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Exploring Managerial Approaches towards Green Manufacturing: A Thematic Analysis

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Abstract : Since manufacturing firms deplete non-renewable resources and pollute air, soil, and water in greatly unsustainable manner, industrial activities or production of products are considered to be a key contributor to adverse environmental impacts. Hence, management strategies and approaches that involve an effective supply chain decision process in a manufacturing sector could be extremely significant to the application of environmental initiatives. Green manufacturing (GM) is one of these strategies which minimises negative effects on the environment through reducing greenhouse gas emissions, waste, and the consumption of energy and natural resources. This paper aims to explore what greening methods and mechanisms could be applied in the manufacturing supply chain and what are the outcomes of adopting these methods in terms of abating environmental burdens? The study is an interpretive research with an exploratory approach, using thematic analysis by coding text, breaking down and grouping the content of collected literature into various themes and categories. It is found that green supply chain could be attained through execution of some pre-production strategies including green building, eco-design, and green procurement as well as a number of in-production and post-production strategies involving green manufacturing and green logistics. To achieve an effective GM, the pre-production strategies are suggested to be employed. This paper defines GM as (1) the analysis of the ecological impacts generated by practices, products, production processes, and operational functions, and (2) the implementation of greening methods to reduce damaging influences of them on the natural environment. Analysis means assessing, monitoring, and auditing of practices in order to measure and pinpoint their harmful impacts. Moreover, greening methods involved within GM (arranged in order from the least to the most level of environmental compliance and techniques) consist of: •product stewardship (e.g. less use of toxic, non-renewable, and hazardous materials in the manufacture of the product; and stewardship of the environmental problems with regard to the product in all production, use, and end-of-life stages); •process stewardship (e.g. controlling carbon emission, energy and resources usage, transportation method, and disposal; reengineering polluting processes; recycling waste materials generated in production); •lean and clean production practices (e.g. elimination of waste, materials replacement, materials reduction, resource-efficient consumption, energy-efficient usage, emission reduction, managerial assessment, waste re-use); •use of eco-industrial parks (e.g. a shared warehouse, shared logistics management system, energy co-generation plant, effluent treatment). However, the focus of this paper is only on methods related to the in-production phase and needs further research on both pre-production and post-production environmental innovations. The outlined methods in this investigation may possibly be taken into account by policy/decision makers. Additionally, the proposed future research direction and identified gaps can be filled by scholars and researchers. The paper compares and contrasts a variety of viewpoints and enhances the body of knowledge by building a definition for GM through synthesising literature and categorising the strategic concept of greening methods, drivers, barriers, and successful implementing tactics.

Keywords : green manufacturing (GM), product stewardship, process stewardship, clean production, eco-industrial parks (EIPs)
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