

Value Chain Analysis of Paddy in Nalgonda District – A Conceptual Framework

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ABSTRACT

Value chain mapping of paddy in Nalgonda district is done to track the flow paddy produced by farmers through various channels undergoing value addition and reaching the ultimate consumers. Accordingly mapping of the value chain is done considering the core processes, actors and the product flows. The core processes involved include, Production of paddy, primary movement of the produce, processing, secondary movement of the products and by products. The various value chain actors included input suppliers, producers, commission agents / traders, processors, FCI, wholesalers, retailers.

Key words: Paddy, FCI, Wholesalers, Retailers, Traders.

INTRODUCTION

Rice is considered to be the oldest and ancient cereal with a history of more than 2800 years. The biggest consumer of rice is China, followed by India, Indonesia, Bangladesh and Vietnam. Rice provides 20 percent of the world's dietary energy supply. Rice is also a good source of thiamine, riboflavin, niacin and dietary fibre. Unmilled rice contains more nutrients than milled or polished white rice. Rice is main staple food in south India. Apart from being consumed as rice there are several other value added products namely, parboiled rice, puffed rice, rice flakes, rice flour, rice wine, rice glue, rice paper, rice starch and other by-products such as rice bran, rice bran oil, rice husk used ash in the brick industry,

broken rice used as feed in the poultry and fish ponds. By-product paddy straw is used as fodder for cattle. India is one of the leading producers in the world of many major crops like paddy, wheat, pulses, sugarcane, spices, and plantation crops. India has 44.07 million hectares under paddy cultivation with a total production of 110.65 million tons in 2015-16. Nalgonda district has major markets for paddy and is grown as the major crop in the Nagarjunasagar project (NSP) canal area due to which agro-based industries are flourishing. The area under Paddy in Nalgonda district is 393743 ha and production is 1205285 t during 2013-14 (Department of Agriculture, Government of Andhra Pradesh).

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As paddy is important food crop it is difficult to plan design policy related to paddy without examining the existing value chain network margins to various value chain actors. An attempt is made to take up value chain analysis in this area to track the value chain from producer to ultimate consumer. The forward and backward linkages were analyzed involving input suppliers, middlemen, processors and regulatory and policy environment coordination.

MATERIALS AND METHODS

Twelve farmers from each village from different categories based on land holding such as marginal, small and large were selected randomly and thus the total sample frame was 120. Different value chain agents of paddy were randomly identified and data was obtained from local trader, commission agents and millers, fair price shops, wholesalers and retailers. A sample of ten traders/commission agents, twelve millers and one rice bran oil extracting solvent plant were selected at random. Both primary and secondary data were collected for the study. The primary data required for the study were collected through personal interview with the help of a schedule

RESULTS AND DISCUSSION

Mapping the value chain of paddy in Nalgonda district

The value chain network may be defined as a range of activities that are required to bring a product from its conception, through its designing, source of raw materials and intermediate inputs, marketing and distribution, to the final consumer¹.

A glance into the conceptual value chain of paddy in Nalgonda district provides insights into the value chain system of paddy in the study area. The figure 3 shows a diagrammatic representation of different value chain actors and processes operating in the paddy crop and the flow of produce and value added products in the chain. The map has been tracked and structured based on data collected from value chain actors at the time of interview. The map has been figured by categorizing the core processes namely Production, Movement of the produce to different stakeholders, processing of the produce, products obtained, marketing of the products to the final consumers through different channels. The movement of the

produce in the map is represented by using arrow marks. The detailed value chain is conceptualized in figure 3.

Core processes involved in value chain of paddy

(a) Production

In the sample area of the study that is Huzurnagar and Miryalagudamandals of Nalgonda district Paddy production is the main agricultural activity due to presence of left canal of Nagarjunasagar project. Production of paddy included all the inputs and input services or support activities utilized in the production of paddy. The inputs included seeds, fertilizers pesticides obtained from private dealers as well from Primary Agricultural Cooperative Societies (PACS) and State Agricultural Department. For the production paddy various operations were carried out which included the land preparation, sowing and nursery preparation, transplanting, application of manures and fertilizers, plant protection chemicals, harvesting drying and threshing. After the production the produce was ready for bagging and transportation and was moved and marketed to various stake holders by the producers for marketing.

(b) Primary movement/marketing of Paddy and by products to various stake holders to Millers for processing/value addition

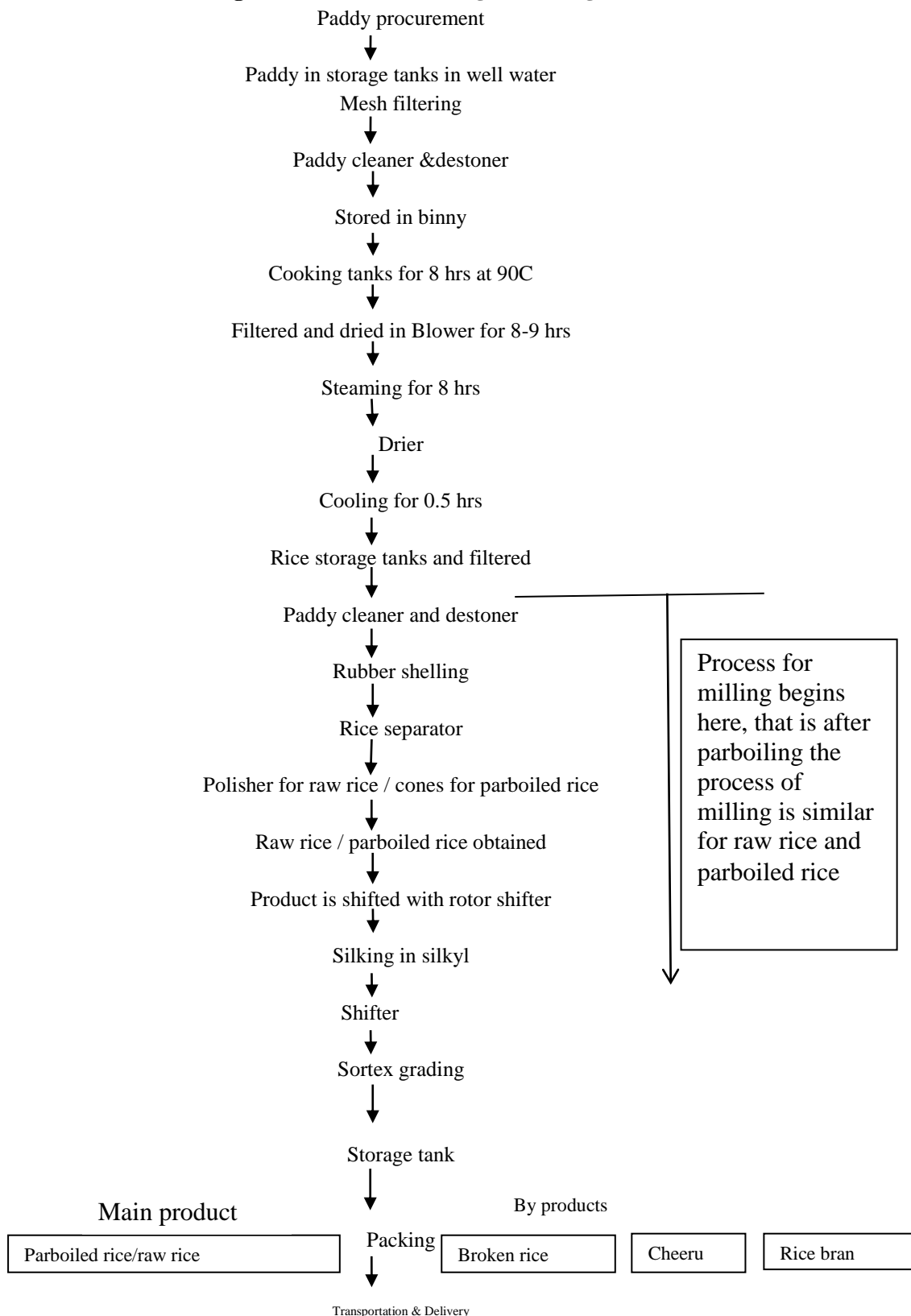
This includes AMC (Agricultural Marketing Committee), fellow farmers, local traders, commission agent, money lenders, millers and FCI. Paddy is sold to fellow farmer as he acquires less marketing cost in transportation and obtains immediate cash, while it is sold to money lender to pay off the credit obtained for the purpose of paddy production. Also local traders were identified who collected the produce from farmers of various villages during the time of harvest at farm gate itself. Farmers also approached the commission agents who obtained 2 per cent commission from farmers. Further it was identified that few farmers preferred to sell the produce directly at mills present nearby their village rather than distantly located AMC which increase the farmers marketing costs. Thus various intermediaries are involved in and ultimately contributed to the movement of the produce towards the mills meant for processing or value addition (parboiling and milling).

(c) Processing technique for parboiling and milling to make parboiled rice.

Paddy is processed to produce either parboiled rice or raw rice in the mills. However parboiled rice is produced only in parboiling mills whereas milling plant can provide to

produce only raw rice. That is parboiled rice mills provide for both parboiling and milling i.e. parboiled mills can produce both parboiled rice and raw rice. The sequence of steps in obtaining the parboiled and raw rice is presented schematically in figure 1.

Fig. 1: Process for Parboiling and milling



Value addition of Rice bran

The raw bran and boiled bran formed the raw materials for oil extraction plant and was processed to obtain crude rice bran oil.

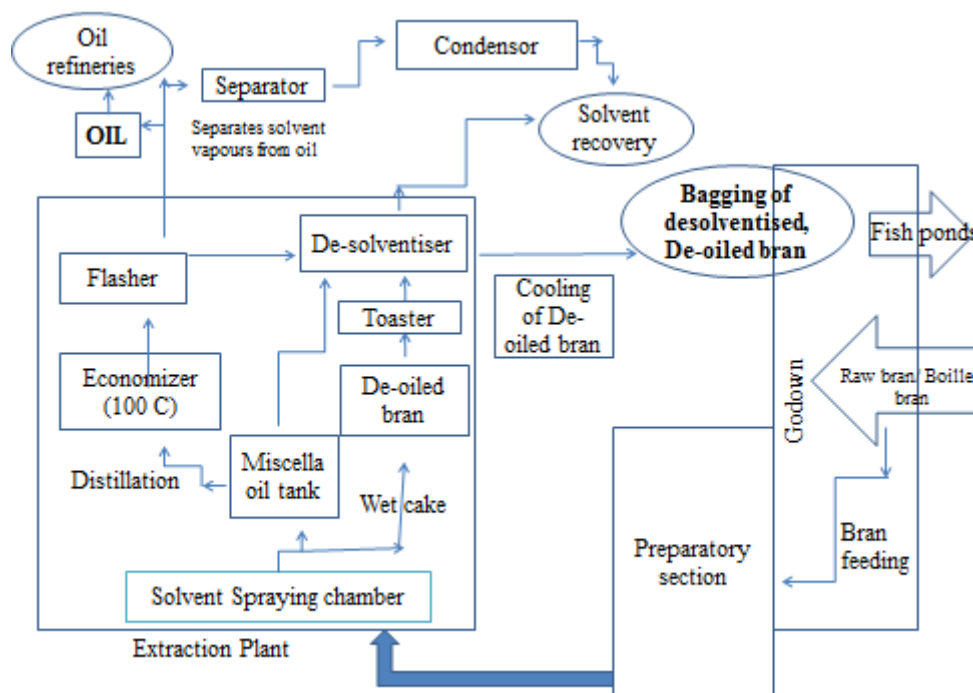


Fig. 2: Solvent Extraction process- Crude rice bran oil preparation

Oil extraction from rice bran is done by the solvent extraction plant. The solvent extraction process consists of treating the raw bran or boiled bran with hexane which is referred to as miscella. Oil is recovered on subjecting the miscella to distillation process. Evaporation and condensation from the distillation of miscella recovers the hexane absorbed in the material. The hexane thus recovered is reused for extraction. The rice bran oil obtained in this process is Crude rice bran oil which may be either subjected to refining process to obtain the edible rice bran oil or used in various other industries. The process of extraction is presented in figure 2

The rice bran oil obtained was moved to the oil refineries at Vishakhapatnam and Hyderabad through tankers where oil refining was done and packed and distributed for retailing to the consumers. The byproducts produced during oil extraction were de-oiled bran used for fish ponds and as ash (stuffing material) in brick industry.

(d) Marketing of the products and by products obtained through processing

Raw rice and parboiled rice being the main products of processing paddy, there are other byproducts obtained. Thus the obtained products traverse diversified ways. It was recorded that the millers were required to deliver 75 % of rice milled to state owned FCI or AP civil supplies and are free to market the rest of the produce, that is either to sell within country (Tamil Nadu, Kerala, Orissa, referred to C-form rice) or outer countries (Bangladesh, Dubai, Switzerland, South Africa etc., known as H-form rice) and within Andhra Pradesh. It was identified on an average that when millers sale 75 percent to FCI, 14 per cent was sold as H-form rice while only 8 per cent was sold as C-form rice and 2 percent was sold within Andhra Pradesh. While the byproducts obtained were marketed to poultry farms, fish ponds, oil extracting solvent plant, brick industry and flour mills.

The crude rice bran oil obtained from solvent extraction plant may be moved to oil refineries located around Vishakhapatnam, Vijayawada and Hyderabad where refined oil is packed and moved to consumers through retailers. In addition to refined rice bran oil. It

may even be sent to other industries such as cosmetics for varied uses. While the de-oiled bran is sent to fish farming ponds located in districts of Andhra Pradesh.

Mapping of value chain actors involved in the value chain of paddy

The movement of the produce from farmers to final consumers is associated with various actors. Value chain actors in paddy value chain of Nalgonda district tracked are: Input suppliers, producers, commission agents / traders, processors, FCI, wholesalers, retailers.

Input suppliers

Material inputs for the cultivation of paddy include seed, fertilizers, plant protection chemicals that are made available by wholesale input distributors, Primary Agricultural Co-operative Societies, private distributors, State Agricultural Department. It was observed that the farmers obtained foundation seed from KVK at Garidepally, Kampsagar and Bapatla. The high material input cost was seen in fertilizers followed by plant protection chemicals and seed. Although fertilizers were provided in state agricultural departments and PACS not all farmers could avail the subsidized fertilizers and had to obtain from private dealers in Miryalaguda and Huzurnagar. In Miryalaguda about 15 seed, 20 fertilizers and 25 pesticide dealers were present and in Huzurnagar 20 fertilizer and pesticide dealer were present. While few farmers although had availability of subsidized fertilizers at PACS. They could not avail it as they have to pay the remaining cash immediately, rather they preferred to purchase fertilizers along with pesticides from the input dealers who would supply fertilizer and pesticide for entire season on credit basis.

The major non material inputs were labour services (human and machinery services) required during the pre-production, production, harvest and post-harvest stages.

Credit services

Various banks and micro financing Institutions like PACS, SHGs were available in the rice growing regions and provided credit to rice growers. In addition to financial institutions few farmers secured loan from money lenders,

fellow farmers, commission agents too. Survey results showed that the 75.8 percent of the farmers availed credit facilities for crop loans and machinery loan from financial institutions while 24.2 percent of the sample respondents met their credit requirements from private money lenders, fellow farmers, input dealers and commission agents and the rate of interest paid by the farmers to non-institutional lenders was found to be 24 percent.

Intermediaries (Commission agents / fellow farmers / traders)

There are both licensed and unlicensed commission agents identified in the survey. Formal interview with the commission agents indicated that they don't buy the produce from the farmers but trade between miller and farmer and claim their commission charges. While other intermediaries like fellow farmers and traders buy and store the produce from the farmers and sell at a later period allowing for speculation of prices. While few intermediaries buy the produce immediately after harvesting of paddy at the farm gate itself. The reason why farmers sell at farm gate is due to lack of place for performing drying and also to avoid the risk of other operations such as transportation and marketing. The commission agents are interested to buy at farm gate as they want to buy at cheaper rate than MSP also which they did not want to reveal. It was noted during the survey that intermediaries involved not only for procurement of raw material to millers but also to distribute the value added products obtained through processing paddy. They delivered the value added products to wholesalers, retailers, consumers and byproducts obtained to concerned industries like oil extracting solvent plant, fish ponds, poultry farms and brick industry.

Wholesalers:

Wholesalers and importers purchase the parboiled and milled rice from the processors. Apart from actual purchase of the rice these wholesalers engage in bulk selling to the retailers and consumers.

Retailers:

These are shop retailers who are either licensed or non-licensed for retailing different products they are not specialized to sell rice only but used as a compliment to other grain products for customers. They purchase smaller quantity and it takes a longer time to finish selling. They usually purchase from wholesalers and millers.

Processors

Three kinds of processors have been identified during the survey namely, parboilers & millers, millers and oil extractors. The parboiling and milling plant owners were licensed for parboiling, milling and retail trade. The millers procure the raw material at a price not less than MSP either directly from farmers or through commission agents and at AMC. However the licensed millers purchase the raw material at AMC while the price at AMC is fixed by closed tender. Miller, who is the owner of milling machine, have double participation in rice trading, firstly they have involved in milling the paddy rice, secondly, they retail the milled rice to Andhra Pradesh State Civil Supplies Corporation Limited (APSCSCL) through FCI agent, consumers, wholesaler and distributors.

Food Corporation of India (FCI)

FCI is the nodal central agency of government of India and state government agencies undertake procurement of paddy under price support scheme and rice under statutory levy scheme. To facilitate procurement of food grains, FCI and various state agencies in consultation with the state government open a large number of temporary purchase centers at various mandis and key points. Apart from the direct procurement, FCI takes over food grains from state agencies for central pool in case of non De Centralised Procurement (DCP) states. Whereas in DCP states only surplus stocks after fulfilling the state's own Targeted Public Distribution System (TPDS/OWS) requirements are taken over by FCI. Rice is also received through statutory levy system that is whatever rice is milled out of paddy purchased by rice millers; a specific percentage of levy is enforced based on the

respective state levy control order. (Annual report of FCI 2012-13)

With regard to FCI procurement in Andhra Pradesh DCP system was followed from Kharif Marketing Season (KMS) 2012-13. The AP State Civil Supplies Corporation Ltd. shall receive raw rice under mill levy under Decentralised procurement during the KMS 2012-13 in the allotted districts of Karimnagar, Warangal, Nalgonda, Guntur, Prakasam, Nellore and Chittoor. The rice mill levy is 75% and the levy free eligibility is 25%. In respect of boiled rice, it may be utilized anywhere in the country since there is no demand within the State. In respect of raw rice, it may be utilized in 1:1 ratio between sale within the State and outside the State.

Value added products tracked along the value chain in Nalgonda**Paddy**

After the harvesting of paddy, the produce is dried and marketed to various stake holders after bagging. After the post-harvest operations such as drying, bagging the produce, paddy is ready for marketing. The survey results showed an average production of 5838 kg ha⁻¹. The paddy produced was met to serve the need of family consumption, gifts and kind wages and the marketed surplus is sold to the millers. However in few villages some of the farmers produced the paddy crop for seed production and sold within the village for fellow farmers. Apart from the main product Paddy the byproduct paddy straw (2 trucks/ha) was mainly used as a fodder material for the cattle. It is seen from the map presented in figure 3 that paddy from various stakeholders has to go through miller.

Parboiled rice and raw rice

The produce once after moving to mills, paddy is processed to either obtain the raw rice or parboiled rice. For this mills are of two kinds where milling units can only produce raw rice by performing milling process. While the parboiled rice mills provide for both parboiling and then milling i.e. parboiled mills can produce both parboiled rice and raw rice. The sequence of steps in obtaining the parboiled and raw rice has already been presented in

Figure 1. Thus raw rice and parboiled rice being the main products of processing paddy, there are other byproducts obtained. The recovery rate of main product, by product and their percentages are presented in Table 1 where it is projected that for every one ton of paddy undergoing parboiling and milling 69.7 (697kg) percent of par boiled or raw rice is obtained. While the broken grain obtained

varied from 6-7% around (66 kg) and rice bran constituting 5-7% (68kg) of one ton of paddy milled while the husk obtained constituted the major byproduct varying from 15-20% (150 kg) of one ton milled paddy. Also cheeru or param which forms the feed for fish ponds and poultry farms was found to constitute 1-2 % of paddy being milled.

Table 1 Products and by-products of processing paddy

S.No.	Main product/By product	Percentage	Average quantity obtained per ton of paddy milled (in kg)	Further tracked movement
1.	Parboiled rice/ raw rice	69.7%	697	FCI, consumers, wholesalers, retailers, importers.
2.	Broken grain	6-7%	66	Importers, flour mills.
3.	Rice bran	6-7%	68	Solvent plant to extract rice bran oil
4.	Cheeru/param	1-2%	15	Fish ponds and poultry farms
5.	Husk	15-20%	153	Reused by parboiling mills for steaming

Thus the obtained products traverse diversified ways. It was recorded that the millers were required to deliver 75 % of rice milled to state owned FCI or APSCSCL. The parboiled rice and raw rice were categorized as C-form and H-form. C-form rice is the rice exported outside the state. While the H-form rice is the rice exported to other countries (Dubai, Switzerland, South Africa). It was recorded in the survey from millers that broken H-form and C-form had much demand abroad. It was identified on an average that when millers sale 75 percent to FCI, 14 per cent was sold as H-form rice while only 8 per cent was sold as C-form rice and 2 percent was sold within Andhra Pradesh.

Byproducts

The various byproducts obtained on milling of paddy were: Raw bran, boiled bran, husk, broken grains, param or cheeru. And the raw bran or boiled ban is processed to obtain the crude rice bran oil and de-oiled bran. The burnt husk which is used to boil water for steaming was sold as ash to the brick industry, while de-oiled bran to the fish farm ponds.

Conceptual value chain network of Paddy in Nalgonda district

Having known the core processes, chain actors and value added products tracked in the sample area of Nalgonda district, a conceptual value chain network of paddy in Nalgonda district has been attempted which is presented in figure 3.

The value chain of paddy is conceptualized according core processes involved. Namely, production of paddy, primary movement of paddy, processing of paddy, secondary movement of main products and by products obtained through processing and ultimate consumers.

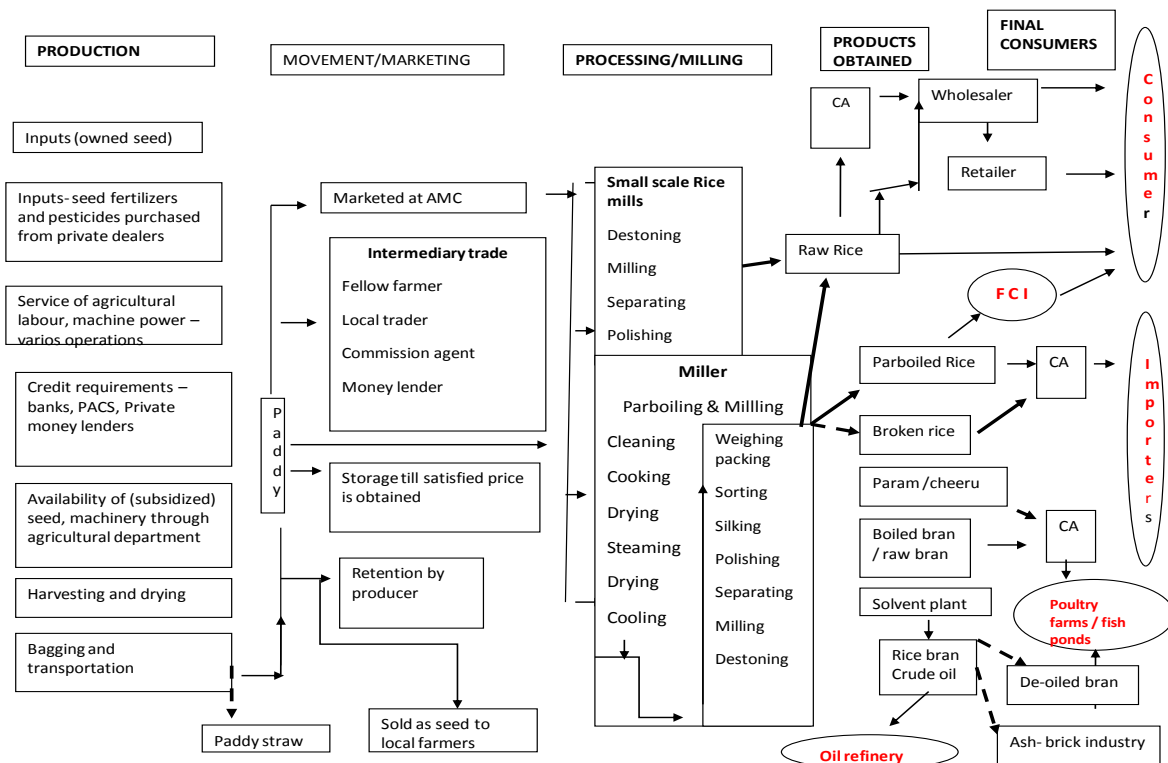
At the extreme left of the network, the production of paddy is presented which includes various actors involved in the production of paddy and activities has been presented from obtaining seed, nursery preparation, transplanting, purchase of fertilizers and plant protection chemicals and services of institutional agencies like PACS, banks, and State Agricultural departments. And non-institutional agencies like private money lenders. Further, operations like

harvesting threshing drying bagging and transport of paddy is done, which is then moved to next level referred to primary movement or primary marketing of paddy. The byproduct, paddy straw is used as feed to the cattle.

The primary movement of paddy from farmer is depicted to the immediate right of production stage. The paddy produced by farmer travels through different channels

resulting in various sub-chains. The paddy may travel through commission agents at AMC, sold to fellow farmers, money lenders, commission agents or traders. The produce may even be stored by the farmer producer and sold at a satisfied price. Apart from selling the paddy, the farmers retain certain quantity for household consumption. It was also identified that few farmers sold the produce as seed to fellow farmers in the village.

Fig. 3: Mapping of core processes, actors and product flows involved in paddy value chain



Thus it can be seen from the network that in spite of the diversified movement of produce to various actors, paddy has to either move to parboiling and milling plant or only milling plant for further movement towards consumers. The parboiling and milling can be seen under the processing head in the value chain network.

Thus the main products and by-products obtained are shown to the right of the processing head, under the head of by-products obtained. The main products obtained are raw rice and parboiled rice. While the by-products obtained are, broken grains, cheeru or param and raw or boiled bran.

Next to the products obtained, the movement of these products is shown as secondary movement towards various end users through various actors. It could be seen from the figure that both raw rice and parboiled rice was procured by FCI and delivered to consumers through fair price shops by depicting the public distribution system. However only raw rice was distributed within Andhra Pradesh while parboiled was moved to Tamil Nadu by FCI agency for public distribution. The raw rice was also transported to consumers through commission agents, wholesalers and retailers. This movement refers to the chain within Andhra

Pradesh. It was known from the survey that parboiled and raw rice was exported to other countries through commission agents. However further movement after export could not be tracked.

With regard to movement of by products, broken grains were exported to flour mills, other states and countries. While cheeru or param was marketed to poultry farms being used as feed. Raw or boiled bran formed the raw material for solvent extraction plant where crude rice bran oil was obtained with de-oiled bran and ash as by product. The crude rice bran oil was moved to oil refineries for refined edible oil or other industries such as cosmetics situated around Hyderabad, Vishakhapatnam and Vijayawada. The de-oiled bran is marketed to fish ponds in the coastal districts of Andhra Pradesh. Similar value chain map showing product flows and main actors involved in the rice value chain were presented by Emongóret *al.*

CONCLUSION

The paddy value chain is complex and diversified. The involvement of various actors and flow of diversified products produced through processing made the value chain a complex diversified network. The products captured in the value chain are raw rice, parboiled rice, rice bran, broken grains, cheeru or param, crude rice bran oil, de-oiled rice bran. As the value of paddy is complex and diversified in the study area still opportunities exist for other value added products like rice flakes and other sophisticated foods. Related food processing industries can be set up in the study area. This provides employment potential in the study area and increases farmer's remuneration. By bringing

commodity interest group and farmer interest group together, identify the hindrances faced by the farmers and thereby help to contribute better value addition in paddy. It was identified that along with the export of rice to other countries, broken grain was also exported which was to be used in the preparation of confectionaries. Thus there is every need to promote rice processing industries which has great potential to obtain diversified value added products. Thus encourage research in food processing sector to produce innovative ready to eat value added products and export the value added products rather than exporting the raw material. Thus increasing the employment, and encouraging the farmers to produce more.

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