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Research Article

Price and trade performance of maize in India: A case of Marketing channel of maize in Karnataka

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Abstract

The study was undertaken to assess the price and trade performance of Maize in India by taking a case of marketing channel of Maize in Karnataka. Marketing cost and price spread was captured by Acharya Method. The results revealed that during 2001-2020, export quantity showed a growth rate of 8.1 per cent in quantity and 27.7 per cent in value, whereas the import quantity growth rate was 34.2 per cent and the value growth rate was 53.5 per cent. Material costs and total costs are lesser for the farmers who were following FPO-led marketing, reduction in cost is mainly due to the availability of inputs at lower prices, which resulted in more B:C ratio and net income. Marketing costs to the producer were highest in traditional channel. Extending credit support and processing of maize through FPO helps farmers to strengthened their marketing process ease to earn better income.

Key words: Maize trade, Marketing channel, Maize prices, price spread

1. Introduction

The International Food Policy Research Institute (IFPRI) calculated that the demand for maize in emerging nations is anticipated to double by 2050 (Rosegrant *et al.,* 2012). In the aspect of providing gainful employment and doubling farmers' income, maize has a higher potential than rice and wheat (Maize vision, 2022). Maize can be used as food, feed, fodder, and as raw material in industries and bio-ethanol production. It has gained popularity in silage and fodder preparation as well. An increase in poultry demand also led to rise maize area production.

A value chain is a series of interconnected economic operations (functions), starting with the provision of specified inputs for a given product and continuing through primary manufacturing, transformation, and marketing to the consumer (GTZ Value Links, 2008). The production-distribution or activity-marketing channels found in the pre-intervention value chain and the FPC (Farmer Producer Company) intervention found in the post-intervention value chain make up the maize value chain (Department of Agriculture and Marketing Cooperatives & Ministry, 2019). By expanding the backward and forward linkages in agriculture, value chains serve as a crucial stimulant for increasing farmers' income. In order to organise farmers and facilitate access to markets, funding, inputs, and technologies, several governmental interventions are being made. Indian case studies demonstrate that farmers that participate in value chains pay less in transaction costs, experience fewer market risks, and make more money. However, addressing many of the value chains' weak links is necessary to increase their effectiveness and inclusiveness (Chengappa, 2018). There are three major categories of maize usage in India: feed, food, and industrial. In India, 60 per cent of the maize consumption goes toward animal feed. Farmers, aggregators/traders, processors (Feed industry/Starch industry), and consumers (Poultry industry/Food or feed

industry) are the key players in the maize value chain in India (Parveen *et al.,* 2021). In account of this current study is mainly focused on studying the price trends, trade performance of maize in India and the marketing channel for poultry feed and various intermediaries playing role in maize marketing in Davanagere district of Karnataka.

2. Data and methodology

Compound annual growth rate

The data on area, production, and yield from the year 1995-2020 were collected from the Directorate of Economics and Statistics, Ministry of Agriculture and Farmers Welfare. Data on imports and exports from the year 2000-2019 was collected from trade and statistics, Ministry of Commerce and Industries. The growth rate was calculated as:

Yt = abt e u …….. (1)

Marketing cost

The total cost incurred on marketing by producer seller and various intermediaries involved in sale and purchase of the commodity till it reaches the ultimate consumer was taken under this head (Acharya, 2004).

$$\mathbf{C = C_f + C_{m1} + C_{m2} + C_{m3} \ldots\ldots + C_{mi}}$$

Where,

C = Total cost of marketing of the commodity,

C_f = Cost incurred by the producer from the time the product leaves the particular stakeholder,

C_{mi} = Cost incurred by the i^{th} middleman in the process of buying and selling the product.

Absolute margin of the i^{th} middleman (A_{mi})

$(Ami) = PR_i - (PP_i + C_{mi})$

Percentage margin of the i^{th} middleman (P_{mi})

$$(P_{mi}) = \frac{PR_i - (PP_i + C_{mi})}{PR_i} \text{ X } 100$$

Where, PR_i = price received by i^{th} middlemen

PP_i = price paid by i^{th} middlemen

C_{mi} = cost incurred by i^{th} middlemen in marketing the produce

Producer's share in consumer's rupee

It is the price received by the farmer (P_f) expressed as a percentage of the retail price (the price paid by the consumer). If P_r is the retail price, the producer's share in the consumer's rupee (P_s) may be expressed as follows.

$P_s = (P_f/P_r) \times 100$

Price spread

Price spread was worked out separately for marketing channels identified in the study area. In general, price spread is defined as the difference between price paid by the consumer and price received by the producer for an equivalent quantity of farm produce. Price spread was calculated using the formula.

Price spread = Consumer price - Producer's price

Import and export trends of maize

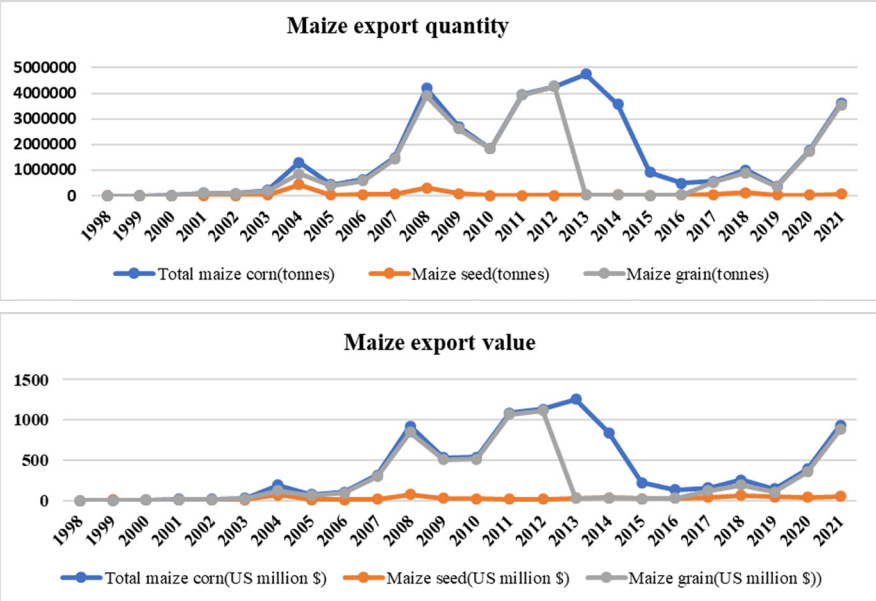
Maize has many industrial uses so it has an important place in the export basket of the country. The growth rate and instability exhibited by maize are shown in the table 4.16. India is exporting and importing maize in various forms. Majorly the maize grain and seed are exported. Maize grain is again exported in different forms such as starch, flour etc. The trends of export and import of maize are represented in table 4.16. It shows that during the period I (2001-2010), the growth rate in the quantity of maize exports was 48.3 per cent and the value was 48.8 per cent. The growth rate in maize import quantity was 38.1 per cent and the import value was 46.2 per cent. In period II (2011-2020), the growth rate in maize export quantity was -20.6 per cent and maize export value was 8.8 per cent. The growth rate in import quantity was 57.2 per cent and the import value was 88.9 per cent. Overall from 2001 to 2020 growth rate in maize export quantity was 8.1 per cent and the export value was 27.7 per cent. The growth rate in maize import quantity was 34.2 per cent and the import value was 53.5 per cent.

Table 1: Growth rates of maize trade in India

CAGR (%)	Period I (2001-2010)		Period II (2011-2020)		Overall	
	Quantity	Value	Quantity	Value	Quantity	Value
Exports	48.3	48.8	-20.6	8.8	8.1	27.7
Imports	38.1	46.2	57.2	88.9	34.2	53.5

Trend of maize trade in India.

The graphical representation of maize trade is shown in fig 4.6. It reveals that Maize export quantity and value increased in the year 2008 due to increased production but later on, it decreased till 2010 because of the ban on maize exports from the government due to pressure from domestic industries. Domestic prices were already high and the government in fear that high international prices would further increase domestic prices banned the export. Exports decreased drastically from the year 2013-2015. Cheaper supplies of maize from other countries such as the USA resulted in this trend where high-priced Indian maize could not lure foreigners in purchasing which led to a decrease in exports. Contrasting trends in maize imports were also found. Maize imports increased from 2008 to 2010 and from 2013 to 2015.



Share of maize trade in India-2021

Maize seed and their export shares are represented in fig 4.7 for the year 2021. The export share of seed in quantity was 2 % which is 6 % value of exports. Maize corn other than seed share in a quantity of exports was 98 % which is 94 % value of exports. Among the maize grain exports, corn starch constitutes 15 % of the quantity and 20 % of the value of grain and its products. Groats and meals of maize constitute 2 % of the export quantity and value of maize grain and its products as shown in figure 4.8. Imports in 2021 as represented in 4.9 consists of negligible seed and most of it is maize grain and its products. Among the maize grain imports, corn starch constitutes 14 % of the quantity and 33 % of the value as shown in fig 4.10.

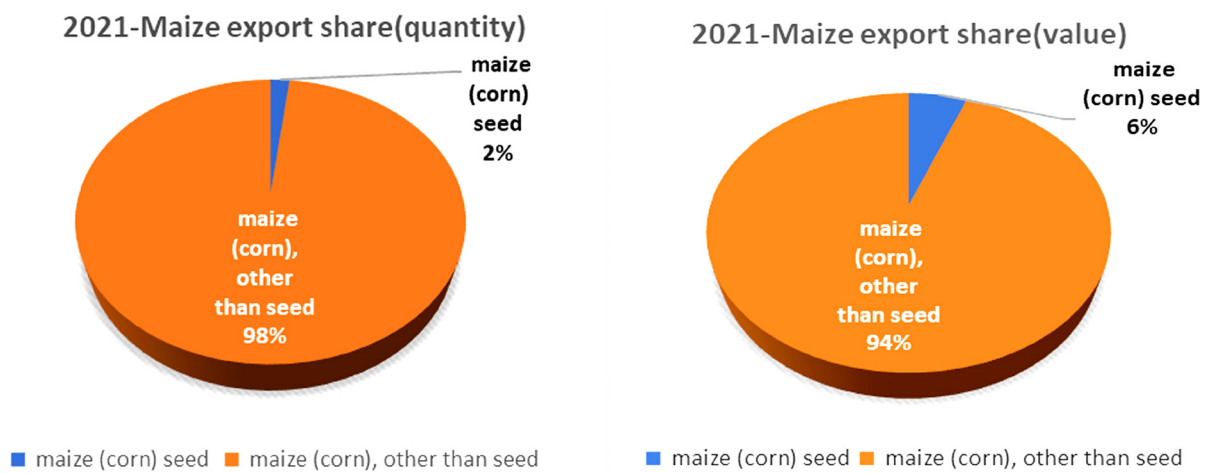


Fig 1: Seed and grain share in total maize exports

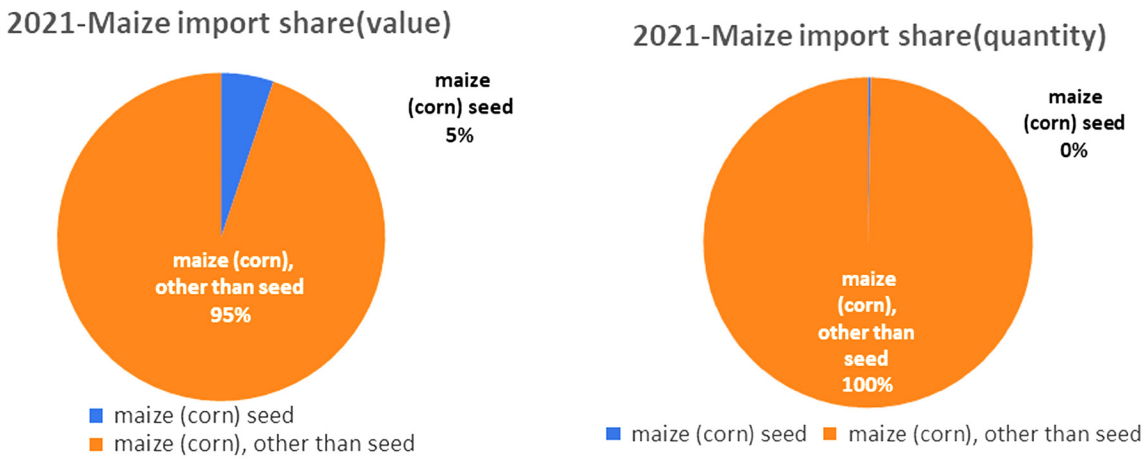


Fig 2: Seed and grain share in total Maize imports Price trends of maize in India

Maize is grown in all the seasons in the country and maize exhibits wide variations in prices. The wholesale price of maize was analyzed from 2010 to 2021 in major states. The growth rate and instability in prices shown by maize are represented in table 4.17. Telangana recorded the highest growth rate of 5.5 per cent followed by Chhattisgarh with 5.38 per cent and Tamil Nadu (4.73 %). The instability was found to be highest in the state of Maharashtra (15.62%) followed by Madhya Pradesh (14.28 %) and Karnataka (13.83 %). By 2020 highest prices were found in Tamil Nadu (₹1727.84/Q) followed by Telangana (₹1701.05/Q) and Rajasthan (₹1688.80/Q).

Table 2: Growth rate and instability of prices in major maize growing states

	CAGR (%)	I (%)	TE-2020 (₹/Q)
Andhra Pradesh	4.50	9.89	1491.30
Chhattisgarh	5.38	6.42	1515.69
Karnataka	4.72	13.83	1677.26
Madhya Pradesh	3.49	14.28	1517.51
Maharashtra	3.66	15.62	1654.07
Rajasthan	4.23	10.81	1688.80
Tamil Nadu	4.73	12.47	1727.84
Telangana	5.50	7.71	1701.05
Uttar Pradesh	4.25	11.00	1663.69

CAGR-Compound Annual Growth Rate (%):,I- Instability (%),:TE-Triennium ending year

Price trend of maize in major states in India

The price trend in India is shown in fig 4.11 and monthly price variation among states is depicted in fig 4.12. Prices in India showed a constant increase with a peak in 2019 which later decreased slightly. When the monthly price variation among major states are compared, Chhattisgarh showed low monthly price variation with low prices whereas states like Rajasthan, Tamil Nadu and Karnataka showed high prices with high variation. Other states such as Andhra Pradesh, Madhya Pradesh, and Uttar Pradesh showed moderate monthly price variation.

Marketing channels existing in the Karnataka

As maize is widely spread, marketing has also been well-developed in the study area. Maize produced in the area is used for various purposes like maize-based food products, raw material for other industries, starch production, poultry feed, cattle feed, etc. This makes the marketing channel diverse in the area. The starch industry was present in the district, and many food-based industries have also flourished. Some part of the maize is exported to other countries. However, recent years have shown a spurt in poultry farming in the area. Poultry feed is one major

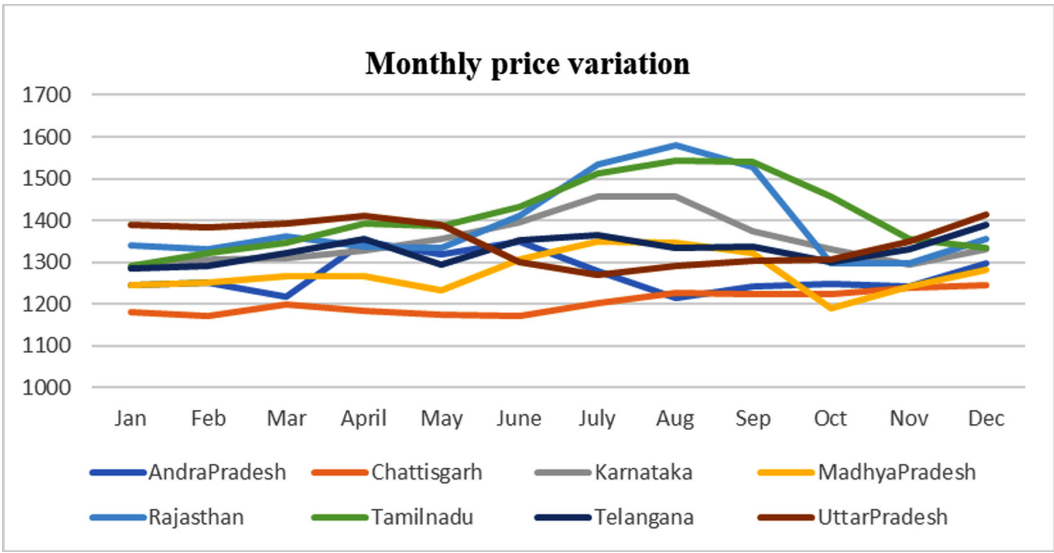


Fig 3: Monthly price variation of maize in major states

input for poultry industries and maize is an important constituent of poultry feed, lot of demand for maize for poultry feed is also found. The present study focuses on the poultry feed-based value chain in the Davanagere district and market channels operating for maize with respect to poultry feed.

Though various market channels for various purpose exists for maize, most of the maize produced in the area was used for poultry feed. So, in the current study market channels which were existing for poultry were exclusively studied. Four major channels were identified for maize marketing which is used for poultry feed as presented in table 4.34. Channel I was where the producer/farmer sells produce to the village trader, the village trader to the wholesaler, wholesaler to the feed processing company from which the poultry feed reaches the consumer through either the poultry contractor or feed dealer of the company. In Channel II maize is sold to the wholesaler from which it reaches the consumer through intermediaries like feed processing companies and contractors or dealers. In channel III maize is sold from producer to Farmer Producer Organizations(FPO), FPO to poultry feed company, company to contractor/ feed dealer and finally to the consumer. In the fourth channel, the feed processing company themselves go to the farmers field and purchase produce from farmers by offering an extra price than the prevailing market price with on cash payment which is later processed and reached to consumers through contractors/dealers. The channel IV discussed is known as zero billing as farmers will not be charged anything and all the expenses will be borne by the processing company.

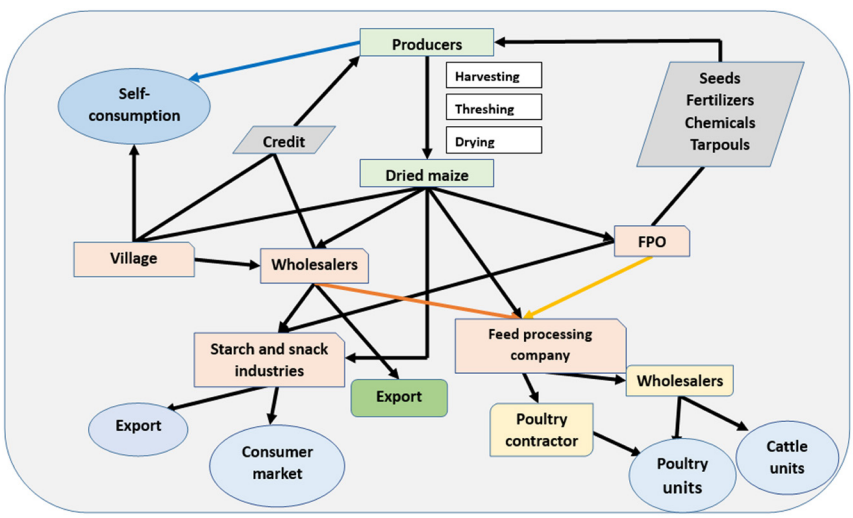


Fig 4: Value chain map in the study area
(Source: Primary survey, 2022)

Table 3: Marketing channels existing for poultry feed in Davanagere

Channels	Stakeholders	Number of farmers (%)
Channel I	Producer-Village trader-Wholesaler-Processor-consumer	86(71.6)
Channel II	Producer-Wholesaler-Processor-Consumer	21(17.5)
Channel III	Producer-FPO-Processor-Consumer	7(5.8)
Channel IV	Producer-Processor	6(5)

Source: Compiled based on primary survey, 2022

Comparison of maize market channels for poultry feed

The comparisons of marketing cost and margins across four channels were presented in table 4.43. Total marketing costs were highest in channel III (₹525/Q) followed by channel I (₹468/Q) and least in channel IV(₹404/Q). Total marketing margins were highest in channel I (₹693/Q) followed by channel II (₹651/Q). Price spread was recorded highest in channel I (₹1197/Q) and was found least in channel IV (₹897/Q). Producer's share in the consumer rupee was least in channel I (0.58) and was highest in channel IV (0.66). Market efficiency was highest in channel IV (1.95) and least in channel I (1.46). Though channel IV is having highest market efficiency compared to all channels, it is difficult to adopt and also marginal and small farmers face discrimination, as the company will not be able to take produce from them as area of production, will be small and scattered.

Table 4: Comparison of marketing channels

Particulars	Channel I	Channel II	Channel III	Channel IV
Total market costs	468	419	525	404
Total market margins	693	651	520	505
Price spread	1197	1159	1112	897
Producer's share in consumer rupee	0.58	0.60	0.61	0.66
Market efficiency	1.46	1.62	1.70	1.95

Conclusion

Trade pattern of maize during 2002-2020 revealed, export quantity with a growth rate of 8.1 per cent in quantity and 27.7 per cent in value, whereas the import quantity growth rate was 34.2 per cent and the value growth rate was 53.5 per cent. Corn starch has a 15 % share in maize grain export accounting for 20 per cent export value of maize grain products. Marketing costs to the producer were highest in channel II, followed by channel III. Marketing costs are highest in channel III but market margins are lower than in channel I and channel II. Channel IV is having least market cost and market margins. Marketing margins are highest in channel I. Price received by the producer is highest in channel IV and least in channel I. Price spread is highest in the channel I and least in channel IV. Market efficiency is in the order of channel IV > channel III > channel II > channel I. Credit support given by traders and wholesalers to farmers makes it an obligation for farmers to sell produce to lenders. Extending credit support through FPO helps farmers not to get into the trap. FPOs has to be strengthened by undertaking the processing of maize instead of depending on private companies. The APMC market in Davanagere is not linked to e-NAM. This helps farmers to sell the produce in the market giving higher prices.

Author contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Conflict of interest

No

Declaration

The authors declare no conflict of interest.

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