

Identifying and analysing constraints in the branded rice market: A comprehensive study of stakeholders in Kerala, India

ABSTRACT

The study assessed the various constraints faced by the stakeholders in branded rice market in Kerala. These stakeholders include farmers, exporters, non-exporting private rice manufacturers, co-operative society, wholesalers, retailers and consumers. By examining the constraints across the branded rice market from production to consumption, the study aimed to identify the critical issues like, production constraints, procurement constraints, marketing constraints, institutional constraints export constraint and financial constraints. A sample of 30 farmers and one agent, five exporters and 10 non-exporters 20 wholesalers and 30 retailers and 120 consumers from Ernakulam and Palakkad districts were selected for the study.

The study identified the major problems faced by the stakeholders of branded rice market by using Garret's ranking method. Farmers were facing difficulties in rice production due to high input costs, high labour costs and untimely availability of water. Delay in procurement from SUPPLYCO and adequate facilities for drying and cleaning compel them to sell their produce in the open market. There was a communication gap between institutions and farmers. Lack of transportation facilities, high maintenance cost of machinery and financial difficulties were the major constraints faced by PADDICO. High transportation cost, high international trade barriers and price volatility were the major constraints faced by private manufacturers of branded rice. Heavy documentation & procedures was the major constraint faced by exporters. Lack of demand of branded rice was the major constraint faced by resellers. High price was the major constraint faced by the consumers. The high cost of production faced by farmers can be reduced by improved mechanisation in the rice cultivation. The study also recommended the suggestions for the constraints of other market stakeholders of branded rice market.

Keywords: Branded rice, PADDICO, constraints, garret's ranking, contract farming

INTRODUCTION

The branded rice market in Kerala plays a pivotal role in the state's agricultural economy. It directly affecting the livelihoods of farmers and influencing consumer preferences. The market involves a wide range of stakeholders, including farmers, exporters, non-exporting private rice manufacturers, co-operative society, wholesalers, retailers, and consumers. These stakeholders face diverse constraints that impact the efficiency, profitability, and long-term sustainability of the branded rice market.

Numerous studies have examined the rice market in Kerala and India, often focusing on general market conditions, production challenges, and supply chain inefficiencies. For instance, Krishnan (2018) analysed the supply chain of rice in Kerala, identifying gaps in procurement and distribution processes. Nair et al. (2020) highlighted the issues related to market price fluctuations and the limited access of small-scale farmers to branded rice markets. However, the unique constraints faced by each player in the branded rice market have not been sufficiently studied. Specifically, challenges like inconsistent procurement policies, regulatory hurdles for exporters, competitive pricing pressures on retailers, and quality concerns for consumers remain underexplored.

This study aimed to bridge the research gap by investigating the constraints faced by all stakeholders involved in the branded rice market in Kerala. The primary objective of the study was to assess the constraints faced by the stakeholders in the branded rice market of Kerala. By providing a holistic understanding of these challenges, the researcher recommends suggestions to improve market conditions, and to overcome the constraints in the branded rice market.

MATERIAL AND METHODS

Location of the study

Based on the convenience of the researcher, the Kerala was selected as the location for the study.

Period of study

The survey was conducted during the period of October, 2023 to September, 2024.

Sources of data

Both primary and secondary sources were used for the collection of data. Primary data was collected from farmers, exporters, non-exporters, wholesalers, retailers and consumers by using pre-tested structured interview schedule separately for different stakeholders. Secondary data was collected for the area, production, per capita rice consumption and cost of cultivation of rice, from published reports of Department of Economics and Statistics and other official websites of Government of Kerala, Government of India and Food and Agriculture Organisation.

Sample selection

A sample of 30 farmers, five exporters, 10 non-exporters, one co-operative rice mill, 20 wholesalers, 30 retailers and 120 consumers were provided the data.

RESULTS AND DISCUSSION

The researcher identified the various constraints faced by the stakeholders in the branded rice market in Kerala. The farmers who sold their produce in the open market were selected for the study. They were selling their paddy mainly to the co-operative society and private rice manufacturers. From the cultivation to handover the produce to manufacturers, the farmers were facing many challenges. The manufactures including co-operative society were also faced constraints in procurement, processing and marketing of the produce. The resellers, who plays an intermediary role also facing constraints in the rice market. The final stakeholders in the rice market were consumers, the constraints faced by them also discussed in the study.

Constraints faced by farmers in the branded rice market

The constraints faced by farmers were identified by the researcher for the study. It includes the constraints that compel farmers to enter into the branded rice market and the constraints faced by them in the existing scenario. Those constraints were classified into production, procurement, marketing, institutional and financial constraints. The respondents were ranked based on the order or constraints they faced from most to less impactful. The researcher analysed the response by using Garrett ranking method.

Production constraints of farmers

The farmers are facing constraints from land preparation to sales of their produce. As well as the farmers were overcoming the several stages of the paddy production. They were facing the issues in production mainly related to inputs, mechanisation, pest & disease and gambling of monsoon. The table below helps to get a clear picture about the constraints faced by the farmers in the study.

Table 1 Production constraints of farmers (n=30)

Production constraints	Score	Average	Rank
High cost of inputs	1962	65.4	1
High cost of labour	1927	64.23	2
Untimely availability of irrigation	1860	62	3
Excessive weed growth	1828	60.93	4
Occurrence of pests and diseases	1714	57.13	5
Uneven rainfall pattern	1552	51.73	6
Scarcity of labour	1525	50.83	7
Non availability of inputs	1440	48	8
Insufficient availability of irrigation	1381	46.03	9

Difficulties related to mechanisation	1295	43.17	10
Inadequate supply of quality seeds	1165	38.83	11
Attack from wild animals	901	30.03	12
Natural calamities	740	24.67	13

Table 1 clearly showed that, the farmers faced major constraints such as high input costs, high labour costs and untimely availability of water. They didn't experienced issues related to the unavailability of inputs or difficulties with mechanisation, as these resources were rented from nearby Tamil Nadu on a seasonal basis. However, during the Virippu season, they struggled with excessive weed growth, which complicates production.

Procurement constraints of farmers

The procurement on paddy from farmers to the rice manufacturers is an important stage. As the farmers sold their produce to SUPPLYCO in the earlier years, the delay in procurement by them also act as a constraint to farmers. The study revealed that, mainly the procurement constraints compel the farmers of Kerala to sell their produce in the open market. The procurement constraints and the corresponding ranks are listed in table 2.

Table 2 Procurement constraints of farmers (n=30)

Procurement constraints	Score	Average	Rank
Delay in procurement from SUPPLYCO	2288	76.27	1
High loading charges	1683	56.1	2
Inadequate facilities for drying and cleaning	1669	55.63	3
Lack of demand	1276	42.53	4
Quality rejection issues	1271	42.37	5
Conflicts between procurement agents and farmers	1226	40.87	6
Delay in procurement by private rice manufacturers	997	33.23	7

Table 2 showed major constraints faced by farmers in procurement includes, delay in procurement from SUPPLYCO, high loading charges and in adequate facilities for drying and cleaning. The lack of demand from rice manufacturers leads to a low selling price earned by the farmers. The farmers were ranked the conflict between agents & farmers and delay in procurement by private rice manufacturers as less significant. This was because, farmers were reluctant to confront agents, as they represented the last resort for selling their produce.

Marketing constraints of farmers

The SUPPLYCO was given high price to the farmers in Kerala. But in recent years there was a delay in the payment by the SUPPLYCO to the farmers. That was indirectly affected the farmers and attracted them to enter into the branded rice market. so, here is an attempt to rank the marketing constraints faced by farmers.

Table 3 Marketing constraints of farmers (n=30)

Marketing constraints	Score	Average	Rank
Delay in payment from SUPPLYCO	2311	77.03	1
Lack of storage facility	1902	63.4	2
High transportation cost to warehouse	1637	54.57	3
Lack of transportation facilities	1497	49.9	4
More distance to marketing centres	1418	47.27	5
Undue interference of agents	1239	41.3	6
Losses occurred in transit	1170	39	7
Delay in payment from private millers	706	23.53	8

Table 3 showed the marketing constraints of farmers. The delay in payment from SUPPLYCO, lack of storage facilities and high transportation cost to warehouse were ranked as the most significant constraints in the above table. The lack of storage facility and high expenses for transportation and storage compel the farmers to sell off the produce at the earliest. In contrast, losses due to transit and delays in payment from rice manufacturers were considered the least significant. The timely payment and reduced logistical expenses were the factors that attracted farmers by the private rice manufacturers.

Institutional constraints of farmers

The institutional constraints faced by farmers include legal and political constraints like restrictive laws, unnecessary government interference and administrative neglect. These problems can make it harder for farmers to access resources and run their production and marketing smoothly. Those constraints are identified and shown in table 4.

Table 4 Institutional constraints of farmers (n=30)

Institutional constraints	Score	Average	Rank
Communication gap between institutions and farmers	2250	75	1
Political influence in rental government machineries	1446	48.2	2
Intervention of political parties in the procurement industry	1431	47.7	3
MNREGA not covering paddy	1179	39.3	4
Ineffectiveness of Kerala Paddy Land and Wetland Conservation Act, 2018	1134	37.8	5

Table 4 showed that the communication gap between institutions and farmers was ranked as first. Farmers responded that the communication gap between Padasekharams, Krishibhavan and SUPPLYCO leads to delay in procurement from farmers. The political influence in rental machines forced the farmers to rent the machines at a high cost from agents. Finally, that leads to the increased the input cost of the farmers. The selected farmers were actually not bothered about MNREGA and Kerala Paddy Land and Wetland Conservation Act, 2018. They were not preferring the MNREGA labours. The amendment of the Kerala Paddy land and Wetland Conservation Act, 2018 was much more flexible and favours the farmers.

Financial constraints faced by farmers

As paddy cultivation is a costly process, the farmers may face constraints of financial aspects. It is an important factor, and farmers mainly depends on the government for the support. The table below shows the identified financial constraints faced by the farmers.

Table 5 Financial constraints faced by farmers (n=30)

Financial constraints	Score	Average	Rank
Lack of adequate subsidy from government	1878	62.6	1
Lack of sufficient quantum of credit	1515	50.5	2
Lack of information on source of credit	1476	49.2	3
Resistance of bank to avail credit	1446	48.2	4
Untimely availability of credit	1394	46.47	5
Lack of financial support for recovering loss	1231	41.03	6

Table 5 indicated that, lack of adequate subsidy from government act as a significant constraint faced by farmers and ranked it as one. The farmers were facing constraints to get sufficient quantum of credit from financial institutions. In addition to that, there was a lack of source of information about credit among the farmers. The financial support for recovering loss was ranked as last. The farmers responded that they got sufficient amount of insurance from the government under the crop insurance scheme Pradhan Mantri Fasal Bima Yojana (PMFBY) in the last year.

Constraints faced by manufacturers of branded rice

The constraints faced by the rice manufacturers plays a significant role in the branded rice market. The constraints faced by the private rice manufacturers and co-operative society is distinguishes and presented it here. As there was only one co-operative society performed in the branded rice market, there is no need for applying Garret ranking method.

Procurement constraints faced by manufacturers of branded rice

The private rice manufacturers of branded rice and co-operative society were facing the procurement constraints due to different reasons. The private manufacturers were procuring rice directly from farm gate, but the co-operative society sold their vehicle in 2009 due to the financial problems faced by them. So, the farmers were bring and sell their produce at co-operative society. The below table listed the major procurement constraints faced by these two rice manufacturers.

Table 6 Procurement constraints faced by manufacturers of branded rice

Procurement constraints	Private manufacturers of branded rice (n=15)			Co-operative society (n=1)
	Score	Average	Rank	Rank
High transportation cost	1235	77.19	1	2
High storage & maintenance cost	892	55.75	2	4
Low quality grain	858	53.63	3	5
Interstate procurement constraint	839	52.44	4	6
Non-availability of paddy	621	40.31	5	7
Lack of transportation facilities	621	38.81	6	1
Lack of storage facility for paddy	462	28.88	7	3

Table 6 showed that the private rice manufacturers were incurring high transportation cost, but they were not lacking the transportation facilities. The increased price of the fuels was the reason behind this particular constraint. As mentioned in the introduction of the table, the co-operative society was lacking transportation facilities and that results high transportation costs in another way. The private rice manufacturers facing constraints on storage and maintenance cost. They pointed out that the maintenance including electricity, equipment maintenance or even utility cost associated with these were high. The co-operative society lacks storage facilities and they incurred high maintenance cost from old age equipment and machines. The non availability of paddy and interstate procurement constraints ranked as least significant, because of the strong presence of interstate agents and rice manufacturers to connect beyond the states.

Processing constraints faced by manufacturers of branded rice

Processing of the paddy into the branded rice plays an important role among the rice manufacturers. So, the constraints faced by them in this stage must be identified. The manufacturers may be facing constraints on quality standards, availability of water, packaging and storage for branded rice.

Table 7 Processing constraints faced by manufacturers of branded rice

Processing constraints	Private manufacturers of branded rice (n=15)			Co-operative society (n=1)
	Score	Average	Rank	Rank
Difficulty in meeting regulatory and quality standards	974	64.93	1	2
Difficulty in maintaining hygiene and sanitation	880	58.67	2	3
Difficulty in quality control	866	57.73	3	4
Lack of availability of water	772	51.47	4	5
Lack of skilled labour	685	45.67	5	7
Difficulty in developing attractive product packaging	550	36.67	6	6
Lack of storage facility	478	31.87	7	1

Table 7 showed that lack of storage facility of the co-operative society act as a significant constraint of them. Both of the manufacturers were facing difficulty to meet the quality standards on processing of rice. It was specifying about the rice processing constraints that intended to meet the international demand. The both exporter and non-exporters opined that the processing guidelines or the regulatory standards to meet the international demand was strict. They specified about the fertiliser parameter to be avoided for international market. The maintenance of hygiene and sanitation in the processing also act as a constraint among the rice manufacturers. Even though it doesn't act as a constraint in the domestic market, it was act as a processing constraint related to the international demand as well.

Marketing constraints faced by manufacturers of branded rice

Marketing function of the branded rice plays a significant role in the market. the private rice manufacturers mainly rely on wholesalers and retailers for this function. While the co-operative society market their produce through their own outlets. Still, both of them face many constraints and those are listed and ranked in the below table.

Table 8 Marketing constraints faced by manufacturers of branded rice

Marketing constraints	Private manufacturers of branded rice (n=15)			Co-operative society (n=1)
	Score	Average	Rank	Rank
Price volatility	1182	78.80	1	1
High cost of packaging materials	1083	72.20	2	6
High market competition	903	60.20	3	7
Lack of sufficient marketing budget	897	59.80	4	2
Distribution problems	745	49.67	5	5
Lack of consumer awareness about brand	740	49.33	6	4
High promotional cost	594	39.60	7	3
Lack of skilled marketing personnel	541	36.07	8	10
Difficulties in market research	390	26.00	9	9
Difficulties in digital marketing	350	23.33	10	8

Table 8 showed that the private rice manufacturers were ranked the price volatility in the market as a major constraint faced by them. As the rice market in Kerala mainly depends on the other states for rice, the supply from them influenced the price of rice in the local market within Kerala. Secondly, the co-operative society lacks budget for marketing, while the private manufacturers ranked the second rank for high package cost. Both of these rice manufacturers were not seen the digital marketing and market research as a constraint to them.

Institutional constraints faced by manufacturers of branded rice

Rice manufacturers were going through significant challenges due to institutional constraints like high international trade barriers, steep tax rates and strict government regulations. These factors along with price controls limit their ability to compete and grow in the market. the institutional constraints faced by rice manufacturers were illustrated in table 9.

Table 9 Institutional constraints faced by manufacturers of branded rice

Institutional constraints	Private manufacturers of branded rice (n=15)			Co-operative society (n=1)
	Score	Average	Rank	Rank
High international trade barriers	1080	72	1	1
High tax rates	840	56	2	2
Rules and regulations of government	597	39.8	3	3
High price controls	453	30.2	4	4

Table 9 reflected that all the rice manufactures including co-operative society ranked the high international trade barriers as a significant constraint. To ensure the domestic price stability, the government banned exports of non- basmati white rice on 20th July, 2023 can be read along with this.

There was 20 per cent export duty also implemented on white rice in 2022. The second rank was given to the high tax rates, which was implemented by the government from 18th July 2022 onwards. These two constraints connected to the rules and regulations of the government, which was ranked as third.

Financial constraints faced by manufacturers of branded rice

The researcher identified that; the rice manufacturers were struggling with financial constraints. This starts from contributing the seed capital and never ends. Some of the major financial constraints and their corresponding ranks done by the rice manufacturers are shown in the table below.

Table 10 Financial constraints faced by manufacturers of branded rice

Financial constraints	Private manufacturers of branded rice (n=15)			Co-operative society (n=1)
	Score	Average	Rank	Rank
High capital investment	1113	74.20	1	1
High interest rates for borrowed fund	902	60.13	2	3
High energy cost	897	59.80	3	5
High maintenance cost for machinery	738	49.20	4	2
High labour cost	661	44.07	5	4
Lack of subsidies	553	36.87	6	7
High depreciation cost	341	22.73	7	6

Table 10 depicted that; both private rice manufacturers and co-operative society ranked high capital investment as a major constraint faced by them. For meeting the investment, they took loan from the financial institutions. The rice manufacturers opined that sometimes the interest rates charged by the financial institutions were intolerable. The co-operative society was pass through a high financial crisis, mainly due to the high interest charged for their loans as well as the high maintenance cost associated with the machines which was 26 years old. Due to the financial crisis faced by the co-operative society in 2006, they temporarily shut down for it a year and after that they sold their vehicle as a temporary source of finance.

Export constraints faced by manufacturers of branded rice

Exporters of branded rice face several challenges during the export process. only five exporters were selected for the study. the constraints faced by them was listed. These includes dealing with complicated regulations and paper work, managing high shipping costs and transportation delays and difficulty to meet varying quality standards in different countries. The ranks for the corresponding constraints are listed in table 11.

Table 11 Export constraints faced by manufacturers of branded rice (n=5)

Export constraints	Score	Average	Rank
Heavy documentation & procedures to be followed for export	359	71.8	1
High transaction cost	351	70.2	2
High tariffs and duties	340	68	3
Varying quality standards in different countries	255	51	4

Difficulty in negotiating the price with buyers	253	50.6	5
Difficulty in finding packaging materials to suit the export requirements	225	45	6
System breaks down in customs	202	40.4	7
High warehouse cost at the port	150	30	8
Rejection of export materials	95	19	9

From the above table, it can be understood that, the exporters were facing heavy documentation & procedures to export their rice. the costs associated with the export transaction was also high and ranked it as second. The government was imposing high tariffs and duties on rice export and it act as a constraint to the exporters. The warehouse cost and rejection of export materials were ranked as least significant, as it was not faced by the exporters in their past experiences.

Constraints to enter into international market by non-exporters

The non-exporters including co-operative society, encounter numerous challenges when attempting to access international markets. The table below mentioned some of the constraints faced by them, related to documentation, tariffs & duties and quality standards maintained by the international markets. The non exporters were ranked them according to the significance and the researched presented it in table 12.

Table 12 Constraints to enter into international market by non-exporters

Constraints to enter into international market	Private non- exporters (n=10)			Co-operative society (n=1)
	Score	Average	Rank	Rank
Heavy documentation & procedures to be followed for export	686	68.60	1	1
High transaction cost	667	66.70	2	3
High tariffs and duties	666	66.60	3	2
Difficulty to find buyers from international market	570	57.00	4	4
Difficulty in negotiating the price with buyers	464	46.40	5	5
Varying quality standards in different countries	458	45.80	6	6
Difficulty in finding packaging materials to suit the export requirements	400	40.00	7	8
High warehouse cost at the port	348	34.80	8	9
Rejection of export sample	201	20.10	9	7

Table 12 showed that, all the non- exporters including co-operative society ranked the heavy documentation & procedures for export as a first constraint faced by them. The private non- exporters ranked high transaction cost and high tariffs and duties as their next major constraints, while co-operative society ranked high tariffs and duties as second and transaction cost as third. High warehouse cost and rejection of the export samples are also noted, but they are considered less significant overall as they didn't even enter into that stage.

Constraints faced by resellers

The resellers are the distributors in the branded rice market. they were also faced constraints while connecting the rice manufacturers and consumers. The constraints faced by both wholesalers and retailers in their operations were identified, ranging from market demand issues to high operational costs. These constraints not only impact the efficiency of their business but also influence their ability to provide consistent supplies to consumers. The constraints of both the stakeholders were separately identified, ranked and presented in the two tables below.

Table 13 Constraints faced by wholesalers (n=20)

Constraints	Score	Average	Rank
Lack of demand	1508	75.4	1
High loading & unloading charges	1365	68.25	2
Price volatility	1180	59	3
High storage & energy cost	969	48.45	4
High transportation cost	898	44.9	5
Lack of quality	853	42.65	6
High commission for interstate agents	673	33.65	7
Non-availability of rice	474	23.7	8

Table 13 showed that the wholesalers faced a range of challenges, with lack of demand being the most significant constraint, scoring the highest (score-75.4). this can be interpreted that the fluctuations in market demand heavily affect wholesalers' ability to move their stock. High loading and unloading charges rank second (score-68.25), indicating that operational costs related to logistics are a major concern. Price volatility (score-59) and high storage and energy costs (score-48.45) also rank high, emphasising the financial risks and operational expenses that wholesalers must manage. Most of the wholesalers were having a rented store for their business. The non-availability of the rice was a least significant constraint, as there was sufficient supply of rice from within and outside states by the rice manufacturers and agents.

Table 14 Constraints faced by retailers (n=30)

Constraints of retailers	Score	Average	Rank
Lack of demand	2262	75.4	1
High storage cost	2028	67.6	2
Price fluctuation	1626	54.2	3
High loading & unloading charges	1584	52.8	4
High transportation cost	1212	40.4	5

Lack of quality	1068	35.6	6
Non-availability of rice	630	21	7

Table 14 showed the constraints faced by retailers. For retailers, the lack of demand was also a major constraint, with the highest score (score-75.4), mirroring the concern of retailers. This shows the retailers were equally affected by fluctuating market demand, which directly impacts their sales. The retailers opined the reason behind the decrease in demand was due to the shift of consumers from traditional meals to biriyani or Chinese food. The migration of the consumers to abroad also influenced the same. High storage cost ranked as second (score-67.4). they were struggling with costs of maintaining inventory as they also deal with rented stores and incurring high expenses on it. Price fluctuations and high loading and unloading charges add to their financial pressures. Interestingly, non-availability of rice was ranked as the least significant, indicating the sufficient supply of rice from the rice manufacturers to meet the demand of the consumers.

Constraints faced by consumers

Consumers are the final stakeholders of the branded rice market the constraints faced by them also need to be identified. Those constraints mainly related to the price, quality, availability and packaging of the product. Here was an attempt to identify the constraints faced by consumers in the market.

Table 15 Constraints faced by consumers (n=120)

Constraints of consumers	Score	Rank
High price	76	1
Inconsistency in quality	66	2
Limited rice types	58	3
Non availability of the brand	51	4
Low shelf life	47	5
Non-availability of the preferred packet	40	6
Non availability of the preferred variety	33	7
Low quality packaging	25	8

Table 15 showed that, high price is the major constraint faced by the consumers in the branded rice market followed by inconsistency in quality. It indicates that the issue of affordability among consumers. They also experienced variations in the quality of the rice and it affected their satisfaction level as well. The limited rice types indicates that the consumers were feel that their choice are restricted to choose the rice types like single boiled, double boiled, fortified and sortex from the stores.

CONCLUSION

The study identified the major problems faced by the stakeholders of branded rice market. Farmers were facing difficulties in rice production due to high input costs, high labour costs and untimely availability of water. Delay in procurement from SUPPLYCO and adequate facilities for drying and cleaning compel them to sell their produce in the open market. There was a communication gap between institutions and farmers. Lack of adequate subsidy from government, lack of sufficient quantum of credit from financial institutions and lack of source of information about credit among the farmers were the major financial constraints faced by farmers. Lack of transportation facilities, high maintenance cost of machinery and financial difficulties were the major constraints faced by PADDICO. High transportation cost, high international trade barriers and price volatility were the major constraints faced by private manufacturers of branded rice. Heavy documentation & procedures was the major constraint faced by exporters. That hinder the non-exporters from enter into the

international market as well. Lack of demand of branded rice was the major constraint faced by resellers. High price was the major constraint faced by the consumers.

SUGGESTIONS

The improvements on mechanisation on paddy farming can be done and improve the cultivation practices with the help of Kerala Agricultural University. The co-operative society was mainly suffering from financial constraints and old age machines. The co-operative society can issue a large number of shares with higher price. So, they can replace the scrap machines and develop the financial position of the society. The rice manufacturers of branded rice can enter into a contract farming with the farmers to maintain the consistency in quality of branded rice.

Disclaimer (Artificial intelligence)

Option 1:

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

Option 2:

Author(s) hereby declare that generative AI technologies such as Large Language Models, etc. have been used during the writing or editing of manuscripts. This explanation will include the name, version, model, and source of the generative AI technology and as well as all input prompts provided to the generative AI technology

Details of the AI usage are given below:

- 1.
- 2.
- 3.

REFERENCES

1. Krishnan, A., 2018. Supply Chain Analysis of Rice in Kerala. *Journal of Agribusiness*, 15(3), 45-62.
2. Nair, M., Kumar, S., & Joseph, P., 2020. Market Price Fluctuations and Access to Branded Rice Markets for Small-Scale Farmers in Kerala. *Indian Journal of Agricultural Economics*, 75(1), 112-127.
3. Food and Agriculture Organization., 2023. FAO rice market monitor. Retrieved from <https://www.fao.org/market-monitor/rice/en/>
4. Karangami, R., Dhenge, S. and Mehta, S.Y.P., 2019. Constraints Faced by Rice Growers in Adoption of Recommended Rice Cultivation Practices in Palghar District of Maharashtra, India. *Int. J. Curr. Microbiol. App. Sci*, 8(10), pp.682-685.
5. Karthick, S., Saminathan, R. and Gopinath, R., 2020. A Study on the Problems faced by Farmers in Paddy Marketing of Cauvery Delta Region, Tamilnadu. *International Journal of Management*, 11(10), pp.2155-2164.
6. Keerthi, P.N., 2018. Mapping of value chain of paddy in Thrissur district. M.Sc thesis, Kerala Agricultural University, Thrissur, 96p.
7. Mataia, A.B., Beltran, J.C., Manalili, R.G., Catudan, B.M., Francisco, N.M. and Flores, A.C., 2020. Rice value chain analysis in the Philippines: Value addition, constraints, and upgrading strategies. *Asian Journal of Agriculture and Development*, 17(1362-2020-1834), pp.19-42.
8. McCarthy, S., Singh, D.D., and Schiff, H., 2008. Value chain analysis of wheat and rice in Uttar Pradesh.
9. Toma, T., Tegegn, B. and Zemedu, L., 2017. The structure-conduct-performance analysis of honey Market in Shebenino District, Snnpr, Ethiopia. *Journal of Biology, Agriculture and Healthcare*, 7(17).
10. USAID (United States Agency for International Development). 2008. Structure-Conduct, Performance and Food Security: FEWS Net Markets Guidance No 2. (www.fews.net). Accessed On March 31, 2016.
11. Van Nguyen, N. and Ferrero, A., 2006. Meeting the challenges of global rice production. *Paddy and Water Environment*, 4, pp.1-9.
12. Varma, M. S. 2017. Soaring rice price forces Kerala to eye Rs 100 cr worth buy from West Bengal. *Financial Express*. [online]. Available: <https://www.financialexpress.com/market/commodities/kerala-government-to-buy-rice-worth-100-crore-from-west-bengal/570436/> [03 August 2022].

13. Wijesinghe, A. and Weerahewa, J., 2017. Structure, conduct and performance of the rice milling industry of Srilanka evidence from selected cases. *Economic Research*, 4(2), pp.71-90.
14. Wilson, R.T. and Lewis, I., 2015. The rice value chain in Tanzania. A Report from the Southern Highlands Food Systems Programme, FAO, 9.
15. Zhao, X., & Li, H. (2018). Global trends in rice milling technology and implications for developing countries. *World Development*, 107, 104-115.
16. Zorinah, P., 2016. Analysis of structure, conduct and performance of cabbage market in central district of Botswana (Doctoral dissertation, University of Nairobi).

UNDER PEER REVIEW