

# **Industry 4.0 Between What It Is and How It Is Perceived by the SMEs**

**Ozias Freddy Metohoue<sup>1</sup>, Said Echchakoui<sup>2</sup>, and Anissa Frini<sup>3</sup>**

Management science department  
University of Québec at Rimouski

<sup>1</sup>[OziasFreddy.Metohoue@uqar.ca](mailto:OziasFreddy.Metohoue@uqar.ca),

<sup>2</sup>[Said\\_Echchakoui@uqar.ca](mailto:Said_Echchakoui@uqar.ca),

<sup>3</sup>[Anissa\\_Frini@uqar.ca](mailto:Anissa_Frini@uqar.ca)

## **Abstract**

Industry 4.0 is a new concept that has attracted the interest of many people in different disciplines. However, it remains relatively unknown as a concept by many companies, especially small and medium-sized enterprises (SMEs). The first objective of this study is therefore to illustrate the facets of the “Industry 4.0” concept from 54 definitions, in order to better understand it. The second objective is to conduct qualitative exploratory research to i) identify the perceptions of manufacturing SME managers regarding the benefits, challenges, and barriers associated with the adoption of Industry 4.0, ii) compare these findings with the results in the scientific literature, and iii) recommend a range of levers for use by SMEs to guide them in the successful implementation of Industry 4.0. Fifteen semi-structured interviews were conducted with manufacturing SMEs. First, our analyses of the 54 definitions made it possible to define Industry 4.0 by considering the three facets of “What?” “Why?” and “How?” Next, the results of the empirical study revealed the challenges (economic, technical, material, logistical, strategic, relational, and planning), benefits (increase in product production and quality, improved working conditions, decentralized and digitized production, and increased innovation capacity and data availability), and barriers (financial resources, human resources, skills, technology, and strategy). The results particularly highlighted the necessary skills (operational, technical, managerial, social, and personal) as an essential prerequisite. To implement this new environment, the article recommends a series of levers for SMEs, including, among others, establishing good change management through the development of new strategies and business models, and the adoption of a new corporate culture, with consistent leadership, planning, and implementation.

## **Keywords**

Industry 4.0, Internet of things, Internet of services, Cyber-Physical systems, SMEs perception.

## **Biographies**

**Ozias Freddy Metohoue** holds in 2020 a master of science in project management from the University of Quebec at Rimouski and a Master of Business administration in Finance and management control in 2016 from the management science faculty of Agadir (Maroc) and a bachelor in 2014 from the Haute Étude de commerce et de management of Abimey-Calavi (Bénin). He is acting now as a project manager of the 57<sup>th</sup> Quebec Games at Rimouski.

**Dr. Said Echchakoui** is an associate professor of Marketing at the University of Quebec at Rimouski. He holds DBA degree from the University of Sherbrooke, Quebec, Canada. He is affiliated with the Quebec Order of Engineers and at the Association of Professional Engineers & Geoscientists of New Brunswick, Canada. His research interests focus on Industry 4.0, strategy management, sales, relationship marketing, modeling, and business performance. His work has been published in journals such as the International Journal of Hospitality Management, Journal of Industrial Information Integration, European Journal of Marketing, Journal of Retailing and Consumer Services, Recherche et Applications en Marketing, Journal of Modelling in Management, Journal of Global Marketing and Global Business and Organizational Excellence.

**Dr. Anissa Frini** is professor in quantitative methods and production in the department of management science of Université du Québec à Rimouski. She holds a Ph.D in operations and decision support systems in 2006, an MBA in Information Systems in 1999, both from Laval University. She has expertise with multiple criteria decision aid, dynamic decisions, temporal MCDA, uncertainty modelling and risk management. Her research is applied for sustainable development, project selection, healthcare, flood risk management, sustainable forest management and corporate sustainability. Her work has been published in journals such as European Journal of Operational Research, Expert systems with applications, Multi-Criteria Decision Analysis, International Journal of Multi-Criteria Decision Making, Environmental impact assessment review, Mathematical problems in engineering, Computational Economics, International Journal of Information Technology and Decision-Making.