

Evaluation of Economic Aspects of Paper and Paperboard Recycling from Municipal Solid Wastes of Alborz Province

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ABSTRACT

For consider the human problems that have faced in recent years Inappropriate disposal of waste, including paper and cardboard production and the environment Regardless of which category of recycling and reuse of recycled materials, in addition to loss of assets And the cost of paper, causing the loss of natural resources and environmental damage is irreparable. Given the importance of economic and environmental aspects of recycling in the recycling of waste paper and cardboard was Alborz province. This descriptive was studied in order to determine the amount of municipal waste recycled paper and cardboard from the Alborz in 1388. For data collection, statistics and information used in the municipality. 59604 tons of paper consumed in the Alborz, in 1388 only 10 percent of the recovery and recycling has been collected from the origin. 10% of municipal waste recycled paper and cardboard from the failure of saving 99720 trees, 47030 (GJ) energy consumption is 1058184 cubic meters of water per year. Earnings from sales of recycled paper in the design of 5960450 thousand Rials, respectively. Also coming in with 100 percent recycled will save an amount equivalent to 59,604,500 Rials. The results showed that the recycling of waste paper and cardboard Alborz province is an economic justification and environmental.

Keywords: Recycled Materials, Environmental, Cardboard, Alborz Province.

INTRODUCTION

Increasing production of waste, including paper and cardboard recycling, regardless of category, in addition to squander national assets will also result in the loss of natural resources [1]. Recycling is a process in which materials are separated and collected as raw materials are used to produce new products [2]. Theoretically, the value in the dry recyclable component of municipal waste, including plastics, paper, cardboard, glass, metals, textiles and the bread is dry [3]. Paper and paperboard in the municipal solid waste generally includes: newspapers, books, magazines, paper printing, advertising, commercial, administrative correspondence, cardboard, packaging paper and tissue paper are [4]. These components are now collected as a mixture. In Iran, only 25 percent of the research paper at the annual 100 thousand tons of solid waste gets recycled paper. The concept of life-sustaining trees is 1700000 [2]. Considering that Iran is about 10.9% of municipal solid waste paper and cardboard to form a high potential for recycling these materials discovered in the country [5].

The ears should examine the benefits of paper recycling:

- 1- The need to reduce deforestation and preserve natural resources (per ton of recycled paper cut 17 trees to prevent forest [6-7].
- 2- Reducing energy consumption (Factories that produce paper from recycled paper uses 40 percent less energy than factories that produce paper from wood they are consuming. To produce energy equivalent to one ton of paper from wood 20 GJ is required [6].
- 3- Reduction in waste generation due to reduced water consumption (300,000 liters of water to produce one ton of paper from wood is needed. If the rate of 60 percent decreased the use of recycled paper.
- 4- Reduce the consumption of chemicals material.
- 5- Job creation (in the form of workshops, sales, distribution and use of recycled paper).
- 6- Capital preservation (protection from imports and revenue from selling recycled materials).
- 7- Reduce the volume of garbage and solid waste management effect on other steps to reduce costs, including collection, transportation and waste disposal.

The economic benefits of recycling paper and cardboard, Commission Europe Commission has recommended that strict Recycling and reuse of paper and paperboard used for the burial or burning them is preferred [8]. Although the status of waste management especially in the collection and transportation of country has improved significantly in recent years However, specific studies on recycling of waste components Such as recycled paper and cardboard, the country has not been divided. In this study the economic aspects of waste paper and cardboard recycling Alborz province (population 2.5 million people in 1388) were evaluated.

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EXPERIMENTAL

This descriptive was studied in order to determine the amount of waste paper and cardboard recycling was done in the Alborz in 1388. For data collection, statistics and information used in the municipality. According to statistics obtained from the separation of paper and cardboard in the origin Population informed of the Alborz Province (2500000) and per capita paper consumption per citizen in 1388 and the percentage that was recycled. The economic value of recycling and 100% current and 50 were evaluated.

RESULTS

Statistics show that around 2300 tons waste is produced in the Alborz per day on average. The average amount of paper and cardboard seventh percent (59604.5 tones) of municipal solid waste forms. Of which about 10 percent (5960.45 tons) of all paper used is recycled.

In Table 1 the profit from recycling paper and cardboard, Table 2 the environmental benefits and Table 3 and the economic benefit resulting from the current recycling 50 and 100 percent recycled paper and cardboard has been mentioned.

Table 1. Benefits from recycling paper and cardboard

	Paper collected (tons/year)	Sales price per ton of material recycled (thousand rial)	Profit from the current recovery (thousand rial)	Benefits of recycling 50% (thousand rial)	Benefits from 100 percent recycled (thousand rial)
paper and cardboard	5960.45	1000	5960450	29802250	59604500

Table 2 - Environmental benefits of recycling paper and cardboard in the Alborz

Index	Time		Time	Monthly	Yearly
			Daily	Monthly	Yearly
The current recycling paper and cardboard (10%)		Loss of cutting trees (trees)	227	8310	99720
		Reduction of energy consumption (GJ)	130.64	3919.2	47030.4
		Reduce water consumption (cubic meters)	2939.4	88182	1058184
Recycling 50%		Loss of cutting trees (trees)	1385	41550	498600
		Reduction of energy consumption (GJ)	653.2	19596	235152
		Reduce water consumption (cubic meters)	14697	440910	5290920
Recycling 100%		Loss of cutting trees (trees)	2770	83100	997200
		Reduction of energy consumption (GJ)	1306.4	39192	470304
		Reduce water consumption (cubic meters)	29394	8818200	10581840

Description: Every ton of recycled paper in exchange for re-use of cutting of trees is about 17 and 180 cubic meters of water and energy consumption (GJ) 8 will be saved.

Table 3 - The economic benefits of recycling paper and cardboard in the Alborz

Index	Time	Time	Yearly
		Yearly	Yearly
The current recycling paper and cardboard (10%)		Economic benefits of reduced deforestation (thousand rial)	29916000
		Economic benefits of reduced deforestation (thousand rial)	11597696
		Economic benefit of reduced water consumption (thousand rial)	2645460
		Proceeds from sales of recycled paper (thousand rial)	5960450
		Reduce the costs of collection and transportation of waste (thousand rial)	1788135
Recycling 50%		Economic benefits of reduced deforestation (thousand rial)	51907741
		Economic benefits of reduced deforestation (thousand rial)	13227300
		Economic benefit of reduced water consumption (thousand rial)	29802250
		Proceeds from sales of recycled paper (thousand rial)	8940675
		Reduce the costs of collection and transportation of waste (thousand rial)	259538705
Recycling 100%		Economic benefits of reduced deforestation (thousand rial)	299160000
		Economic benefits of reduced deforestation (thousand rial)	115976960
		Economic benefit of reduced water consumption (thousand rial)	26454600
		Proceeds from sales of recycled paper (thousand rial)	59604500
		Reduce the costs of collection and transportation of waste (thousand rial)	17881350
		Total (thousand rial)	519077410

- 1) The value of a hectare of forest is 120 million rial. There are 400 forest trees at a hectare of forest at average, [9]. Each tree is worth an estimated 300,000 rial
- 2) One kilowatt hour of electricity production costs and delivery times 900 rial and the economic value of energy (GJ) is 246,600
- 3) The economic value of one cubic meter of water is estimated at 2,500 rial.
- 4) Collection, transport and disposal of waste for each kilogram, 300 rial is the cost to municipalities of the Alborz province.

DISCUSSION

The results showed that a total of 59604.5 tons of paper and paperboard consumption is in the Alborz in 1388. The total amount of paper consumed, only 10 percent of it is collected and recycled. Comparing the results of this study can be seen with statistics and information about other Iranian cities; Recycling of waste paper and cardboard that are currently present in the Alborz province of Isfahan is located in the lower position. For example, while an average of 10 percent of the Alborz in paper and cardboard waste is recycled, while in the city of Isfahan, 15.5 percent of waste is recycled. According to Article 4 of the ordinance approved waste management 10/5/1384, The normal waste management master plan and detailed operational waste management So that the waste produced in provincial capitals and cities with populations of one million by the end of 1390 and in other towns and villages by the end of 1392 all the normal waste collection can be separated. Accordingly, there is still a huge gap between the amounts recovered in the province of the country, there are indicators Alborz. 10% recycled paper and paperboard consumption in the Alborz 1058184 cubic meters of water annually, reduce the. This means reducing the amount of wastewater discharged to the environment. Also energy save is 47030.4 (GJ). 57.6 percent of the economic benefit of recycling paper and cardboard to reduce deforestation is And economic benefit of reduced energy consumption, reduce water consumption, revenue from sales of recycled paper, reducing transportation costs and waste by municipality Respectively equal to 22.3, 5.1, 11.5 and 3.4 percent .

These percentages are determined by comparing the proceeds from the sale of recycled paper compared to other economic and environmental benefits, Only a small percentage of the economic benefit of recycling paper and cardboard which is, And in consideration of all economic and environmental aspects of recycling paper and cardboard Can be explained by economic and environmental recovery of waste paper and cardboard from the province following the Alborz province.

Conclusion

The results showed that the recycling of waste paper and cardboard Alborz province of the economic justification is adequate. The development and increasing recycling paper and cardboard Recommended the expansion of investment in education and culture in society should be done.

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