Examining the Extent of Environmental Compliance Requirements on Mechatronic Products and their Implementation through Product Lifecycle Management

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The present mixed-methods study examined the opinions of industry practitioners related to the implementation of environmental compliance requirements into design and manufacturing processes of mechatronic and electromechanical products. It focused on the environmental standards for mechatronic and electromechanical products and how Product Lifecycle Management software tools are used to facilitate environmental compliance of such products. Both qualitative and quantitative data were collected during the study and they included perceptions of people who work on design and development of those products. Use of the constant comparative method with data retrieved from interviews in the study revealed that environmental compliance standards related to mechatronic and electromechanical products can be grouped in the following four categories: standards related to hazardous substances, standards related to the end of the product lifecycle, standards related to energy efficiency and standards that deal with environmental impact on nature. Other conclusions are that Product Lifecycle Management tools are mostly used to support material tracking of hazardous substances in the company and that there are many problems related to that. The most important problem is related to resources, such as cost and time, for which a company needs to manage environmental compliance information. Integration of environmental compliance also has caused new job openings and changes in participants' daily job activities. Quantitative portion of the study included data gathered from 103 industry practitioners with the original survey instrument consisting of 66 items, five of which included 30 Likert-type response items of which 25 were used in Exploratory Factor Analysis and one was used as a response variable. Statistical analysis of qualitative data revealed that the greatest influence on the level of customer satisfaction related to environmental compliance of mechatronic and electromechanical products have neutral collaboration and data exchange. Constraints related to the environmental compliance, along with other four predictors identified in the study are effective product data management, location, consequences of non-compliance, and global supply chain. Results of the stepwise linear regression lead to the conclusion that the major influence on the level of customer satisfaction related to environmental compliance of mechatronic and electromechanical products are location, global supply chain and constraints related to environmental compliance.