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# Systematic Literature Review on the development of digital skills in business organisations

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**Abstract.** The purpose of this study is to investigate the status and the future evolution of the scientific contributions for the development of digital competencies in the business organisations. So, this paper presents a comprehensive review of the studies associated with the development of digital skills. We use Web of Science database as a primary search engine and cover 56 articles over the period 1998 - 2019. The records are statistically analyzed and categorized using Bibliometrix, a package of R used to create comprehensive science mapping analysis. The findings show that researches have grown exponentially between 2016 and 2019 and the development of digital skills in the business organisation remains an emerging issue for the next future.

**Keywords:** digitalisation, digital transformation, digital skills,

## 1 Introduction

Scholars' and practitioners' interest in digital transformation has exponentially grown in the last decade since digitalisation has widespread in all industries and for all kinds of organizations. The use of new technologies has affected business organizations, with more and more analogic businesses becoming digitised in order to survive in today's competitive market. The digitalisation is a structural change for not only a single business unit but for entire organizations, as for them becoming digitised is a strong key point to remain competitive. Key strategic functions from marketing to accounting and human resources can now benefit from new tools and techniques which allow them to be more efficient [1]. Although the digital transformation leads several advantages in terms of cost savings and efficiency improvement, it also requests companies to make relevant efforts [2]. In fact, digital transformation means changing companies' operational models and developing new competencies. With regards to the business model, digitalisation influences corporate strategies and leads the board to reconsider and adapt the traditional business model [3]. Also, the development of digital skills and competences has become a key point on the agenda of all organisations. Particularly, digital transformation has the potential to change the world of work forever. While some look skeptical towards the arrival of digital transformation as it might lead to a future in which human work has been replaced by automated machines, others are welcoming

the changes and the innovative of potential of digitalisation. Either way, the consequences of the digital revolution are quickly becoming one of most debated issues of the current days [4]. Since the development of digital skills in business organisations represents an emerging issue that plays an important role in shaping academic debate, the purpose of this work is to offer an in-depth bibliometric study to explore the main contributions about this topic. The purpose of this work is to map the existing literature on the topic and analyze its framework, in order to get a better understanding of the most commonly used keywords and themes. The paper first focuses on defining the terminology that is going to be used in the paper screening process. Then it shows the methodology adopted, focusing on the various steps that led us from the first batch of 804 papers to the final selection of 56. We then show how the data were analysed through the Bibliometrix tool.

## 2 Research Methods

This paper offers an in-depth bibliometric study to explore the main researches about the development of digital skills in business organisations. As the systematic literature consists of reviewing an existing body of literature using a clear and reproducible methodology [5], we use the PRISMA guidelines to develop our reporting strategy [6]. We selected papers published from 1998 to 2019 on the Web of Science. The choice of Web of Science for our sole citation database depends on the overlaps between Web of Science and Scopus that are the two major citation databases in terms of coverage and source reliability. As demonstrated by Gavel and Iselid (2008), 84% of Web of Science articles are also indexed in Scopus. Since, Web of Science was created before others citation database and for this reason it covers a wider range of time, we decided to use Web of Science instead of Scopus [7].

On Web of Science database, we used the following search terms in Topic:

(i) digital transformation skill\*

OR

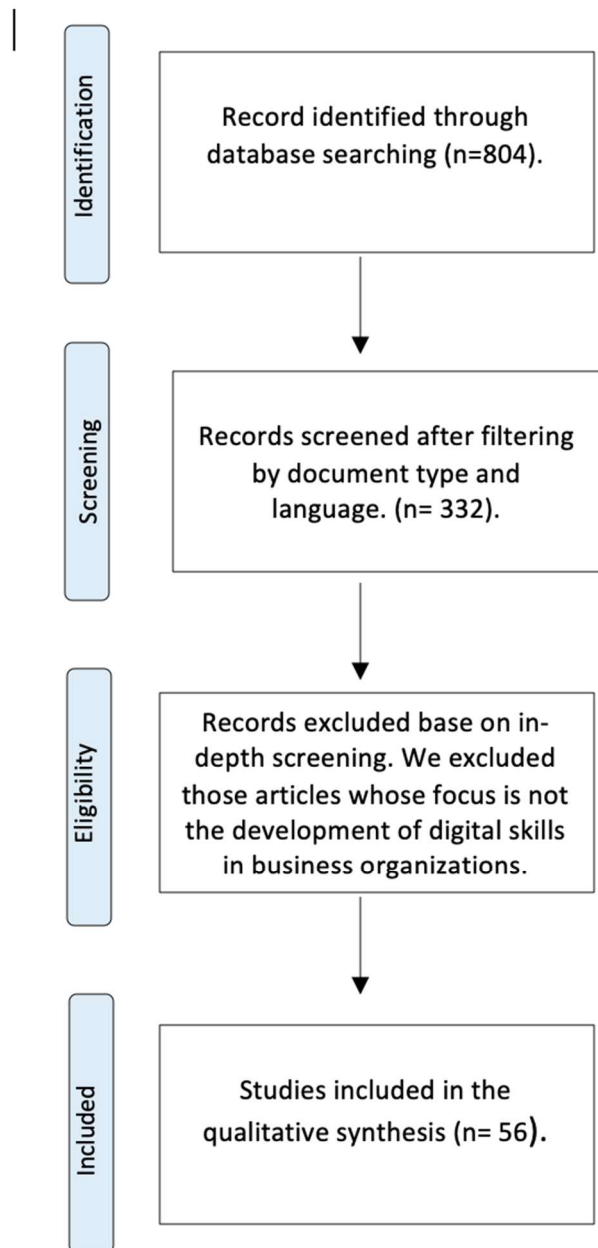
(ii) digital transformation competenc\*

OR

(iii) digital transformation expertis\*

The use of the above-mentioned search terms and Boolean Operators on the Web of Science database resulted in 686 entries. We then refined our research by limiting the results obtained in five specific fields: Management, Business, Economics, Education Educational Research, Operations Research Management Science. This filter yielded 388 records. With regard to document type, we decided to include both proceedings and papers reaching a threshold of 380. Digital transformation is an emerging issue that informs the recent debate among academics and practitioners. Proceedings allow us to consider a large amount of relevant information that have not yet been published in full paper yet [8]. Then we filtered the result once again considering the language and document type. We make sure that all contributions were written in English [9]. At this step we counted 332 papers.

The next step was to manually screen the papers and filter out those that were not involving the topic of digitalization, KPI and benchmarking in them. This was achieved by analyzing each title and abstract through the reference management software Mendeley. This manual screening phase would allow us to make sure that papers that contained keywords connected to our search in their abstract or title but belonged to a different field would not be considered in our final pool. [10] Finally, we exported the final archive of 56 papers in a file that was readable by Bibliometrix. We then used R and its Bibliometrix package to analyse the dataset obtained and extract the results discussed later in the following section of the paper. Bibliometrix is a package of R used to create comprehensive science mapping analysis [11].



**Fig. 1.** Research Prism that shows our research procedure

### 3 Findings

#### 3.1 A Subsection Sample

In an effort to analyze how the scientific production has been distributed throughout the years, we have produced the above graphic which shows the number of items (y axis) distributed per year (x axis). The production of content related to Digital Transformation Skills and Competences has increased exponentially throughout the year. In particular, we saw a massive spike in production in the time span between 2016 and 2019, in which the production went from 3 to 21 items, with a growth rate of 700%. The average annual growth rate is 1,57% in the whole-time frame considered in the research, from 2013 to 2020, whereas it is equal to 3,5% if we consider the time frame from 2013 to 2019.

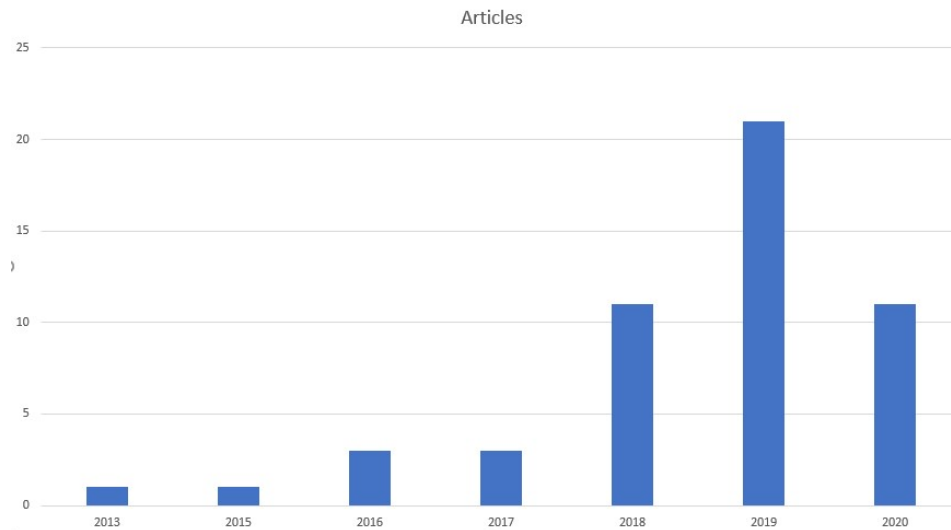


Fig. 2. Annual scientific production

#### 3.2 The most common keywords

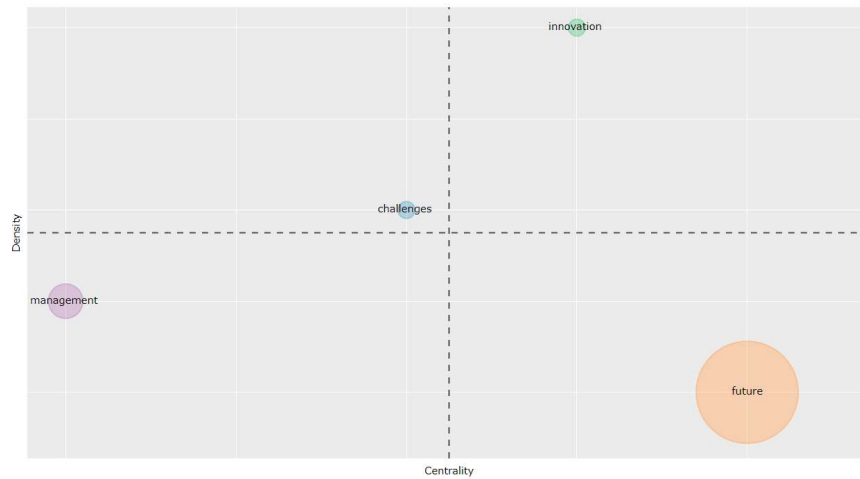
The three most common Keywords found in studies associated with Digital Transformation Skills are Future with a frequency rate of 7, Management with 6 and Challenges along with Innovation at 5 in the Keyword Plus Bibliometric analysis. Among the most common keywords we can also find Knowledge, Business and Impact.



Fig. 3. The most common keywords

### 3.3 Thematic Map

The Thematic map is based on co-word network analysis and clustering. The methodology is inspired by the proposal of [12] and allows researchers to analyse themes according to the position in which they are placed within the map. In the upper-right quadrant we have the motor-themes, in the lower-right quadrant the basic themes, in the lower-left quadrant we identify the emerging or disappearing themes. Finally, in the upper-left quadrant we can find the so-called niche themes. In the case of our research on the development of digital skills or competencies, we can see that “challenges” is a niche theme. On the other hand, “future” represents a basic theme that are the main topics discussed by papers focused on the development of digital competences in business organizations.

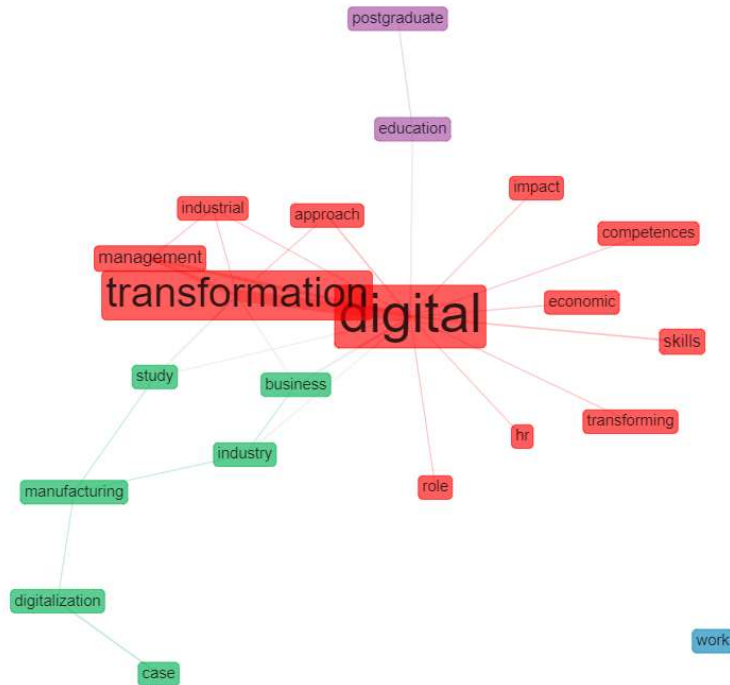


**Fig. 4.** Thematic map

### 3.4 Co-occurrence network

The Keywords co-occurrence network analyses the structure of a scientific field in an attempt to find existing links between keywords in the [13]. From our analysis, there appears to be a strong connection between the words “Management”, “Transformation” and “Digital”. The same thing can be said about the cluster made of the keywords “Manufacturing”, “Digitalization” and “Industry”.

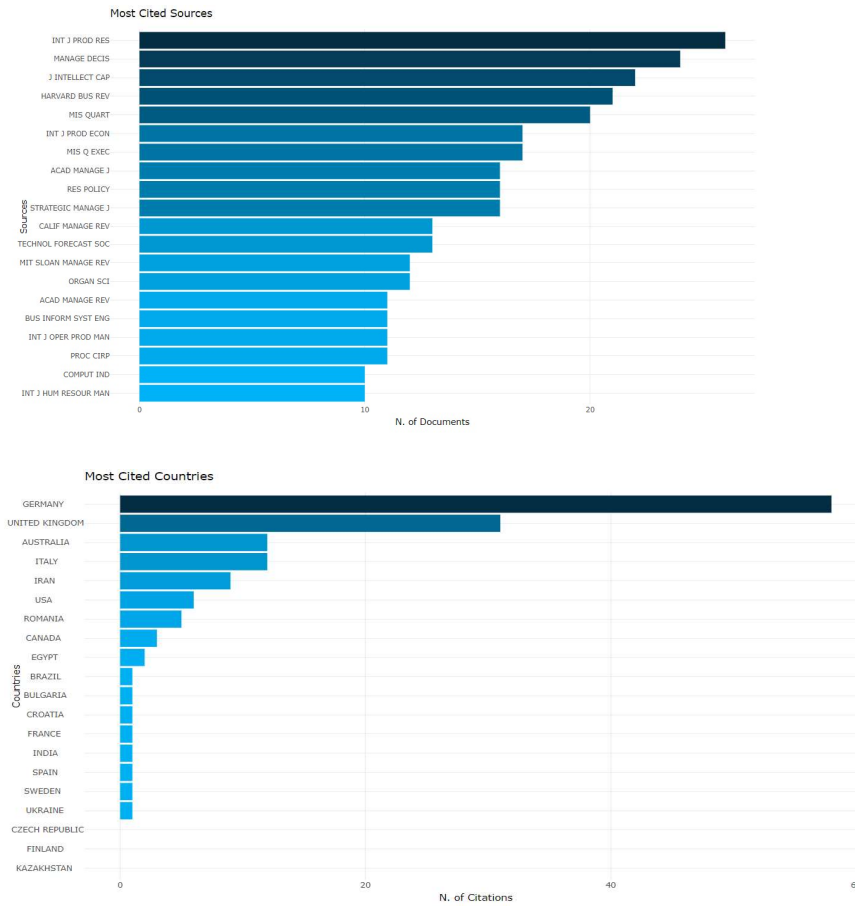




**Fig. 5.** Co-occurrence network

### 3.5 Authors and Sources

When it comes to the most cited sources, the top spot is taken by the International Journal of Production Research with over 20 documents cited. The second place is occupied by the Management Decision journal whereas the third one is taken by the Journal of Intellectual Capital. As far the most cited countries are concerned, Germany has the top spot with almost 60 citations. United Kingdom is at the second spot of this list with approximately half of those citations. These numbers are influenced by our research methodology that filtered out papers not written in English.



**Fig. 6 & 7.** Most cited Authors and most cited Countries

## 4 Conclusions

This work represents a first draft of a research currently in progress. Said research was inspired by the SMAQ initiative promoted by the University of Turin, which features a college level course targeted for small to medium sized enterprises and centered on the topic of Digital Transformation. The purpose of this paper was to map the impact of knowledge and skills within the Digital Transformation processes, given how relatively new this research field is. The novelty of the topic is confirmed by the annual scientific production volumes, that are slowly increasing throughout the years, and the overall limited amount of results found in the Web of Science database. After identifying the skill related keywords and matching them with the Digital Transformation keyword,

the authors filtered the results in order to identify potential interesting works for the research. After this step, the analysis was focused on the occurrence map of specific keywords in order to map the possible trends that are currently being developed within the field. In the next future, it will be interesting to see how the industry is going to react to said changes, given how keywords such as “Future” and “Challenges” are amongst the most commonly used ones. These findings lead us to believe that there’s a strict connection between digitalization and the evolution path of the business world.

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