

Practices Prevailing in Collection, Sorting and Grading of Recovered Paper - A Comparison

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The use of recycled fibre in paper production has increased significantly during the last five years. Today almost 37% of the paper & paperboard production in India is based on recycled fibre furnish. During the last few years, most of the capacity expansion that has taken place were based on RCF furnish only. Further due to environmental pressures future expansions are also expected to be based on RCF as the small agro based mills are gradually integrating their virgin fibre capacity with RCF based capacity to achieve the discharge norms. With this changing scenario, the demand for wastepaper requirement is bound to increase. Presently due to low recovery of indigenously consumed paper, the mills are relying on imported wastepaper procured from different regions of the world to meet their raw material requirement. The reason for low recovery is attributed to improper and unorganized collection system prevailing in the country. Wastepaper recovery system in India is very haphazard and unorganized and as a result large quantities of wastepaper gets diverted for cheaper packaging or become the part of municipal waste. Also due to lack of any grading system in place, the paper collected is in mixed form and is not found suitable for paper industry. CPPRI has made sincere efforts in this direction and under one of its project study has formulated a grading system for indigenous recovered paper which could not be made effective due to lack of an organized collection system in the country. CPPRI also made a study on prevailing practices in wastepaper collection & grading in France & Japan and it is felt that there is a considerable scope to improve the present collection system in India. CPPRI in its endeavor is continuously making effort to establish an appropriate collection system with grading in place to maximize the recovery of RCF for Indian paper industry. The paper presents the salient features of prevailing practices in collection of different grades of recovered paper and the grading system followed in France & Japan and comparison made with India to indicate the lacunas in the existing system practiced in India.

INTRODUCTION

Use of recovered paper has become an important element in the pulp & paper business worldwide. It has been identified as one of the survival routes against dwindling forest resources and a greater concern amongst the people for greener environment.

Recycling has economic benefits also as it extends to provide the paper products without an equivalent increase in the demand of wood. The economic effect of recycling is to keep paper prices down, since without recycling the increased demand for wood results in higher prices.

In India the recovered paper (RCP) is being used by all segments of the paper industry as an alternate source to meet the growing demand of fibrous raw materials. A steady growth has been made over the years in the utilization of wastepaper as a papermaking raw material. Today as much as 37% of the paper production

is based on recycled fibre furnish, however, this has been achieved with more than 70% of import substitutes as no appreciable rise in recovery rate is witnessed in the last two decades. The present recovery rate stands at 18% against the world average of 48%.

The Indian paper industry started using RCP as a fibrous raw material for paper making in early 70's only, when the Govt. took a conscious decision to increase the domestic capacity to compensate the sudden spurt in domestic demand. With the Government encouragement a number of small paper mills based on recycled fibre and other non-conventional raw material were installed.

In the formative years, this segment of the industry was not very much organized and the capacity of the mills ranged from 4t/d-30t/d mainly producing low grades of paper. Only after 1990's the actual growth of this segment could be observed. Fig. - 1 shows the statistics for RCP recovery, utilization and imports trends in India

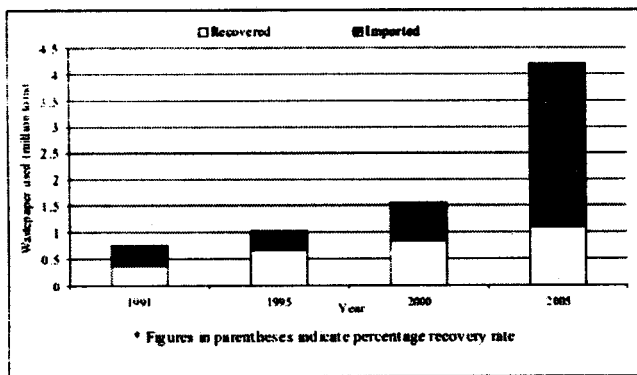


Figure 1 : Utilisation of Recovered Paper (1991-2005)

during 1991-2005. It clearly indicates that though the RCP consumption has gradually increased from 0.749 million tons in 1991 to 4.1 million tons in 2005, there has been a very marginal increase in RCP recovery i.e. from 0.355 million tons in 1991 to 1.04 million tons in 2005, which has led to increased imports of RCP to meet the shortfall in domestic demand of paper.

The total paper & paperboard consumption in India is around 5.8 million tons, of which only 1.04 million tons (18%) is recovered. As per the observation made by M/s Jaakko Pyory Consulting, (Finland) in their report on "Global Competitiveness of Indian Paper Industry", main wastepaper grades available for recycling are-

Old Corrugated containers- 40%

Mixed Paper- 20%

Office refuse- 20%

Old Newsprint & Magazines- 20%

Despite the fact that a major segment of the industry is utilizing the recovered paper for papermaking, the industry is facing serious problems in processing of imported and indigenous recovered paper primarily due to poor quality of indigenous RCP and presence of contaminants in imported RCP.

There are number of factors which attribute to poor and inconsistent quality of indigenously recovered paper. Besides the fibre quality, which is mainly governed by the virgin fibre quality, the other major factor is improper and unorganized collection and distribution system prevailing in the country. Due to lack of an Indian grading system, at source grading/sorting is not practiced, as a result most of the paper is recovered in mixed form and not in grades. This results in high percentage of prohibitive material and out throws, which adversely affect the quality of recovered paper stock.

On the contrary, every country which are the major players in paper recycling business have RCP grading system in place which facilitates the collection of recovered paper sorted in grades with a limited mixture of fibre types. In these countries, various collection systems are in practice to recover RCP in grades. To

adopt these systems in India, we definitely need a gradation framework for different available RCP varieties. CPPRI has made sincere efforts in this direction and under one of its project study on "Availability & Utilization of wastepaper" has formulated a grading system for indigenous recovered paper, however, which could not be made effective due to lack of an organized collection system in the country. As a follow up of this project an Indian delegation comprising of representatives from, INMA, IPMA, IRPMA, IARPMA & CPPRI visited France & Japan and made a study on prevailing practices in wastepaper collection & grading in these countries and it was felt that there is a considerable scope to improve the present collection system in India for paper recovery. CPPRI in its endeavor is continuously making effort to establish an appropriate collection system with grading in place to maximize the recovery of RCF for Indian paper industry.

In this paper CPPRI will share its experience on prevailing practices in France & Japan and a comparison is made to identify the gaps in Indian system.

DISCUSSIONS

A. LEGISLATION ON RECYCLING- Its impact on Enhanced Recovery

Prevention of waste and material recycling are the most important means of limiting the generation and growth of municipal and industrial waste. A wide range of legislation in various countries tries to promote material recycling and reduce further the generation of waste that requires disposal. These regulations get responsibilities for taking back used paper products as packaging material independent of the public disposal system and recycle them.

I. Europe

The 1994 Directive on Packaging and Packaging Waste

The EU Packaging Directive 1994 places top priority on preventing packaging waste and covers packaging made from paper and board glass, metal, plastic and composite material, including re-use of packaging material, recycling of packaging material and other uses of packaging waste and a consequent reduction of the amount of waste for final disposal

The EU member states must establish systems for take back, collection and utilization of used products as secondary raw material. All parties involved in the production, converting, import & distribution of packaging products must take responsibilities for this waste in accordance with "Polluter pays" principle, final consumer plays decisive part in prevention and use of packaging and packaging waste.

Based on "Polluter pays" principle The Directive led to the foundation of European waste management systems and take back systems.

According to EU Packaging Directive the term "Utilization" means

Material Recycling - Reprocessing of packaging materials in a production process for the original purpose or for other purpose including organic use but not combustion for generation of energy.

Energy Recovery - The use of combustible packaging materials for energy recovery by direct combustion with or without other types of waste but with heat recovery.

Organic utilization - The aerobic treatment (biological use) or anaerobic treatment (biogas generation) with microorganisms in a controlled process of biologically degradable products of the packaging materials to produce established organic residue or methane.

Landfill disposal is not a form of organic utilization.

II. France

Under EU Directives, France has various ordinances for different products which stipulates the principle of producer responsibility. Special efforts have occurred in the packaging sector where the establishment of Eco-Emballages marked the formation of a collection system comparable with ARA in Austria or DSD in Germany. All the packaging is covered by the two French Decrees-

(i) Household Packaging Decree Effective from 01.01.1993 - The regulation has three options i.e.

- Deposit system
- Setting up an independent elimination system
- Adhering and contributing to an approved organization

Benefits -

Recycling rate 84%

Recovery rate 62%

[The decree recognizes incineration with energy recovery as a mode of recovery (valorization). Administration controls that the individual companies meet their obligations placed upon them by the decree (Penalties may be imposed)]

(ii) Industrial & Commercial Packaging Decree Effective from 15.07.1995 - The decree puts the responsibility on holders of industrial and commercial packaging waste (Industrialists, Distributors) exceeding a volume of 1100 liters per week. The end holder has an obligation of 100% valorization

Consequences - Incineration without energy recovery and land filling are forbidden (A legal obligation put on those who unpack)

Benefits - Paper & Board recycling rate 40%

III. Japan

In Japan the Waste Disposal Law enacted was in 1970

and amended in 1991 when the Resource Recycling Facilitation Law called the Recycling Law was added. Article I describes the purpose of this law as considering that Japan relies on importing many important resources, but a large part of these resources are now being discarded without being used. The law provides the basic mechanism for promoting the use of recyclable resources, and thereby promotes the healthy development of the nation's economy.

According to Ministerial Ordinance No. 53, Ministry of International Trade and Industry - it states that taking into consideration that the low ratio of wastepaper used in printing paper, information-related paper, & wrapping paper and the different uses of wastepaper depending on the kind of paper, the industry shall in cooperation with consumers and central and local Governments, strive to increase recycling rate to 55% in domestic paper production by 1994 (This limit has increased to 60% by 2006).

Benefits - Over the last 40 years, wastepaper has been utilized merely because of fibre cost reduction, and as much as was necessary to meet demand was collected. However, increased recovery is now generating more wastepaper than economically required, for example, by environmental and political movements and as results of high recovery, exports to China and Taiwan from the year 2000 onwards has increased.

IV. India

There is no specific legislation in practice to enhance the recovery of waste paper in India.

B. CENTRES FOUNDED TO PROMOTE RECOVERY & RECYCLING IN WASTE PAPER

(i) ECO-Emballages, in France

It is a private company with a public interest role formed in 1992 at the behest of the government and ecological responsible companies and is committed to recovery of household packaging through the fees collected from its licenses. Provides green dot in return.

With councils and local authorities as partners, it offers financial & technical assistance to them in organizing selective sorting and recycling of household packaging.

(ii) Paper Recycling Promotion Centre (PRPC), in Japan

PRPC was founded in 1974 in cooperation with state, paper companies and paper stock dealers under Jurisdiction of Ministry of International Trade & Industry. The Centre- Supplies information on paper recycling surveys and report.

Undertake publicity activities to create awareness.

- Supplies information on paper recycling surveys and report.
- Undertake publicity activities to create awareness on socio-economic roles of recycling

- Provides guarantee of obligation for the industry to ensure smooth fund procurement in introducing large packaging machinery.
- Keeps balance on supply and demand to stabilize prices.
- Promotes R&D activities on the advancement of technology for recycling and reuse of recovered paper for new products.

(iii) In India there is no such central agency to monitor and control the trade of RCP collection. By and large it is an unorganized sector being managed by a chain of rag pickers, street vendors, scrap dealers & paper trade merchants. As such there is no role of local administration in this network.

C. COLLECTION & SORTING SYSTEM FOR WASTEPAPER

I France

Collection of packaging in France

As per the EU Directives on waste management the industries are collectively responsible with the local communities for reclamation and elimination of packages from household products they put on the market. The packaging waste is collected separately through three different channels as depicted in Figure 2.

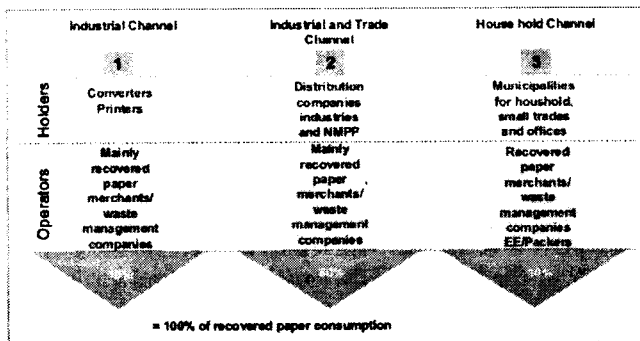


Figure 2 : Practices in Collection & sorting of Wastepaper in France

Concept

There is a close network of producers, public authorities, local administration and recycling centers under the monitoring of Eco-Emballages to ensure that the commitments are completed. The system network is shown in Figure 3.

ECO-EMBALLAGES gives financial support to local authorities committed to a programme of collection and sorting of all household packaging and guarantees recycling, composting or incineration of used household packaging. France has take back guarantee system for collection of packaging waste as shown in Fig. 4.

Household collection system for ONP and OMG

In France collection of newsprint and magazine waste

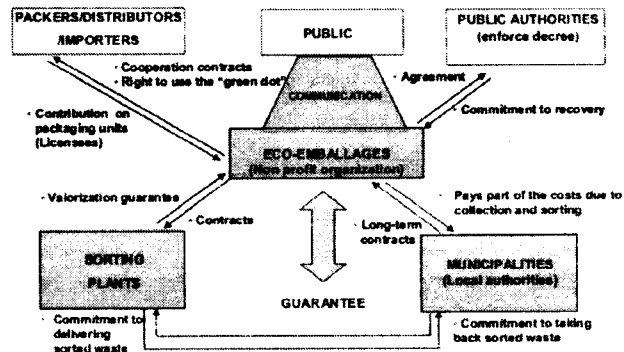


Figure 3 : Concept of Packaging Waste Management in France

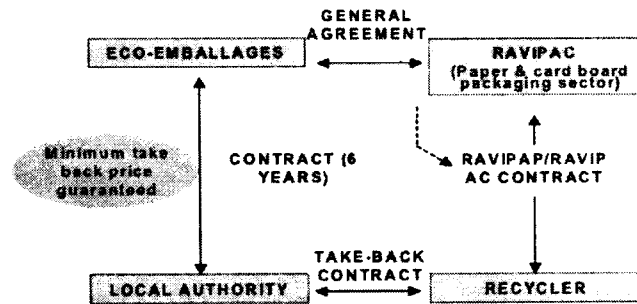


Figure 4 : The Take-back Guarantee System for Packaging Waste

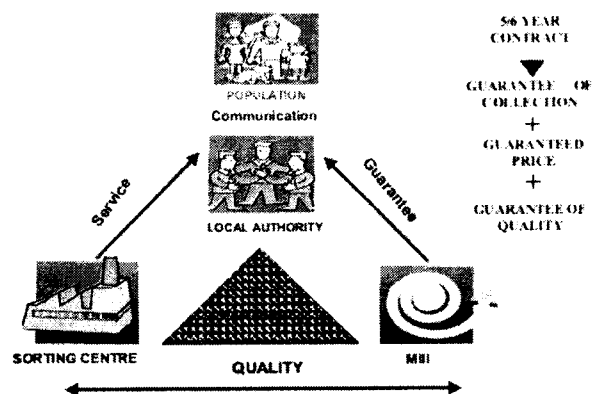


Figure 5 : House Hold Collection Route for ONP/OMG A THREE WAY CONTRACT

is made through three-way contract system as shown in Fig.- 5.

Advantages of Three way Household collection System are

- It guarantee a long-term outlet for sorted and collected paper, at a price controlled by contract for local authorities
- It ensures a regular flow of recyclable material to be sorted throughout the year for sorting center.
- It provides a guarantee supply of quality raw material sorted according to strict specifications of

an economically viable cost for mill.

Collection of paper from municipal waste stream

The municipal waste is collected in two containers.

- Green containers to collect paper, plastic, metal. Containers are collected by the local authorities and sent to sorting centres for sorting of waste.
- Grey containers to collect vegetables/fruit/meat wastes, which goes for making compost.
- Tissues polythene and other wastes are incinerated for generation of electricity.

Sorting plants are integrated with incinerators or composting units for 100% valorization (value addition)

Sorting of RCF

Sorting is carried out at sorting centres, which are in operation with forward linkages with major users of recycled fibre. A combination of both negative & positive sorting techniques is deployed in these sorting centres.

In negative sorting only acceptable paper waste is allowed to drop onto the conveyor out of the total unwanted and undesirable waste material while in positive sorting acceptable grade and quality of paper is hand picked and segregated.

II. Japan

Compared to other countries, the environmental awareness among the society is much higher in Japan. The common man, shopkeepers, departmental stores, office management are well educated and aware about the environmental protection and resource recycling. The concept is infused in primary school level only. In Japan emphasis is given on "sorting at source" concept by the paper stock dealers and sorted waste is brought in sorting center for making bales as per the defined grades. Products with plastic lamination are first scratched to detach plastic overlays separately. Fig. 6. shows the wastepaper generation and collection routes in Japan.

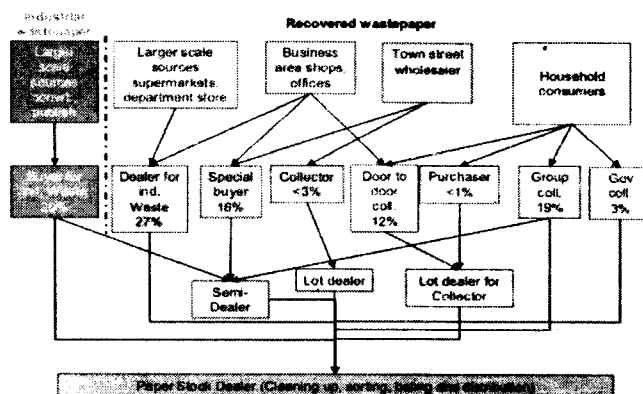


Figure 6 : Wastepaper generation & collection routes in JAPAN

III India

Collection

In India though the wastepaper is recovered through different routes but as such no integrated system with backward and forward linkage is prevailing. The paper is collected through various routes viz.

- Collection of wastepaper from household and shops by hawkers for onward supply to wastepaper traders
- Collection from printing houses and converters by traders
- Direct collection by mill from Government/Private Offices, Institutions, Banks etc. through tenders for disposal of records.
- Household collection from dustbins and streets by rag pickers
- Municipal waste collection

Sorting

As such there is no state of the art facility for sorting and baling of wastepaper, however, some big wastepaper merchants have the facilities for stocking, manual sorting and baling by pneumatic/mechanical bale presses for onward supply to paper mills. However, these facilities are available along the coastal areas where the traders have big business of wastepaper imports also.

Fig. 7 shows a typical wastepaper collection system prevailing in some of the big cities in India.

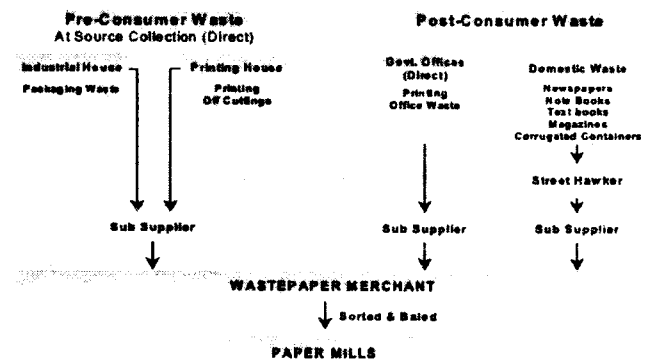


Figure 7 : Wastepaper collection system prevailing in some of the big cities in India

Despite of this collection system the availability in indigenous RCP for paper industry is only 18%. The reason is the lack of a grading system and at source segregation of collected RCP in graded form. Secondly the awareness level among the society for segregation of waste at source and recycling concept is very low due to which most of the time post consumer paper collected is not found suitable for recycling by paper industry.

Table 1 : Grading of Recovered paper- A Comparison

Details	India	France	Japan
Proposed By	Central Pulp & Paper Research Institute (CPPRI)	European standard EN 643 by European committee for standardization (CEN) in consultation with CEPI (Confederation of European Paper Industries) and ERPA (European Recovered Paper Association)	Paper \Recycling Promotion Centre (PRPC)
Effective from Grading System	- 20 varieties graded in IX groups based on fibre quality and type.	1994 57 varieties graded in five groups Group I - Ordinary Grd. Group II - Medium Grd. Group III - High Grd. Group IV - Kraft Grd. Group V - Special Grd	1990 27 Varieties graded in IX groups based on fibre quality and type.
Implementation	Not followed due to lack of an organized collection system.	Strictly followed during collection & Sorting	Strictly followed during collection & Sorting

Table 2 : Classification of Indian Standard Varieties of Wastepaper

Statistical group	Grades	Contents
Group I White woodfree Unprinted	No. I cuttings Hard white shavings	Printers cuttings from high quality white printing paper uncoated or coated but without any printing. (Contains ruled or unruled cuttings) Shavings or sheets of untreated high grade, high brightness bond ledger papers. Free from printing and ground wood.
Group II White woodfree printed	Note books White records/office records	School notebooks, bleached variety with less ink. Sometimes slight yellowing observed. Mixed wastepapers as collected from office refuse. Contains mixed office records including various grades of writing, printing, xerox, typing paper, CPO, envelopes with some staple/pins/cellophane and carbon paper (contains both heavily printed and unprinted matter).
Group III White & lightly printed mechanical	No-II cutting White duplex cuttings	Printer cuttings from average quality printing papers made of recycled or high yield pulps, unwanted or coated but without printing. New cuttings of uncoated/coated duplex boards with very little printing/lamination received from folding box board cartons converters
Group-IV Colored woodfree /colored records	Colored cuttings /colored records	Colored cuttings received from printers of books, magazines, posters or advertisements. Contains newspapers, lottery tickets, text books, brown boards etc.
Group-V Heavily printed mechanical	Text book Old directory Old newspaper/ over issues Old magazines/ over issues	Old textbooks without plastic laminated or straw board covers, contains bleached printed sheets, yellowness observed due to ageing. Clean telephone directories bleached & heavily printed. Severe yellowness observed due to ageing. Includes both old as well as over issues from publisher house. Old newspapers collected from consumer or from newspaper vendors. Newspaper, printed but unused as available from newsprint presses or agencies. Old or over issue magazines printed on good quality printing paper from chemical or recycled pulp, uncoated or coated paper.

Cont.....

Group-VI Brown Kraft	Kraft multiwall bag waste Mixed kraft cuttings New double lined kraft corrugated	New kraft multiwall bag waste and sheets with little printing but without staples or stitching. Cuttings of kraft paper received from converters with very little printing and no staples/pins or cellophane. Corrugated cuttings received from industrial packaging, corrugated box manufacturers with very little printing & staples/paste/cellophane.
Group-VII Old corrugated containers	Old corrugated boxes	Mixture of corrugated box with kraft/white top liner /printed/unprinted. Stapled/pasted/spliced with cellophane, having one or few piles of corrugation.
Group-VIII Mixed papers	Mixed waste paper Road sweepings Lottery tickets	Mixture of all varieties of paper including white or colored paper, bleached & unbleached, coated & uncoated, printed & unprinted, with & without mechanical pulp papers not limited to fibre content/quality and contaminants from converting units. Mixture of various grades of waste paper as received from municipal dustbin not limited to fibre content or quality. Printed lottery tickets, unused over used received from agencies/vendors.
Group-IX Contaminated grades	Sack Kraft waste/cuttings Currency cuttings	Cuttings from the converters making industrial sack Kraft, having high stretch, wet strength and burst made from chemical Kraft pulp. Printers trimmings of currency paper

Grading of recovered paper

The purpose of wastepaper grading is basically to provide a framework for sorting, so that grades, which are defined within the system, represent acceptable levels of non-homogeneity of fibre types and promotion. This also allows recycling to be accomplished even in products in which specific properties are desirable.

There are many different wastepaper grading systems in use normally restricted to specific geographic regions e.g. these systems have been developed over an extended period of time and are generally quite different. Periodic revisions are made to incorporate new grades and all grading system provides basic definitions. In France & Japan, a standard grading system for collected RCP is in practice, which is proposed by some agencies involved. In France at the sorting center the RCP collected is sorted & baled in graded form while in Japan, the collection is made on "sorting at source by grading" concept. In India there is no standard grading of RCP exists. In the year 2002 CPPRI has proposed a grading system but it could not be made effective as its implementation needed an organized sector of collection in the country and unfortunately it was not existing. Table 1 shows a comparison of grading system & Table 2 shows the grading system proposed by CPPRI for indigenous RCP.

CONCLUSIONS

1. With growing demand of paper & paperboard, the utilization of RCP/wastepaper will also increase. As per the Jaakko Poyry estimates the recovery rate should

reach to a level 38% by 2020 to keep a pace with growing utilization rate, however, it is only possible if the collection mechanism is improved with at source grading of paper.

2. In India, a considerable scope is there for improvement in the existing system of collection of consumed paper. There is a need to setup an integrated paper collection chain exclusively for paper industry with proper gradation/classification of paper in place for better end utilization. This setup should have backward integration of collectors and dealers & forward linkage of supplier and paper industry.

3. It is observed that the recycling rates are higher in the countries where the legislation is in force and the possibility of such legislation should also be explore in India.

4. CPPRI is making sincere efforts in this direction and is trying to involve NGO's to setup a paper recovery chain exclusively for paper industry, however, it requires a commitment from the industry owners.

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