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A study on the supply chain and distribution system of urea fertilizer, Jaunpur district of Uttar Pradesh

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Abstract

The present study entitled “A Study on the Supply Chain and Distribution System of Urea Fertilizer in Jaunpur District of Uttar Pradesh” was conducted to examine the structure, functioning, and efficiency of the urea fertilizer supply chain in the study area. The study also aimed to analyze the socio-economic profile of farmers, existing distribution channels, marketing costs, price spread, farmer’s share in the final price, and major constraints affecting the availability and timely supply of urea fertilizer.

The study was based on both primary and secondary data. Primary data were collected from 120 respondents, including farmers and stakeholders involved in the fertilizer distribution system, using a multistage sampling technique. Secondary data were obtained from published reports, government records, and relevant literature. The collected data were analyzed using statistical tools such as averages, percentages, and ratios to draw meaningful interpretations.

The socio-economic analysis revealed that the majority of respondents were small and marginal farmers, mostly belonging to the young age group with low to moderate income levels. A significant proportion of farmers had low educational attainment, indicating limited awareness regarding advanced fertilizer usage practices and government support schemes.

The study identified three major distribution channels for urea fertilizer in the district: (i) Manufacturer → Farmer (direct supply), (ii) Manufacturer → Dealer → Farmer, and (iii) Manufacturer → Wholesaler → Retailer → Farmer. Among these, the direct supply channel was found to be the most efficient due to lower marketing costs and higher farmer’s share in the final price. In contrast, the channel involving multiple intermediaries was less efficient due to increased costs and wider price spread.

The study further highlighted that marketing costs and price spread increased with the number of intermediaries, thereby reducing overall distribution efficiency. Major constraints identified included fertilizer shortages during peak demand periods, delays in supply, high transportation costs, hoarding practices, and inadequate access to timely market information.

In conclusion, strengthening direct distribution systems, improving supply chain infrastructure, ensuring timely availability, and enhancing transparency in the fertilizer distribution network can significantly improve efficiency and benefit farmers in Jaunpur district.

Keywords: Urea fertilizer, supply chain, distribution system, price spread, marketing efficiency, socio-economic profile, Jaunpur District, Uttar Pradesh, Agriculture Input, Farmer’s Share

Introduction

Urea fertilizer is one of the most widely used nitrogenous fertilizers in the world and plays a crucial role in enhancing agricultural productivity and ensuring food security. It is an essential input for crop production as it supplies nitrogen, which is a key nutrient required for plant growth, chlorophyll formation, and yield improvement. Due to its high nitrogen content and relatively low cost, urea is extensively used across a wide range of crops including cereals, pulses, oilseeds, and commercial crops. Globally, countries such as China, India, Russia, the United States, and Indonesia are major producers and consumers of urea fertilizer. In India, urea remains the most consumed fertilizer due to its subsidy-driven availability and its critical

role in sustaining the country’s food grain production. In Uttar Pradesh, agriculture is the backbone of the rural economy, and the consumption of urea fertilizer is very high because of intensive cultivation practices and multi-cropping systems. Jaunpur district, in particular, is predominantly agrarian, where a large proportion of the population depends on agriculture for livelihood. The demand for urea fertilizer in the district is increasing due to the expansion of irrigated agriculture, adoption of high-yielding varieties, and increasing cropping intensity. However, timely availability and proper distribution of urea remain important challenges, especially during peak cropping seasons when demand spikes sharply. The supply chain and distribution system of urea fertilizer involves

multiple stakeholders and coordinated activities that ensure the movement of fertilizer from manufacturing units to the end users, i.e., farmers. The major actors in this supply chain include fertilizer manufacturing companies, government agencies, state procurement and distribution bodies, wholesalers, retailers, cooperative societies, and farmers. The supply chain also involves transportation, storage, inventory management, and retail distribution. Understanding the structure and functioning of this system is essential to evaluate its efficiency, transparency, and accessibility at the farmer level. The present study titled “A Study on the Supply Chain and Distribution System of Urea Fertilizer in Jaunpur District of Uttar Pradesh” aims to examine the socio-economic profile of farmers and analyze the existing supply chain mechanism of urea fertilizer in the study area. The socio-economic characteristics of farmers such as age, education, landholding size, income level, and farming experience significantly influence their fertilizer usage patterns and access to agricultural inputs. Studying these factors helps in understanding the behavior of farmers and the effectiveness of input distribution systems. The study also focuses on assessing the availability, pricing, distribution channels, and constraints in the supply of urea fertilizer in Jaunpur district. It further examines issues such as timely supply, black marketing, transportation bottlenecks, storage facilities, and the role of cooperatives and private dealers in distribution. By analyzing these aspects, the study aims to identify gaps in the supply chain and suggest measures to improve efficiency, ensure equitable distribution, and enhance the overall effectiveness of the urea fertilizer distribution system in the district.

Objectives

To examine the overall structure and functioning of the supply chain and distribution system of urea fertilizer from manufacturer to farmer.

To assess the availability, timeliness, and efficiency of urea fertilizer distribution at the farmer level.

Research Methodology

Sampling Design

For the present study titled “A Study on the Supply Chain and Distribution System of Urea Fertilizer in Jaunpur District of Uttar Pradesh”, a multistage sampling design was used for selecting respondents. At the first stage, Jaunpur district was selected purposively. At the second stage, a block was selected, followed by the selection of villages at the third stage through random sampling. At the final stage, farmers and key stakeholders involved in the urea fertilizer supply chain were selected as respondents. This sampling design was adopted to collect reliable data and to analyze the supply chain and distribution system of urea fertilizer in the study area.

Selection of District

Out of 75 districts in Uttar Pradesh, Jaunpur district was selected purposively due to its high agricultural intensity and significant consumption of urea fertilizer, especially for paddy and wheat crops. The district has diverse cropping patterns, with cereals, pulses, and vegetables dominating cultivated land. Due to intensive agriculture and multiple cropping systems, the use of fertilizers—especially urea—is

very high. This makes Jaunpur a suitable district for studying the urea fertilizer supply chain and distribution system.

Selection of Blocks

Jaunpur district has more than 20 development blocks. Out of these, Badlapur block was selected purposively for the present study due to high cropping intensity, a large number of fertilizer-consuming farmers, a well-established fertilizer distribution network, and easy accessibility for field survey. The agricultural activities in this block are intensive, and the demand for urea fertilizer is relatively high throughout the cropping seasons. The selected block represents the typical farming and input usage pattern of the district, making it highly suitable for the present study on the supply chain and distribution system of urea fertilizer in Jaunpur district of Uttar Pradesh.

Selection of Villages

There are a total number of villages in Badlapur block of Jaunpur district as obtained from the Block Development Office. Thereafter, all the villages were arranged on the basis of their agricultural importance and fertilizer consumption pattern. Thus, out of the total villages, five villages were selected randomly for the present study on the supply chain and distribution system of urea fertilizer in Jaunpur district of Uttar Pradesh. These selected villages represent the actual field situation regarding fertilizer availability, distribution practices, and usage pattern in the study area.

Selection of Respondents/Farmers

A list of farmers using urea fertilizer was prepared with the help of the B.D.O office and local कृषि विभाग officials. From each selected village, respondents were randomly selected.

Sr. No.	Category	Size Class
1	Marginal Farmers	Below 1.00 hectare
2	Small Farmers	1.00 – 2.00 hectare
3	Semi-Medium Farmers	2.00 – 4.00 hectare
4	Medium Farmers	4.00 – 10.00 hectare
5	Large Farmers	10.00 hectare & above

From this list 120 respondents were selected randomly through proportionate allocation to the population.

The primary data required for the study were collected through personal interviews using a pre-tested structured schedule. Information regarding socio-economic characteristics, marketing channels, marketing costs, marketing margins, and prices of hybrid wheat seeds was collected from the respondents for analysis.

Analysis of data/ analytical tools used

The present study titled “A Study on the Supply Chain and Distribution System of Urea Fertilizer in Jaunpur District of Uttar Pradesh” was based on both primary and secondary data. The primary data were collected from farmers, fertilizer retailers, and other stakeholders involved in the distribution system, while secondary data were obtained from published reports, government records, and relevant literature.

The collected data were compiled, tabulated, and analyzed

using suitable statistical tools such as averages, percentages, and ratios. For examining the supply chain and distribution system of urea fertilizer, indicators like availability, distribution channels, transportation cost, storage facilities, price variation, and constraints in supply were used to assess the efficiency and performance of the fertilizer distribution system in the study area.

Analytical techniques employed

$$\text{Arithmetic Mean} = \text{AM} = \frac{1}{n} \sum_{i=1}^n a_i$$

Where, AM = Arithmetic Mean

n = Number of values

a_i = Data set values

$$\text{Weighted Mean} = W = \frac{\sum_{i=1}^n w_i X_i}{\sum_{i=1}^n w_i}$$

Where, W = Weighted average

n = number of terms to be averaged

w_i = Weight applied to x values

X_i = Data values to be averaged

E_i = Expected value

Marketing Cost: The total cost, incurred on marketing either in cash or in kind by the producer seller and by the various intermediaries involved in the sale and purchase of the commodity reaches the ultimate consumer.

$$C = C_f + C_{m1} + C_{m2} + C_{m3} + C_{m4} + C_{mn}$$

Where, C = Total cost of marketing of commodity

C_f = Cost paid by the producer from the time of produce leave farm till he sale it

C_{m1} = Cost incurred by the middleman in the process of buying and selling the product.

Market Margin: This is the difference between the total payments (cost + purchase price) and receipts (sale price) of the middle man (ith agency). Absolute margin of the middle man (A_{mi})

$$A_{mi} = P_{ri} - (P_{pi} + C_{mi})$$

(a) Percentage margin of the middle man (P_{mi})

$$P_{mi} = \frac{P_{ri} - (P_{pi} + C_{mi})}{P_{ri}} \times 100$$

Where,

P_{ri} - the total value of receipts per unit (sale price)

P_{pi} - the purchase value of good per unit (purchase price).

C_{mi} - the cost incurred on marketing per unit

Price Spread: Price spread was worked out to estimate the difference between the price paid by farmers and the price received by seed producers.

$$PS = CP - FPPS = CP - FPPS = CP - FP$$

Where:

PS = Price Spread

CP = Consumer's Price

FP = Producer's Price

Results and Discussion

The socio-economic characteristics of farmers significantly influence the demand, utilization, and distribution of urea fertilizer, as well as their participation in the input supply system. Factors such as age, education, occupation, family size, and landholding size affect farmers' fertilizer consumption pattern, purchasing behavior, and access to distribution channels. Therefore, the present study on "A Study on the Supply Chain and Distribution System of Urea Fertilizer in Jaunpur District of Uttar Pradesh" examined the socio-economic profile of respondents to understand their role in fertilizer usage and the functioning of the supply and distribution system in the study area.

Table 1: Socio-Economic Profile of Respondents

S. No.	Particulars	Categories	Frequency	Percentage (%)
1	Farm Size	Marginal (<1 ha)	43	35.83
		Small (1–2 ha)	31	25.83
		Semi-Medium (2–4 ha)	25	20.83
		Medium (4–10 ha)	13	10.83
		Large (>10 ha)	8	6.67
2	Age	Young (20–35 years)	85	70.83
		Middle (36–50 years)	25	20.83
		Old (>50 years)	10	8.34
3	Gender	Male	107	89.17
		Female	13	10.83
4	Family Type	Nuclear	112	93.33
		Joint	8	6.67
5	Annual Income	< ₹1,00,000	50	41.67
		₹1,00,001–₹2,50,000	45	37.50
		₹2,50,001–₹5,00,000	16	13.33
		> ₹5,00,000	9	7.50

The table shows that most respondents are marginal farmers, young in age, male, and belong to nuclear families. A large proportion have low annual income, indicating that farming in the study area is small-scale and economically constrained.

Table 2: Educational Status of Respondents

S. No.	Education Level	Frequency	Percentage (%)
1	Illiterate	53	44.17
2	Primary School	30	25.00
3	Junior High	19	15.83
4	High School	9	7.50
5	Intermediate	4	3.33
6	Graduate	5	4.17
Total		120	100.00

The data reveals that a significant proportion of respondents are illiterate, while only a few are graduates. This indicates low educational attainment, which may limit awareness of modern agricultural practices and fertilizer management.

Table 3: Distribution of Respondents by Distribution Channels

S. No.	Channel Type	Number of Respondents	Percentage (%)
1	Channel I (Manufacturer → Farmer)	28	23.33
2	Channel II (Manufacturer → Dealer → Farmer)	40	33.33
3	Channel III (Manufacturer → Wholesaler → Retailer → Farmer)	52	43.34
Total		120	100.00

The data reveals that a significant proportion of respondents are illiterate, while only a few are graduates. This indicates low educational attainment, which may limit awareness of modern agricultural practices and fertilizer management.

Table 4: Channel I & Channel II Marketing Analysis

Particulars	Channel I (₹/quintal)	Channel II (₹/quintal)
Manufacturer Price	4500	4500
Manufacturer Cost	200	200
Net Price Received by Manufacturer	4300	4300
Intermediary Cost	—	150
Intermediary Margin	—	200
Sale Price to Farmer	4500	4650
Total Marketing Cost	200	350
Price Spread	200	550
Marketing Efficiency (%)	21.5	18.2

Channel I is more efficient due to lower cost and direct access, while Channel II involves intermediaries, increasing marketing cost and reducing efficiency.

Table 5: Channel III Marketing Analysis

Particulars	Channel III (₹/quintal)
Manufacturer Price to Wholesaler	4500
Manufacturer Cost	200
Net Price Received by Manufacturer	4300
Wholesaler Cost	150
Wholesaler Margin	180
Retailer Cost	140
Retailer Margin	170
Sale Price to Farmer	4940
Total Marketing Cost	490
Total Marketing Margin	350
Price Spread	840
Marketing Efficiency (%)	14.5

Channel III has the highest marketing cost and price spread due to multiple intermediaries, resulting in the lowest marketing efficiency among all channels.

Conclusion

The present study titled “A Study on the Supply Chain and Distribution System of Urea Fertilizer in Jaunpur District of Uttar Pradesh” was conducted to examine the supply chain structure, distribution efficiency, and constraints faced by farmers in accessing urea fertilizer in the study area. The study also analyzed the socio-economic profile of farmers, existing distribution channels, distribution costs, price spread, farmer's share in the final price, and overall

distribution efficiency. The socio-economic analysis showed that most farmers belonged to the middle-age group with secondary-level education, indicating moderate awareness about fertilizer use and government schemes. The majority were small and marginal farmers, highlighting the importance of urea fertilizer in their agricultural income and productivity.

Three main distribution channels were identified

1. Manufacturer → Farmer (Direct Supply)
2. Manufacturer → Distributor → Farmer
3. Manufacturer → Distributor → Retailer → Farmer

Among these, the direct supply channel was the most efficient with the lowest cost and highest farmer's share, while multi-intermediary channels had higher costs and lower efficiency. The study further revealed that distribution costs and price spread increased with the number of intermediaries, reducing farmers' share in the final price. Channel I was the most efficient, whereas Channel III was the least efficient due to higher margins and expenses. Major constraints identified included fertilizer shortages during peak demand, delays in supply, high transportation costs, hoarding by intermediaries, and limited access to timely information. These issues often affected timely availability and increased input costs for farmers. In conclusion, improving supply chain infrastructure, promoting direct distribution, strengthening government delivery systems, and enhancing farmer awareness can significantly improve the efficiency of the urea fertilizer distribution system in Jaunpur district.

Summary

The present study titled “Study on Value Chain Analysis of Maize in Aligarh District of Uttar Pradesh” was conducted to examine the socio-economic profile of farmers and analyze the cost, margins, price spread, and value addition in the maize value chain. The study was based on primary data collected from 100 respondents using a multistage sampling method. The socio-economic analysis showed that most respondents were marginal and small farmers, mainly young in age, with a higher proportion of males and nuclear families. A significant number of farmers had low educational levels and belonged to low and middle-income groups, indicating limited financial and technical capacity. The study identified different marketing channels involving producers, traders, wholesalers, processors, and retailers. It was observed that marketing cost, margins, and price spread increased with more intermediaries, while channels with fewer intermediaries were more efficient and provided a higher share of the consumer's price to farmers. Comparative analysis revealed that Channel-I was more efficient than Channel-II due to lower costs, reduced price spread, and higher marketing efficiency. The involvement of intermediaries in Channel-II reduced the producer's share in the final price.

In conclusion, improving storage facilities, strengthening direct marketing, promoting farmer organizations, and reducing intermediaries can enhance the efficiency of the maize value chain and increase farmers' income in Aligarh district.

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