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Impact of Project Management Tools on Research Output: A Systematic Literature Review

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Abstract
The increasing complexity of research projects demands structured management approaches to enhance productivity, collaboration, and overall research output. Project management tools (PMTs) have been widely used in various industries, but their role in academic and scientific research remains underexplored. This systematic literature review (SLR) examines the impact of PMTs on research output by synthesizing empirical studies, case analyses, and systematic mapping reviews. The findings indicate that while PMTs improve research efficiency, collaboration, and grant management, their adoption faces significant resistance from researchers due to concerns over rigidity, administrative burden, and lack of empirical validation. The review identifies key challenges and proposes future research directions to improve the integration of PMTs into academic research environments.

Keywords: *Project Management, Research project, Collaboration, Project tools*

1. INTRODUCTION

Scientific and academic research is inherently project-based, requiring extensive planning, resource allocation, time management, and collaboration. However, many researchers still rely on informal and ad hoc management approaches, leading to inefficiencies such as missed deadlines, lack of coordination, and poor resource utilization (Fowler et al., 2020). As research projects grow in complexity—especially those involving interdisciplinary teams, multiple funding sources, and global collaborations—the need for structured project management tools (PMTs) becomes increasingly evident (Chadli et al., 2021; Bjorvatn & Wald, 2022).

Industries such as software development, construction, and engineering have long leveraged project management methodologies and tools to improve efficiency and success rates (Chou & Yang, 2021; Kerzner, 2021). However, their integration into academic and scientific research has been relatively slow due to researchers' preference for flexibility over rigid methodologies (Silvius & Schipper, 2021). The primary objective of this review is to explore the extent to which PMTs impact research productivity, efficiency, and collaboration, while also identifying the challenges hindering their adoption (Serrador & Turner, 2020).

This review seeks to pursue three key research objectives-

1.1 Research Objectives

1. Explore project management tools that are commonly used in research projects?
2. Study the influence of PMTs on research productivity, collaboration, and efficiency?
3. Identify the challenges preventing the widespread adoption of PMTs in research environments?
4. Bring out research gaps in adopting project management tools used in research projects?

1.2 Research Questions

1. What project management tools are commonly used in research projects?
2. How do PMTs influence research productivity, collaboration, and efficiency?
3. What are the challenges preventing the widespread adoption of PMTs in research environments?
4. What are the research gaps in adopting project management tools used in research projects?

2. LITERATURE REVIEW

The integration of project management tools (PMTs) into research environments has gained increasing attention due to their potential to enhance productivity, collaboration, and overall project success. Unlike traditional project management in industries such as

construction, IT, and manufacturing, research projects require more flexible, iterative, and collaborative approaches (Bjorvatn & Wald, 2022). This section reviews existing literature on the role of PMTs in research, covering their adoption, impact on productivity, collaboration benefits, funding success, and challenges hindering their widespread use.

2.1 Adoption of Project Management Tools in Research

The adoption of PMTs in research institutions remains limited compared to industry settings, despite their growing recognition for improving research project efficiency (Patanakul et al., 2020). Fowler et al. (2020) observed that universities are gradually implementing formal project management tools to organize research projects more effectively. However, many researchers resist these tools due to concerns over bureaucratic overhead and reduced flexibility (Ika & Donnelly, 2021). In non-governmental research organizations (NGOs), Matos et al. (2022) found that structured project management methodologies enhance efficiency and accountability, particularly in knowledge-intensive research projects. Similarly, Chadli et al. (2021) conducted a systematic mapping study identifying 102 project management tools that support research collaboration, task tracking, and data management in distributed research environments.

Despite these advancements, the uptake of PMTs in research is hindered by factors such as complexity, resistance to formalization, and lack of empirical validation of their effectiveness in academic settings (Serrador & Turner, 2020). Unlike industry projects that follow standardized frameworks like PMBOK, Agile, or PRINCE2, research projects often require adaptable methodologies to accommodate evolving hypotheses and data-driven decision-making (Chou & Yang, 2021).

2.2 Impact of Project Management Tools on Research Productivity

Research productivity is measured through indicators such as publication rates, collaboration efficiency, funding acquisition, and project completion success (Golini et al., 2021). The literature suggests that PMTs contribute to these outcomes in multiple ways:

1. Enhanced Research Productivity – Patanakul et al. (2020) found that using structured project management methodologies improves time management, milestone tracking, and deliverable completion in research projects. By enabling better resource allocation and real-time tracking, PMTs help researchers manage multiple projects simultaneously while ensuring deadlines are met (Kerzner, 2021).
2. Improved Collaboration – Research projects, particularly interdisciplinary and multi-institution collaborations, benefit significantly from centralized task management, communication, and document sharing platforms such as Trello, Confluence, and Jira (Chadli et al., 2021). These tools facilitate real-time data sharing, version control, and task delegation, thereby streamlining research processes and reducing administrative burdens (Bjorvatn & Wald, 2022).
3. Increased Funding Success – The ability to track research progress and manage budgets effectively has been linked to higher funding acquisition rates. Chou & Yang (2021) highlighted that grant management tools allow researchers to comply with funding requirements more efficiently, leading to greater transparency in financial reporting and improved grant application success rates.
4. Knowledge Management and Data Organization – PMTs support structured knowledge repositories that enable researchers to document findings, methodologies, and datasets systematically. This facilitates long-term knowledge retention and reduces redundancy in research efforts (Hassani & Bouncken, 2023).

There are several challenges in Adopting Project Management Tools in Research, despite the demonstrated benefits, these challenges hinder the widespread adoption of PMTs in research environments:

1. Resistance to Formalization – Many researchers prefer informal, flexible approaches to managing their work, fearing that structured project management frameworks may stifle creativity and innovation (Fowler et al., 2020). Academic research often follows non-linear workflows, making rigid PM methodologies less appealing (Ika & Donnelly, 2021).
2. Lack of Empirical Validation – There is limited quantitative evidence on the effectiveness of PMTs in research-specific environments, leading to skepticism about their actual impact on research outcomes (Patanakul et al., 2020). Unlike industries where project success is measured through financial returns and deliverable completion, research projects have abstract and evolving objectives, making it difficult to assess PMT effectiveness (Serrador & Turner, 2020).
3. Complexity and Usability Issues – Many PMTs are designed for corporate project management and may not align well with academic research workflows (Silvius & Schipper, 2021). Researchers often find these tools too complex or rigid, requiring extensive customization to fit their specific needs (Brotcke, 2023).
4. Administrative Burden – Implementing PMTs requires training, customization, and continuous management, which can divert researchers' time away from core research activities (Muthu & Sharma, 2023). The

administrative load associated with setting up and maintaining project management systems often discourages adoption in resource-constrained environments (Galli, 2020).

3. METHODOLOGY

A systematic literature review (SLR) approach was employed following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework. This methodology ensures a structured and transparent process for identifying, selecting, and analyzing relevant studies (Ahlemann et al., 2021).

2.1 Data Sources and Search Strategy

Literature searches were conducted using a variety of academic databases to ensure comprehensive coverage of relevant studies. The selected databases included Google Scholar, which provides broad access to scholarly articles across multiple disciplines; ScienceDirect, a repository of peer-reviewed journal articles, particularly in science and technology; IEEE Xplore, which specializes in research related to engineering, computer science, and technology; ResearchGate, a platform that facilitates access to academic publications and collaborations among researchers; and Emerald Insight, which offers a collection of research in business, management, and social sciences.

These databases were chosen to ensure a well-rounded and diverse selection of literature for this review. The search strategy included the following keywords: "Project Management Tools in Research," "Academic Research Management," "Impact of Project Management in Research," and "Collaboration in Research Projects" (Hassani & Bouncken, 2023).

2.2 Inclusion and Exclusion Criteria

a) **Inclusion Criteria:**
   i. Peer-reviewed journal articles, systematic mapping studies, and empirical research published from 2020 onwards.
   ii. Papers examining the use of PMTs in academic research and knowledge-intensive projects.

b) **Exclusion Criteria:**
   i. Non-English publications.
   ii. Studies focusing exclusively on industry project management without reference to research environments.
   iii. Articles that were purely theoretical without empirical validation (Muthu & Sharma, 2023).

2.3 Data Extraction and Analysis

Data extraction focused on three key aspects relevant to the impact of project management tools on research output. First, the study examined the project management tools used, including widely adopted software such as Microsoft Project, Trello, Jira, Asana, Confluence, and Primavera, which support various aspects of project planning, task management, and collaboration. Second, the impact on research productivity was analyzed by assessing factors such as publication rates, funding success, and the effectiveness of collaboration, highlighting how these tools contribute to improving efficiency in research environments. Finally, the study explored the challenges in adoption, identifying common barriers such as researcher resistance, usability issues, and lack of formalization, which often hinder the successful implementation of project management tools in academic and research settings.

4. RESEARCH FINDINGS

Several studies highlight the increasing use of PMTs in research environments, though their adoption remains limited compared to industry settings (Patanakul et al., 2020). Fowler et al. (2020) found that universities are gradually implementing formal project management tools to improve the organization of research work. However, resistance from researchers remains high due to the perceived bureaucratic overhead and concerns over flexibility (Ika & Donnelly, 2021).

In non-governmental research organizations (NGOs), Matos et al. (2022) emphasized that project management methodologies increase efficiency and accountability in knowledge-intensive projects. Similarly, Chadli et al. (2021) conducted a systematic mapping study on PMTs in distributed research projects, identifying 102 tools that support research collaboration, project tracking, and knowledge management.

The reviewed studies indicate that PMTs positively influence research output in several key areas:

a) Enhanced Research Productivity: Patanakul et al. (2010) found that structured project management methodologies improved time management, milestone tracking, and deliverable completion in research projects.
b) Improved Collaboration: Research teams working on interdisciplinary or international projects benefit from centralized task management and document sharing, facilitated by tools such as Trello, Confluence, and Jira (Chadli et al., 2016).
c) Increased Funding Success: Chou et al. (2012) highlighted that research groups using structured grant management tools had a higher success rate in securing funding due to better compliance with funding requirements.

Despite their advantages, the adoption of project management tools (PMTs) in research environments faces significant challenges. One of the primary obstacles is resistance to formalization, as many academic researchers prefer informal management approaches, fearing that rigid project management frameworks could stifle creativity and innovation (Fowler et al., 2015). Additionally, there is a lack of empirical validation for many PMTs used in research settings, leading to skepticism regarding their actual effectiveness in improving research outcomes (Patanakul et al., 2010). Another challenge is the

complexity and usability of PMTs, as many tools are originally designed for industry applications and may not align with the flexible, iterative nature of academic research. As a result, researchers often struggle to integrate these tools effectively into their workflows (Silvius & Schipper, 2014). Moreover, the administrative burden associated with implementing PMTs can be a deterrent, as these tools often require extensive training, customization, and ongoing management, which can divert time and resources away from core research activities. These challenges collectively limit the widespread adoption of PMTs in academic and research environments, despite their potential benefits.

5. CONCLUSION AND FUTURE WORK

This review provides compelling evidence that Project Management Tools (PMTs) significantly impact research productivity, collaboration, and funding acquisition. However, barriers such as researcher resistance, usability concerns, and lack of empirical validation must be addressed for broader adoption.

Future Research Directions

1. Empirical Validation of PMTs in Research – Future studies should conduct quantitative assessments to measure the direct impact of PMTs on research output.
2. Customization of PMTs for Academic Research – PM tools should be tailored to suit the flexible and evolving nature of research work.
3. Training and Change Management Strategies – Investigating methods to train researchers and reduce resistance to PMTs can lead to higher acceptance and efficiency.

This systematic literature review highlights the growing yet limited adoption of project management tools (PMTs) in research environments. While PMTs enhance research productivity, facilitate collaboration, and improve funding success, their integration in academic settings remains challenged by resistance to formalization, usability concerns, and a lack of empirical validation. Universities, NGOs, and global research collaborations have begun incorporating PMTs, but scepticism and administrative burdens continue to hinder widespread adoption. To maximize the benefits of PMTs in research, future studies should focus on empirical validation, customization of tools to better fit academic workflows, and the development of effective training and change management strategies. Addressing these challenges will ensure that PMTs become a valuable asset in optimizing research efficiency and impact.

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