

SCIENTIFIC REPORT (Sep-Dec 2020)

Project PN-III-P1-1.1-TE-2019-1773

Title: „The fourth industrial revolution: overcoming the challenges of implementing Industry 4.0 technologies at manufacturing companies in Central-Eastern Europe”

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1. Stage summary

For the period of September – December 2020, within the project entitled “The fourth industrial revolution: overcoming the challenges of implementing Industry 4.0 technologies at manufacturing companies in Central-Eastern Europe” a detailed analysis of the related literature has been realized. In this stage we have analyzed 119 scientific articles related to the *Industry 4.0* concept which were published mainly in journals indexed by Web of Science in the domain of production and operational management, strategic management, international management and technology management.

The mutual starting point of the analyzed articles is represented by the fact that in the past few years digitalization was becoming more and more dominant in different industries of production and it brought a revolutionary transformation of the companies’ operating mode in these economic sectors. This digitalization includes the emergence of smart technologies, which is described as a whole by the term Industry 4.0 or the fourth industrial revolution (Lasi et al., 2014; Valenduc and Vendramin, 2016). The Industry 4.0 concept refers to a set of technologies and methods used in manufacturing which imply the utilization of certain manufacturing processes and smart product which collectively create an environment in which all the participants of the manufacturing activity (employees, machines and equipment, robots) are connected and transfer information between them (Schlechtendahl et al., 2015; Brettel et al., 2014). According to multiple classifications, Industry 4.0 includes solutions and emerging technologies like big data, cloud computing, Internet of Things, artificial intelligence, 3D printing, automated machines and systems, robots, virtual and augmented reality, simulation methods, etc. (OECD, 2017; Gerbert et al., 2015).

Starting from the myriad of solutions and emerging technologies, related to the Industry 4.0 concept, in the first stage of the research we developed an updated theoretic framework regarding the implementation means of Industry 4.0 technologies, and the performance achieved using these technologies which can have an essential role in the development of production companies not only in the developed countries but also in the developing ones, such as countries from Central or Eastern Europe.

2. Description of the literature analysis method

In the first stage those keywords have been identified which are at the base of the literature analysis related to managerial implications in Industry 4.0. Given the fact that the term Industry 4.0 includes a large set of new manufacturing technologies, we used the following search terms: “Industry 4.0” AND “implementation”, “manufacturing technology” AND “implementation”, “Industry 4.0” AND “performance”, “manufacturing technology” AND “performance”. The search of bibliographic sources has been conducted in English. To identify highly trustworthy bibliographic sources, we used the academic search engine provided by the Web of Science platform. The search interval was restricted to 2011-2020 (the period after the appearance of the term Industry 4.0). For the aforementioned keywords we have found over 250 articles. After filtering the articles by analyzing the titles and the abstracts, we managed to identify the 119 most relevant scientific articles. After putting them through a full-text analysis, 35 articles were used to elaborate the research framework which will be used as a starting point for carrying out the case studies at production companies in Romania and other Central and Eastern European countries. The first version of the research model which will be supplemented with other factors regarding the most important challenges concerning the implementation of Industry 4.0 technologies can be consulted on the figure below.

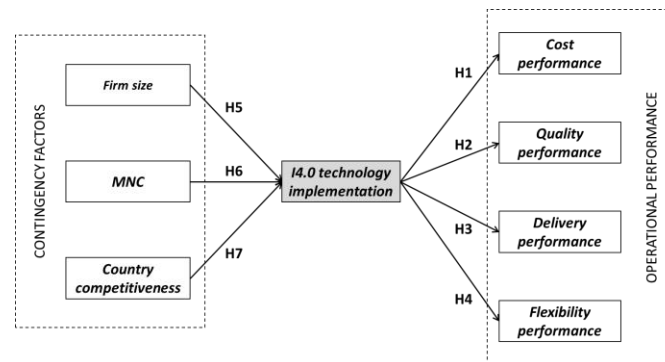


Figure 1. The initial version of the research model

Based on the analysis of the scientific articles and the initial version of the research model we realized a case study protocol of over 10 pages, which contains the most important investigation domains and the main research direction followed during the interviews which are to be conducted in the next stage of the research. These interviews will be completed with personal visits in the manufacturing units of the companies participating in the study, and with the analysis of secondary data collected from these companies.

Therefore, all the objectives proposed for Stage 1 of the research are fulfilled, as follows: (a) Activity 1.1: Systematic search in the academic literature based on keywords, (b) Activity 1.2: Article content analysis, and (c) Activity 1.3: Finishing the research framework and realizing the case study protocol (interviews).

References

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