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Vítor João Pereira Domingues Martinho



Trends of the Agricultural Sector in Era 4.0

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Trends of the Agricultural Sector in Era 4.0

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About This Book

This book is an overview of the impacts on the agricultural sector worldwide of Era 4.0, highlighting dimensions related to Agriculture, Food and Industry (4.0). The main topics discussed are those associated with IoT in the various sectors of the economy and their impacts on the sustainability of the farms. Specifically, the following dimensions were addressed: impacts of Era 4.0 on agriculture around the world and on different farming activities; relations between Agriculture 4.0, Food 4.0 and Industry 4.0 and the various dimensions of Agriculture 4.0. There is a deep concern with the relationship between sustainability and agricultural competitiveness, where the smart concept is called to contribute. This book can be a relevant contribution, in these domains, with interesting insights for policymakers, students, researchers and economic stakeholders.

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Chapter 1

Bibliometric Analysis on Era 4.0: Main Highlights for the Agricultural Sector



1.1 Introduction

There are not many studies relating to Agriculture 4.0 and bibliometric analysis. The same occurs for the topics Food 4.0 and bibliometric. Nonetheless, for the subjects Industry 4.0 and bibliometric analysis, the findings are different and there are, in fact, many more documents. As follows, in this section, contributions from some of these studies have been highlighted.

Agriculture 4.0 is associated with the consideration of information and technologies to be incorporated into agricultural equipment for better efficiency and precision in the farming sector [1]. A more efficient and competitive agricultural sector is determinant to improve the competitiveness of agriculture and to address sustainability goals [2]. Agriculture 4.0 contexts are associated with technologies such as IoT (Internet of Things), machine learning and geostatistics [3].

Another way to deal with the challenges created by climate change and the increasing need for food may be to better understand consumers' behaviour and their attitudes towards food. This further understanding allows for better design approaches towards more sustainable food consumption [4].

For Industry 4.0, the implementation of robotics and automation are among the main tasks for the several activities developed in this sector, including the construction [5] and building industry [6]. Robotic technologies may bring relevant added value into different industrial activities, such as logistics [7]. Digital tools and smart objects are other approaches often considered by companies in the Era of Industry 4.0 [8]. The literature about these topics has increased in recent years, IoT and Cyber-Physical Systems (CPS) are some of the most considered keywords [9] and China and USA are among the leading countries in terms of research on these issues [10]. Nonetheless, other countries, such as Brazil, have also made their contributions [11]. The concepts associated with Industry 4.0 appear, indeed, as interrelated with diverse contexts and dimensions, for example, those related with the sharing economy [12], Big Data [13], Sustainable Manufacturing 4.0 [14], apparel

industry [15], marketing [16], Cloud Manufacturing [17], artificial intelligence, neural networks and data mining [18] and sustainable development [19]. These multi-dimensional characteristics of Industry 4.0 technologies call for multidisciplinary approaches [20].

Considering these frameworks, it seems pertinent to analyse the several bibliographic interrelationships of Era 4.0 with agricultural sector dynamics. In this way, several documents, in a search carried out on 23 December 2021, from the Web of Science Core Collection (WoS) [21] and Scopus [22] databases for the topics “agricultur* 4.0”, “agricultur* and food 4.0” and “agricultur* and industry 4.0” were considered. These documents were analysed through bibliometric analysis, following the VOSviewer [23, 24] software procedures, to highlight the main dimensions from the literature about the main sources, countries, organisations and authors. For the bibliometric analysis, bibliographic data for the following links were considered: co-authorship; co-occurrence; citation; bibliographic coupling; and co-citation. The term “agricultur*” was used as it allows for a broader search and captures expressions that encompass words such as “agriculture” and “agricultural” [25].

The findings which were highlighted by this research may be considered as a relevant basis for the several stakeholders associated with the different dimensions of the agricultural sector, specifically policymakers. In fact, the new challenges created by recent realities demand new approaches in the design of policy measures [26, 27].

The remaining structure of this study is organised into 3 more sections for each individual topic analysed (“agricultur* 4.0”, “agricultur* and food 4.0” and “agricultur* and industry 4.0”) and a final section for the conclusions.

1.2 Bibliometric Analysis for the Topic “Agricultur* 4.0”

For this topic, 122 and 218 documents were found on the WoS and Scopus databases, respectively. This section is organised into subsections for every link provided by the VOSviewer software for bibliographic data and inside each subsection, the metrics for the different items are highlighted. In this way, this section is divided into 5 subsections for each link assessed (co-authorship; co-occurrence; citation; bibliographic coupling; and co-citation). The main metrics are presented in tables and figures (network visualisation maps). In figures, each colour corresponds to a cluster.

1.2.1 *Co-authorship*

The relatedness for these links is based on the number of co-authored documents. One was always considered as the minimum number of documents of an item. The dimension of the circle associated with each item shows the number of documents.

From the WoS data, Fig. 1.1 and Table 1.1 shows that, for this link (co-authorship), the number of documents networked for the item authors is reduced, recent and without citations. The same happens for the item organisations (Fig. 1.3 and Table 1.3). For the item countries, the number of documents networked is higher (Fig. 1.2 and Table 1.2). Brazil is among the countries with a greater number of documents (with high relatedness with Portugal and Spain). England, Spain, Netherlands, France and Australia are the top 5 countries having more citations.

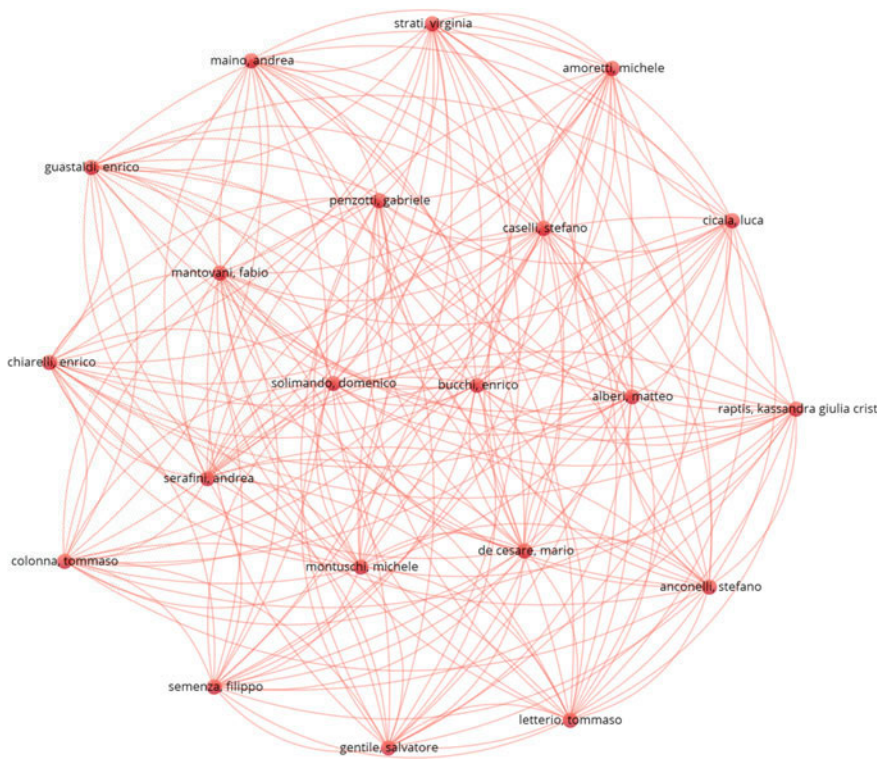


Fig. 1.1 Authors networked from WoS for co-authorship links

Table 1.1 Authors networked from WoS for co-authorship links

Authors	Documents	Citations	Avg. pub. year
Alberi, Matteo	1	0	2021
Amoretti, Michele	1	0	2021
Anconelli, Stefano	1	0	2021
Bucchi, Enrico	1	0	2021

(continued)