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Time Management and Control: A Bibliometric Analysis

Roumeissa Salhi

PhD candidate, Dept. of Civil Engineering,
University 20 Août 1955 SKIKDA, Algeria

Abstract

Time management and control are crucial for project success, and it has known an increasing interest by researchers around the world since the appearance of project management and until now. The aim of the present paper is to provide a comprehensive overview of researches in this field. A bibliometric analysis of researches in time management and control published in the Web of Science (WoS) during 2012-2021 was conducted in order to find the most influential publications in this field, as well as, the countries that contribute the most to these researches, and the most used key words. The VOS Viewer was used for mapping and visualizing bibliometric networks. The results show an increased trend of publications in this field. And that the major contributors to researches in Time Management and Control are People's Republic of China, the United States of America, and England. Moreover, Labadie (2004) was the most cited author. Also, the results show 3 main levels of keywords, the first was related to time management in general, the second was related to the models and systems using and the third concerning the tools, the methods used in time management and control. These findings could help researchers to understand more the topic of time management and control, and it opens up the scope of view to conduct studies in related fields.

Keywords: Time Management, Time Control, Bibliometric Analysis, Web of Science, VOS Viewer

Introduction

Time is probably the most valuable asset available to people and organizations (Mbachu, Jasper 2007). It is irreversible, irreplaceable and it determines the efficiency of the processes necessary for the management of companies.

Time can be managed, spent, mastered and controlled (Lakein, 1973 cited by B.A.H.Al-Nady et al. 2016), and unless it is managed, nothing else can be managed. Therefore, time management is crucial to reach the stage of project success, according to Gransberg and Ellicott, 1997 (cited by Boyd and Madzima 2017) projects that are managed well in terms

of time management from inception through to practical completion have the potential to succeed.

Time management which was initiated with the famous PERT (Program Evaluation and Review Technique) planning tool and which dates back to 1958 (Dombkins 2009), was a topic of concern to researcher for more than half a century, and in the last two decades time control has known an increasing interest by researchers worldwide.

In order to provide a comprehensive overview of published articles in the field of time management and control and to understand the underlying developing models, a bibliometric analysis has been conducted.

Bibliometric analysis is the application of statistical and mathematical methods for the analysis of scientific publications in many disciplines and fields of study to find the most influential publications, journals, organisations, and countries (Yu et al. 2018). Bibliometrics can also analyse information more intuitively by mapping social networks, such as co-word, co-authorship and co-citation networks.

Several network visualisation tools can be used in bibliometric analysis methods. In our study the bibliometric analysis is done using the Visualisation Of Similarities Viewer (VOS Viewer).

VOS Viewer is a software package developed at the Center for Science and Technology Studies (CWTS) at Leiden University (Netherlands) and is very popular for constructing, mapping and visualizing bibliometric networks.

These networks include journals, researchers, or individual publications,…etc, and they can be constructed based on citation, bibliographic coupling, co-citation, or co-authorship relations.

Research objectives

This study aims to answer the following questions:

What is the publication trend of articles related to time management and control?

What are the dominant areas of research in time management and control?

Which countries have contributed the most to these researches?

What are the influential publications in this field of research?

What are the most common keywords used in research on time management and control?

Research methodology

A bibliometric analysis of research on the field of time management and control has been done using the VOS Viewer Software. The data set used in this analysis was obtained from the ISI Web of Science (WoS) database on 29 March 2021.

Our query was done using the following two terms “Time Management” and “Time Control” and only publications in English language were considered, also the scope of our search was not limited by a specific duration. The search including title, abstract and keywords gave us 983 results dated between 2012 and 2021.

The figure 1 summarizes the method used in this study and the results obtained from the analysis are presented in the followings sections.

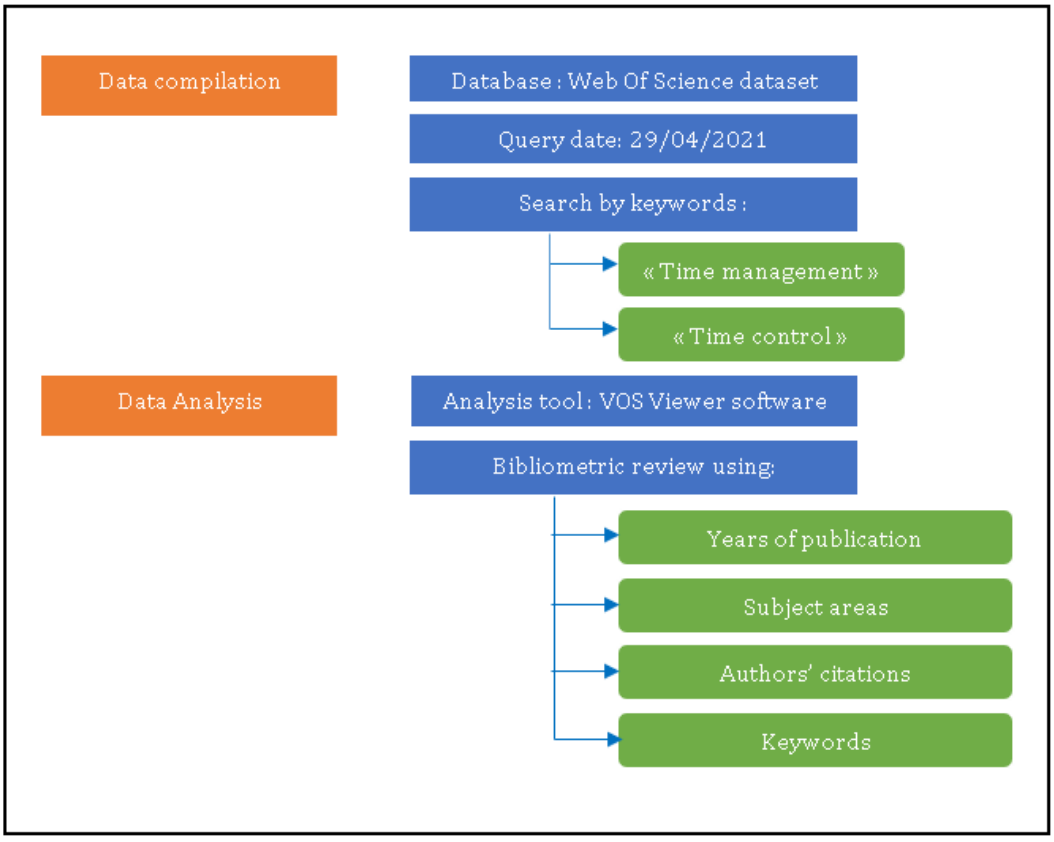

Figure 1: Research methodology

Discussion and results

4.1. Research growth: the publishing trend of "time Management and control" related publications

Using the Web of Science as a database, 983 publications in the field of time management and control were found. Figure 2 shows the frequency of publications per year and the trend in the number of publication from 2012 and 2021. The results show an increasing trend of publications ranging from 35 publications in 2012 to 95 publications in 2017.

On the other hand, the number of publications during the year 2018 decreased slightly to 85 publications, then the rhythm of evolution returns with 90 publications during the year 2019 and a peak of 100 publications during the year 2020.

However, only 15 publications were found in the year 2021. This is not surprising and quite normal as our research is done in March 2021 so it is only the result of 3 months and an expected increase for the number of publications is possible during the current year (2021).

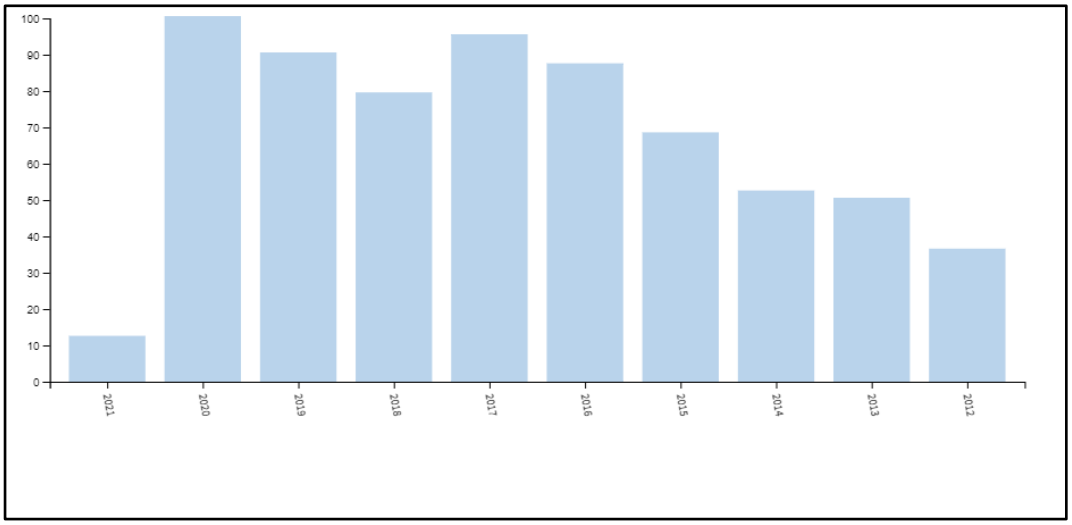

Figure2. Frequency of publications in time management and control field during 2012-2021

4.2. Subject area of time Management and control

The distribution of the sectors in which time management and control have been addressed is shown in Figure 3. From this figure it can be seen that there is a diversity of disciplines in which time management and control has been discussed.

Overall, the distribution indicates that research on time management and control is emerging in various fields: civil engineering, construction building technology, industrial engineering, management …etc.

As shown in figure 3, the top 3 dominant sectors in terms of publications and research in management and time control are the civil engineering sector with 29.37% followed by construction building technologies with 20.51 % and industrial engineering with 12.49%.

From these results it can be seen that the construction sector is the most dominant in terms of time management and control research, which is logical as time is an important pillar and cornerstone for the success of construction projects.

The management sector has also experienced a large interest in time management and control compared with the other sectors. This can be justified by the fact that time management is a branch of project management and follows the general rules and principles of management.

Figure3. The top 10 of most subject area used in publication.

4.3. Geographical distribution of time Management and control publications

Figures 4 and 5 show the geographical distribution of publications on time management and control. From these figures, it can be seen that publications in this area of research are unevenly distributed, and that time management and control has attracted much attention in North America, East Asia, Europe, the Middle East and Australia. However, few researches have been found in South Asia, South America, and Africa.

It can also be noted that the People's Republic of China is the major contributor in Time Management and Control research with a total number of 245 publications and 1541 citations, followed by the United States of America with 172 publications and 3337 citations, England (58 publications and 851 citations), Canada with 52 publications and 949 citations, and Australia (49 publications and 917 citations).

These results are not surprising and can be explained by the fact that the majority of these countries are pioneers in the field of management in general and project and time management in particular; and can be is demonstrated by the number of organisations created by these countries.

China has seen a growing interest in project management over the last two decades (the introduction of the PMI's "*Project Management Professionals (PMP)*" in 2000, then the IPMA's *"International Project Management Professional (IPMP)"* in 2001, and the creation of project management organisations such as *"the Construction Project Management*

Committee of China Construction Industry Association", "the Project Management Committee of China International Project Consultation Association", and "the Project Management Instructional Committee of China Project Consultant Association".

Moreover, the Americans are pioneers in the field of management (Harry Igor ANSOFF the pioneer in "management and strategic planning", Edward DEMING the founder of the "quality movement" and of the famous quality circles known as "the Deming wheel", Douglas GEGOR the author of the "authoritarian and participative management theories" known as "the X and Y theories", Abraham MAWSLOW the famous designer of the "pyramid of needs", and Frederik TAYLOR the father of the "scientific management theory" and the inventor of the "time study" and the "work methods" are all of American origin), but they are also pioneers in project management (*"the American Management Association (AMA)"* created in 1923 and *"the Project Management Institute (PMI)"* founded in 1969) and in time management in particular (the PERT, GANTT, critical path and LOB methods are designed by Americans).

In the UK, Johan ADAIR was the pioneer of British management thinking, and in terms of project management "The Association of Project Management" (APM) founded in 1972 and "The Chartered Management Institute" (CMI) founded in 2000 are based in the UK. On the other hand, Henry MINTZBZRG who defined the 10 main roles of leaders is of Canadian origin and Elton MAYO was the guru of management in Australia, and concerning project management, the Australian Institute of Project Management (AIPM) was founded in 1976.

4.4. Bibliographic network analysis

4.4.1 Citation network analysis (CAN)

A network citation analysis was made to find the most powerful articles which have the most connection with the research subject in the field of Time management and control. The results found (as presented in figure 6) show that the top 5 most influential authors are Labadie (2004) with his article entitled "Optimal operation of multireservoir systems" which has reached 1796 citations, followed by Bryde, Broquetas, and Volm (2013) with 1211 citations of their article "The Project Benefits of Building Information Modeling (BIM) ", then Lok (2010) with a number of citations 563, and Akinci et al. (2006) in the 4th place with a total of 344 citations, and Yewhalaw (2009) in the 5th place with 135 citations.

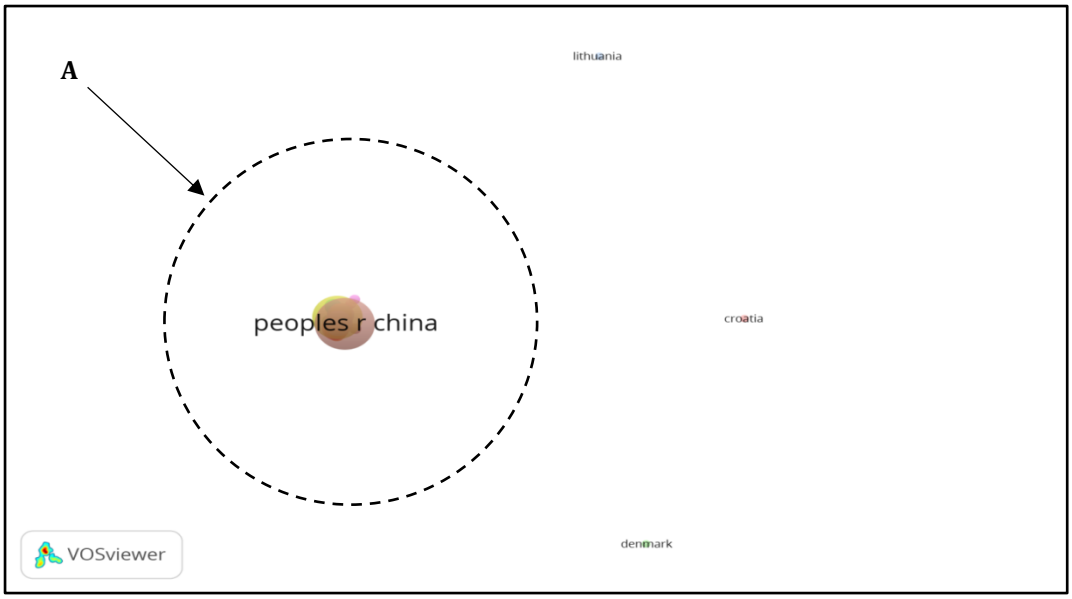

Figure4. Geographical distribution of publications

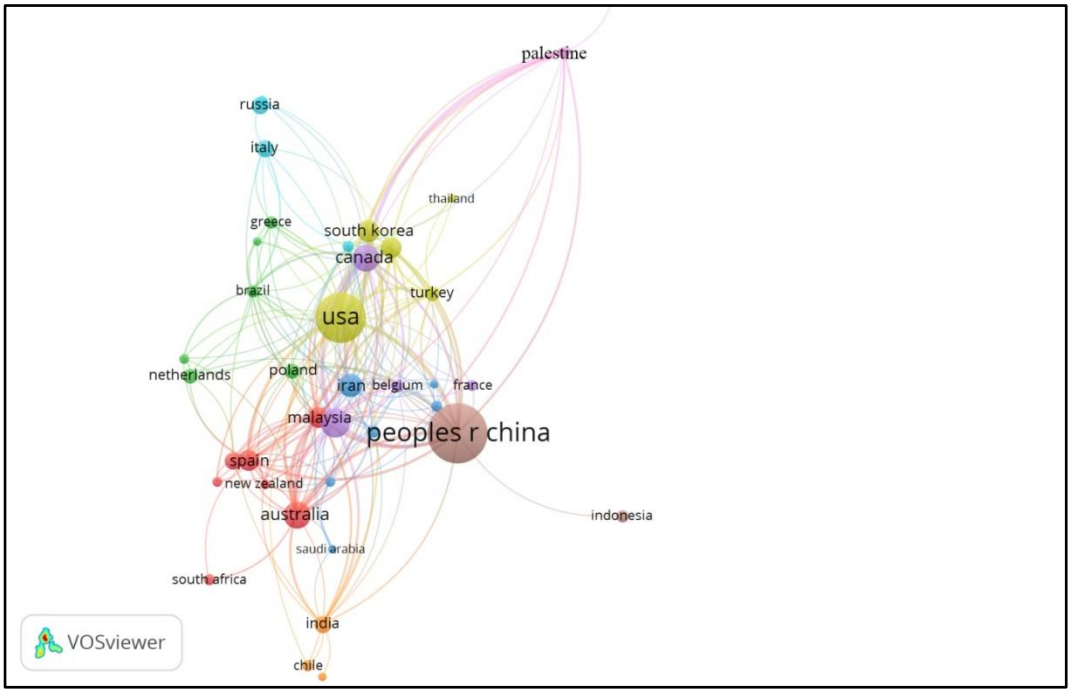

Figure5. Geographical distribution of publications (zoom in on part A)

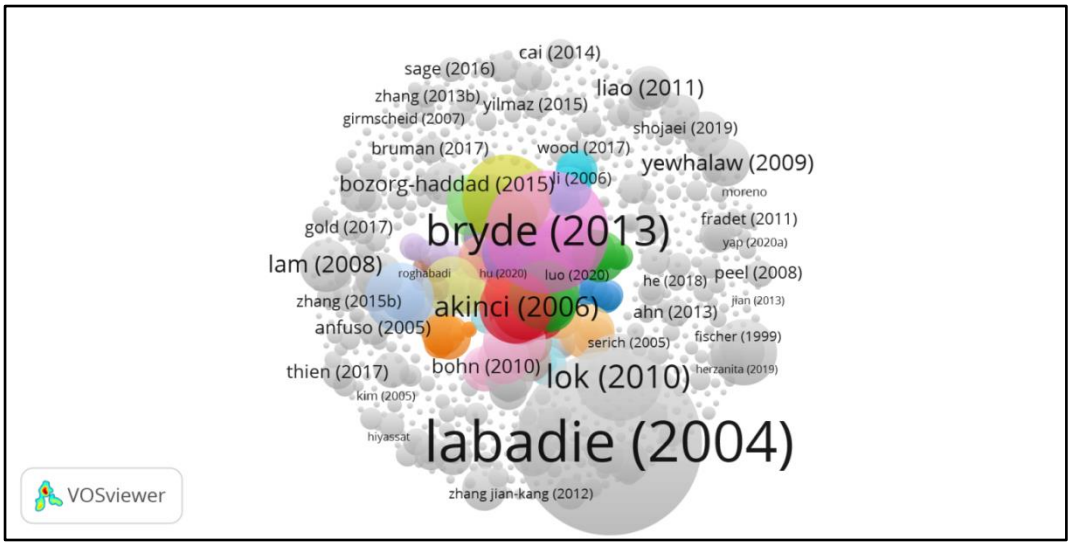

Figure6. Authors' citations

4.4.2 Keywords Analysis

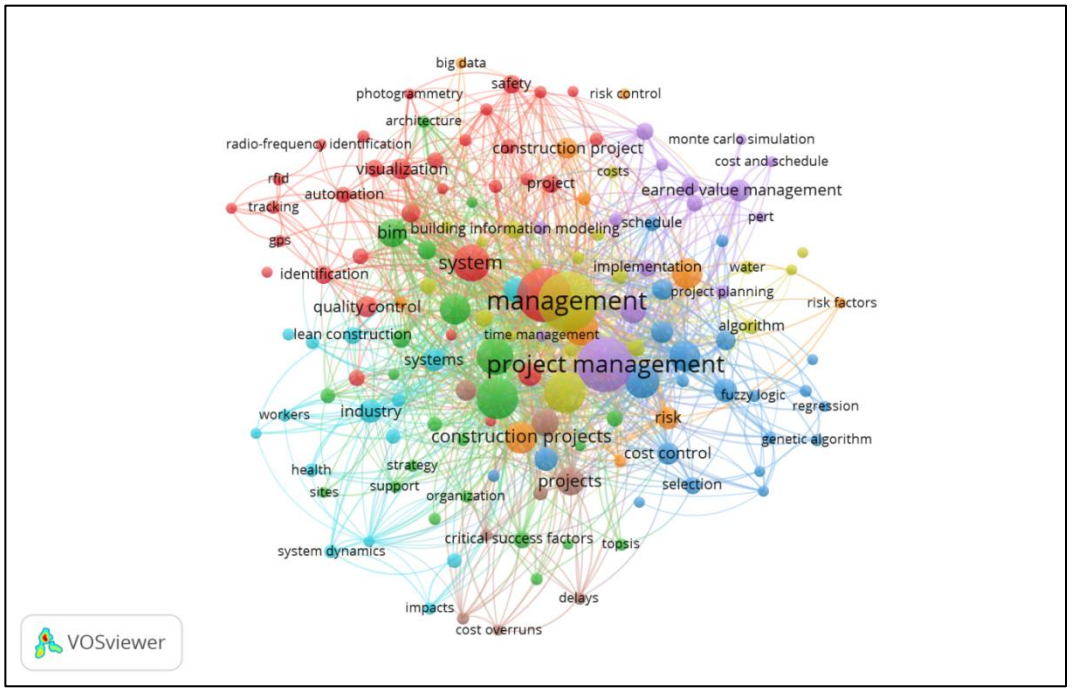

Figure7. Network visualisation map of keywords

The keywords obtained from the 983 articles studied were mapped using the VOS viewer software. The associated keywords are indicated by different colored balls and they are usually listed separately, however they are closely related to each other.

The results presented in Figure 7 show 3 main levels of ranking:

In the first ranking, the most frequently cited words (more than 100 citations) were divided into 3 major groups: "Management", "Construction", and "Project Management", with occurrence rates of 141, 116 and 118 respectively.

In the 2nd ranking the words that have a strong connection with each other and with the 1st rank keywords and that also have a strong occurrence in the field of time management and control are: "performance", "model", "design", "system", "structure", "cost", "construction projects".

The 3rd ranking includes words related to time control: "time", "construction management", "BIM", "projects", "simulation", "Lean", "visualisation", "algorithms", "fuzzy logic", "earned value management" .... etc.

Conclusion

A comprehensive overview of researches published in the Web of Science (WoS) during 2012-2021 on time management and control field has been conducted through a bibliometric analysis in order to find the publishing trend of publications, the most influential publications in this field, as well as, the countries that contribute the most to these researches, and the most used key words.

A total number of 983 publications was analysed and the bibliometric networks of these papers was mapped using the VOS Viewer software. The results show an increased trend of publications in this field. And that the major contributors to researches in Time Management and Control are People's Republic of China, the United States of America, and England. Moreover, Labadie (2004) was the most cited author in the fieled of time management and control. Also, the results show 3 main levels of keywords, the first was related to time management in general, the second was about the models and systems using and the third concerning the tools, the methods used in time management and control.

These findings could help researchers to understand more the topic of time management and control, and it opens up the scope of view to conduct studies in related fields.

Our study undoubtedly have some limitations among which the dataset used in this study includes only papers published in the ISI WoS, also only studies in English language are considered in this research. Similar researches could be done using other databases, and including articles with other languages. Further, it is suggested to carry out a study for comparing the ISI WoS findings with the findings of others databases.

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