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## END-OF-LIFE VEHICLES ASSESSMENT OF THE AUTOMOBILE INDUSTRY USING REVERSE LOGISTICS SUPPLY CHAIN AND MACHINE LEARNING ALGORITHMS

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### Abstract

Automotive industry is highly regulated in terms of waste management. With the fast-expanding number of automobiles on the road, governments around the world must also increase waste management measures. Furthermore, modern facilities for the reuse and recycling of waste materials such as metal, solvents, batteries, and plastics are nearing the end of their useful lives. Reverse logistics management of End-of-Life Vehicles (ELVs) is increasingly focusing on practical solutions for getting additional value from products at the end of their life. This article focused on the end-of-life vehicle assessment of the automobile industry for waste management. Accordingly, the study suggested using reverse logistics of the supply chain (RLSC) for managing automobile waste efficiently and effectively. Insufficient Information Sharing (IS) is a significant matter in the RLSC of automotive waste that hasn't received much attention. Therefore, this study aims to define the characteristics of IS in RLSC of car waste and to provide information parameters for car trash. For this, the employed received a questionnaire of statistical data with a parameter structure to assess the efficacy of these techniques based on industry practitioners' practical experiences. The parameter structure data from the questionnaire will be anticipated using a case-based reasoning approach based on Artificial Neural Networks (ANNs). Both MATLAB and SPSS software were used to analyse the collected data and the training session of Statistical Package for the Social Sciences (SPSS) lasts only about 98 seconds. In SPSS, the ANN network correctly classified 150 questionnaire cases (out of 186) and the best model was chosen with a regression value of 0.9942. The hypothesis study revealed that Sustainable Logistics Practices (SLP), Material Market Demand (MMD), End of Life Vehicles (ELV), Information Sharing (IS), Recovery (RV), Recycling (RC), and Component Remanufacturing (CR) variables positively correlated with ( $r=0.085$ ,  $r=0.092$ ,  $p<0.01$ ), while only Replacement Parts (RP) is negatively correlated ( $r=-0.083$ ,  $-0.66$ ,  $-0.10$ ) with dependent variables. The Root Mean Square Error (RMSE) value is 0.0013, indicating that the ANN model in MATLAB software performed better than the SPSS model, which had a regression value closer to one. Ultimately, the results from both analyses found that MATLAB software had a higher rate of prediction compared to the SPSS regression model respectively.

*Key words:* automobile waste management, information sharing, recycling, reprocessing, reverse logistics, supply chain management

*Received:* July, 2022; *Revised final:* December, 2022; *Accepted:* January, 2023; *Published in final edited form:* February, 2023

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