Chapter 63
Espousal of Industry 4.0 in Indian Manufacturing Organizations:
Analysis of Enablers

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ABSTRACT

A formal industrialization commenced with steam power generation and the application of machines that mechanized the industrial work in past. Subsequently, the development in electric power, the assembly lines, and mass manufacturing led toward the third era of numeric control and automation. Now in modern era of industry 4.0, robots connected with the computers and machines. Tools are working on machines learning algorithms and running the cyber physical manufacturing systems. Sensing the need of hour, Indian manufacturing organizations are working hard to implement the practices of Industry 4.0. Working on identical direction, the author has identified 12 enablers poignant the espousal of Industry 4.0 in Indian manufacturing sectors from literature review and by opinion of experts. Further, the author has used Decision Making Trial and Evaluation Laboratory (DEMATEL) technique for developing the structural and circumstantial kinship among the enablers of Industry 4.0.

INTRODUCTION

Industry4.0 is a step ahead for advancement in the manufacturing processes and improving the resources utilization. The conversion of traditional machines to sensor enabled and self- discovering machines will hugely impact the performance of the manufacturing process. The real time data monitoring of any product at any stage of the process is the primary requirement of Industry4.0. Advances of information technologies and manufacturing technologies are key elements of Cyber-Physical Systems, and play incredible role in evolution of Industry4.0 (Monostori, 2014).

Industry4.0 in the modern time is a realistic and practical concept which consists of the following parameters: - Internet of Things, high speed Internet connectivity, Cloud based Manufacturing and Smart Manufacturing. Industry4.0 demands a complete involvement of humans within manufacturing process in order of achieving a considerate improvement and minimizing the production wastes.

Lee et al. (2015) observed that in recent time cyber physical system with modern advanced information analytics and network of machines will give edge to transformation toward Industry4.0. "Industry 4.0", "Smart manufacturing", "Integrated Industry" are terms used these days for Industrial reformation (Hofmann and Rusch, 2017). These technologies have capability to transform the methods of design, manufacturing and delivery system completely. Vaidya et al. (2018) observed that modern time is an era of transformation from mass to customized manufacturing. Application of different technologies helps in improving productivity. Industry 4.0 has influenced the SCM and ontogeny of products. Pellicciari et al. (2009) observed that combination of mechanical, electronic, instrumentation and information technology give intelligent and adoptive system. Feng et al. (2018) observed that there is lack of a trained workforce on new technologies. Authors stressed on strong need of training on technologies of Industry 4.0 for both management and staff.

Table 1. Enablers of Industry 4.0

CODE	Enablers	DESCRIPTION
EN1	Availability of Finance	Funds and investments are required for introduction of industry 4.0.
EN2	Connected Industrial Ecosystem	Industries having proper resources/services (material facilities, transport, good environment, etc.)
EN3	High Motivation for new technologies	Interest and motivation towards learning and using new technologies.
EN4	Advanced infrastructure	Current infrastructure being suitable and sufficient for implementation of new technologies.
EN5	Requirement from the Customers	Demand from the customers. Motivation and knowledge of initiating the change required to bring new technologies.
EN6	Networking and Local Servers Support	High bandwidth networking support as well as availability of locally accessible servers.
EN7	Effective supply chain management	Effective and efficient transport facilities leading to productive supply of products.
EN8	Management support	Support from the management for adoption of new technologies i.e. Industry 4.0.
EN9	Trained staff	Workers being well trained and educated for working on new technologies.
EN10	Availability of Advanced cyber security	With the widespread flow of internet connectivity throughout each level of the industry and the use of end to end communications through cloud or local servers in industry 4.0, the risk of cyber safety threats increases dramatically.
EN11	Excellent hardware and software availability	Different machining hardware's must fulfill the requirement for running the advance machinery with appropriate software support
EN12	Suitable plant layout	Industries having proper plant layout as well having enough space for establishment of advance machinery and land for the expansion of existing industrial area.
EN13	Awareness about industry 4.0	Awareness and knowledge about the practices of industry 4.0.

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