

A Study on Rice Processing Operations at Sri Navadurga Industries, Sacheripet

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Abstract— This paper focuses on the rice processing operations followed at Sri Navadurga Industries, Sacheripet, with special reference to the production process, machinery functioning, by-products, and waste management practices. The study was conducted to understand the systematic flow of rice production from paddy procurement to the packaging of finished rice. It also examines the roles and functions of various machines used at different stages, such as cleaning, soaking, boiling, drying, milling, and packaging. Proper functioning of machinery plays an important role in improving production efficiency, minimising grain breakage, and maintaining product quality. The study further highlights the by-products generated during the rice milling process, including husk, bran, and broken rice, and analyses their utilisation for economic and operational benefits. In addition, the waste management techniques adopted by the industry are examined to understand how the organisation minimises waste and maintains environmental sustainability. The findings reveal that effective operational practices, proper machinery utilisation, and efficient waste management contribute significantly towards productivity, quality enhancement, and sustainable rice processing operations at Sri Navadurga Industries.

Index Terms— Rice Processing, Rice Milling, Production Operations, Machinery Functioning, By-Products, Waste Management, Paddy Processing, Operational Efficiency, Rice Industry, Sustainable Practices.

I. INTRODUCTION

The rice milling industry plays a major role in the agricultural and food processing sector of India. Rice is one of the staple foods consumed by a large portion of the population, and therefore efficient rice production and processing are essential for food security and economic development. Rice mills convert raw paddy into consumable rice through different stages such as cleaning, de-husking,

polishing, grading, and packaging. The effectiveness of these operations directly influences the quality of rice, production cost, and profitability of the industry. In the present competitive business environment, operational efficiency has become very important for rice mills. Operational efficiency refers to the proper utilization of machines, labour, time, raw materials, and energy to achieve maximum output with minimum wastage and cost. Process optimisation focuses on improving the overall production process by reducing delays, minimizing losses, improving machine performance, and maintaining product quality. Efficient operations also help industries improve productivity, reduce energy consumption, and enhance customer satisfaction.

Sri Navadurga Industries, located at Sacheripet, is engaged in rice milling and related processing activities. The industry undertakes various operations involved in converting paddy into finished rice products. Like many rice industries, the company faces challenges related to machine efficiency, production management, energy utilization, wastage control, and maintaining quality standards. Therefore, studying the operational efficiency and process optimisation practices of the company becomes important to identify areas of improvement and suggest suitable measures.

II. COMPANY PROFILE

Sri Navadurga Industry started in 1972. The late Sri B. Venkatesh Kamath started Sri Navadurga Industry. This rice milling industry engaged in the processing and production of rice. The company undertakes activities such as procurement of paddy, cleaning, drying, milling, polishing, grading, packaging, and distribution of rice products. The organisation operates intending to produce quality rice products while

maintaining efficiency in operations and customer satisfaction.

The company has established itself as a recognised rice processing unit in the region through consistent production and operational activities. It uses machinery and semi-automatic systems for different stages of rice processing. The organisation also focuses on maintaining quality standards and the timely supply of products to the market. This company has received ISO 90001- 2015 certification for its high- quality products. The industry's skilled workforce is well versed in the various processes in the production of rice. There is a total of 45 employees who are educated, trained and have well experience in technology in the industry. The types of rice produced here are,

- BVK Kaje

Kaje rice is key offering of Sri Navadurga Industry, known as red rice. The BVK brand has gained a reputation in the Dakshina Kannada and Udupi districts. Premium quality paddy is sourced from regions such as Madikeri, Chikkamagaluru, Hangal and other areas. Kaje rice is sold in package sizes of 5kg, 10kg, 25kg and 50kg.

- BVK Gidda

Gidda rice is another high- quality product offered by Sri Navadurga Industries. In Dakshina Kannada and Udupi districts, Gidda rice is often called as white boiled rice. The raw paddy used is sourced from Hallyala and Madhya Pradesh. Gidda rice is sold in packages of 5kg, 10 kg, 25kg, and 50kg bags.

A. Objectives Of the Study

- To study the rice production process and the functioning of machinery at Sri Navadurga Industries, Sacheripet.
- To study the by-products generated and waste management techniques followed at Sri Navadurga Industries, Sacheripet.

B. Need For the Study

The rice processing plays an important role in the agricultural and food processing sectors by converting raw paddy into consumable rice. Proper rice processing operations are important for maintaining product quality, reducing wastage, and improving productivity. The proper functioning of machinery at different stages of production influences the efficiency

of rice milling and the quality of the final product. It is important to understand the operational practices followed in rice processing industries.

The present study on Sri Navadurga Industries is undertaken to understand the rice production process, the functioning of machinery, the utilisation of by-products, and the waste management practices followed in the industry. The study helps in identifying how systematic operations and proper resource utilisation contribute to operational efficiency and sustainable production practices in the rice milling sector.

III. REVIEW OF LITERATURE

- Achebe, C. N., Nwanya, S. C., & Enibe, S. O. (2024)

The study conducted by Achebe, Nwanya, and Enibe (2024) focused on enhancing process capacity in small-scale rice processing factories. The results indicate that machine downtime and poor operational control reduced rice processing efficiency. The study also suggested preventive maintenance and workforce training to improve machinery performance and operational efficiency.

- Rizieq, R., Purwanto, A., & Purwanto, A. (2025). The study conducted by Rizieq and Purwanto (2025) focused on improving rice production efficiency through optimized allocation of agricultural machinery in Indonesia. The study found that proper machinery allocation improves operational efficiency, reduces production costs, and increases productivity in rice processing operations.

IV. RESEARCH METHODOLOGY

The study is based on both primary and secondary data. Primary data was collected through direct observation, discussions with the managing partner. Secondary data was collected from company website.

V. PRODUCTION PROCESS AND FUNCTIONING OF THE MACHINERY OF RICE AT SRI NAVADURGA INDUSTRIES.

The process of rice milling in Sri Navadurga Industries involves several activities, including collecting of raw materials from local markets as well as farmers. The procurement mainly involves procuring paddy from

local villages, local markets, as well as direct procurement from local farmers. During the harvest seasons, procurement takes place as the quantity of paddy is high in the market or with local farmers. Farmers sell their products to the Sri Navadurga Industries. While selling, the quality of the products is measured, including their moisture content, size, and cleanliness of the grains. Fair prices are given to the local farmers as compared to the market price of the products, as procurement is a key factor for maintaining the flow of raw materials to the rice mills for continuous production. After the procurement, the products are sent to the Sri Navadurga Industries for further processing. It also helps in minimizing cost and increasing profitability.

Procurement of paddy → weighbridge → unloading → cleaning → soaking (90°C) → boiling → drying → milling → packaging → storage & distribution

VI. FIRST DAY

The first day at Sri Navadurga Industries focuses on the acquisition and initial processing of raw paddy. Proper handling during this stage ensures accurate quantity measurement, impurity removal, and smooth production flow, forming the foundation for efficient rice processing.

A. Weighbridge – Paddy Procurement

The weighbridge is the first stage of production where the quantity of raw paddy received is accurately measured. Vehicles are weighed before and after unloading to calculate the net weight of paddy. This process ensures transparency, proper inventory management, accurate billing, and systematic procurement control.

B. Unloading

After weighing, the paddy is unloaded manually or through conveyors. Proper unloading prevents grain damage and reduces wastage. The paddy is then transferred to storage or cleaning sections, ensuring a smooth production flow and efficient material handling.

C. Cleaning

Cleaning removes impurities such as dust, stones, straw, and chaff from the paddy using sieves and blowers. This process improves rice quality, prevents machine damage, reduces grain breakage, and ensures efficient processing in later stages.

Second Day

The second day involves preparing the paddy for further processing through controlled soaking. This stage improves grain strength, minimizes breakage during milling, and enhances the overall quality of rice.

D. Soaking

Cleaned paddy is soaked in hot water at around 90°C to soften the grains and improve moisture absorption. Proper soaking helps easy husk removal, reduces grain breakage during milling, and improves the texture and quality of rice.

Third Day

The third day focuses on strengthening the grains and reducing moisture through boiling and drying. These stages are essential for improving milling efficiency, shelf life, and rice quality.

E. Boiling

Boiling is carried out after soaking to strengthen rice grains and transfer nutrients from the husk to the grain. It reduces breakage during milling, improves grain color and texture, and increases the yield of head rice. Temperature and time are carefully controlled to maintain quality.

F. Drying

Drying removes excess moisture from boiled paddy using sun drying or mechanical dryers. Proper drying prevents fungal growth, avoids grain cracking, and ensures safe storage. It also improves milling performance, aroma, texture, and shelf life of rice.

Fourth Day

The fourth day involves converting processed paddy into market-ready rice through milling and packaging. This stage determines the commercial value and customer acceptance of the final product.

G. Milling

Milling converts dried paddy into edible rice by removing the husk and bran layers. Proper milling improves rice appearance, increases market value, and reduces broken grains. By-products such as husk and bran are utilized as cattle feed or fuel.

H. Packaging

Packaging is the final stage of production where rice is packed in standard-sized bags such as 10 kg, 25 kg,

and 50 kg. Proper packaging protects rice from moisture and contamination, improves shelf life, supports branding, and ensures safe transportation and storage.

VII. FUNCTIONING OF THE MACHINERY

A. Electronic Weighbridge:

Sri Navadurga Industries uses a 30-ton electronic weighbridge for accurate weighing of raw paddy and finished rice. It helps in precise inventory recording, billing, and payment processing while reducing manual errors.

B. Conveyor Machine:

The conveyor machine is used for unloading and transferring paddy from vehicles to storage or processing areas. It enables smooth handling of paddy and supports continuous movement of raw materials into the production line.

C. Cleaner Machine:

The cleaner machine supplied by Fowler Westrup India Pvt. Ltd. has a capacity of 20 tonnes per hour. It removes impurities and ensures controlled and uniform flow of paddy during cleaning and processing operations.

D. Boiler Machine:

The boiler manufactured by Veasons Energy Systems Pvt. Ltd. has a capacity of 3 tonnes per hour. It supplies steam required for boiling and drying operations while maintaining controlled temperature and pressure.

E. Drier Machine:

Sri Navadurga Industries uses an automatic paddy drier supplied by Micron Engineering with a capacity of 25 tonnes. It helps maintain the required moisture content and ensures uniform drying of paddy batches.

F. De-stoner and Paddy Separator Machine:

Imported from Satake International, Japan, these machines operate at 5 tonnes per hour. They remove stones, impurities, and unprocessed paddy through an automated separation process.

G. Rubber Sheller Machine:

The rubber sheller and polishers from Milltech Machinery Pvt. Ltd. operate at 3 tonnes per hour. They

are used for de-husking and polishing paddy in controlled batches to maintain uniform processing.

H. Rice Sorter Machine:

The rice sorter machine imported from Bühler Sortex Ltd., United Kingdom, has a capacity of 3 tonnes per hour. It uses optical technology to separate defective grains and impurities based on color, shape, and size.

I. Packing Machine:

The automatic packing machine manufactured by Sri L. Automation, Bangalore, packs rice in 5 kg, 10 kg, 15 kg, and 25 kg bags. It operates at 10 tonnes per hour and ensures accurate and uniform packaging through automatic weighing facilities.

VIII. BY- PRODUCTS GENERATED AND THE WASTE MANAGEMENT PRACTICES FOLLOWED IN SRI NAVADURGA INDUSTRIES

The by-products generated at Sri Navadurga Rice Industries reflect the effective utilization of raw materials and the industry's commitment towards sustainability. By-products such as immature paddy, immature rice, black rice, and rice bran are not treated as waste but are utilized for various commercial and agricultural purposes. Immature paddy separated during cleaning and grading is used as cattle and poultry feed, helping reduce wastage and improve resource utilization.

Immature rice generated during de-husking and polishing is further utilized in the production of rice flour, brewing, and industrial food processing. This helps the industry achieve optimum utilization of raw paddy and minimize production losses. Black rice, obtained in smaller quantities, possesses high nutritional and antioxidant value due to the presence of anthocyanins. Its separation and proper cleaning increase its market value and contribute additional revenue to the industry.

Rice bran is one of the most economically valuable by-products obtained during polishing. It is supplied to oil mills for the extraction of rice bran oil, which is widely used for cooking and health purposes. The remaining rice bran cake is used as cattle and poultry feed, thereby supporting allied industries and ensuring zero wastage.

The waste management practices followed at Sri Navadurga Rice Industries demonstrate

environmentally sustainable operations. The Effluent Treatment Plant (ETP) effectively treats wastewater generated during cleaning and maintenance activities through physical, chemical, and biological processes. The treated water is reused for gardening, floor cleaning, and other non-potable purposes, helping conserve freshwater resources and reduce environmental pollution.

Similarly, ash generated from burning rice husk in boilers and dryers is properly collected and supplied to farmers for improving soil fertility. This eco-friendly practice reduces land pollution and promotes sustainable agricultural use. Overall, the industry efficiently manages by-products and waste materials, converting them into valuable resources while maintaining environmental responsibility, operational efficiency, and sustainability.

IX. DISCUSSION

The study highlights that Sri Navadurga Industries follows a well-organized rice production process supported by modern machinery and technology. Machines such as the electronic weighbridge, cleaner, boiler, drier, de-stoner, sheller, sorter, and automatic packing machine help in smooth and efficient processing of paddy at different stages. The use of these machines reduces manual errors, improves speed and accuracy, maintains uniform quality, and increases overall operational efficiency.

The study also shows that the industry effectively manages the by-products generated during rice processing. By-products such as rice husk, bran, broken rice, and rice dust are properly utilized for commercial and operational purposes. Rice husk is mainly used as boiler fuel, which helps in reducing fuel costs and supports energy efficiency. Proper waste management and utilization practices adopted by the industry help in minimizing wastage, controlling pollution, and promoting sustainable rice processing operations.

X. FINDINGS OF THE STUDY

- The study found that Sri Navadurga Industries has a proper and systematic process for the purchase of paddy and production of rice.
- The study found that during the milling of rice, by-products are generated, such as rice husk, rice bran,

broken rice and ash, which will be sold to the farmers and the market.

- The study found that controlling moisture in paddy is beneficial in efficient milling and minimizing broken rice where it is controlled by drying it to a safe level of about 12% to 14% moisture content.
- The study found that the Shri Navadurga Industries supply their rice to the HKS agency in Mangalore, which distributes the rice to Udupi, Dakshina Kannada and some parts of Bengaluru.
- The study found that BVK rice has a strong and distinct brand identity.

XI. SUGGESTIONS

- The industry can adopt AI- based monitoring systems in the long term for increased productivity
- The industry can adopt energy efficient practices like using rice husk as fuel and hybrid energy systems.
- The industry can focus on expanding distribution channels to reach more markets and increase sales.
- The industry can take part in promotional activities like Krishi Siri Mela and other agricultural exhibitions to increase outreach.

XII. CONCLUSION

The study concludes that Sri Navadurga Industries follows an efficient and well-managed rice production process with the support of modern machinery and advanced processing methods. Machines such as cleaners, driers, boilers, shellers, sorters, and packing machines help the industry carry out operations smoothly by improving accuracy, reducing manual work, maintaining quality standards, and increasing productivity.

The study also found that the industry makes effective use of by-products like rice husk, bran, and broken rice instead of treating them as waste. Rice husk is reused as boiler fuel, which helps in reducing operational costs and supports eco-friendly practices. Proper waste management and systematic utilization of resources help the industry minimize wastage and maintain a cleaner production environment.

Overall, Sri Navadurga Industries has been successful in maintaining quality rice production through efficient machinery, proper process management, and sustainable operational practices.

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