KMI 4.0: Industry 4.0 by Knowledge Management

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***Abstract*— The fourth industrial revolution takes the automation of manufacturing processes to a new level by introducing customized and flexible mass production technologies. It also use The Internet of Things enabling objects and machines such as mobile phones and sensors to "communicate" with each other as well as human beings to work out solutions. Development of Industry 4.0 technologies is changing the way of knowledge acquiring, transmitting and using. Revision of knowledge management with Industry 4.0 has provided reduction of human factor in operational transaction management. To enhance and maximize this advantage, we launched this special track, allowing to researchers to present and discuss their ideas in this trend**

Keywords-knowledge; knowledge management; industry 4.0, learning factory.

I. INTRODUCTION

The technological revolution is manifested in the intensely-growing Industry 4.0 concept. This process is determined by the diffusion of information technology which results in a transition to a digital economy and higher role of knowledge in society [1].

While mechanization and electrification of manufacturing processes has led to the first two industrial revolutions, the third stage, which is characterized by an increase of informatization and automatization, is currently smoothly transforming into the next industrial revolution. Industry 4.0 is marked by a technical integration of Cyber-Physical Systems in manufacturing and logistics processes as well as the use of the Internet of Things and Services in industrial processes [2].

The process of knowledge management is defined as (1) acquisition of knowledge. Involves the processes of creation and knowledge-building; (2) conversion of knowledge. The storage of useful information in repositories that facilitate access of individuals to the attention; (3) application of knowledge. This is the way is explored and applied knowledge; (4) Protection of knowledge [3].

A learning factory or learning organization are concepts reinforcing knowledge capitalization and knowledge management in a factory or organization. Industry 4.0 and learning factory are not in contradiction but in complementarity. In this context, knowledge management helps the organization to maintain memory and experiences to avoid repetition of faults and minimize costs, which prepares the ground to maximize digitalization and automation and gives a customer the possibility to customize the products according to his preferences.

In this short paper, we try to find this relation via the proposed works for the special track KMI 4.0, by four contributions. They will be summarized in the next section.

II. SUMMARY OF CONTRIBUTIONS

Even the importance of the special track, we received only four works.

A. A Scientometric Framework: Application for Knowledge Management (KM) in Industry Between 2014 and 2019

It is always difficult to identify the most recent works that have been published, especially those published in recent years, due to delays in putting publications online, citations index, etc. Scientometry offers to researchers various concepts, models and techniques that can be applied to KM in order to explore its foundations, its state, its intellectual core, and its potential future development. To this end, a scientometric KM (Knowledge Management) framework was developed to calculate the scientometric indexes related to a query introduced in the Scopus database, to facilitate research and monitoring of productivity and collaboration between the authors of KM in particular and also the dissemination of knowledge. The works between 2014 and 2019 are taken; the industry of services was omitted. It might help the decision makers and researchers to optimize their time and efforts. Unified Modeling Language (UML) was used to translate the development ideas of the scientometric framework structure into diagrams, and Delphi 7 to calculate the indexes and ensure other operations of research (about: articles, their authors, conferences…). This framework only valid for Excel files extracted from Scopus or similar format. Finally, the relation between KM and industry 4.0 was established on found articles in Scopus.

In this work [4], the authors offer the researcher a framework to facilitate finding what are they looking for, related to KM in the field of industry. While Scopus is the biggest database containing abstracts, citations, conferences, books, subjects of research in various sciences. The data contain articles talking about KM and industry, extracted from Scopus, omitted the service industries and introduced to the framework. Moreover, Delphi was chosen to be the workspace of programming the scientometric framework. The value of the framework consists on the relative indexes

calculated for a specific request; they do not exist in research databases. The type of the updating file has to be "Excel" or a similar type, so in this framework, it is suggested that computer scientist concentrates on developing this point, or even better searching for a way to integrate Scopus or other important database directly with the programming application. A scientometric analysis is applied manually on 7 articles, making the relation between KM and industry 4.0. The productivity and the impact of these researches is increasing over time and domains. An interesting future development could be updating more than one database, and comparing them according to the calculation of the scientometric indexes using the framework. Furthermore, the databases could be related to different sciences.

B. Digitalization and IT Backsourcing: Towards a Transformational Model for the German Automobile Industry

The literature review indicated that there are three main motivations for IT backsourcing: unsolvable contractual problems, internal organizational changes and external environmental changes, with the advent of digitalization being a potentially significant driver in future in the last named category. Digitalization has the potential for new, disruptive business and value models and requires companies to shape the digital transformation process.

The contribution of this research [5] to theory has several aspects. First, it will provide an informed view on whether digitalization is encouraging IT backsourcing – currently a gap in the extant literature. Second, it will explore and explain how companies in the German automotive industry justify decisions for IT backsourcing within the framework of a company-wide digital transformation strategy. This will allow key issues regarding IT backsourcing to surface - for example, the need to develop dynamic capabilities and redefine core competencies in order to achieve sustainable competitive advantages in the so-called digital age. Research results will also establish the methods used by companies to forge a strategic link between digitalization and IT backsourcing and to determine the resulting value.

In terms of contribution to practice, the project aims to provide decision makers with operational guidance to assess the scenarios of IT backsourcing as part of a digital transformation strategy. This will improve knowledge for practitioners about the various factors to be considered for identifying the strategic value contribution of IT backsourcing. The study will provide illustrative examples of the practices, procedures and organizational change needed for re-establishing IT services in-house. Finally, an operational framework and associated strategy checklist will provide practitioners with the tools to assess the impact of IT backsourcing decisions on the overall performance of a company, and guide priority-settings for IT backsourcing projects as an enabler for digitalization.

C. Application of Data Mining in Industry in the Transition Era to Industry 4.0: Review

The aim of this paper was to define where research reached in the field of applying DM in Industry 4.0 and logistic. A quick review about the background of Industry 4.0 and DataMining was presented. A complicated query was entered in Scopus database to do a generic analysis on the come-out documents; furthermore the contents had to be analyzed to distinguish what was the additive that it is given by each one. Through this research, different challenges were observed and so been presented.

The analysis of the documents shows the interest to this subject area increased through the years, and as it was expected, Germany was the leader in the number of the selected documents. The variant branches articulating this subject confirms that the application of Datamining is touching numerous fields and has the attention of many researchers. The content of those documents showed the rapidly spread of using Datamining in industry 4.0, improving by that the supply chain management and logistics industry. From the two analyses, the improvement quality of the technologies that used in logistics and industry was noticed, concluding that Datamining would give logistics and Industry 4.0 a leap forward.

This group of documents was chosen according to the query that was written to limit the search to our domain of research; however, many other articles have discussed this subject which could be analyzed and treated. Future research may focus on dealing with the faced challenges; also other challenges could appear by consulting other articles in this field.

D. Analysis of Human Skills in Industry 4.0

This paper [7] presents a state-of-the-art of recent research work analyzing the requirements of Industry 4.0 particularly related to the competences issue. Over the last few years, the fourth industrial revolution has attracted researchers worldwide to find suitable solutions, however there are still many gaps related to the Industry 4.0, particularly related to the humans competences issue, Among the many challenges facing companies in this paradigm, one of the most important is the qualification of employees with the necessary skills to succeed in a transformed work environment. To cope with knowledge and competence challenges related to new technologies and processes of Industry 4.0 new strategic approaches for holistic human resource management are needed in manufacturing companies. The main objective of the presented research is to investigate the importance Employees competences, key to the development of Industry 4.0.

The industrial revolution represents an issue of competitiveness for all industrial companies, their objective is to overturn paradigms and make industry more communicative and more interactive in order to simplify all operations. Whether in terms of training, maintenance or

production, using new technologies, which must be thought out in conjunction with other aspects of competitiveness, and in particular the rise in skills of human capital to all levels of the company. In this article, authors presented some research works about the human skills necessary to face Industry 4.0, this aspect is often displayed as a central concern by public policies, but few are the concrete devices to have emerged. Admittedly, many uncertainties about the development of the industry make it difficult to accurately anticipate skill needs. But effective support for employees affected by the changes will be the key to the successful transition to the industry of the future.

III. Conclusion

The idea of special track KMI 4.0 comes from the conviction that knowledge management is the basic thing to do before launching the project of industry 4.0 in factories. The idea needs an extension in the future, if the conditions become better.

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