

Innovation for Growth and Sustainability - Efforts at Yash Paper Limited

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Abstract: The article shows how pulp & paper industry can identify and assess value creating opportunities underpinned by sustainability following a holistic approach. Pulp & paper industry can start by breaking down the three main contributors to value addition- growth, return on investment and risk management into the business opportunities or 'value creation lever'. The McKinsey tool used for diagnosis in 'sustainability transformation' can be well adapted by them (Fig-1). Yash papers limited has always been looking at how to go about changing sustainability from a cost heading into means of creating long term value. Yash papers Ltd's innovative approach has led to new value added products e.g. molded tableware from virgin bagasse fiber, Pellets from bagasse pith and utilization of lime sludge as filler in paper making. These products are based on market opportunity opened by growing environment related consumer concerns extending the resource saving mindsets of techniques learned to every area of operation and understanding & communicating the outcome of pursuing sustainability to manage regulatory, reputational and operational risk. Pursuing sustainability for value may entail changes in each & every element of organization's strategy and operations amounting to 'sustainability transformation' in its overall cost of doing business.

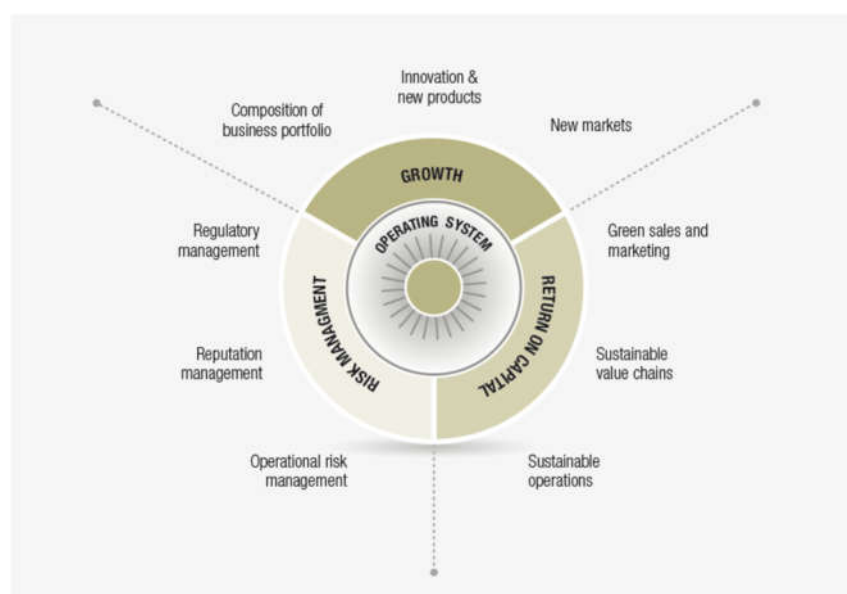
Key words: Pulp and Paper Industry, Growth and Sustainability, Innovative Approach

Introduction

Sustainability can play a vital role in improving the effectiveness of the entire value chain and in creating opportunities and bringing transformation in business; It is a critical business driver involving Operations, Brand reputation and innovation which bring growth.

With an ever-growing concern regarding deforestation and the amount of plastics and Styrofoam use rising globally, companies are increasingly looking for environmentally responsible alternatives to tree fiber for paper and packaging needs. In this consumer driven markets people are more likely to buy from the brands whose products are environmental friendly and known for its health and wellness benefits.

So, there is increasing emphasis on the need for pulp and paper industry to enhance capabilities in innovation in products, process, services, organization and other business aspects to sustain growth. Being highly resource intensive, Pulp and paper industries must focus efforts on innovation in new product development as well as waste utilization for value addition.



Source: McKinsey analysis.

Identifying Sustainability Opportunity

Business opportunities driven by sustainability may vary widely from lever to lever. Some of the examples are:

1. Growth

Applying a sustainability lens to the traditional levers for generating revenue growth—adjusting the business portfolio, developing new products or entering new markets—can uncover new opportunities. Every organization has to review its business portfolio to be successful in the long term. Adding sustainability to the criteria to be used to evaluate existing businesses and explore new business opportunities may alter decisions about whether to hold, divest or pursue them.

Partnerships with energy utilities and chemical companies represent a very real opportunity to take advantage of the global trend towards sustainability. Such companies generally struggle to manage upstream and to source raw material, and they seek out those capabilities in pulp and paper companies. The latter can provide raw material and machinery while the utilities and chemical companies provide the know-how and off take of the final product. Together, they can create win-win partnerships.

Taking into account sustainability issues such as environmental regulations or limited natural resources, when predicting new operational or market trends can prompt innovative ideas capable of generating growth and creating value long into the future.

2. Return on Investment

All industry players operating in today’s cash constrained environment need to reduce the cost of their operations to improve returns. Water and energy consumption are critical cost drivers. Worldwide, Pulp and paper industry is amongst the largest consumers of both, compared to other sectors (Fig.2).



Fig. 2.

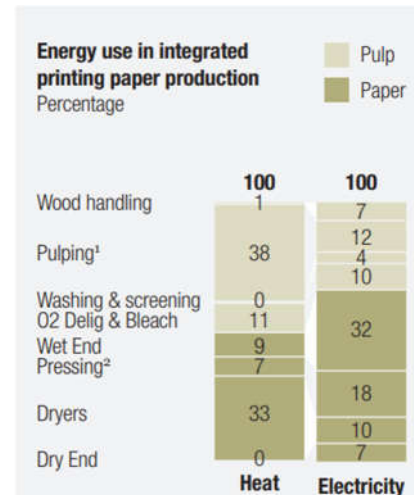


Fig. 3.

A recent study carried out by McKinsey & Company identified more than 20 opportunities available to pulp and paper companies to reduce their consumption of energy and water, ranging from retrofitting buildings to improve the overall efficiency of the machinery to improving water treatment systems. Implementing those measures will most likely lead to increasing returns on capital.

More efficient use of water and energy will have a direct effect on a mill’s position in its respective cost curve (Fig.3),

Some measures, especially those related to energy efficiency, can also generate additional revenues. For example, some chemical pulp mills that have managed to cut their energy consumption are now selling increasing volumes of surplus energy to the external market.

Some opportunities to improve resource efficiency will most likely require capital expenditure. So all such opportunities need to be carefully assessed to ensure that those chosen have a net positive value for the organizations.

3. Risk Management

The paper industry faces a broad array of risks, from rapid changes in national and global regulations, to NGO challenges, to operational risks posed by potential community unrest in less stable operating regions. Pursuing both operational and environmental sustainability in all management decisions will reduce those risks and ensure long term business success.

Companies need to identify their exposure to existing as well as possible future regulations and quantify the impact of potential regulatory scenarios on the market as a whole, as well as their particular organization. They need to formulate strategies appropriate to the different scenarios, including how to adjust to any future financial incentives that governments may offer.

If industry members, through their industry associations, develop a common pulp and paper agenda to take into regulatory negotiations, they will have a much better chance of working with governments and regulators to develop rules that ensure both sustainability and increasing industry value. They will thereby be better prepared to comply with new regulations.

Pulp and paper industry has been increasingly using renewable and sustainable raw materials and energy. The pulp and paper industry should follow this example and be more proactive in informing the public as well as regulators of its sustainable value chains and products to avoid unnecessary or growth limiting future regulations. The sustainability reports that most major pulp and paper companies now produce can help demonstrate to regulators a company’s positive green achievements. The sector sustainability reports produced by the industry associations can do the same for the sector as a whole.

Right alongside regulatory management comes reputation management. The forest industry has long been the target of allegations from NGOs about its upstream activities, especially fiber sourcing. Such allegations generate reputation-damaging publicity, in some cases prompting customers to cancel delivery contracts. Proactive reputation management should help companies to avoid this kind of damage. But companies also need a robust, transparent communication strategy to head off any subsequent charge from NGOs that they are trying to “green wash” their activities.

The first step for any company is to understand its exposure to reputational risk and to address any issues it identifies, for instance, by sourcing only sustainable fiber, refusing to harvest natural forests, protecting threatened animal and plant species, and respecting local community rights.

Yash Paper Ltd established in 1983 with a small capacity of 5 TPD for kraft paper production from secondary fiber has made long strides to rise to one of the major producers of packaging kraft and poster grades based on renewable Agro based bagasse fiber and rice husk as source of energy. Its present capacity is 130 TPD of pulp and speciality paper production along with 11.5 TPD of molded tableware production. As a strategy, it has made continuous efforts to adopt sustainability as base for all its growth opportunities. This has been demonstrated and proven by three innovative projects successful commercialization of the following

1. Moulded tableware products from unbleached bagasse pulp
2. Pelletization of bagasse pith
3. Utilization of lime sludge as filler in paper.

- **Pulp moulded tableware products from bagasse pulp**

Increasing usage of EPS (Expanded polystyrene) and Styrofoam for tableware products has added tremendously to white pollution around the globe. Being non-biodegradable and non-compostable, these products remain in the environment for thousands of years. Research has established that these has even found there way into ocean and sea bed threatening the aquatic life. Also being carcinogenic these products pose tremendous health risk to human beings.

Being made from cellulosic and natural renewable fiber, moulded pulp tableware products are biodegradable and naturally compostable. They pose no risk to environment & human health and promote sustainability in true sense. The demand for these products has been increasing due to increasing customer health and environment awareness and government regulatory pressure.

Research has proved that virgin bagasse fiber being stiff and coarse is very well suited for the food grade tableware products making. After a lot of in house R&D and interaction with technology providers, Yash has established a full scale plant in July 2018 for production of such products.

Details

1. Investment	60 Cr
2. Projected ROI	3yrs
3. Product	Disposable Bowls, serving trays, containers, plates and glasses
4. Furnish	90% unbleached bagasse pulp + 10% soft wood fiber
5. Capacity	11.5 MT/Day (6.6Lacs pieces/day)
6. No. of machines	Nine (2 small machine@500kg/day) and (7 big machines@1500kg/day)
7. Product Weight	5 to 40 gm
8. Sizing chemicals	Water and oil proofing chemicals
9. Heating media	Thermic Fluid
10. Fuel	Rice husk & Pith
11. power consumption	18000 KwH/day
12. Fuel consumption	12 MT pith / day.

Table .1

Pulp Moulding Technology

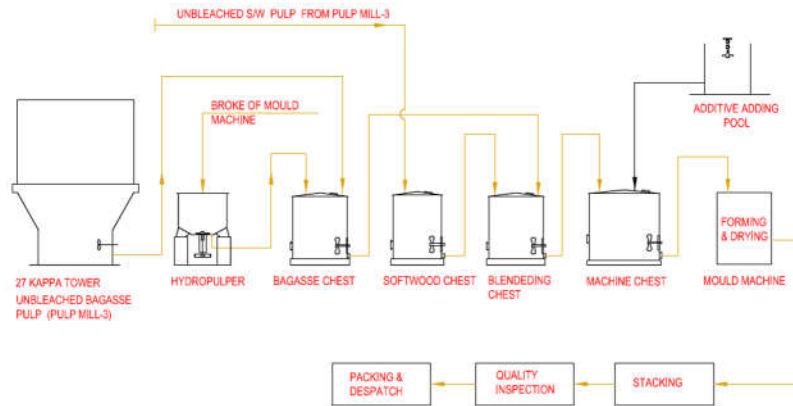
Plant design is based on state of art Thermoforming moulding technology with machines from one of reputed supplier from China having about more than 25 yrs of first hand experiences in pulp moulding technology(Production as well as machine manufacturing).

Process

The stock preparation for blending of fiber & chemicals along with refining and centricleaning is fully automatic. The stock cy is 0.3%, goes to forming section of mold machine where vacuum is also applied to get dryness up to 30%. Thereafter it goes to pressing and drying mold where thermic fluid is used for heating upto 95 % dryness. Products are stacked on individual stackers on each machine. After stringent quality checking of each product for water and oil resistance and physical defects, accepted products are packed, labeled and stacked for supply to market.

Major quality parameters

1. Water proofing
2. Oil proofing
3. Free from physical defects e.g. cracking, fiber missing, foam spots etc.



2- Pith Pelletization

With focus on utilization of renewable fuel for energy, Yash Papers Ltd has been using 90% Rice husk and 10% bagasse pith in boiler. The restrictive factor for utilization of more pith as such in existing boiler are higher moisture% resulting on low GCV, and low bulk density resulting on burning issues in boiler.

YPL has innovated methodology to pelletize pith available while depithing bagasse to overcome above restrictions in usage. A lot of inhouse R&D and pilot scale trial at vendor’s was also done for validation of the methodology. This has finally resulted in successful installation and commercialization of pith pelletization plant.

Technical data on pith availability

1. Bagasse consumption	2, 00,000 MT/ Annum (As such)
2. Pith generation @20%	40,000 MT/Annum or 110 MT/Day (As Such)

Table .2

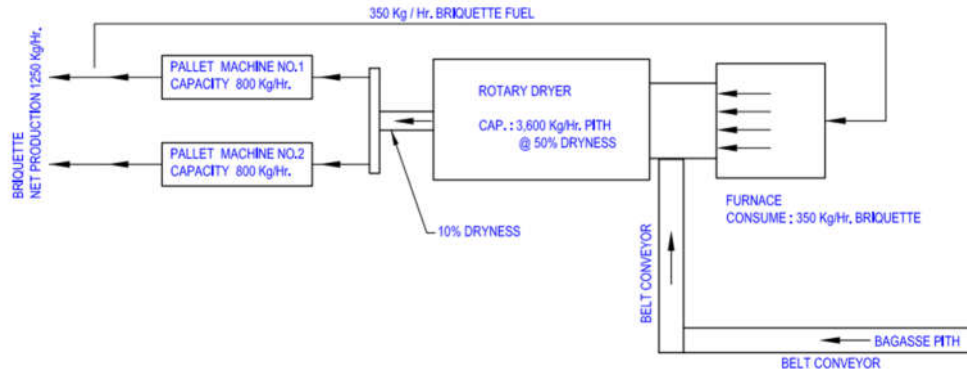
It is noticed that using pith after onset of monsoon becomes impractical due to operational complications specially due to higher moisture% and most of it has to be disposed off at throw away prices as compared to potential value. Pelletization will facilitate 100% pith utilization in house with improve efficiency of boiler besides substantial value addition. Viable commercial proposition has also opened new avenues for revenue generation by selling pellets in open market.

Pelletization plant data:

1. Raw material	Pith at 50% moisture
2. Pith consumption	75 MT /Day(50% moisture)
3. Pellets production	32 MT/Day (8 to 10% moisture)
4. No of pellet machine	2 no's
5. Briquette fuel internal consumption	7 MT / Day
6. Power consumption	2200-2400 Kwh/Day
7. Net pellet production	25 MT/Day
8. Pellet size	10 mm dia.
9. Investment	1.3 Cr
10. ROI	26 months (Internal usage) & 8months (External Sales)

Table .3

- Yash Paper Ltd is first in India to establish a commercial plant for pith pelletization.



PITH & PELLETS ANALYSIS DATA		
MATERIAL	PITH	PELLET
Moisture %	63.1	8.8
Ash %	4.06	3.48
Bulk Density Kg/m ³	70.8	410
GCV Kcal/Kg	1707	4123
NCV Kcal/Kg	-	3817

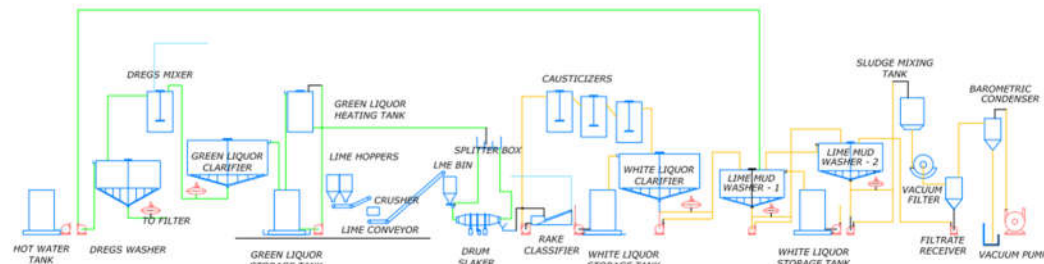
Table .4

Utilization of Lime sludge as Filler in Paper

In our earlier paper in IPPTA volume 25, No-1 / Jan-March 2017, we have presented results of R&D efforts at Yash Papers Ltd to use lime sludge as filler. Based on the studies, a full scale plant trial was done in March 2017 in paper using 50% lime sludge + 50% Talc as a filler. The results were encouraging but following observations were made:

1. Settling was observed due to comparatively poor dispersion due to higher particle size.
2. Increased AKD consumption due to higher particle size.
3. Chocking filler screen due to higher particle size.
4. In addition roughness in paper noticed due to comparatively weaker bonding of lime sludge particles due to high

FLOW SHEET RECAUSTICIZING SECTION



particle size.

Filler properties and trial report

Test Parameters	UNIT	RESULT		
		TALC	LIME SLUDGE without Grinding	LIME SLUDGE after Grinding
Abrasion loss at 174000 rev.	Mg/cm ²	51.6	2.7	-
Particle distribution size	D90	17.4	47.5	14.3
	D50	9.03	21.4	7.46
	D10	3.7	7.2	3.30
	MEAN	10.1	25.4	8.31
charge	Streaming potential	mV	-385	-265
	Cationic demand	(μ eq/liter)	1.34	1.15

ISO Brightness	% ISO	69.84	87.45	-
CIE Whiteness		46.25	87.91	-
Calcium as CaCO ₃		ND	78.3	-
Magnesium as MgCO ₃ (Sample digested)	%	4.17	4.22	-
Silica as SiO ₂		49.5	3.93	-

Table .5, Source: Avantha

Action plan

Earlier analysis of lime sludge particle size has revealed that mean particle size (25 micron) is higher as compared to Talcum (10 micron). We addressed this issue by looking at ways to grind it to suitable particle size distribution. we got it grinded at one of commercial installations to get desired particle distribution (Table- 5)

A second plant trial was done subsequently using 100% grinded lime sludge as a filler and results are presented in table 6. The plant scale trial was successful and earlier issues were not noticed. Paper properties are comparable. Presently the paper has been sent to customer and we are waiting for customer final response to regularize application on sustainable basis with further optimization. Added advantages of higher ash retention were noticed during the trial and the machine speed also increased. Data are mentioned in Table-6.

If successful this innovation will provide solution to one of key environmental challenges for pulp and paper industry specially medium and small agro based units who are not able to install lime kiln due to economical and quality reasons. At the same time it will have tremendous cost implication by way of cutting filler procurement bill & sludge handling cost besides positive impact on environment.

		Soap Stone 100%	Lime Sludge 100%	
Grade		MSP	MSP	
GSM	g/m ²	62	62	
Speed	m/m	194	205	
Draw	mt/hr	2.98	3.06	
Furnish	Bagasse%	70	70	
	O/S +S/W % (70:30)	10	10	
	Broke %	20	20	
Bagasse	pH	8.68	7.96	
	Alkalinity (ppm)	354	328	
	cy %	3.82	3.82	
	%SR	19	18	
Pulp (Softwood 30%+Gunny 70%) Sent to PM 3	cy %	3.92	3.32	
	%SR	21	24	
Machine chest of PM 3	pH	8.4	8.31	
	Alkalinity (ppm)	344	356	
	cy %	4.02	3.89	
	%SR	20	21	
H/B	pH	7.68	7.69	
	cy %	0.83	0.64	
	%SR	32	31	
Back water	pH	7.9	7.95	
	cy %	0.24	0.09	
	Alkalinity (ppm)	260	274	
FPR	%	71.2	85.94	
FPAR	%	47.10	57.1	
Furnish				
Bagasse	%	70	70	70
Softwood + Gunny	%	10	10	10
Broke	%	20	20	20
Paper Properties				
GSM	g/m ²	62	62	62
Actual GSM	g/m ²			63.02
Cobb	g/m ²	41	42	46
TF		55.01	51.72	50
BF		20.22	20.1	19.87
Tensile strength	kg/15 mm	3.6	3.54	3.28
BL	Meter	3920	3752	3492
Moisture	%	5.25	5.15	5.01

Degree of curl				8/16
Ash	%	14.51	27.98	29.37
Chemicals added in stock preparation				
		Soap Stone 100%	Lime Sludge 100%	
Filler Dose	Kg/Ton	273	266	224
Black BF Dye	gm/Ton	1000	1230	1040
Coagulant	gm/Ton	0.93	0.903	0.913
Sizing	Kg/Ton	8.8	23.1	24.56
Retention aid	gm/Ton	197	217	215
Charge Analysis				
		Soap Stone 100%	Lime Sludge 100%	
CHEST	Charge(mV)	Demand (μ eq/liter)	Charge(mV)	Demand (μ eq/liter)
Mixing chest	-195	236	-166	246
Bagasse chest	-186	279	-184	270
Long fiber chest	-211	273	-209	265
Back water	-118	154	-114	169
Head Box	-119	147	-107	162

Table .6

Conclusions:

Successful commercialization of innovative ideas at Yash Papers Limited has proved that continuous R&D effort by pulp & paper industry can help them diversify to new value added products from existing resources and also reduce the cost of production besides finding in-house solutions for environmental challenges. This in true sense will lead to sustainability transformation.

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