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Evaluation of EOL/used cell phones management & disposal alternatives: An ANP and balanced scorecard approach

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Sustainable remanufacturing of mobile phones must meet the challenges of continuously falling prices for new phone models, short life cycles, disassembly of unfriendly designs and prohibiting transport, labor and machining costs in developing countries. One of the important problems faced by the top management in the mobile manufacturing/remanufacturing industries is the evaluation of various alternatives for end-of-life (EOL) mobile phones. EOL mobile phones should be managed carefully because of hazardous content especially in developing countries. The main objective of this study was to analyze the current status of used & end-of-life (EOL) management in Indian business environment, and to investigate the most appropriate EOL cell phone management and disposal option by using Analytic network process (ANP) based decision model. For this purpose, five different EOL cell phones management/disposal alternatives including Repair, Refurbishing & Reuse (RRR), Cannibalization, Remanufacturing & Reuse (CRR), Incineration with energy recovery for most of the elements & disposal to landfill for a few elements (INC), Recycling of complete mobile phone for material recovery (REC) and Disposal of Whole Product to Landfill (LND) were evaluated according to multi-criteria decision making technique ANP. In this context, benefits, costs and risks for the alternatives were taken into consideration. Data was collected and analyzed in order to quantify the environmental and economic outcomes of the current business environment. In the proposed model, uncertainties regarding quantity and conditions of mobile phones, reliability of capacities, processing times, and demand are considered. The few dimensions of reverse logistics for the EOL mobile phones have been taken from four perspectives derived from balanced scorecard approach, viz. finance, social, green business and internal operational perspective. The present approach links the financial and non-financial, tangible and intangible, internal and external factors, thus providing a holistic framework for the selection of an alternative for the reverse logistics operations for EOL cell phones. Many criteria, sub-criteria, determinants, etc. for the selection of reverse manufacturing options are interrelated. The ability of ANP to consider interdependencies among and between levels of decision attributes makes it an attractive multi-criteria decision-making tool. Thus, a combination of balanced scorecard and ANP-based approach proposed in this paper provides a more realistic and accurate representation of the problem for conducting reverse logistics operations for EOL cell phones.

Biography

Arvind Jayant is presently working as an Associate Professor in the Department of Mechanical Engineering and Head, Department of Disabilities Studies, Sant Longowal Institute of Engineering & Technology, Deemed University, Longowal, Punjab, India (Established by MHRD, Govt. of India). His research area expertise includes Supply Chain Management, Reverse Logistics & Simulation of Manufacturing System. He has published more than 100 research papers in International/national journals. He has completed three sponsored research projects of Rs. 10 Millions funded by MSJE, MHRD and CSIR. He is the members of different professional bodies like ISTE, ISME, IWS, IIE (USA), IACSIT (Singapore), IAEngg. (Hongkong). He had visited USA, Japan, England, Nepal and Singapore.

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