

Converting Opportunities into Economic Benefits

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Abstract: We have partnered with a number of paper manufacturers of varied size with turnover ranging from 200 crores to 5000 crores, on their improvement journey. From various engagements, we found that there exist some typical improvement opportunities at each stage of value chain of paper manufacturing, which fall in to the category of 'high return with low to medium efforts' without significant capital expenditure. In this paper, we try to encapsulate our on-field experience and put together the following: (1) Improvement opportunities that are most common stage-wise & related Key Performance Indicators (KPIs). (2) Common improvement methodologies used to realize the benefits. (3) Key success factors of an improvement initiative. (4) Common pit falls. (5) Results: Through vast experience and numerous assignments in the industry we have observed that there exists an opportunity to improve turnover to the tune of 5 - 30% and bottom-line by 15 - 50%. The objective is to help organizations and individuals realize their full potential.

Key words: Pulp and Paper Industry, Economic Benefits, Key Success Factors

1. Introduction

The Pulp and Paper Industry is highly capital, material and energy intensive and return on investment is low. The typical value chain of the paper industry is depicted below (Figure 1):

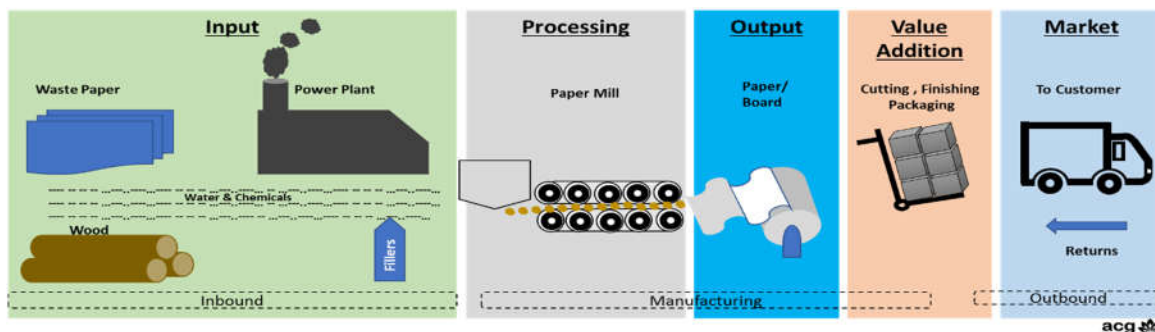


Figure 1: Paper manufacturing value chain

Some common challenges faced by the industry are:

- High Costs
- Lower Yields
- Quality Losses
- Poor OTIF
- Low productivity
- High wastages
- Low Recovery
- High Maintenance Costs
- High Response Time
- Person Dependency

At every stage of the value chain there are critical elements which have good economic value. Our focus should be on ascertaining the economic value and find ways to realize the most of it in the process. Paper mills of various sizes exist and every mill has its own uniqueness.

A typical schematic of a Paper mill in Figure 2.

The whole operations of a paper mills can be divided into 8 sections. Each section presents itself will opportunities affecting the business directly. The measurement and monitoring of correct set of KPIs (Key Performance Indicators) in each section gives an idea of process capabilities and the nature of control measures. We work on specific KPI to get the maximum benefit with low to medium efforts with no or minimal capital investment. Let us have a look at the KPIs in each of the sections.

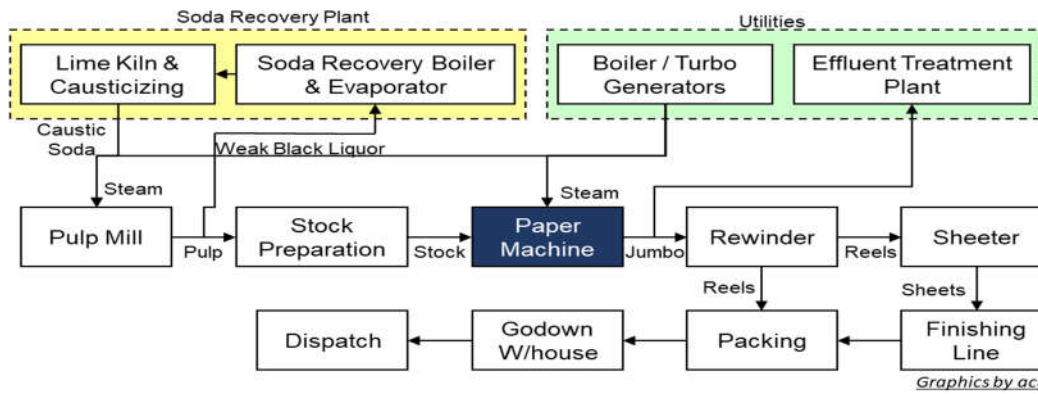


Figure 2: Paper mill schematic

2. Improvement Opportunities and Related Key Performance Indicators

In a paper mill the following table (Table 1) lists stage wise typical Improvement Opportunities that we have unearthed during the diagnostics phase at multiple companies

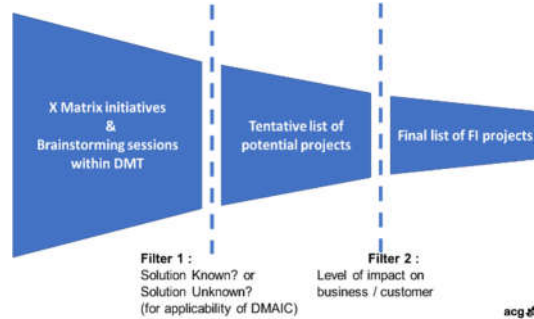
Section	Key Performance Indicators (KPIs)	Typical Opportunities
Pulp Mill	<ul style="list-style-type: none"> Breakdown time Yield Fibre Loss Chemical consumption Chipper Productivity Energy cost 	<ul style="list-style-type: none"> Feed recipe (Furnish) balancing Utilization of feeding conveyors Reduction in Specific power consumption in chippers Digester cycle time reduction Reduction in total consumables (chemicals) cost Removal of leakages and spillages Inventory norms for all spares and consumables
Stock Preparation	<ul style="list-style-type: none"> Water Consumption Power Consumption Fiber Loss Basis Weight (GSM) 	<ul style="list-style-type: none"> Minimizing Fiber loss Variation in stock consistency Agitator maintenance to improve Efficiency and Life Minimizing Fiber loss Variation in stock consistency
Paper Making	<ul style="list-style-type: none"> No. of Breaks Breakdown time Efficiency Re-pulp % Production Rate Set up time Steam Consumption 	<ul style="list-style-type: none"> Minimizing MTTR and MTBF Weight (GSM) variation along X, Y axis Minimization in changeover losses Edger alignment stabilization Wire life management Rope life management Inventory norms for all spares and consumables Removal of leakages and spillages
Rewinding	<ul style="list-style-type: none"> Breakdown time Finishing Loss Minor stoppages / Jamming Rough cutting Set up time (Reel Loading time) 	<ul style="list-style-type: none"> Deckle optimization Cutting Knife/ Shear life Finished Paper wastage
Packing/ Dispatch	<ul style="list-style-type: none"> Packing cost Packing Productivity On-Time-In-Full (OTIF) Logistics cost 	<ul style="list-style-type: none"> Reduction in FG inventory Reduction in errors in packing Packing material utilization Minimization in damage at packing stage
Printing	<ul style="list-style-type: none"> Wastage OEE Set up time 	<ul style="list-style-type: none"> Specific consumables cost Template/ equipment life Wastages
Others	<ul style="list-style-type: none"> Internal Handling Cost Contract Labour Deployment Cost Spares Cost 	<ul style="list-style-type: none"> Product Portfolio Optimization Reduction increasing, high COBB, dandy marks, rough cutting size variation Quality at source: reduction in all quality related losses across the value chain
Utilities	<ul style="list-style-type: none"> Steam to Fuel ratio Auxiliary Power consumption Unburnt carbon % 	<ul style="list-style-type: none"> Improving Soda Recovery Reduction in trappings Condensate recovery Improving feed quality to digester RM storage management Compressed air loss

Table 1: Improvement opportunities and related KPIS

3. Improvement Methodologies

The methodologies used to get specific results and sustained benefits comprise of the following approaches:

- a) **Focused Improvement Projects (FIPs):** - These are high impact projects on improving the above mentioned KPIs. The project selection is based on priority matrix directly giving business benefits. A Cross-functional team of 5-6 individual is formed to execute this project. The typical methodologies used for FIPs are DMAIC (Six Sigma), TOC, Lean etc.



(Figure 3 – Focused Improvement Project Selection)

- b) **Area Effectiveness Teams (AETs):** - The whole plant is divided into multiple small work areas and a cross-functional team comprising of members from production, maintenance, quality, purchase (if required) is formed. Generally, the team size is of 5-6 members. These members are given full ownership of their area. Each AET has defined KPIs that can be directly measured and controlled by them. The KPIs are categorized into PQCDMSM (Productivity, Quality, Cost, Delivery, Safety and Morale) and targets are assigned for each KPI. The team meets for 15-20 minutes on daily basis at fixed time to discuss trends of the KPIs and resolve issues. These teams are supported and guided by department heads.
- c) **Daily Management & Strategy Execution:** - In order to sustain the results of multiple actions taken in various work areas and by various teams, management information system, data management and monitoring at Plant level is required. There are specific KPIs categorized under PQCDMSM for the plant and its review is taken at top management at a regular interval (weekly, bi-weekly or monthly). The key strategies that form its part are material purchase, production planning, product mix, logistics, manpower deployment, power and fuel management, vendor management, channel partner management etc. Getting these strategies right becomes crucial to achieve the maximum efficiency of people and processes at plant level.

Implementation mechanism:

For a successful change initiative most companies deploy designated group of 2-6 persons for driving the improvements and the change management process. This group had a direct reporting to the top management. An engagement to gain economic benefits from the opportunities available at a paper mill goes through an AS IS assessment of different work areas and creation of a TO BE map which serves as a guideline for performing improvement activities and getting sustainable results.

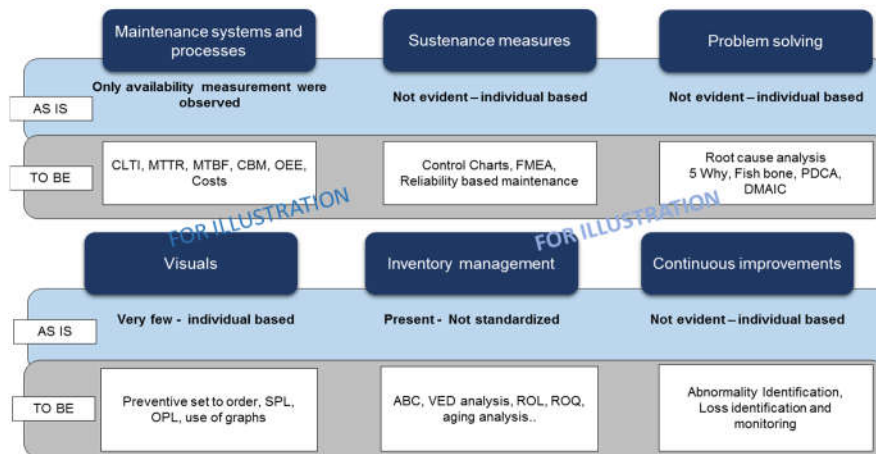


Figure 4: Illustrative ‘as is’ and ‘to be’ assessment

Our experience in the paper industry reveals that 09-15 months of time is required to set up required system and processes for basic stability of the plant. Post 15 months as the capability of the team improves standardization across the plant for different work practices are carried out with excellence road maps focusing on controlling variability across processes. This process of continuous improvement need to be carried out through a business excellence cell to achieve world class benchmarks and to have distinctive capabilities in terms of product as well as people.

The progress in this improvement journey is measured through 4 notches of excellence



Figure 5: Levels of excellence

4. Key Success Factors

Key success factors for on-boarding to a successful improvement journey:

- Establish Need and Importance:** The initiative has to be driven with clear message to all employee on the importance of the projects.
- Leadership Review Mechanism:** A proper review mechanism at top level for all initiative keeps the people motivated, helps in taking faster decisions and timely course corrections. We recommend a fortnightly or monthly review of the progress by the top management
- Capability building:** Capability building of the team is of high importance. The team needs to be equipped with the right set of tools and resources required to perform their role effectively. A proper system for training need assessment followed by internal or external training/ workshops should be put in place
- Way of work:** The initiative has to be smoothly blended with daily routine so that it does not become a separate one-time project.
- Morale and Motivation:** A defined Rewards and Recognition mechanism has to be put to celebrate success and keep employees motivated.
- External support care:** In case an external set of persons are engaged to assist in driving the improvement initiative, they should have prior experience of the same industry, else a lot of time is consumed in understanding the basic of paper manufacturing processes and operations.

5. Common Challenges and Pitfalls

Common Pitfalls which affect the speed and sustainability of results:

- Minimal involvement of top management in improvement projects
- Competing projects started on standalone basis in same work area leading to poor synergy among employees and or external agency.
- Poor training of employees who are supposed to execute the project
- Thinking of such projects as one of activity which will last a few months
- Half-hearted support for the project

6. Results: Opportunities That Can Be Converted to Economic Benefits

Our Experience at Multiple Paper mills of all sizes have resulted in benefits across functions, some Inclusive but not limited to, are as follows:

There is an improvement in capability at the lower levels and a lot of day to day problems which used to get escalated earlier gets solved at lower levels

The solutions to problems are more permanent and sustainable in nature

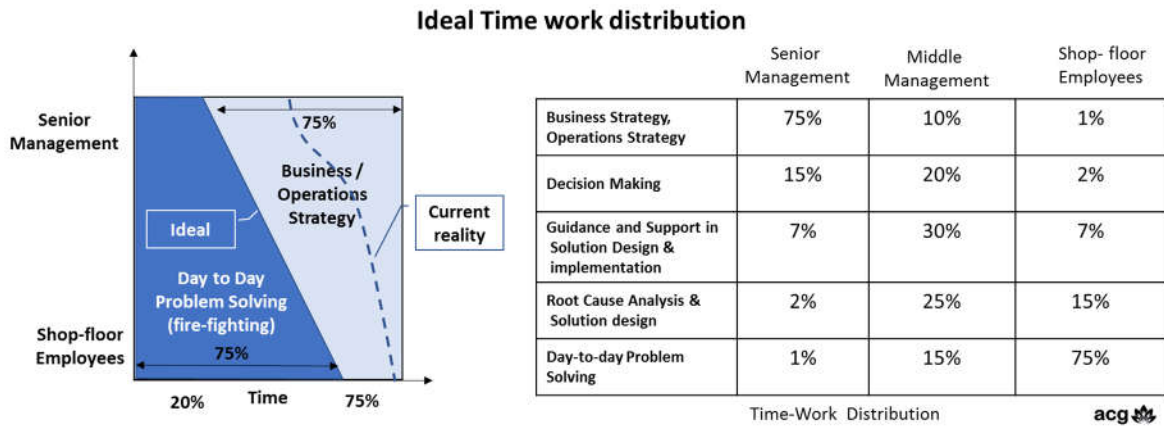


Figure 6: Work time distribution

On the Tangible aspect, the typical opportunities available in particular area / function in a paper mill vary across range and when approached in a systematic manner, yield sustainable benefits as below.

Machine / Area	Opportunity Head	Reduction	Improvement
Digestor	Cooking Cycle Time	5-10%	
Digestor	Throughput		5-10%
Fibre Line	Downtime	10-25%	
Fibre Line	Downtime in pulp machine	15-20%	
Finishing	Sheet machine OEE		10-20%
Packaging	Thoughtput		20-30%
Packaging	Material Cost	10%	
Paper Machine	Downtime	40-80%	
Paper Machine	Power Consumption	5-15%	
Paper Machine	Chemical Cost	10-20%	
Paper Machine	Prime Yield		2-4%
Paper Machine	Throughput		10-15%
Planning	Product wise lead time	30-40%	
Planning	OTIF		25-40%
Procurement	Procurement cost through alternate sourcing	2-3%	
Recovery plant	Efficiency		Upto 2.5%
Utility	Sp Power Consumption in CFB & TG	5-18%	
Accounts	PO processing time	40-50%	
Accounts	Claim Settlement turnaround time	~30%	
Strategy	Model development for customer segregation basis volume, value and growth potential		
Channel development	Development of channel partner Performance Evaluation model		

Table 2: Illustrative Results

There always exist, subtle and hidden opportunities for improvement which become evident with proper analysis and right set of eyes. These opportunities can be unearthed and benefitted from with customized intervention using the required set of tools and implementation mechanism. Companies that have embarked on the journey of continuous improvement and operational excellence often see a positive change in the culture and way of working across the organization