

New Product Development for Green and Low-Carbon Products – A Case Study of Taiwan' s TFT-LCD Manufacturer

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Abstract

Green supply chain has become an important topic these days due to pollution, global warming, extreme climatic events, etc. A green product is manufactured with the goal of reducing the damage to the environment and limiting the use of energy and other resources at any stage of its life, including raw materials, manufacture, use, and disposal. Carbon footprint is a good measure of the impact that a product has on the environment, especially in climate change, in the entire lifetime of the product. Carbon footprint is directly linked to CO₂ emission; thus, the reduction of CO₂ emission must be considered in the product life cycle. Although more and more researchers are working on the green supply chain management in the past few years, few have incorporated CO₂ emission or carbon footprint into the green supply chain system. Therefore, this research aims to propose an integrated model for facilitating the new product development (NPD) for green and low-carbon products. In this research, a systematic model based on quality function deployment (QFD) is constructed for developing green and low-carbon products in a TFT-LCD manufacturer. Literature review and interviews with experts are done first to collect the factors for developing and manufacturing green and low-carbon products. Fuzzy Delphi method (FDM) is applied next to extract the important factors, and fuzzy interpretive structural modeling (FISM) is used subsequently to understand the relationships among factors. A house of quality (HOQ) for product planning is built last. The results shall provide important information for a TFT-LCD firm in designing a new product.

Keyword : New product development (NPD); carbon footprint; CO₂ emission; TFT-LCD; quality function deployment (QFD); fuzzy Delphi method (FDM);

fuzzy interpretive structural modeling (FISM).