



# Bibliometric analysis of worldwide scientific literature in Project Management Techniques and Tools over the past 50 years: 1967-2017

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## INTRODUCTION

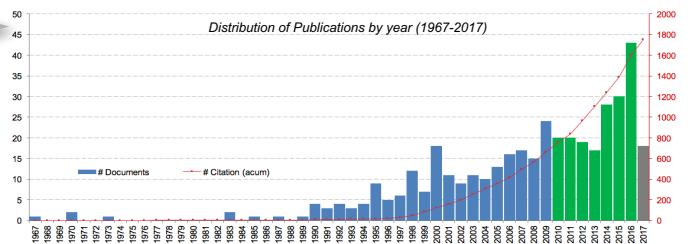
The Project Management techniques and tools are precisely what make managing projects efficient and more effective. These can be described as the ways that we gather information, communicate, and generally get things done. With this in mind, it is necessary analyze the relationship between the techniques and tools and the knowledge areas of the PM to understand the full impact of these in Project Management Process: Initiating, Planning, Executing, Monitoring and Controlling and Closing.

In this way, the main objective of the present article is to describe the relationship between of the Techniques and Tools of Project Management with the PMBOK 6 Knowledge Areas (Project Integration Management, Project Scope Management, Project Schedule Management, Project Cost Management, Project Quality Management, Project Resource Management, Project Communication Management, Project Risk Management, Project Procurement Management and Project Stakeholder Management) available in the literature using bibliometric tools.

Bibliometrics can be defined as a set of methods and tools for evaluating and analyzing academic publication and citation in order to explore its impact on a specific field and how it contributes to the progress of science in the main areas of research.

## METHODOLOGY AND DATASET

In order to carry out the bibliometric performance and network visualization map analysis, we used the Web of Science™ Core Collection using the following advance query: TS=("Project Management Tool" OR "Project Management Tools" OR "Project Management Technique" OR "Project Management Techniques" OR "Project Tool" OR "Project Tools" OR "Project Technique" OR "Project Techniques"). This advance query retrieved a total of 548 Publications, of which 405 are directly related to use of the techniques and tools of PM. To do that, we review all the abstracts and download the publications. In addition, the knowledge base was further refined and limited to Articles, Proceedings and Reviews published in English.

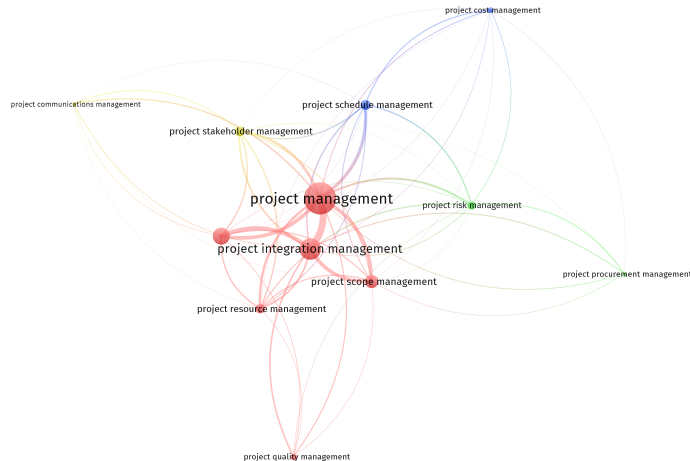


## PERFORMANCE BIBLIOMETRIC ANALYSIS

To understand how the techniques and tools of PM have evolved in terms of publication, citations and impact, we evaluated their performance through analysis of the following bibliometric indicators: published publications, received citations, most cited articles, most cited authors, data on geographic distribution of publications and h-index. The bibliography performance analysis is structured in two parts: evaluation of the publications and their citations with the aim of testing and evaluating scientific growth; and analysis of the authors, publications, journals and research areas to assess the impact of the publications.

The Network visualization map of Techniques and Tools of PM based on the PMBOK knowledge areas is shown in Figure 9. The concepts with minimum occurrences of 5 times were shown in the map. The concepts with the same color were commonly listed together (Cluster). For example, concepts with red color such as PM Techniques&Tools, Project Integration Management, Project Management and Project Scope Management existed in Cluster 1 and had the highest percentage of relationship within this cluster. The thickness of connecting line between any two concepts indicates strength of relation. For example, the link strength (relation) between Project Management and Pm Techniques&Tools is 17 and it represents a thick line. On the other hand, the line between Project Management and Project Integration Management had a link strength of 32.

Network visualization map of Techniques and Tools of PM based on the PMBOK knowledge areas



It is important to mention that three items (Project Management, Project Integration Management and Project Scope Management) are related to all other items. In addition, all the Cluster are interrelated.

| Cluster             | Items                            | Links (Total link strength) | Occurrences |
|---------------------|----------------------------------|-----------------------------|-------------|
| Cluster 1 (6 items) | Project Management               | 11 (131)                    | 121         |
|                     | Project Integration Management   | 11 (109)                    | 72          |
|                     | Project Scope Management         | 11 (59)                     | 37          |
|                     | Project Quality Management       | 6 (21)                      | 14          |
|                     | Project Resource Management      | 10 (49)                     | 24          |
|                     | PM Techniques&Tools              | 10 (52)                     | 53          |
| Cluster 2 (2 items) | Project Risk Management          | 10 (36)                     | 20          |
|                     | Project Procurement Management   | 6 (15)                      | 8           |
| Cluster 3 (2 items) | Project Schedule Management      | 9 (48)                      | 26          |
|                     | Project Cost Management          | 9 (19)                      | 13          |
| Cluster 4 (2 items) | Project Communication Management | 7 (18)                      | 7           |
|                     | Project Stakeholder Management   | 10 (49)                     | 26          |

## CONCLUSIONS

- The size of literature related to techniques and tools of PM showed a noticeable increase in the past decade. Given the large volume of citations received in this field, it is expected that the use of techniques and tools of PM will be seen as part of the projects.
- Research in techniques and tools of PM needs to be encouraged, particularly in the new industrial sectors and collaborative projects.
- Techniques and tools are related mainly to the Project Integration Management and Project Scope Management, but has interaction with all of the knowledge areas of PM.
- Keep in mind that the focal point of reference for all the items are the Project Management and Techniques and Tools, we identified four Cluster interrelated that group the knowledge areas based on the use of the use and application of techniques and tools of PM.

