPC estimated were 0.81 in 2017, 0.88 in 2018 and 0.64 in 2019. These figures revealed that onion exports to Bangladesh have moderate competitive advantage during the study period. Further, the average NPC value (0.78) is close to one which indicates that the competitiveness was low during the study period.

Hyma *et al.*, (2003) reported that the average value of onion calculated at Stable Exchange Rate (SER) for the financial years from 1996-97 to 1999-2000 was 0.80 indicating the moderate export competitive nature of Indian exports. Further, Gulati *et al.*, (1994) reported average NPC at SER for onion during 1986-87 to 1992-93 was 0.71. This indicates the moderate competitive advantage of Indian onion.

#### **4.3. DIRECTION OF TRADE OF ONION EXPORTS**

Markov chain analysis was employed to know the direction of trade of onion exports from India. The estimated transitional probability matrix is furnished in the Table 4.7. The Transitional probabilities provide a broad indication of changes in the direction of onion exports from India. The major importing countries considered for the analysis of Indian onion were Bangladesh, Malaysia, UAE, Sri Lanka and Nepal. The export to remaining countries was pooled under other countries.

Nepal is the most stable and favourite export destination among the importers of Indian onion since it retained its original share of 0.731 i.e., the probability that Nepal retains its export share of 73.1 percent over the period. It lost its share to Srilanka to the extent of 15.8 per cent and 11.1 per cent to UAE. It gained the share of other countries, Bangladesh to the extent of 5.7,1.9 per cent respectively.

Other countries group is the next stable importance of Indian onion as reflected by its probability of retention at 70.7 per cent. It lost its share to Malaysia to the extent of 22.3 per cent and 5.7 per cent and 1.3 per cent to Nepal and UAE respectively. It gained 59.1 per cent share from UAE and 8.6 per cent share from Malaysia.

UAE could retain 28.5 per cent of its original share. UAE lost its major share to other countries to the extent of 59.1 per cent followed by Srilanka (12.4 per cent). UAE gained from the share of Malaysia (21.7%), Bangladesh (14.1%), Nepal (11.1%) and others (1.3%).

Bangladesh could retain 27.3 per cent of its original share it lost its major share to Srilanka to the extent of 32.1 per cent followed by Malaysia (24.6%), UAE(14.1%) and Nepal(1.9%). It gained entire share of Srilanka(100%) and major share of Malaysia (42.7%).

Malaysia has retained its original share to the extent of 27.1per cent. It lost its major share to Bangladesh (42.7%) followed by UAE (21.7%) and others (8.6%). It gained 24.6 per cent share of Bangladesh, 22.3 per cent share of other countries.

Srilanka does not retain its original share as indicated by the 0.00 per cent retention probability. It lost its entire share to Bangladesh. It gained from Bangladesh to the extent of 32.1 per cent, Nepal (15.8%) and UAE (12.4%).

**Table 4.7. Transition probability matrix for importing countries of Indian onion (2010-11 to 2019-20)**

Country	Bangladesh	Malaysia	U A E	Srilanka	Nepal	Others
<b>Bangladesh</b>	0.273	0.246	0.141	0.321	0.019	0.000
<b>Malaysia</b>	0.427	0.271	0.217	0.000	0.000	0.086
<b>U A E</b>	0.000	0.000	0.285	0.124	0.000	0.591
<b>Sri Lanka</b>	1.000	0.000	0.000	0.000	0.000	0.000
<b>Nepal</b>	0.000	0.000	0.111	0.158	0.731	0.000
<b>Others</b>	0.000	0.223	0.013	0.000	0.057	0.707

From the results it was concluded that Nepal was the most stable and favourable destination followed by other countries, UAE, Bangladesh and Malaysia. Srilanka was proved to be the most unstable and thus unreliable market for Indian onion since it had zero retention probability.

#### **4.3.1. Projections of Indian Onion Export to Major Importing Countries**

The exports shares of Indian onion to various countries were computed using transitional probability matrix of the Markov chain model and the actual and estimated exports have been presented in Table 4.8 and 4.9 respectively. The market share projections of Indian onion exports to different countries have been computed for a period of five years, up to 2024-25.

From the Table 4.8 it was revealed that the actual and predicted shares of onion exported from India to various countries during the study period were consistent for most of the cases. The actual share of Bangladesh had fluctuations over the study period (2010-11 to 2019-20). In the whole period, it decreased from 33.64 per cent to 23.27 per cent. However, it reached highest actual share 37.34 per cent in 2014-15. Similarly, the estimated figures showed that the export share would decrease from 29.83 per cent in 2010-11 to 24.93 per cent in 2019-20. The projected export share of Bangladesh had been seen (Table 4.9) to decrease marginally from 24.92 per cent in 2020-21 to 24.40 per cent in 2024-25.

With regard to Malaysia, both the actual and predicted onion export shares showed a declining trend from 24.17 per cent in 2010-11 to 17.11 per cent in 2019-20. Predicted share was observed to decline from 18.93 per cent to 16.60 per cent. It was forecasted that in 2020-21 the onion exports share of the Malaysia would be constant at 16.60 per cent Further projection to 2024-25 showed that the export share of Malaysia would be in the same range as depicted by a very marginal increase from 16.60 per cent to 17.07 per cent from 2020-21 to 2024-25.

In the case of the United Arab Emirates, the percentage share of the actual onion exports had shown a slight increasing trend throughout the study period. It increased from 10.93 per cent in 2010-11 to 13.68 per cent in 2019-20. The estimated export share was expected to decline from 13.62 per cent in 2010-11 to

12.00 per cent in 2019-20. From the future projections it could be seen that slight declining UAE exports from 11.99 to 11.68 for the period from 2020-21 to 2024-25. The decrease is meagre and thus it's worth nothing that UAE could maintain its share of onion exports from India.

With regard to Sri Lanka, the actual onion exports share depicted a fluctuated trend from 10.34 per cent in 2010-11 to 11.28 per cent in 2019-20. However, the estimated values of onion exports share fall from 12.55 per cent down to 10.22 per cent during the study period. With regard to the future projections, Sri Lanka could be seen to exhibit a slight increase of onion export shares from 10.22 per cent in 2020-21 to 10.43 per cent in 2024-25.

Examination of Nepal showed that both the actual proportion and predicted proportions exhibited an increasing trend i.e., the actual share increased from 2.58 per cent to 6.74 per cent while, the predicted share increased from 3.58 per cent to 6.98 per cent from 2010-11 to 2019-20. The projected market share was also expected to increase from 6.98 per cent to 7.65 per cent (2020-21 to 2024-25).

The actual Indian onion exports share to the countries pooled under 'others' depicted fluctuations during the study period from 18.34 per cent to 27.92 per cent. The estimated market share was also fluctuated for 'others' from 21.50 per cent to 29.29 per cent. 'Other countries' (Baharain, Singapore, Mauritius, Saudi Arab, Pakistan, Kuwait, Maldives, Qatar, Germany, Netherland, UK, Indonesia etc.) were projected to have further slight decrease of onion exports share from 29.29 percent in 2020-21 to 28.76 per cent in 2024-25.

The actual and predicted shares of onion exports revealed that the difference is by and large small. That means the actual shares of onion exports were inconsistent with the estimated shares, which were derived from the Markov chain analysis, validating the use of this model for predicting the share of different countries by using transitional probability matrix.

Keeping in view of the foregoing discussion, Nepal was the most promising importer of Indian onion. Nepal can't make onions in factories and local production is minimal. Their only option is to import from India.

**Table 4.8 Actual and predicted values of onion to different countries (2010-11 to 2019-20)** (volume in tonnes)

	Bangladesh		Malaysia		U A E		Sri Lanka		Nepal		Others		Total
	Actual	Predicted	Actual	predicted	Actual	Predicted	Actual	Predicted	Actual	Predicted	Actual	Predicted	
<b>2010-11</b>	391550.23 (33.64)	347256.49 (29.83)	281360.45 (24.17)	220400.26 (18.93)	127264.96 (10.93)	158539.48 (13.62)	120378.99 (10.34)	146040.77 (12.55)	29980.55 (2.58)	41705.46 (3.58)	213495.74 (18.34)	250290.71 (21.50)	1164030.92 (100.00)
<b>2011-12</b>	313633.51 (24.29)	367424.20 (28.46)	301313.84 (23.34)	227894.42 (17.65)	179049.81 (13.87)	168442.21 (13.05)	153266.7 (11.87)	128227.69 (9.93)	34857.06 (2.70)	49202.00 (3.81)	308818.06 (23.92)	349967.47 (27.11)	1290938.98 (100.00)
<b>2012-13</b>	489877.3 (30.31)	447446.87 (27.68)	385274.74 (23.84)	306090.80 (18.94)	211754.87 (13.10)	219550.81 (13.58)	149394 (9.24)	186045.17 (11.51)	17421.98 (1.08)	42947.08 (2.66)	362631.32 (22.44)	414548.49 (25.65)	1616354.21 (100.00)
<b>2013-14</b>	404884.74 (27.70)	436758.06 (29.88)	240489.6 (16.45)	250118.14 (17.11)	172074.19 (11.77)	167464.27 (11.46)	223697.42 (15.31)	157267.87 (10.76)	38907.76 (2.66)	58082.06 (3.97)	381468.22 (26.10)	391951.18 (26.82)	1461521.93 (100.00)
<b>2014-15</b>	456734.5 (37.34)	348040.28 (28.45)	215194.39 (17.59)	219444.80 (17.94)	131630.19 (10.76)	159146.44 (13.01)	131646.45 (10.76)	173882.09 (14.21)	70543.31 (5.770)	72859.22 (5.96)	217589.52 (17.79)	250065.87 (20.44)	1223338.36 (100.00)
<b>2015-16</b>	422075.65 (31.01)	418498.71 (30.750)	244272.7 (17.950)	224809.54 (16.52)	169684.48 (12.47)	172961.52 (12.71)	199136.44 (14.63)	169146.49 (12.43)	81146.86 (5.96)	81479.61 (5.99)	244568.74 (17.97)	294118.20 (21.61)	1360884.87 (100.00)
<b>2016-17</b>	846869.86 (35.71)	597169.41 (25.18)	371972.16 (15.69)	423183.65 (17.85)	302359.8 (12.75)	307502.77 (12.97)	207480.57 (8.75)	330050.78 (13.92)	133530.16 (5.63)	143130.05 (6.04)	509227.31 (21.47)	570531.91 (24.06)	2371439.86 (100.00)
<b>2017-18</b>	333165.48 (21.59)	436707.54 (28.30)	276162.25 (17.89)	241716.08 (15.66)	226248.44 (14.66)	187349.04 (12.14)	227965.35 (14.77)	150626.91 (9.76)	100150.95 (6.49)	101363.90 (6.57)	379687.13 (24.60)	425770.04 (27.59)	1543379.6 (100.00)
<b>2018-19</b>	578111.71 (27.24)	529261.57 (24.94)	332450.83 (15.67)	362910.11 (17.10)	258492.15 (12.18)	250208.48 (11.79)	229711.81 (10.82)	239374.24 (11.28)	139494.86 (6.57)	146536.74 (6.91)	583829.86 (27.51)	593933.74 (27.99)	2122091.22 (100.00)
<b>2019-20</b>	259369.92 (23.27)	277887.27 (24.93)	190693.85 (17.11)	185097.20 (16.60)	152529.78 (13.68)	133734.19 (12.00)	125756.76 (11.28)	113905.50 (10.22)	75191.1 (6.74)	77778.49 (6.98)	311287.16 (27.92)	326519.97 (29.29)	1114828.57 (100.00)

Note: The figures within the parenthesis indicate percentage shares of total exports

Eventhough Chinese onions were available in the international market, but Chinese onions tend to be big and fleshy so Nepalis don't prefer it. Other important point to look further was that the share of Nepal in the total Indian exports of onion was negligible.

Further India is occupying major per cent share of Nepal onion imports. Hence there was less scope for further increasing the onion exports to Nepal. Bangladesh which is the major exporter of Indian onion had shown downward trend in their imports. The country had started increasing its own production.

Indian onion occupies major share in the onion imports of Malaysia, UAE and Srilanka. Hence there was not much scope for increasing the quantities of onion exports to these countries. The results were incline with the results of Pramod *et al.*, (2006) and Kusuma and kumara (2014).

**Table 4.9 Projections of onion exports (2020-21 to 2024-25)**

(volume in tonnes)

	<b>Bangladesh</b>	<b>Malaysia</b>	<b>U A E</b>	<b>Sri Lanka</b>	<b>Nepal</b>	<b>Others</b>	<b>Total</b>
<b>2020-21</b>	277887.27 (24.92)	185097.20 (16.60)	133734.19 (11.99)	113905.50 (10.22)	77778.49 (6.98)	326519.97 (29.29)	1114922.63 (100.00)
<b>2021-22</b>	268694.08 (24.10)	191544.68 (17.18)	130244.04 (11.68)	117927.04 (10.58)	80899.15 (7.26)	325698.69 (29.21)	1115007.68 (100.00)
<b>2022-23</b>	272962.62 (24.48)	190843.35 (17.11)	129690.47 (11.63)	115039.18 (10.32)	82955.43 (7.44)	323611.44 (29.02)	1115102.49 (100.00)
<b>2023-24</b>	270938.90 (24.30)	191238.97 (17.15)	130182.43 (11.67)	116663.89 (10.46)	84422.41 (7.57)	321748.95 (28.85)	1115195.54 (100.00)
<b>2024-25</b>	272180.88 (24.40)	190431.65 (17.07)	130262.97 (11.68)	116307.08 (10.43)	85349.30 (7.65)	320757.44 (28.76)	1115289.31 (100.00)

Note: The figures within the parenthesis indicate percentage shares of total exports

# *Chapter – V*

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*Summary and Conclusions*



## Chapter-V

# SUMMARY AND CONCLUSIONS

This study sought to examine the export performance of onion from India. This chapter presents a summary of the study. The methods of data collection and analysis have been summarized. Besides, the research objectives of the study and their major findings have been enumerated. Finally, policy implications based on the findings have been discussed.

### 5.1 OBJECTIVES OF THE STUDY

The study was conducted with the following objectives;

1. To analyse the growth of export of onion from India.
2. To analyse the export competitiveness of onion from India.
3. To study the direction of trade of onion from India.

### 5.2 METHODOLOGY

The present study is based on secondary data. The main statistical data on export quantity, value of onion, domestic price, marketing costs, international price were collected from various issues of APEDA, National Horticulture Board, AGMARKNET, FAOSTAT, yearbooks of Agricultural statistics of Bangladesh and other published sources. Similarly, the exports of onion to various countries from India were collected from APEDA. The cost involved in the export of onion from India to major destinations was collected from the onion exporters of Nasik market.

To study the growth of onion exports, compound growth rate model was employed. Coefficient of variation, Cuddy-Della Valle Index as a measure of instability was employed. To study export competitiveness, Nominal Protection Coefficient (NPC) was used by employing the data on various aspects such as wholesale prices, marketing costs, freight charges, insurance costs and exchange rate among other relevant aspects. Markov chain process was used to study the direction of trade to various destinations mentioned.

### **5.3 MAJOR FINDINGS OF THE STUDY**

Major findings of the study are briefly summarized below for a comprehensive review and to draw specific conclusions.

#### **5.3.1 Growth of Exports of Onion from India and Instability**

Share of Indian onion exports in national onion production was estimated as 8.60 in 1995-96 and 4.89 in 2019-20. The growth in share percentage was -0.54. Share of Indian onion exports in world onion exports was 7.79 in 1995-96 and 8.01 in 2019-20 and CAGR was 2.95 per cent.

Over all there was 8.54 per cent growth in export quantity of Indian onion, 14.60 per cent in export value and 5.57 per cent in unit value during the period from 1995-96 to 2019-20 and these growth rates were significant at 1 per cent level. Bangladesh which is the largest importer of Indian onion had shown 12.15 per cent growth in export quantity, 18.78 per cent growth in export value and 5.90 per cent in unit value for the above said period. Malaysia the second largest importing country had 6.48 per cent, 12.18 per cent and 5.36 per cent growth in export quantity, value and unit value. 5.38 per cent, 11.40 per cent and 5.71 per cent growth in export quantity, value and unit value was observed in the case of United Arab Emirates. Nepal had observed highest growth in export quantity (39.59), value (49.53) and unit value (7.11). Others countries had 10.80 per cent, 16.70 per cent and 5.32 per cent growth in export quantity, value and unit value respectively.

Regarding the production of onion for a period from 1995-96 to 2019-20 had high growth rate of 9.13 per cent, followed by 6.12 per cent growth in area and 2.83 per cent growth in productivity.

Overall, the country had experienced 56.04 per cent, 78.42 per cent and 45.61 per cent variation in export quantity, export value and unit value of onion during the period from 1995-96 to 2019-20. The coefficient of variation for export quantity, value and unit value realization of Indian onion to various countries were Bangladesh (71.06%, 83.95% and 48.17%), Malaysia (46.72%, 68.75% and 47.18%), UAE (45.44%, 71.45% and 44.73%), Sri Lanka (43.07%,

84.35% and 51.89%), Nepal (103.58%, 126.17% and 66.08%) and others (72.36%, 93.96% and 44.35%) respectively during the period from 1995-96 to 2019-20.

Overall export quantity of onion had recorded highest Cuddy-Della Valle instability index (28.48) followed by export value (24.32) and unit value realization (19.47). Country wise instability indices for Bangladesh (43.38, 38.99 and 20.66), Malaysia (28.40, 23.77 and 23.51), UAE (30.66, 27.41 and 17.61), Srilanka (23.35, 25.44 and 22.79), Nepal (55.47, 55.58 and 35.32) and others (32.54, 32.72 and 21.87) were calculated for export quantity, value and unit value realization respectively.

### **5.3.2 Export Competitiveness of Indian Onion**

In the present study, an attempt has been made to ascertain whether onion was competitive as exportable commodity or not. Here, the domestic prices were compared with the international prices. The nominal protection coefficients of Indian onion were estimated for the years 2017 to 2019.

The average estimated NPC was 0.78 during the period 2017 to 2019 indicating that Indian onion was moderately global price competitive. However, looking at the individual years under review, it could be seen that onion exports were competitive in the study period from 2017 to 2019.

### **5.3.3 Direction of trade of onion from India**

The results of Markov chain showed that Nepal is the most stable and favourite export destination among the importers of Indian onion since it retained its original share of 73.1 percent over the study period of 2010-11 to 2019-20. It lost its share to Srilanka to the extent of 15.8 per cent and 11.1 per cent to UAE. 'Other countries' group is the next stable importance of Indian onion as reflected by its probability of retention at 70.7 per cent.

UAE, Bangladesh and Malaysia were also found to be stable importers of Indian onion after Nepal and Other countries with the retention percentages of 28.5, 27.3, 27.1 respectively. Srilanka was found to be unstable importer as it could not retain its original share.

## 5.4 POLICY IMPLICATIONS

- The growth rate of onion exports in terms of quantity and value were showing increasing trend thus there was a lot of scope for further increasing the onion exports in the future. Hence efforts should be made by the government for improvement in logistic facilities and other infrastructural facilities like storage godowns in shipyards in order to facilitate for export of the commodity.
- Now India is exporting most of its product to Bangladesh, Nepal, Srilanka, Gulf countries where and for east countries where there was less scope for further increasing the exports to these countries as India already occupied major share in these countries. Hence diversify the market to European countries and USA. The problem to export these countries was variety they do not prefer red onions. They prefer yellow onions. Hence research should be focused to develop traits desired to explore the potential in these countries.
- From time to time the government has to ban the export of onion and also imposes MEP to tame domestic prices. This creates lot of instability in the export of onion as it debar traders from exporting onions. Hence an appropriate export policy should be developed. To safeguard India's reputation in the global market as a reliable supplier.
- Exporting dehydrated onion in the form of powder/ flakes/ chopped slices will attracts new avenues for exporting onion. Quality assurance is the key factor for export competitiveness of dehydrated onion.

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