

Continuous Growth and Innovative Measures at JK Paper for Sustainability

P.K. Suri, Mayank Jindal, D.K. Tripathy, Arun Kumar Agarwal

JK Paper Mills, P.O. Jaykaypur – 765017, Dist. Rayagada (Orissa), India

Abstract: JKPM is manufacturing its quality paper by advance manufacturing technology in a sustainable manner. To be competitive in the global race, it is imperative to focus on innovation which is a key tool to move forward. Implementation of breakthrough idea, latest manufacturing process, continuous improvement through raw material management & yield improvement, energy efficiency improvement & low cost automation are the key approaches to make the industry for sustainable growth & competitive. In addition to the above high importance was given for mitigation of smell by installing methanol plant & improvement in customer satisfaction by changing the packing styles is the highlights of the paper.

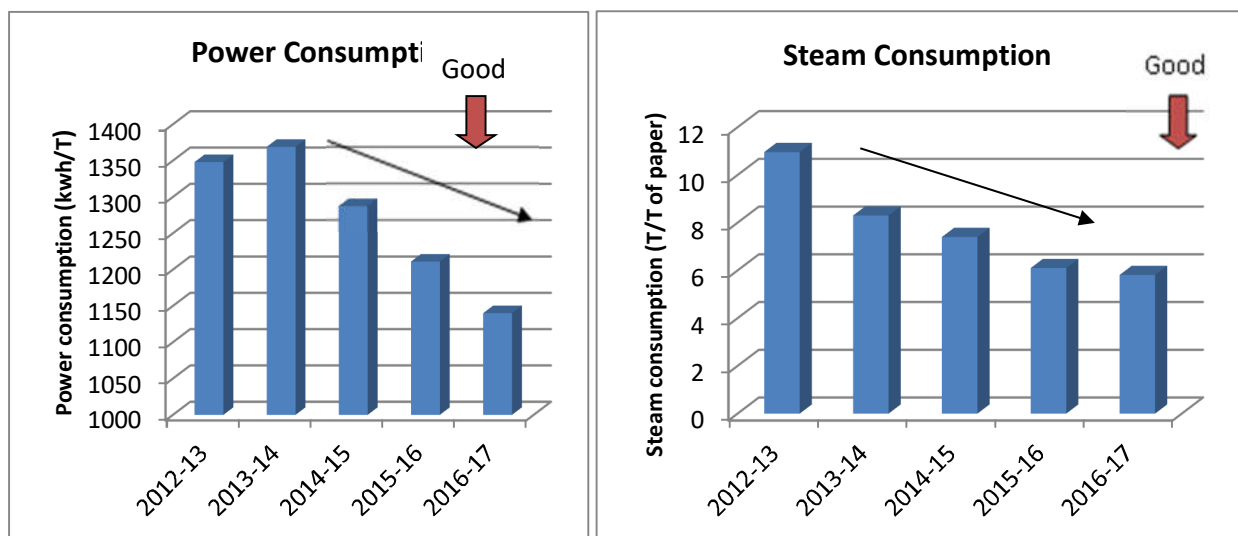
Key words: Continuous Growth, Pulp and Paper Industry, Innovative Measures, JK Paper

1. Introduction

Amongst the emerging markets, India is topping the list with average 7.1% GDP growth in 2016. The development pattern of India in the last two decades also shows an average growth of above 7%.^{1,2} Due to growth in literacy, change in lifestyle and increasing consciousness for personal hygiene, per capita consumption of paper in India is increasing day by day. Per capita paper consumption in India is about 13 kg which is far below the global average of 57 kg, this show a huge growth opportunities for the Indian paper industries with a projected demand for paper is 20 Million ton by 2020 and 24 Million ton by 2025.³

Sustainable production despites high input cost, stringent environmental norms are the key challenges which the industry has to overcome by continuous efficiency improvement through raw material management, energy efficient & man power productivity improvement.

J K Paper leads this motto in the country and installed Rs 18.5 Billion project at its parental unit in Rayagada, Odisha. This expansion featured a complete switch over from decades old technologies to latest state of the art installation right from wood handling till product dispatch. The graphical representation of key benefits derived from 2013 expansion project and continuous improvements are shown below:



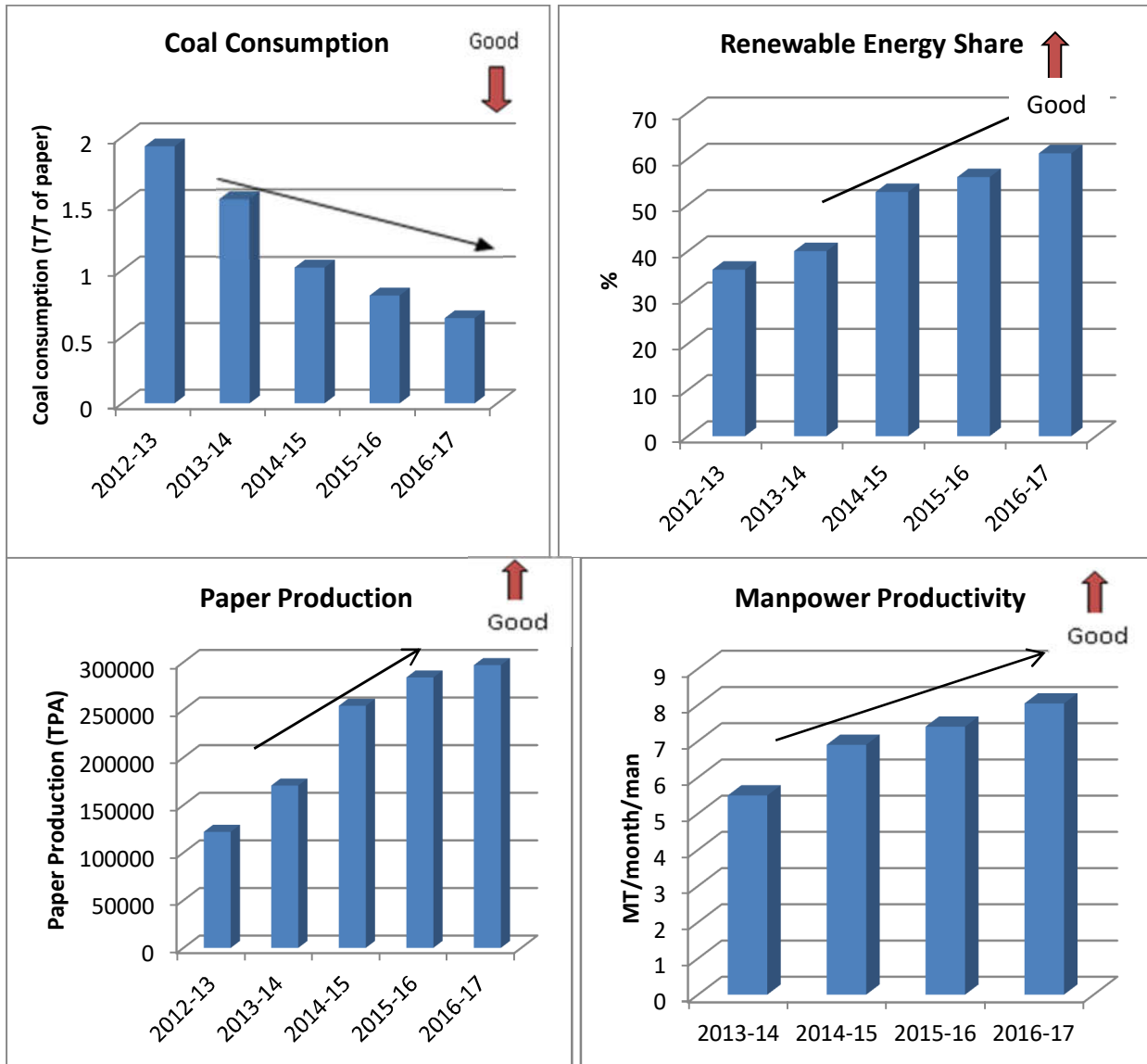


Fig. 1. Benefits derived from expansion project and by continuous improvement

Advanced technology selection and switching over from less efficient facility has helped in gaining a quantum jump in production as well as overall performance of 4M.

Simultaneously Continuous improvement through Encouraging excellence and relevance of scientific research, strengthening the raw material management, Breakthrough idea & its implementation, man power productivity improvement & environmental friendliness are the key area which enables the sustainable growth. The details for the same will be covered in the paper.

A. Encouraging Excellence and Relevance of Scientific Research:

Various in-house completions on breakthrough idea, and focus on the latest research work & its execution are helping the industry to manufacture its product in an environmental friendly & cost-effective manner simultaneously improving the customer satisfaction.

B. Continuous Improvement:

i) Raw Material Management & Yield Improvement:

In a regular basis, high importance was given to local procurement which has increased to 70% in the year 2017 -18 which not only reduce the logistic cost but also improve the pulp quality. Further, as the raw material were fresh having a good moisture content which have an impact on reducing the dust generation while chipping & benefits in subsequent pulping operation.

Optimization of cooking conditions, chips with good moisture content helps to improve the pulping conditions. Further reducing the digester temperature from 167°C to 157°C improved the pulp quality & pulp yield by preventing the cellulose degradation (Fig: 2 &3)

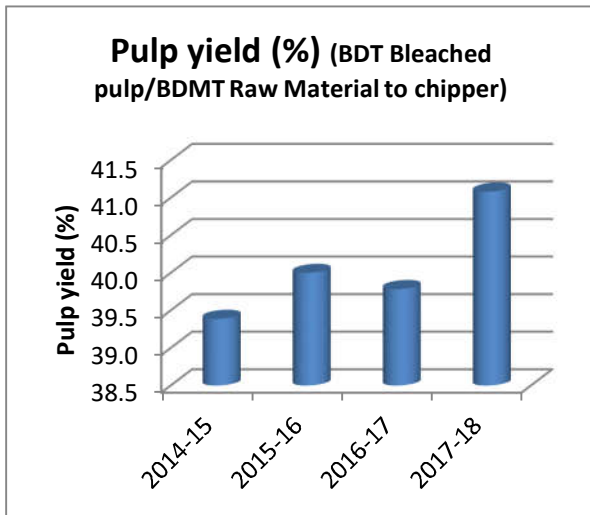


Fig. 2. Pulp yield

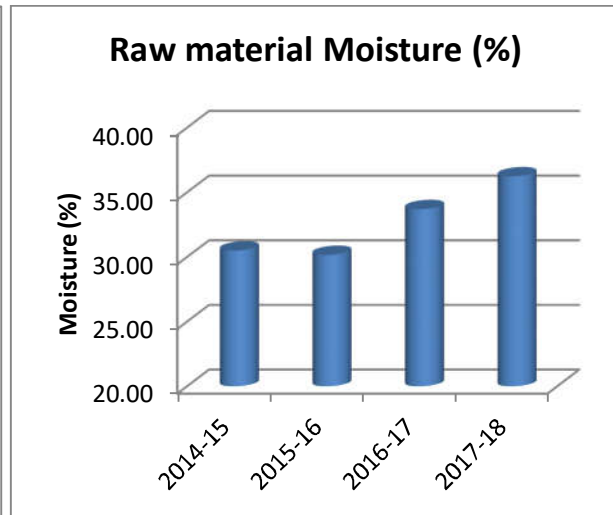


Fig. 3. Raw Material Moisture

In addition to the above based on facts & idea to improve the pulp yield the screen reject which was thrown outside was evaluated to find out the feasibility of utilization. Experiments were conducted at nearby R&D center PAPRI. Under similar condition of pulping the result reflect a good pulp yield (Unbleached) approximate to 60 %. Also, the pulp quality was good. To improve upon pulp yield by recycling the waste it was decided to feed with the chips.



Fig. 4. Fine screen rejects



Fig. 5. Knotter rejects

Also, the left over small pieces from the stacks are also being collected and fed to chipper along with wood a log which helps to contribute for overall yield improvement.



Fig. 6. Left Over Pieces from Stacks.

Combinations of all above practices maximize the conversion by improving the pulp yield from 39.1 % to 41 % BDT bleached pulp/BDMT Raw material fed to chipper).

C. Energy Efficiency Improvement

i. Installation of Micro Turbine

Continuous improvement in achieving high energy efficiency is a regular practice at JKPM Further, as the pulp mill is operating at 105% of the design capacity rendering high steam generation in the recovery boiler. Due to limitation in turbine extraction, surplus steam is passed through PRDS and used in process directly without giving power generation advantage; hence we are going to install a micro turbine to tap this energy. This Micro turbine will be resulting in coal saving equivalent to 2.4 MW energy.

ii) SCAPH (Steam Coil Air Preheater) replacement in recovery boiler

Primary air system and secondary air system in the recovery boiler equipped with individual SCAPH (Steam Coil Air Pre-Heater). Both primary air heater and secondary air heater utilize auxiliary LP steam and MP steam. Additional one Heat Exchanger coil installed in each of Primary and Secondary SCAPH to raise air temperature after Air Pre-heater from 135°C to 160°C. Hence, combustion and LF boiler efficiency have been improved and resulted in fuel saving (Coal) significantly (table 1).

Table 1. SCAPH installation in Recovery boiler benefits

Power generated out of additional HP steam, KWH	41
Eq. Net HP steam Kgs/ Hr	156
Eq. Net Coal savings kgs/ hr	35

iii) Centralized Refining for Paper Machines

Refining of pulp stock is one of the major power consuming processes in a paper mill, so keeping this thing in mind we have gone for centralized refining for the different paper machines. Energy efficient refiners (640 KW) of 2 nos were installed which replace 6 nos of small refiner (350 - 400 KW) along with 2 nos of stock pump & 2 nos of agitator. This had an impact on reduction of refining energy & improving manpower productivity. The details are highlighted in table-2.

Table 2. Centralized refining benefits

Refiners/Machines	PM3		PM4		PM5		TOTAL	Centralized refining	Savings
	DDR28	TDR24	TDR 24	TDR 24	TDR 24	TDR 24			
Type of Refiner								TDR	
Installed Power, KW	400	350	350	350	350	350	2150	1280	870
Running Load, KW	365	329	246	265	256	237	1698	1100	598
No Load, KW	190	120	130	140	140	140	860	210	650

D. Mitigation of Smell: Methanol recovery from SOG and NCG

Paper manufacturing industry generates huge quantity of waste in the form of solids, liquids and gas. All the three form of waste has a great environmental impact. To make the industry sustainable & competitive it is essential for the manufacturing industry to reduce, recycle and reuse the different form of waste.

Stripper off gasses (SOG) and concentrated non-condensable gasses (CNCG) are generated as a part of process in evaporator and fiber line, at the present condition SOG from Evaporator is fired in Lime Kiln, whereas CNCG from Evaporator and Fiber line is vented to atmosphere. These gases mainly contain methanol vapors, TRS etc. which can be collected and converted to methanol. The generated methanol can be used as a fuel in lime kiln.

JKPM will be the first integrated paper mill in the country to install methanol recovery unit for a complete smell free plant and this will be operational by April 2018.

E. Improvisation in Packing Quality and Style

To improve customer satisfaction packing quality as well as styles were modified. Shrink wrapping film was used for ream packing by replacing the corrugated box for approximate to 2500 t/month of paper. Changing the packing style improve customer satisfaction and also helps in packing cost reduction.



Fig.7. Shrink Wrapping

F. Low Cost Automation

Various areas have been identified in the plant to implement low cost automation solutions to improve the manpower productivity. Starch handling systems, Lime handling system are some of the area where these low cost automation solutions have been implemented.

For example, by automation and mechanization of starch preparation and handling system, handling (which includes loading, unloading and feeding) of 50 Kg starch bags were replaced with 1 MT bags and manpower productivity improved from 600 Kg/man/day to 2100 Kg/man/day.

6. Conclusions

Sustainable production by improving energy efficiency & environmental friendliness are the key factors which makes JKPM globally competitive.

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