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Rice Matters: From Household Love to Global Trade

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Abstract
In Gwalior, India, Vikram Kapoor asked his wife Meenal to make lunch on July 30, 2023, sparking a discussion about rice. Rice, originating in India and China 9,000-10,000 years ago, is now a global staple. India is the world's top rice exporter (40% of global exports). Rice is the second most important cereal crop globally, with 510 million metric tons produced in the last harvest year and 510.3 million metric tons consumed in 2021/2022. India provides subsidized rice through government schemes. Meenal's concern was about the distribution system and costs of subsidized rice in India.

Keywords: Supply chain management, international trade and export management, policy, and decision-making

About Rice

Rice, one of the most important staple foods in the world, has a long and fascinating history. Its origins can be traced back to around 9,000-10,000 years ago in the region of eastern India and southeastern China, making it one of the earliest domesticated crops in human history. From its birthplace, rice cultivation gradually spread throughout Asia, reaching Southeast Asia, Korea, Japan, and the Pacific Islands through trade and migration. It played a crucial role in the development of ancient civilizations in China and India, shaping their societies and cultures.

In Southeast Asia, rice farming was instrumental in the rise of powerful kingdoms like the Khmer Empire. Japan and Korea also embraced rice as a central part of their diets and cultural identity. Over time, rice spread to other parts of the world through trade routes, reaching the Middle East, Egypt, and eventually the Americas through European exploration and slave trade. Today, modern agricultural practices and technologies have boosted rice production, ensuring its continued significance as a vital food source for more than half of the world's population and preserving its cultural importance in diverse societies globally.

History Of Rice

Origins: Rice cultivation is believed to have originated in China around 10,000 to 14,000 years ago. From there, it spread to other parts of Asia, including India, Southeast Asia, and eventually to Africa and Europe through trade routes. It is thought that rice cultivation began as a wild grass known as *Oryza rufipogon*, which early humans gradually domesticated into the cultivated rice we know today (Oryza sativa).

Spread to Different Regions: Rice cultivation reached the Indian subcontinent around 5000 to 4000 BCE, and it became an essential crop in the Indus Valley Civilization. From India, rice cultivation expanded to Sri Lanka, and it was later introduced to regions like Thailand, Myanmar (Burma), and Indonesia.

In China, rice farming has a rich history dating back thousands of years. The Yangtze and Yellow River valleys were crucial areas for rice cultivation. Chinese farmers developed sophisticated irrigation systems to grow rice in these regions.

Spread to Other Continents: Rice was introduced to the Middle East around 3000 BCE, reaching regions such as Mesopotamia (modern-day Iraq) and Persia (modern-day Iran). The spread of rice continued westward, reaching the eastern Mediterranean and North Africa. In Europe, rice cultivation began to appear in Spain and Portugal during the Middle Ages.

In Africa, rice was introduced through trade with Arab merchants and subsequently spread to various regions, becoming a significant crop in West Africa and the African Great Lakes region.

Rice in the Americas: Rice also made its way to the Americas during the period of European exploration and colonization. It is believed that African slaves brought to the New World played a crucial role in the establishment of rice plantations in places like South Carolina and Georgia in the United States.

Modern Cultivation and Importance: Today, rice is grown on every continent except Antarctica and is a staple food for over half of the world's population, particularly in Asia, where it is a dietary staple. It is also an essential crop for millions of farmers and an important source of income for many countries. Different varieties of rice are cultivated, and various methods of rice farming are employed, including traditional flooded paddies, terraced fields, and dryland cultivation.

Rice plays a crucial role in global food security, and efforts continue to improve its cultivation, yield, and resistance to pests and diseases to meet the demands of a growing population. Overall, the history of rice is a testament to the ingenuity and resilience of human agricultural practices and their impact on shaping civilizations and cultures around the world.

Meenal pointed out to her husband that he might be aware of Rice and its history, but did he know that the Government of India distributes free rice to people?

Her husband replied, "Yes, I am aware of it, but not everyone has access to it. The government has specific criteria, and based on those criteria, they provide free rice to eligible individuals."

Meenal expressed concern, saying, eligible individuals? "Distributing rice for free could lead to price hikes and affect everyone."

Vikram Kapoor chimed in, "You're right, but there are many poor people who cannot afford rice and food grains. It is the responsibility of the Government of India to support them and provide free rice. In India, various schemes offer free or subsidized rice and food grains, and the Government of India even provides rice at Below Poverty Line (BPL) rates to State Governments under the Welfare Institutions & Hostels Scheme. Table 1 explains about the free or concessional rates distribution system in India.

Table 1: Annual allocation of foodgrains for 2023-24 (In lakh tons)

Name of Scheme	**Rice**
A. TPDS (NFSA Allocation)	
Antyoday Anna Yojana (AAY)	73.04
Priority Household (PHH)	279.51
TPDS (Tide Over)	21.25
PM POSHAN (MDM)	11.67
WBNP(ICDS)	12.83
Total	**398.30**
B. Other Welfare Schemes	
Hostels and Welfare institutions	1.43
Scheme for Adolescent Girls (SAG)	0.225
Annapurna	0.00
Total	**1.66**
C. Additional Allocation (Festival, calamity, additional TPDS, etc.)	
Natural Calamity etc. (MSP Rates)	0.30
Festival/Additional Requirement etc. (Economic Cost)	0.91
Total	**1.21**
Total (A+B+C)	**401.17**

Source: Department of Food & Public Distribution, Govt. of India

Public Distribution System (PDS) in the 1960s

Public distribution of essential commodities was in existence in India during the inter-war period. However, PDS, with its focus on the distribution of food grains in urban scarcity areas, had emanated from the critical food shortages of the 1960s. PDS substantially contributed to the containment of the rise in food grain prices and ensured access to food for urban consumers. As the national agricultural production had grown in the aftermath of the Green Revolution, the outreach of PDS was extended to tribal blocks and areas of high incidence of poverty in the 1970s and 1980s.

Revamped Public Distribution System (RPDS)

The Revamped Public Distribution System (RPDS) was launched in June 1992 to strengthen and streamline the PDS as well as to improve its reach in the far-flung, hilly, remote, and inaccessible areas where a substantial section of the poor live. It covered 1775 blocks wherein area-specific programs such as the Drought Prone Area Programme (DPAP), Integrated Tribal Development Projects (ITDP), and Desert Development Programme (DDP) were being implemented and in certain Designated Hill Areas (DHA) which were identified in consultation with State Governments for special focus. Food grains for distribution in RPDS areas were issued to the States at 50 paise below the Central Issue Price. The scale of the issue was up to 20 kg per card. The RPDS included an area approach for ensuring the effective reach of the PDS commodities, their delivery by State Governments at the doorstep of FPSs in the identified areas, additional ration cards to the left-out families, infrastructure requirements like additional Fair Price Shops, storage capacity, etc. and additional commodities such as tea, salt, pulses, soap, etc. for distribution through PDS outlets.

Targeted Public Distribution System (TPDS)

The Targeted Public Distribution System (TPDS) was launched in June 1997 by the Government of India with a focus on providing food grains to the poor. States were required to establish foolproof systems for identifying the poor and ensuring transparent and accountable distribution of food grains at the Fair Price Shops (FPS) level. Initially, the scheme aimed to benefit about 6 crore poor families with an annual allocation of approximately 72 lakh tonnes of food grains. The identification of the poor was based on State-wise poverty estimates from the Planning Commission for 1993-94.

The TPDS also included a transitory allocation for families above the poverty line (APL) to continue receiving subsidized food grains. In 2000, the allocation of food grains for below-poverty-line (BPL) families was increased from 10 kg to 20 kg per family per month at 50% of the economic cost (Table 2). The Central Issue Prices (CIPs) for APL were set at 100% of economic cost, ensuring that the entire consumer subsidy benefited the BPL population. The number of BPL families was increased in 2000, and TPDS allowed flexibility to States/UTs in fixing retail issue prices, ensuring better distribution of food grains. Table 2 shows the economic cost of rice from 2018-2023.

Table 2: Economic Cost of Rice

Year	**Cost Rs. Per quintal**
2018-19	3444.10
2019-20	3720.06
2020-21	3939.26
2021-22	3562.49
2022-23	3858.19
2023-24 BE*	3918.05

Source: FC Accounts for Economic Cost and FCI for Offtake under TPDS and OWS, BE-Budget Estimated*

Antyodaya Anna Yojana (AAY)
The Antyodaya Anna Yojana (AAY) , launched in December 2000, aimed to reduce hunger among the poorest segments of the Below Poverty Line (BPL) population. Antyodaya Anna Yojana (AAY) is a public distribution system scheme of the Government of India.

It identified one crore of the poorest BPL families and provided them with highly subsidized food grains at Rs. 2 per kg for wheat and Rs. 3 per kg for rice. The entire food subsidy was passed on to the consumers, and the scale of the issue increased from 25 kg to 35 kg per family per month from April 1, 2002. The scheme expanded to cover 2.50 crore poorest households, including 50 lakh BPL households in 2003-04, and another 50 lakh households at risk of hunger in 2004. By 2005, the AAY covered 2.5 crore households, accounting for 38% of the BPL population.

Meenal told Vikram, "If the government has been distributing a significant amount of rice to the poor people and also selling it in the wholesale market, why don't they consider exporting it and earning foreign exchange?"

Vikram replied, "Yes, the government does engage in rice exports. Let me tell you about the export of rice."

Rice Exports
IMF warns of worldwide food inflation, fears of shortages, and panic buying due to India's export ban on non-Basmati white rice. India is the largest rice exporter globally, accounting for 40% of worldwide exports, with non-Basmati white rice making up almost half of it. African countries, Bangladesh, and Nepal are significant buyers of Indian non-Basmati rice, while the Middle East and Central Asia prefer Basmati exports.

The export ban (July 20, 2023) could impact import needs and global rice prices. The ban was deemed necessary due to poor monsoon, diminishing harvest prospects, and domestic price increases. In South Asia, India is the seventh-largest country by area with a population of 1.44 billion, and though fertility rates decline, population growth continues due to improved sanitation and healthcare, leading to increased life expectancy and reduced child mortality.

Rice exports from India
India was the world’s largest rice exporter, followed by Thailand and Vietnam. The export of rice other than the basmati variety increased by a whopping 109 percent since 2014, with parboiled rice making up the majority of exports in this category. Milled rice, broken rice, rice in husk, and husked brown rice were also exported.

Table 3 shows the country exported rice to over 150 nations, continuing to extend its market share in Africa, Asia, and Europe. In 2022, Saudi Arabia, Bangladesh, and the United Arab Emirates were the major importers of Indian rice.

Table 3: The World's Biggest Exporters of Rice in Year-2022

Country	Export (in percent)
India	22.5
Thailand	8.5
Vietnam	7.5
Pakistan	3.6
U.S.	2.1
Others	11.4

Source: USDA, Reuters

Statistics and Facts about Rice

Worldwide

Rice is the world's second most important cereal crop following only corn. Nearly 510 million metric tons of milled rice were produced in the last harvesting year worldwide. Traditionally, countries in Asia have the largest share of world rice production. According to the most recent official data, with a production volume of over 212 million metric tons in 2021, China was the world's leading paddy rice producer, followed by India and Bangladesh.

U.S. market

The United States was also ranked among the leading global rice producers in 2021. The nation's rice production value amounted to just over three billion U.S. dollars in 2021. Leading U.S. states in rice production were Arkansas, California, and Louisiana. The United States was also ranked among the leading five rice exporters worldwide, primarily shipping this commodity to Mexico, Haiti, and Japan.

Global trade

The major rice-exporting nations include India, Vietnam, and Thailand. India had the highest export volume of rice worldwide, at 18.75 million metric tons as of 2021/2022. Vietnam was the second largest rice exporter, with about 6.5 million metric tons of rice worldwide in that year. The largest rice importers were the Philippines and China. The retail price of white rice has increased in recent years. The average price per pound of long-grain white rice was 92 cents in the U.S. in 2022, almost double the price in 2004.

Total Global Consumption

Total global consumption of milled rice amounted to approximately 510.3 million metric tons in 2021/2022. China consumed almost 155 million metric tons of milled rice in 2021/22 and was by far the world's leading rice consumer in that year. Following China, India is ranked second with 108.5 million metric tons of rice consumption in the same period.

The average global consumption of rice is about 70 kilograms per person per year. This figure varies significantly from country to country, with people in Asia consuming much more rice than people in other parts of the world. Table 4 shows the average rice consumption in China is about 140 kilograms per person per year, while the average rice consumption in the United States is only about 4 kilograms per person per year, however, monitoring the rice market was a critical task considering more than half of the world's population consumes rice daily.

Table 4: Global consumption of Rice (Top three countries)

Country	Consumption (million metric tons)
China	155
India	108.5
Indonesia	33.5

Source: Statista

Paddy rice production

Paddy or rough rice are the unprocessed rice kernels grown in a flooded or well-irrigated field. Paddies require a maintained level of water, around 10 to 15 centimeters, for the growth part, and the fields are then dried before harvesting in the sunny season. Table 5 shows the Asia Pacific region, China and India were the leading rice paddy producers, with a significant gap to Indonesia in third place.

Table 5: All India production of Rice (July-June) ((Million Tons)

Year	(Kharif)	(Rabi)	Total
2019-20	102.28	16.59	118.87
2020-21	105.21	19.16	124.37
2021-22	111.00	18.47	129.47
2022-23	110.03	15.90	125.93
Total	428.52	70.12	498.64

Source: Economics & Statistics Division, M/o Agriculture & FW

Impact of rice production

Rice requires highly specific environmental conditions to grow. After maize, rice was the world's most produced crop. India ranked second in rice production globally. This volume amounted to over 129 million metric tons in the financial year 2022. The Indian rice industry is positively impacted by government support for rice production, suitable monsoon season, an increase in the number of rice processing industries, and exports. However, climate change has had an impact on the crop seasons, along with high fertilizer prices, inadequate irrigation systems, and issues within farming communities. The most recent of the latter involved the farmer protests, one of the largest demonstrations in the world. Despite these shortcomings, however, the annual yield of rice was 2.8 metric tons per hectare in fiscal year 2022, significantly higher than the previous year.

Global rice market

Global rice consumption has been increasing by population growth. China and India are the main consumers of rice. As of February 2019, China and the Philippines were the main importing countries of rice, while India and Thailand were the main exporters.

Rice cultivation

Rice requires specific growing conditions to be successfully cultivated. It must be grown in a flooded field in several inches of water. Once the unprocessed rice is harvested, it is known as paddy rice. In 2021, China produced about 213 million metric tons of paddy rice, making that country the top producer of paddy rice worldwide. India had the largest harvest area of rice in the

2020/21 crop year, at 45 million hectares, while China harvested 30.8 million hectares of rice in that year.

Rice trade worldwide

In addition to having the largest harvest area of rice, India also was the top exporter of rice in the 2022/2023 marketing year. During that period, India exported 21.5 million metric tons of rice. Despite being the top producer of rice worldwide, China's consumption of rice cannot be satisfied by domestic production. China is also the top importer of rice any country in the world, with over five million metric tons of rice.

Rice is the most common staple food in many Asian countries including India. Rice is India's most significant food crop. It is a Kharif (autumn) crop cultivated in warmer regions during the monsoon season from June to September. Rice is extracted from the paddy crop during harvesting. The leading rice-producing states were West Bengal, Uttar Pradesh, Andhra Pradesh, Punjab, Tamil Nadu, Bihar, Chhattisgarh, and Odisha. Over 3,000 varieties of rice are grown across the country, some of which take as less as 60 to 75 days to be grown. The South Asian peninsular ranked second for consumption of rice globally. This barely comes as a surprise when more than half of the Indian population consumes rice. Of all varieties, white rice is most consumed as it also helps with digestive problems. Table 6 shows the state-wise rice production and procurement in India.

Table 6: State wise Rice Production and Procurement in India (In Lakh Tons)

Sates/UTs	**2018-19 (Kharif & Rabi Crop)**		**2019-20(Kharif & Rabi Crop)**		**2020-21 (Kharif & Rabi Crop)**		**2021-22 (Kharif & Rabi Crop)**		**2022-23**	
	Prod.	**Proc.**	**Prod.**	**Proc.**	**Prod.**	**Proc.**	**Prod.**	**Proc.**	**Prod.**	**Proc. Upto 31.07.23**
Andhra Pradesh	82.35	48.06	86.59	55.32	78.83	56.66	77.64	44.61	85.42	28.34
Telangana	66.7	51.9	74.28	74.54	102.17	94.53	124.10	73.94	160.14	88.35
Assam	52.21	1.01	49.85	2.11	52.15	1.42	43.82	3.79	49.80	3.98
Bihar	61.56	9.49	62.98	13.41	67.47	23.84	77.17	30.09	67.25	28.17
Chandigarh		0.13		0.15		0.19	0.00	0.18		0.13
Chhatisgarh	65.27	39.71	67.75	50.53	71.61	47.74	80.22	61.65	82.38	58.65
Delhi							0.19			0.00
Gujarat	19.12	0.09	19.83	0.14	21.46	0.74	21.01	0.82	23.95	1.18
Haryana	45.16	39.42	48.24	43.07	44.25	37.89	46.18	37.06	54.07	39.77
Himachal Pradesh	1.15		1.44		1.4		1.68	0.19	1.19	0.09
Jharkhand	28.94	1.53	30.13	2.55	27.53	4.28	29.30	5.12	14.00	1.17
Jammu & Kashmir	0	0.09		0.1		0.26	4.93	0.27		0.22
Karnataka	34.31	0.59	36.35	0.41	42.92	1.38	43.18	1.47	40.01	0.14
Kerala	5.78	4.65	6.06	4.82	6.34	5.2	4.87	5.09	5.81	4.97
Madhya Pradesh	44.95	13.95	47.78	17.4	44.14	24.97	48.15	30.70	76.57	30.93
Maharashtra	32.76	5.8	28.96	11.67	32.92	12.72	35.98	12.27	38.99	12.38
Odisha	77.34	44.48	83.6	47.98	88.1	52.58	92.91	48.31	96.21	53.83
Puducherry				NEG			0.57	0.00		0.00

Punjab	128.22	113.34	117.79	108.76	127.84	135.89	128.85	125.48	131.47	122.01
Net (Tripura)		0.07		0.14		0.16	8.11	0.39		0.29
Tamil Nadu	61.31	12.94	71.71	22.04	68.81	30.53	79.07	18.76	78.51	21.74
Uttar Pradesh	155.45	32.33	155.18	37.9	155.2	44.78	152.72	43.91	151.71	43.89
Uttarakhand	6.18	4.62	6.58	6.82	7.15	7.18	7.16	7.74	6.42	6.00
West Bengal	162.42	19.79	158.81	18.38	165.24	18.9	167.29	24.01	156.37	23.37
Rajasthan	4.53		4.81		6.34		4.79	0.05	5.77	0.00
Others	29.09		29.98		31.82		14.84		29.37	
All India Total	**1164.78**	**443.99**	**1188.7**	**518.27**	**1243.68**	**601.85**	**1294.71**	**575.88**	**1355.42**	**569.60**

Production Source: Directorate of Economics and Statistics, Procurement Source: FCI Daily Bulletin

Meenal's Dilemma

Meenal was taken aback by the rice statistics, prompting her to question Vikram. She pondered over the seeming contradiction: despite our nation's rich status and rice being a significant export commodity earning foreign exchange, why does the government allocate such large quantities under various welfare schemes? The concept of this widespread distribution troubled her, as it created a disparity where some receive the resource for free while others purchase it with their money. She envisioned a unified nation governed by a single set of rules.

In response, Vikram engaged Meenal in a discussion. He questioned whether the act of government distributing items for free was inherently problematic. Drawing upon the cultural notion of India being referred to as the "Bowl of Rice," Vikram highlighted the centrality of rice in the country's cuisine, economy, and way of life.

Yet, Meenal's concerns ran deeper than mere free distribution. She also contemplated the logistics surrounding storage, transportation, and potential spoilage costs. Her primary dilemma lay in the intricate distribution system and the associated expenses it incurred.

Discussion Questions

1. What elements could be included in a multifaceted solution for widespread freeship distribution of rice?
2. How can a comprehensive market analysis help in addressing the challenges associated with determining the price of rice?
3. In what ways could streamlining the distribution system contribute to ensuring equitable access to rice across different regions?
4. How would a cost-benefit analysis help in deciding whether to export rice or use it for domestic consumption?

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Appendices

Appendix 1: Pesticide spraying at the farm

Source: Self-taken, pesticide spraying

Appendix 2: Harvesting at the farm

Source: Self-taken, harvesting rice