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### A novel Approach in Remanufacturing for Improved Collection Network design

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#### Abstract

In current world, the uses of four wheelers and two wheelers are increased day by day. Consumption of tyres have increased as larger nearly 15 million ton per annum scrap tires are recycled in India up to the year 2013. Improper methods of disposal and recycling create a major impacts on environment (i.e., pollute the air, water and soil) and human (i.e., dengue fever, encephalitis etc.). Selecting efficient methods for the collection and recovery of end of life tyres has become an important issue in India. The main objective of this paper is to design a sustainable recovery network, in which economic, environmental and social impacts are balanced. In this concerning recovery network we consider a statistical data analysis method for data collection and local area (Nasik) for surveying. Considering the result of local survey, In future the best heuristics method will be selected for comparison and it has been developed to maximize economic and social benefits and minimize negative environmental impact.

Keywords: Surveying, Data collection, Sustainable recovery network.

#### I. Introduction

Nowadays disposal of different wastes produced from public areas and from different industries is a major problem. Improper disposal of wastes is major issue of this current world. Improper methods of disposal would create major health risk for human and environment. In India large amount of waste tyres are generated in every year. Rubber tyres are user friendly but not eco-friendly as they are non-bio degradable. The users of two wheeler and four wheeler are not following systematic methods in waste tyre disposal. Comparing to other countries the tyres which comes to the end of life period the used tyres are disposed in proper network method and which is to protect the environment from all the major issues. In India the waste tyres are not flow in a systematic order and also there is no legislation which bans the improper disposal of waste tyres. A tyre which comes to the end of life period the users are thrown into urban areas and it creates major hazardous for human and environment. It pollutes the air, water and soil. This paper is concerning about the entire major impacts and has to create a sustainable recovery network which has to protect the environment from various menaces. And also various methods are available such as incineration, landfill, and pyrolysis for controlling the improper disposal of waste tyres. These various methods are given improper solution towards ecological menace. In this creation of sustainable recovery network considering the local areas for surveying and also relevant data's collected from various local companies. In these relevant data's various possible factors are available that is trade with used tyres and recovery disposal for consideration. The benefits of sustainable recovery network is to protect the humans from various major diseases (mosquito borne diseases, lung cancer etc.) and also decreases the environmental impacts (pollution, global warming etc.) and improves the social benefits (export, re-tread etc.) .these sustainable recovery network changes the environment into clean and green environment.

#### II. Literature Review

By reducing the environmental impacts and also use various technologies for reducing the improper disposal of used tyres [1]. Improper disposal of waste tyres create a various diseases for human and also pollute the soil and water and atmosphere various recent technologies like pyrolysis method and incineration methods are available to

recover a waste tyres into energy. Objective of this paper is to reduce the environmental impacts and energy recovery. And also compare the results of both method and take best method which is suitable and sustainable for environment.

Consider the existing network and also various types of recommendation are consider for minimizing the waste generation in Hong Kong[2]. Waste generation is a major problem in Hong Kong conducting survey method for relevant data collection and also tabulated the collected matters. Researchers consider the reuse, recycling methods for reducing the waste generation. For further research nine types of recommendation methods are considered to give good solution towards ecological menaces. And also compare the existing methods for further research. Use relevant processes for improving the economic and social benefits and also compare with GA for finding optimal solution [3]. Waste reductions is a main aim of this paper and also design a sustainable recovery network, in which economic, environmental and social impacts are balanced. Considering the major processes that is Life cycle analysis (LCA) has been applied to investigate the environmental impact. Analytical hierarchy process (AHP) has been utilized to calculate social impacts and also Multi-objective genetic algorithm (MOGA) has been applied to find the Pareto-optimal solutions. Scrap tires have been considered for a case study.

In German statistical data collection table is used for selecting different reduction techniques [4]. The objective of this paper is to reduce the scrap tyres using some technology that is size reduction technology. Using statistical data analysis method for collecting the information associated in scrap tyres. For future the various technologies will be processed and comparing the results of existing technology and also give good solution towards scrap tyres reduction. End of life product management is complicated one using algorithm for problem solving and comparison and choose a best solution [5]. The product which comes at the end of life period the management of recovery process is a critical issue in current world. Creating a new problem depends on end of life products and forms a sustainable network for recovery and use genetic algorithm for solution. This GA solution is compared to some suitable software's like MATLAB and LINGO software for finding the optimal solution and gives good quality of the products.

### III. Problem Description

In Nasik two tonnes of used tyres are generated per day. These used tyres are not flow in a systematic manner and these used tyres are disposed into public areas and water dumped areas and also urban areas. In this metropolitan's city these type of improper disposal is a major issue and leads to create a serious problem for human and environment. There is no other network or any other systematic flow orders followed in Nasik till now. In Nasik sustainable recovery network for used tyres is a must one. This recovery network is to increase the commercial benefits and also protect the human from various diseases and also environment. In these network is best one for collecting various information about used tyres from users.

### IV. Solution Methodology

Selection of new methodology for minimizing the improper disposal of used tyres is a challengeable one in Nasik. Improper disposal of used tyres leads to create major problems in environment and human. In Nasik concerning about all the environmental and social impacts and analyse the data collection results we choose sustainable method from relevant base paper it give good solution and which should be balanced towards ecological menaces. Scrap tyre disposal statistics method is a best suitable method for collecting the data in the various company and also categorise the collected data. The purpose of this method is to attain some objectives in order to give good solution towards ecological menaces. In this method the various factors are available 1.trade with used tires (Sales, Export, and Re-tread) and 2.recovery disposal (Material, Energy, Landfill) the data collection would be formed in a systematic order it is based on the survey. Scrap tyre disposal statistics method is taken from the journal "Scrap Tyre Recycling by Kurt Reschner Berlin, Germany pg. no: 2 to 3". In this journal 30 companies are selected for surveying. Based on the survey result tabulate the collected data and also categorize trade with used tyres and recovery disposal. And also suitable recovery process is to be selected for minimizing the generation of scrap tyres and selected method is suitable for maximizing the economic benefits social benefits. Choose local area Nasik for survey. The purpose of survey is to collecting various information's from various companies. And find a various reverse logistics methods are used in various companies. Also various methodologies are available in processes. Relevant data's are collected based on the set objectives. The survey is purely based on considerable factors which are available on the above and relevant techniques are used to achieve set objectives. It is useful for creating a new network it tends to minimize the negative environmental impacts and maximizing the economic and social benefits. In this data collection relevant data's are

collected from various tyre companies depends on our project relevant technologies are used in some companies for reduction of used tyres these relevant data's collected from various companies is segregated and tabulated. And these data collection tabulation is helped to form a sustainable recovery network in Nasik metropolitan city.

### V. Data Collection

This tabulation indicates various exact data related to minimization of improper disposal of used tyres. Based on the base paper methodology we visited number of companies and collected various important matters related to set objective. In existing network the tyre which comes at the end of life period many of the users are disposed that used tyres in various method some of the users are given that used tyres into small scale tyre industries. These companies collected that various two wheeler and four wheeler tyres and provide a large space for dumping it creates various diseases and also resale that used tyres into another user. The damaged tyres are collected from various two wheeler workshop and four wheeler workshop and cut into various sizes and these tyres are exported for various purposes which lead to give high benefits. Some users are choosing the beneficial technique that is re-treading technique. These techniques give a valuable benefit for users and it leads to decreases the improper disposal of waste tyres.

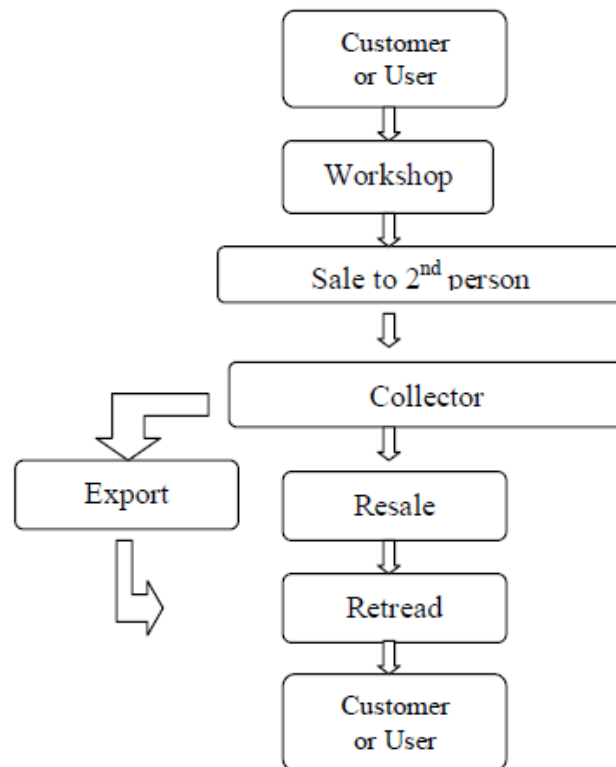
Table1: Data collection

Sl No	company	Resale	Export	Retread	Material	Energy	landfill
1	1	50%	-	-	10%	-	5%
2	2	60%	10%	-	-	-	-
3	3	30%	40%	-	5%	-	-
4	4	10%	50%	-	-	-	-
5	5	20%	30%	40%	10%	-	-
6	6	10%	10%	40%	10%	-	20%
7	7	40%	30%	-	-	-	-
8	8	10%	20%	50%	5%	-	-
9	9	40%	30%	-	-	-	-
10	10	10%	20%	50%	-	-	-
11	11	10%	50%	-	10%	-	-

### VII. Sustainable Recovery Network Design

In the creation of sustainable recovery network based on the base paper concerning about the survey result and data collection the following data's are tabulated. And design a proper network in order to minimize the negative impacts of the environment and maximize the economic and social benefits. Sustainable network is to facilitate the tyre flow. In order to minimize the improper disposal of used tyres. It leads to give good solution towards ecological menace. The more scrap tyre are utilize proper manner. Minimize the negative environmental impacts. Maximize the economic and social benefits are the importance of sustainable recovery network

Figure 1. sustainable recovery network design



### VIII. Conclusion

Based on the scrap tyre disposal statistics method we choose local area for surveying. In Nasik division survey is to be completed and data's are collected from various companies and segregated the collected information. These valuable data collection helps to take a sustainable recovery network design technique. In this paper consider the various environmental impacts created due to the improper disposal of used tyres. From the base paper we have taken the sustainable methodology related to improper disposal. In Nasik various companies are visited and also collected the information based on used tyres. It helps to select a suitable recovery network design technique for reducing the improper disposal and protect the human and environment from various impacts. Based on the survey result the sustainable recovery network was designed. It helps to give good solution towards ecological menaces. In future the multi objective problem will be developed and it will be solved using relevant heuristics method for further comparison and also find the optimal solution.

### References

- [1]. Zhiqiang Lua, Nathalie Bostel, "A facility location model for logistics systems including reverse flows: The case of remanufacturing activities" *Computers & Operations Research* 34pg no . 299-323(2007).
- [2]. Srikanth Kumar, M. Ramachandran, A Novel Approach for the Vendor Selection in the Refrigeration Industry, *International Journal of Applied Engineering Research*, Volume 10, Number 11 (2015) pp. 10120-10122.
- [3]. Mohammad Bagher Fakhrazad & Mitra Moobed, "A GA Model Development for Decision Making Under Reverse Logistics" *International Journal of Industrial Engineering & Production Research*, Vol.21, Number 4 , pp. 211-220 December 2010.
- [4]. F. Schultmann, M. Zumkeller, and O. Rentz, "Modeling reverse logistic tasks within closed-loop supply chains: an example from the automotive industry," *European Journal of Operational Research*, vol. 171, no. 3, , pp. 1033-1050(2006).
- [5]. Sudarshan Lodha, M. Ramachandran, Need of Multi criteria decision making in Vendor Selection for the Automobile Industry, *International Journal of Applied Engineering Research*, Volume 10, Number 11 (2015) pp. 10301-10304.
- [6]. O.Listes, and R. Dekker, "A stochastic approach to a case study for product recovery network design," *European Journal of Operational Research*, vol. 160, no. 1, pp. 268–287, 2005.
- [7]. P.Georgiadis and D. Vlachos, "The effect of environmental parameters on product recovery," *European Journal of Operational Research*, vol. 157, no. 2, pp. 449–464, 2004.
- [8]. H. J. Ko and G. W. Evans, "A genetic algorithm-based heuristic for the dynamic integrated forward/reverse logistics network for 3PLs," *Computers & Operations Research*, vol. 34, no. 2, pp. 346–366, 2007.

- [9]. Mayank Jain, M. Ramachandran, Buy/Make decision making framework for pump product development with multi criteria decision making, *International Journal of Applied Engineering Research*. ISSN 0973-4562 Volume 10, Number 11 (2015) pp. 10486-10489.
- [10]. J. Bautista and J. Pereira, “Modelling the problem of locating collection areas for urban waste management. An application to the metropolitan area of Barcelona” *Omega*, vol. 34, no. 6, pp. 617– 629, 2006.
- [11]. S. Mansour and M. Zarei, “A multi-period reverse logistics optimization model for end-of-life vehicles recovery based on EU Directive”. *International Journal of Computer Integrated Manufacturing*, vol. 21, no.7, pp. 764–777, 2008.
- [12]. V.K. Sharma, F. Fortuna, “Disposal of waste tyres for energy recovery and safe environment” *Applied Energy* 65 page no.381-394 (2000).
- [13]. Vivian W.Y. Tam C.M. “Evaluations of existing waste recycling methods: A Hong Kong study” *Elsevier journal Building and Environment* 41 pg. no. 1649–1660 (2006).