

Chapter 91

Sustainable Manufacturing in the Era of Industry 4.0: A DEMATEL Analysis of Challenges

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ABSTRACT

This is an era of information technology and Industry 4.0 in the manufacturing sector. Globalization and spread of technology have leveled the field of competition among all economies. With aforementioned development, there is a need for sustainable manufacturing practices to justify the use of natural resources all over the globe. Both developed and developing economies should adopt the sustainable practices of manufacturing. On other hand, managing challenges of sustainable manufacturing is an uphill task for manufacturing organizations for several reasons. In this chapter, the author has analyzed the challenges of sustainable manufacturing by using DEMATEL technique to differentiate them in cause and effect challenges. This differentiation can further help in effective analysis of these challenges. From practical and managerial viewpoints, this study can help the policymakers and strategy planners of manufacturing organizations in better understanding of sustainability and its aspects. Further, it can help in developing policies on sustainable manufacturing on national and international level both in developed and developing economies.

INTRODUCTION

Sustainability is a concept that is accepted widely these days. But common assumptions relate sustainability to only environmental issues. Sustainable manufacturing means ability to sustain, less wastage or carbon-less manufacturing. It has three aspects related to environment, economic and social. Sustainable manufacturing focuses on such strategies which work in present without sacrificing and polluting the resources of future. The process of production and product manufacturing should be environment friendly, sustainable in order to meet the criteria of recycle, remanufactured and reusable products till the end of their tenure.

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The science of winning organizations deals with the Green strategies that also combines the spotting and disposing of the various types of wastes that are frequently disregarded. As of now definition of Green has included “helping to sustain the environment for future generations”. Sustainable has been defined these days as “The elimination of waste everywhere while adding value for customers”. With environment, economy, and society, modern manufacturing is highly depends on technology and the influential role of technology on sustainable manufacturing practices cannot be ignored. Molamohamadi and Ismail (2013) observed that very few authors have studied the scope of technology in resolving the environmental and social menaces.

The information technology and practices of Industry 4.0 has contributed significantly on sustainability front. With digitalization of other process, manufacturing practices have also evolved significantly in this era (Kayikci, 2018). Digital practices can contribute significantly for sustainability by reducing carbon foot prints, maximizing renewable energy usage and can generate efficient and economical viable technology solutions suitable for both individual and society. Haapala et al. (2013) stated that Sustainable manufacturing calls for coincidental thoughtfulness of economic, environmental, and social significances colligated with the production and delivery of goods.

SUSTAINABLE MANUFACTURING IN ERA OF INFORMATION TECHNOLOGY (IT) AND INDUSTRY 4.0

Practices of sustainable manufacturing can improve production facilities while reducing poor environmental and social effects. Nambiar (2010) observed that sustainable practices can enhance product quality, market shares and overall profits for organizations. Sriyogi et al. (2013) stated that there is knowledge gap in the existing supply chain management literature, especially on sustainable practices followed by emerging-markets. Dutta et al. (2020) studied the digital transformation priority of Indian discrete manufacturing Industries.

Bhanot et al. (2015) focused on reducing high dependency on non-renewable natural resources(SM) leading to environmental pollution. Molamohamadi & Ismail (2013) stated that sustainable practices of manufacturing prove to be more relevant in modern time. Mittal and Sangwan (2014) studied the barriers affecting the implementation of green manufacturing, on all three aspects of sustainability. Fairfield et al. (2012) illuminates the factors influencing companies to implement sustainability practices. Luthra et al. (2011) observed that green supply chain management have attracted focus in recent time. Keivanpour et al. (2013) stated that for sustainable development, strategies focusing on environment, economical and social issues should be planned. Non-sustainable industrial development in emerging economies is creating grievous environmental and social threats (Mittal et al., 2013).

Ghazilla et al. (2015) observed that depleting natural resources, carbon foot prints and other waste management issues are forcing manufacturing industries to stick to regulations related to environment. Mohanty et al. (2002) stated that in modern time modifications in materials, products, and processes is highly influenced by the sustainability. Growing population all over the globe is putting extra pressure on natural resources. New development in technologies needs to focus on efficient utilization of resources and sustainable practices (Davidson et al., 2010). Bhamu et al. (2011) stated that manufacturing practices like lean and green should focus on improving production efficiency while derogating their environmental and social effects. Zubir et al. (2012) studied the issues of sustainability in automotive industries of Malaysia. Bhanot et al. (2015) focused on use of renewable energy for sustainable indus-

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