



International Journal of Current Research Vol. 10, Issue, 01, pp.64190-64193, January, 2018

RESEARCH ARTICLE

ASSESSMENT ON BENEFITS OF ENVIRONMENTAL-ECONOMIC WASTE RECYCLINGIN MASHHAD DURING 2013-2015

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ARTICLE INFO

Article History:

Received 18th October, 2017 Received in revised form 26th November, 2017 Accepted 21st December, 2017 Published online 19th January, 2018

Key words:

Waste, The economy Recovered, Mashhad, Environment.

ABSTRACT

This was across - sectional study that was conductedin 2014. The purpose of this study was to characterize the quality and quantity of recyclable waste in Mashhadcity in terms of the economic value and environmental impact. On the other hand, the energy from burning them and the resulting benefits were studied. The results show an average of 1,656 tons of waste is produced in the city of Mashhad; the per capita waste production per person is 630 grams per day. Based onthe physical analysis of waste in Mashhad, during 1389, 1390, and 1391, there were 630,650, 700 put rescible materials, 209, 208, 230 Paper, 198, 212, 230 Metal, 235, 223, 240, plastics, 160, 190, 187glass, and 98, 110, 99P at respectively. If we dofull recycling of solid waste per dayin 2278 to 91 million Rialsprofit, it only resultsinan economic benefit of recycling that shows in the great city of Mashhad. The amount of energy derived from burning materials will reach to 21224050GJ in 1391.

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Citation: Mokhtar Karami, Majid Ebrahimi and Javad Dawoudian, 2018. "Assessment of benefits environmental-economic waste recycling in Mashhad During 2013-2015", *International Journal of Current Research*, 10, (01), 64190-64193.

INTRODUCTION

Amount of waste produced depends on many different factors and parameters, some of which are: the population size of the area under study, socio - economic factors - cultural, rainfall, etc. (Shahroodi and Javadi, 2007). Due to increasing population and rising living standards, the technologies of solid waste from industrial and human activities are increasing. The last time due to the devastating impact of solid waste on the environment was not known, solid waste management were not given much importance and also the lack of technology, and personnel of national resources to prevent the Solid Waste Management for it (Beretclin and Celer, 2003). Global status of municipal solid waste management: Municipal solid waste contains many different compounds that require the proper management of all classes of storage, collection, disposal and burial. Municipal waste management reasons focused on different countries and the international community, especially developed countries, and some of the factors include:

• Release of municipal waste in the environment, causing severe and irreversible environmental pollution in groundwater flow (air and soil).

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- Municipal solid waste is one of the major contributors to greenhouse gas emissions that lead to global warming, pose a significant negative impact.
- It does not accept any compromise in the high cost of waste management.
- Part of the waste is recycled. This means that reusing them will save valuable energy and raw materials.
- Producing energy from waste is cleaner than energy from fossil sources.
- The production of energy from waste, all or a portion cost back with waste management.

For solid waste management system in a region of the principles, technical design and implementation of programs related to the maintenance, collection, transportation, final disposal and reclamation projects such as compost fertilizer sources, energy from waste, biogas production, recycling and reuse, the need for accurate determination of physical and chemical characteristics the amount of waste produced in the region. In terms of diversification, diversification of production and characterization of municipal solid waste components, it is very difficult to consider as a basis for scientific management activities on the environment and public health provision which is considered necessary (Diaz *et al.*, 1993). In Iran, despite the numerous progressions in the years after the Islamic Revolution over 4,000 million rails has arisen in order to collect and transport 50 tons of waste in urban and rural areas of which

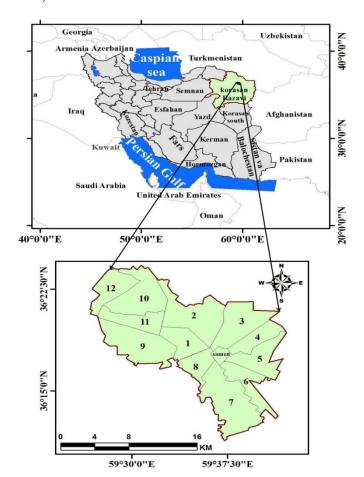
about 70 percent include compost and 20% of the industries are recyclable (Farashi *et al.*, 2008).

Definition of Waste

In fact, the waste material becomes a waste, it lost its economic value, or No other use must be put in place over the hurt and harm to human health or the environment, also enclosed is permanently, and safely control. Typically, trash all solid waste (corruptible and incorruptible) is said, procurement, distribution and sale centers of food products, will produce industrial enterprises, commercial, agricultural and hospitals (Movashed, 2013).

Control and waste management

Management of solid waste, including toxic waste and hazardous waste management, is among inevitable necessities in urban areas. Today, rapid population growth, urbanization, migration of people from rural to urban areas, changes in consumption patterns and uncontrolled industrial development and diversification of the things led to a steady increase in production municipal solid waste (Mohammadi, 2009). Currently, most communities in the management of urban waste into municipal authorities have become one of the main priorities. Technology and population growth, industrial waste recycling has become one of the most important environmental challenges and humanitarian issues. Each country has different procedures adopted to square away the big problem (Sajadi, 2008).



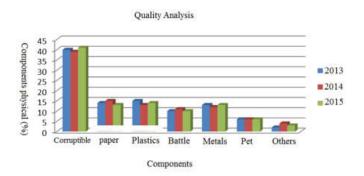
Literature

Karimi et al. (2015) showed that the amount of solid waste generated in the city of Chalus annual average of 102.5 tons per

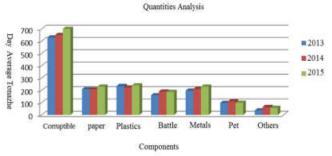
day and Per capita production of municipal solid waste per person per day on average is 1.626 kg. Abdoli Klor *et al*, (1391) tested economic values and environmental benefits of recycling waste for the city of Bandar Anzali and the results establish the various phases of the plant and the recovery of recyclable materials from municipal waste, which are economically feasible and environmental. Ahmadpoor *et al.*, (2014) examined recyclable wastes from the city of Chalus quantitatively, the results showed that in addition to the economic aspects of recycling these materials, thereby regenerate forests, reduce degradation of natural resources, and the environment; Reducing pollution and landfill problems are related to many social problems that will be reduced accordingly.

MATERIALS AND METHODS

Mashhad, capital of Khorasan Razavi province, with a population of 2,600,000 and 204 square kilometers is located in the North East of Iran and the longitude 59 degrees 15 minutes and 60 degrees 36 minutes latitude 35 degrees 43 minutes to 37 degrees and 8 minutes. This was a cross - sectional study conducted in 2014. Data collected through interviews with officials and experts in recycling schemes, operated utilities and contractors. The origin of the documents in this field was observations and research institutions and libraries. The purpose of this study was to characterize the quality and quantity recyclable waste in Mashhad in terms of the economic value and environmental impact. On the other hand, burning them and profit from them were determine the estimated economic examined. To environmental studies, library resources and internet sources were used. Finally, to compare data from a physical analysis in SPSS were compared with each other. Data analysis was performed using Excel software.

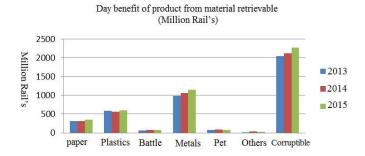


Graph 1. Percent of components physical in Mashhad city in period of 3 years (2013-2015)



Graph 2: Day Average Tonnage in Mashhad city in period of 3 years (2013-2015)

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Graph 3. Day benefit of product from material retrievable (Million Rail's) in Mashhad city in period of 3 years (2013-2015)

Table 1. Day benefit of product from material retrievable (Million Rail's)

| 2015 | 2014 | 2013 | Cost of each kg (Rial) | Type |
|------|--------|--------|------------------------|----------|
| 345 | 312 | 313.5 | 1500 | paper |
| 600 | 557.5 | 587.5 | 2500 | plastic |
| 74.8 | 76 | 64 | 400 | bottle |
| 1150 | 1060 | 990 | 5000 | material |
| 79.2 | 88 | 78.4 | 800 | per |
| 29 | 32 | 18.5 | 500 | others |
| 2278 | 2125.5 | 2051.9 | | total |

Table 2. Day Energy of product from burn in Mashhad city (2013-2015)

| Туре | Energy based on 1 ton material (GJ) | 2013 | 2014 | 2015 |
|-------------|-------------------------------------|----------|----------|----------|
| Corruptible | 4650 | 2929500 | 418500 | 423150 |
| Paper | 16500 | 3448500 | 10725000 | 11550000 |
| Plastic | 32600 | 7661000 | 6780800 | 7498000 |
| Bottle | 4650 | 744000 | 1036950 | 1116000 |
| Material | 700 | 138600 | 133000 | 130900 |
| Pet | 2200 | 215600 | 466400 | 506000 |
| Total | - | 15137200 | 19560650 | 21224050 |

Table 3. Reduced of cost economic and environmental product from retrievable of 100% of paper

| Year | Index | Tree (number) | Water (m³) | Space of land file (m³) | Oil (Gallon) |
|------|-------|---------------|------------|-------------------------|-----------------|
| 2013 | day | 3553 | 37620 | 627 | 96767 |
| | year | 1296845 | 13731300 | 228855 | 35319955 |
| 2014 | day | 3536 | 37440 | 624 | 96304 |
| | year | 1290640 | 13665600 | 227760 | 35150960 |
| 2015 | day | 3910 | 41400 | 690 | 106490 |
| | year | 1427150 | 15111000 | 251850 | 38868850 |

Table 4. Reduced of cost economic and environmental product from retrievable of 100% of bottle

| Year | index | Oil (Gallon) | Carbonate sodium (kg) | Feldspar (kg) |
|-------|-------|-----------------|-----------------------|---------------|
| 2013 | day | 4800 | 31382.4 | 10944 |
| | year | 1752000 | 11454576 | 3994560 |
| 2014 | day | 5700 | 37266.6 | 12996 |
| | year | 2080500 | 13602309 | 4743540 |
| 2015 | day | 5610 | 36678.18 | 12790.8 |
| Total | year | 2047650 | 13387535.7 | 4668642 |

DISCUSSION AND CONCLUSION

The results of qualitative and quantitative measurements of solid waste are shown in Figure 1. The economic value of the material (separation at source) was estimated in Figure 3. The average annual per capita waste per person was calculated to determine the statistical differences between the different

compositions of SPSS software was used (Table 2). Since reusing of 3989 grams per ton of recycled paper reduces the release of particulate matter, 2,782 grams of CO2, H₂S is released into the atmosphere in order to reduce the discharge of approximately 15 grams of SO, with 100% of recycled paper in Mashhad in daily 91 91 741 kilograms of particulate matter, 641 441 grams of CO₂, 34.5 kg of H₂S to the atmosphere. On the other hand, there were about 700 perishables in 1391 since the rate of about 350 to 400 tons of it is converted into compost.

Conclusion

The results show an average of 1,656 tons of waste is produced in the city of Mashhad; the per capita waste production per person is 630 grams per day per capita national average (640 g) less. Based on the physical analysis of waste in Mashhad, for the years 89, 90, 91, 630,650, 700 putrescible materials, 209, 208, 230 Paper, 198, 212, 230 Metal, 235, 223, 240, plastics, 160, 190, 187 glass, 98, 110, 99 Pat is respectively. According to Table 1, the full recycling of solid waste daily amount of 2,278 million Rail's profit achieved in just 91 years – is This economic benefit of recycling in the city of Mashhad great show. According to Table 2, the amount of energy derived from burning material 91 can be obtained in about 21,224,050. To produce one ton of paper, 17 trees are cut. Thus, according to Table 3 with 100% recycled paper content in day 91 of the 3910 outage will prevent trees in Mashhad. In addition, the amount of recycled paper and 106,490 gallons per day of oil and 41,400 cubic meters of water will be saved. On the other hand, and according to Table 4 of 100% recycled glass in Mashhad, 5610 gallons of oil per day, 36,678 kg and 12,790 kg of sodium carbonate, feldspar storage and dissipation are preventing them.

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