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How Has E-Health Entrepreneurship Discourse Evolved During Covid-19? A Scientometric Analysis

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Abstract

Covid-19 outbreak highlighted the need for treating non-Covid-19 patients remotely, where possible, in order to save their lives, and to avoid overload of healthcare systems and workers. However, it also highlighted the unpreparedness of most countries in the world to face such a paradigmatic shift from in-presence health to e-health. In most cases, this was due to the scarce investments on technological development and business development, low amount of innovative start ups launched, and a lack of entrepreneurial spirit in the sector of e-health solutions. This clearly makes it very relevant to understand the ongoing discourse on e-health entrepreneurship dynamics in literature, and to capitalize, where possible, such an understanding, and also to identify research gaps and new trends that pave the way for future directions of research. This study is based on a scientometric analysis conducted by means of the Biblioshiny app on an initial et of 198 publications in the field at hand extracted from Scopus in the subject areas of Engineering; Social Sciences; Business, Management and Accounting; Decision Sciences.

Keywords: E-Health; Telemedicine; Teleassistance; Entrepreneurship; Start-up; Literature Review.

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1. Introduction

During the Covid-19 outbreak, different problems arise globally and highlighted the urgence to implement, where possible, an alternative way to efficiently and effectively control non-Covid-19 patients remotely. Different examples of epidemic outbreaks exist based on our scientometric analysis, all linked to excessive damages of human and material capital, including a great number of deaths, but almost always very scarce attention has been paid to other patients, that were not sufficiently treated (or were not treated at all) during such outbreaks as well as to other non-health related effects (e.g. social, economical, political, technological, logistical) [1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19]. These problems pushed all nations to implement effective and efficient control protocols and technological solutions to rapidly respond to crises of their healthcare systems as well as the other industries related to it – e.g. healthcare products manufacturing and logistics, identification of sources and availability of raw materials, standard and quality certification entities and systems [6,8,9,10,14,15]. Moreover, also organizational and procedural aspects as well as legal ones have been implemented within the framework of the response strategy. An emergency implementation of new e-health solutions, together with the strengthening of existing ones, has been performed thanks to the knowledge developed so far. In fact, it becomes crucial for the management of the healthcare systems to capitalize on existing results in literature, and both emerging and consolidated technologies during the outbreak. However, a systematic analysis of literature in order to understand the ongoing discourse and its future directions on e-health entrepreneurship is still missing, and this field remains underexplored and unsystematized, calling for this scientometric work. Hence, this paper aims at conducting a scientometric analysis to identify the most highly relevant researches in the literature and their contributions on the issues of e-health entrepreneurship based on publications indexed in the Scopus database. Also, it is geared to look for trends in e-health entrepreneurship, identifying gaps and research areas for future investigation within Engineering; Social Sciences; Business, Management and Accounting; Decision Sciences. The main research questions are: which are the hot topics and future directions in these fields? Which are the existing gaps?

2. Methodology

This work proposes a scientometric analysis of the ongoing discourse in literature in the field of e-health entrepreneurship. The search strategy included the following sets of keywords combined together: the first set included the keywords e-health*; telemedicine*; teleassistance*; the second set included the keywords patent*; startup*; start up*; start-up*; venture*; entrepren*; enterpr*. Given the purpose and scope decided by the co-authors, the search strategy has been performed within the Scopus' subject areas of: Engineering; Social Sciences; Business, Management and Accounting; Decision Sciences. The initial step of the search strategy identified 198 publications. All co-authors identified and read the most relevant works in literature in order to perform a qualitative check in the second step. Then, they performed the extraction of relevant documents from the Scopus database with consolidated methodologies that are proved to be reliable [5,7,8,9,11,12,13,16,18]. In this process, the set of documents identified as relevant to the research work at hand has been analyzed with RStudio and the Bibliometrix package through the Biblioshiny app [3].

3. Results and Discussion

The results of the scientometric analysis are reported in the following figures. Despite the desperate need for and the strong focus on e-health solutions as well as the rise of start ups in the pharma and biotech industries, amongst others, the annual scientific production on e-health entrepreneurship during the outbreak has not increased significantly (Fig. 1). In fact, it remained substantially the same of pre-Covid-19 periods, with ups and downs over the last 15 years. Maybe, this can be explained by a delay in the review and publication process that is typical of many areas in the scientific community, so that the current results obtained by scientists in many fields are not immediately available. However, what is also noticeable is the fact that the scientific production during the pandemic is not higher than previous peaks in the annual scientific production.

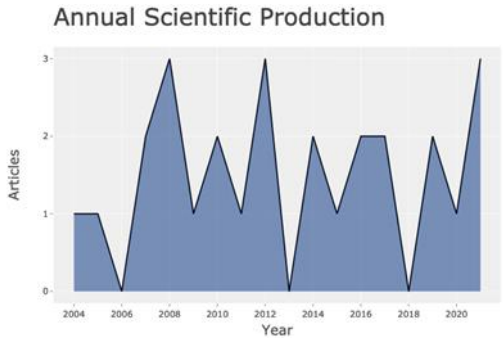

Figure 1: [3]

Also, Fig. 2, shows that citations of articles in the average, in this field, have not increased as it would be expected, too, but they just reflect the periodic trend registered since 2004. This result is coherent with the one highlighted by Figure 1, as both scientific production and citations did not overcome the previously achieved peaks during past pandemics.

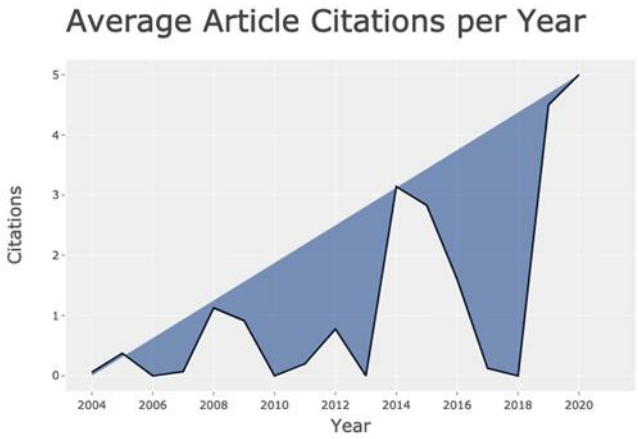

Figure 2: [3]

Fig. 3 depicts a clear prevalence of multidisciplinary-oriented journals in terms of most locally cited references in the dataset, that combine health, technology, social sciences, and informatics as fields of interests. Hence, this

multidisciplinary approach is favoured with respect to highly specialized, but narrowly focused journals, that are not very relevant, instead.

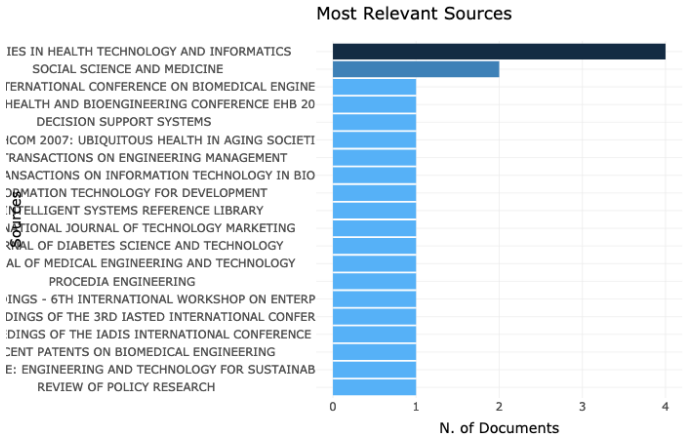

Figure 3: [3]

However, the most globally cited references are, instead, related to specialized journals in the rea of telemedicine, telecare and e-health, whilst many others are less cited as they refer to information systems, computer science, sustainability, business and management, amongst others (Fig. 4).

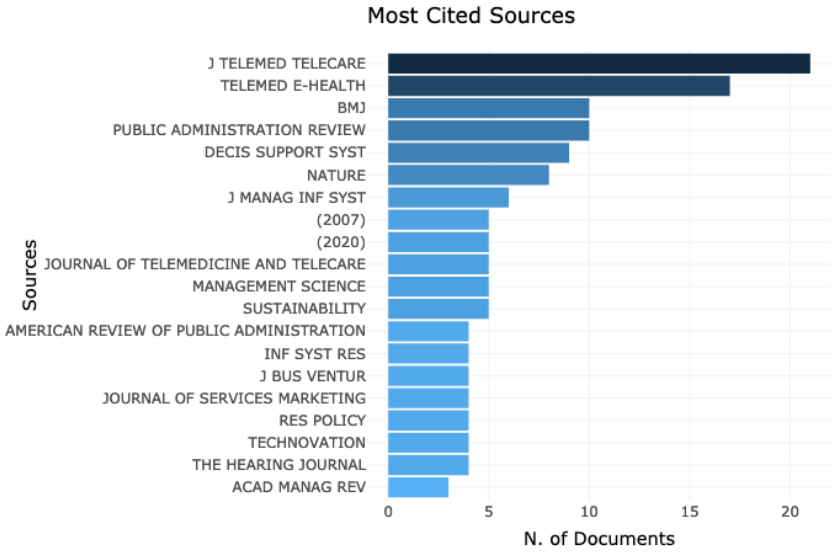

Figure 4: [3]

Fig. 5 shows the application of the Bradford's Law that clearly highlights how the journals with a multidisciplinary scope attract more articles on the topic of e-health entrepreneurship.

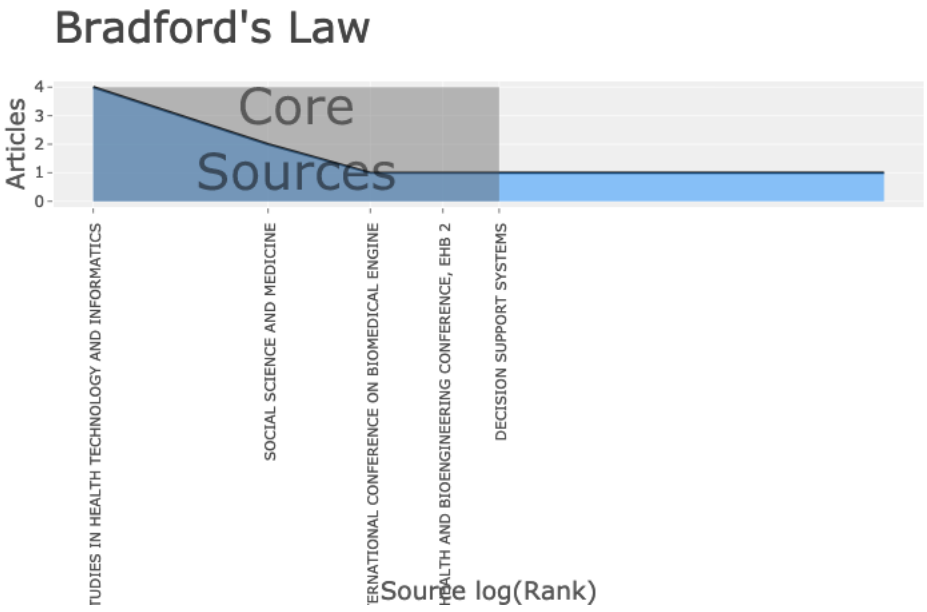

Figure 5: [3]

Fig. 6, Fig. 7, and Fig. 8 prove how the literature is fragmented also in terms of impactful authors: there are no main authors in this field, based on either authors' production overtime (2004-2021), or frequency distribution of publications, or author impact. Namely, authors published on e-health entrepreneurship topics here and there in the last 15 years, with a maximum timespan of 3-4 years between the first and last publication. The percentage of authors with only one published work on e-health entrepreneurship is definitely higher than 90%, thus, showing how there are no leaders with high-frequency of publication. Moreover, the top 20 of cited authors have all between almost 10 and more than 40 citations each, thus, proving how all the most important authors have a considerable level of reputation in the scientific community.

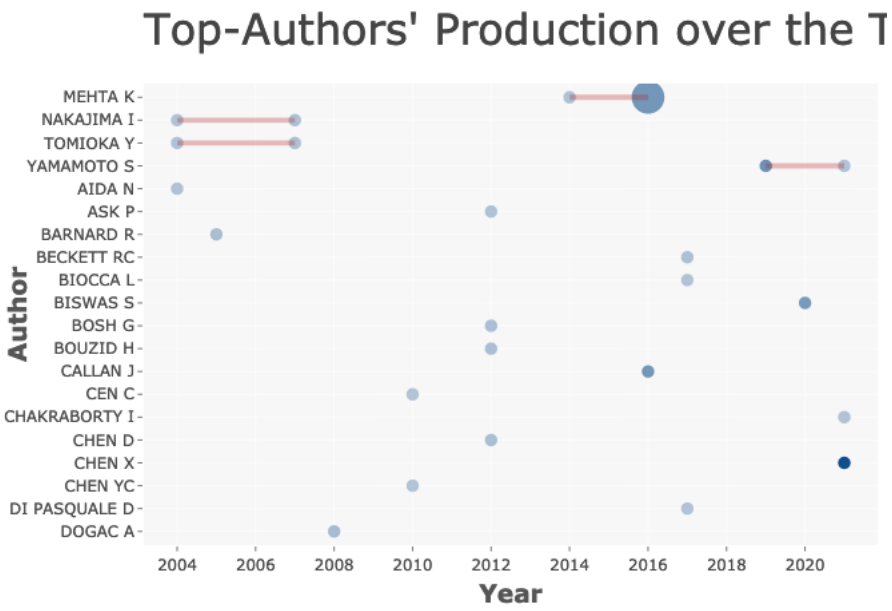

Figure 6: [3]

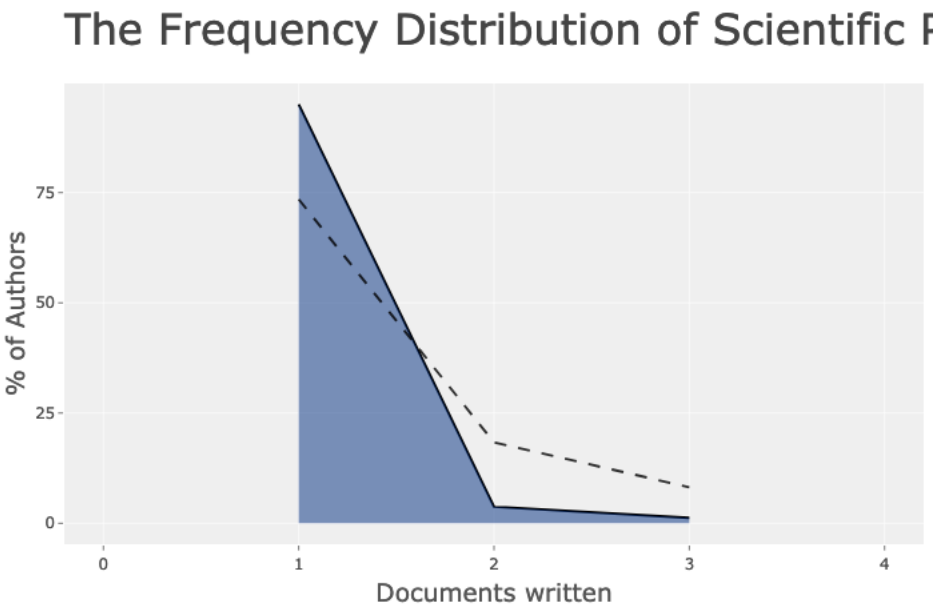

Figure 7: [3]

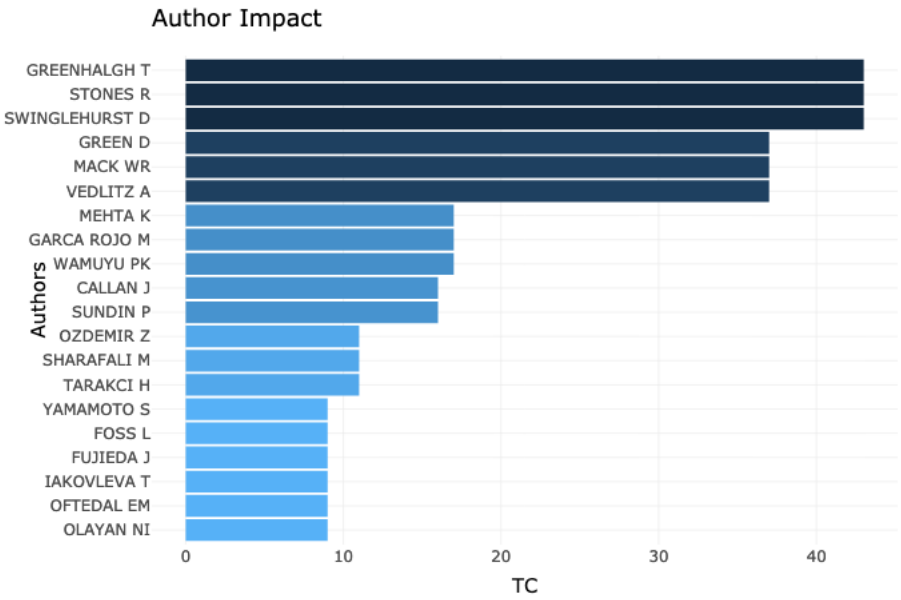

Figure 8: [3]

As per the most relevant affiliations and countries that are active in this field, Fig. 9, Fig. 10, Fig. 11, Fig. 12, and Fig. 13 show that Asian and Northern American institutes are the most active in researching on e-health entrepreneurship. Also, European countries follow them, but, surprisingly, major efforts in terms of investment of research efforts on this topic are from Kenya.

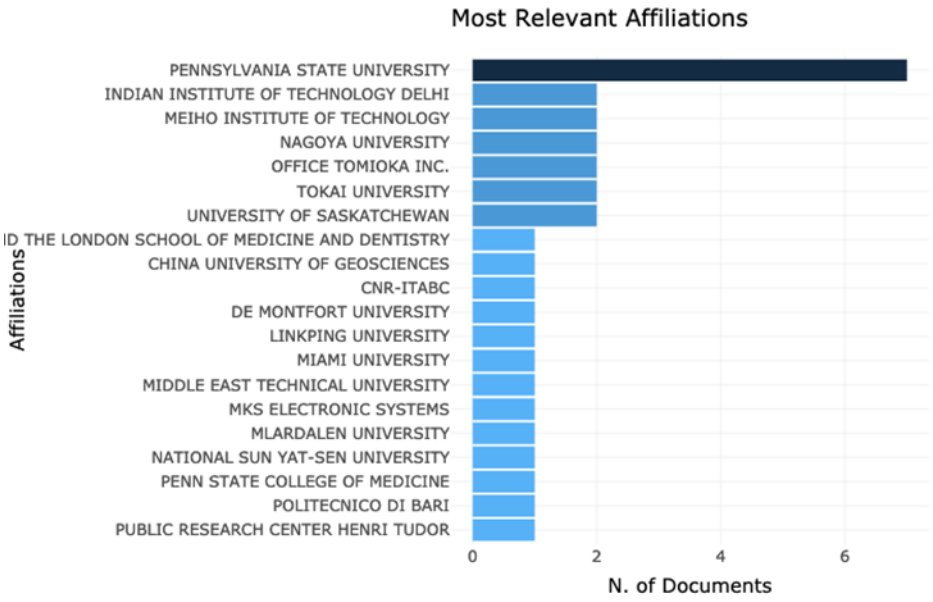

Figure 9: [3]

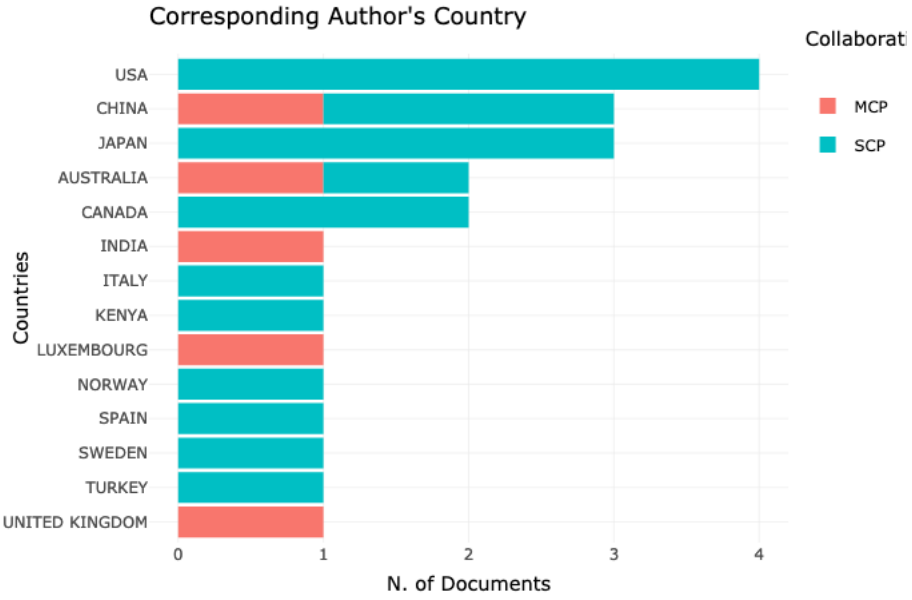

Figure 10: [3]

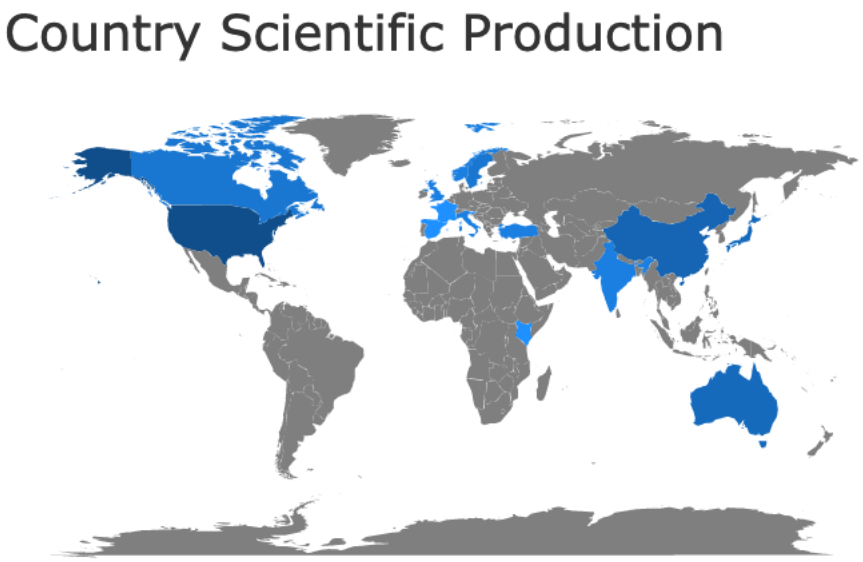

Figure 11: [3]

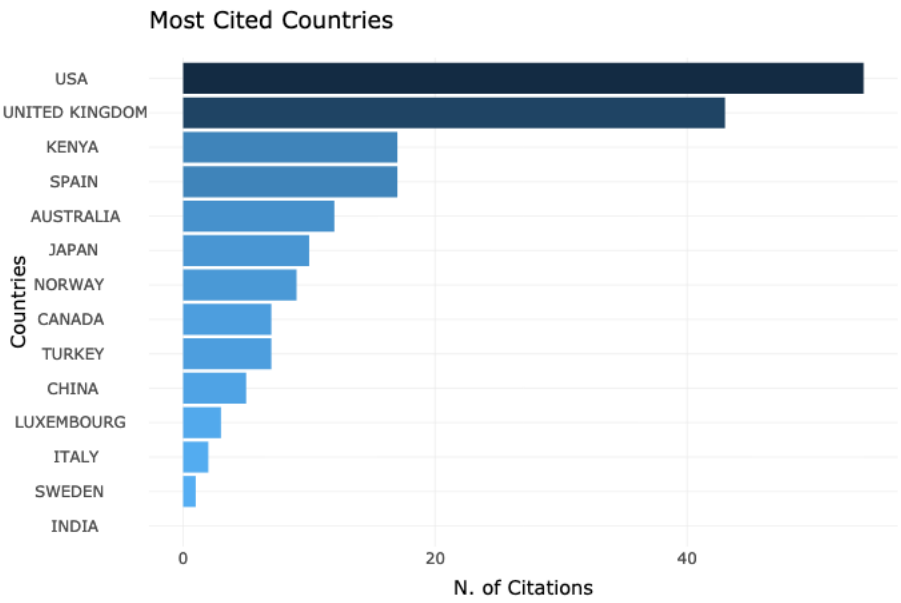

Figure 12: [3]

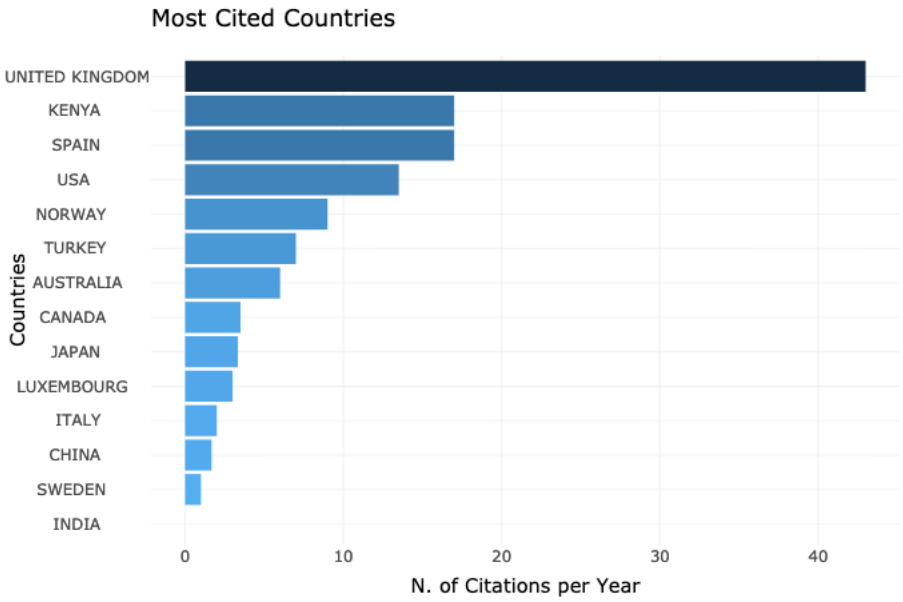

Figure 13: [3]

Finally, Fig. 14, and Fig. 15 show that, while there is low capitalization on past knowledge in the same field (Fig. 14), still the actual collaboration among countries worldwide is limited (Fig. 15) to research collaborations mainly between U.S.A. and Australia, U.S.A. and other Far/South East countries, intra-European collaborations, U.K. and other Far/South East countries.

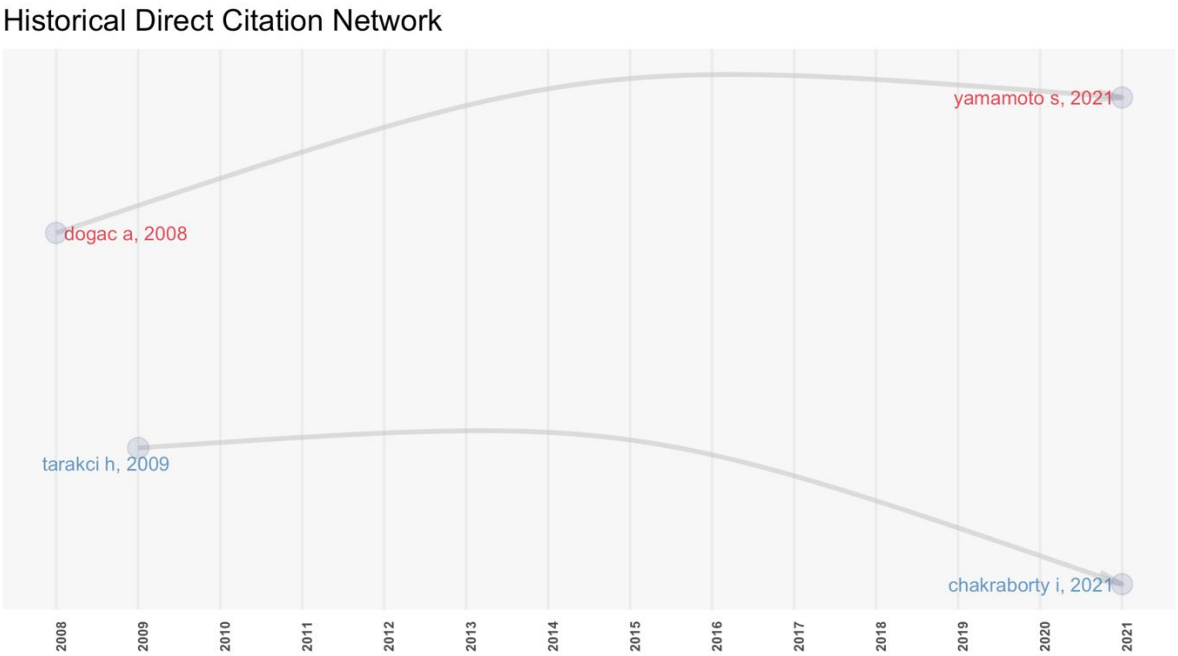

Figure 14: [3]

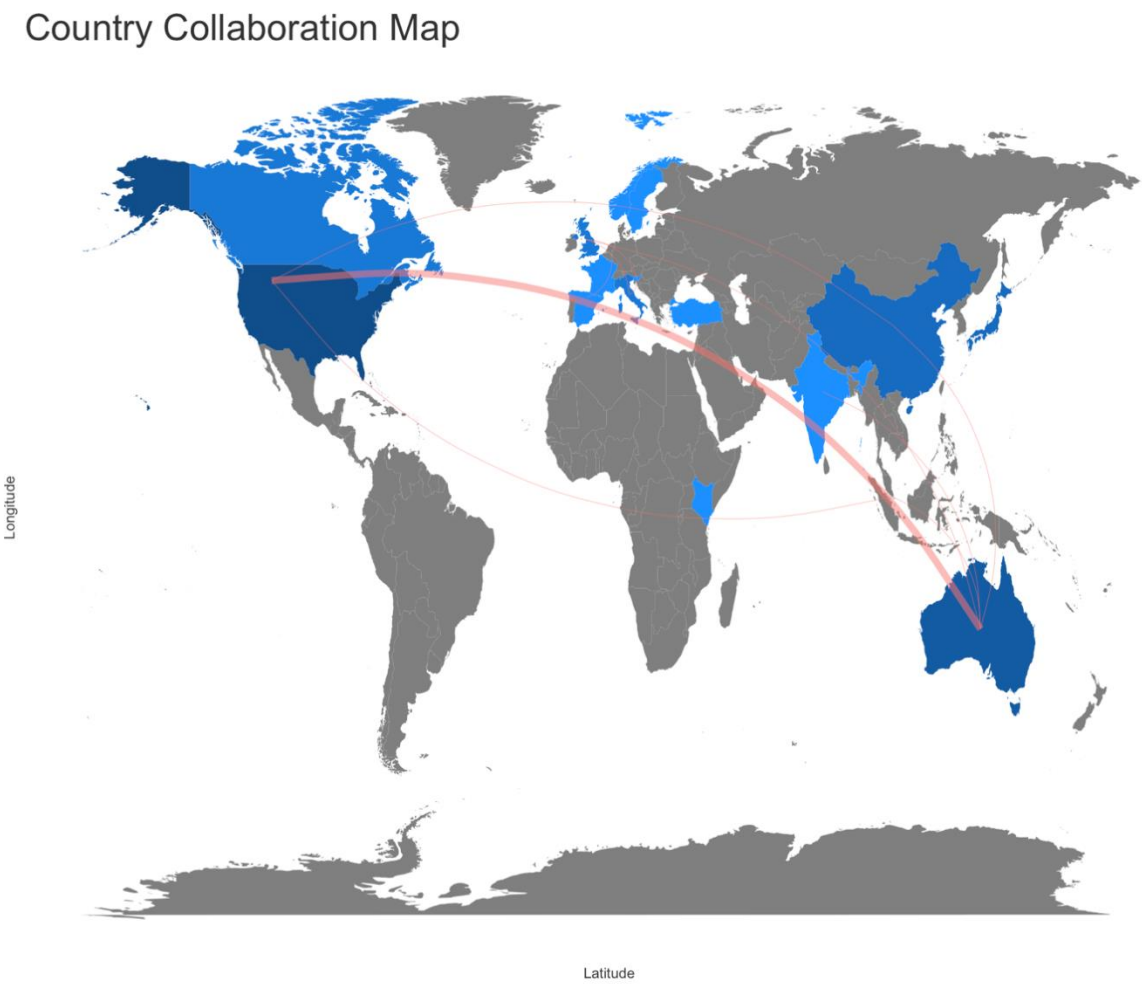

Figure 15: [3]

4. Conclusions

The subject of this scientometric study is the hitherto underexplored field of e-health entrepreneurship in relation to the identification of possible research trends and gaps for the COVID-19 outbreak. A fragmented and non-systematized approach has been highlighted by the scientometric analysis, especially with reference to the disjoint picture revealed by the use of several different keywords, and the fragmentation of destination sees. Moreover, this evidence is supported by the lack/non-systematic collaboration channels among different countries worldwide, that call for quite a redundant and non-globally coordinated research effort in the field, though we know today how global coordinated efforts are important in order to ensure resilience, efficiency, effectiveness and timeliness of the response in global and/or national e-health systems in order to support healthcare systems. Also, emerging trends of research revealed a previous gap (and the current attempt to fill it in) related to multidisciplinary research efforts that should involve more tight collaboration between social sciences, engineering, decision sciences, and business and management areas. This suggests how coordinated and multi-faceted the efforts should be in order to enrich this research area, also emphasizing the need for a

systematized research coordination globally. Finally, this study also suggests that relevant preparedness efforts for possible crises in the future should be directed towards the manifold environmental, economic, and social consequences affecting this issue, too. However, this study is characterized by the choices made by the co-authors, that were very picky in terms of qualitative analysis conducted for the selection of a limited number of highly relevant research publications: this is the main limitation of the study, as qualitative selection is by construction limited if compared to quantitative one. Moreover, qualitative approaches are also subjective if compared to quantitative ones. Then, such a scientometric analysis paves the way for a future study adopting a deeper qualitative approach in order to analyze the content of each paper and its role the development of the ongoing discourse in the field of analysis.

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