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Systematic Review

Ambidextrous Innovation in Project Management: A Systematic Literature Review

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Abstract: Projects work under constant pressure of resource and time constraints. In order to perform effectively and efficiently, innovation seems to be a significant factor. However, due to the different nature of projects as compared to the organization, projects have been finding it difficult to undertake such innovation. However, ambidextrous innovation, which seeks to balance exploratory and exploitative innovation, offers a possible solution. However, research on the relationship between ambidextrous innovation and project management is at an early stage. The purpose of the present research is to undertake a systematic review of the literature to build and synthesize the understanding of innovation ambidexterity at the project level. Following the Preferred Reporting Items for Systematic Reviews and Meta Analysis (PRISMA) guidelines, our research collected data from the Web of Science and SCOPUS databases. By adhering to the PRISMA approach, we ensured a rigorous and transparent approach to the systematic review study, allowing for comprehensive data collection and analysis. The results of the present review study suggest that interest is building rapidly to incorporate ambidextrous innovation into project management. Ambidextrous innovation seemed to positively impact both the performance and capability of projects to undertake the innovation. Further, important drivers such as organizational culture, knowledge management, innovation activities, and agility play key roles in undertaking ambidextrous innovation at the project level. Further, elements of the team such as team integration, alignment, and knowledge utilization also play key roles. Finally, the avenue of future research has also been highlighted.

Keywords: ambidextrous innovation; project management; explorative innovation; exploitative innovation

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1. Introduction

External and macroeconomic issues are putting pressure on projects to perform effectively and efficiently by cutting costs, reducing waste, and becoming more sustainable (Musarat et al. 2021). The ongoing external and macroeconomic pressure has left less room for projects and organizations running such projects to be successful in a way that satisfies the requirements and demands of the project stakeholders (Nguyen et al. 2023). Therefore, it is required and demanded that the projects change how core project activities are undertaken (Ali et al. 2023) One of the critical solutions that can pave the way for projects to change the way core activities are being undertaken is innovation (Ju et al. 2020). Innovation can be defined as creating and experimenting with new things in core project activities to improve the efficiency and effectiveness of the projects. The innovation can be radical, in which a significant newness is introduced into core project activities, and it can be incremental, in which core project activities are improved and enhanced gradually and incrementally. However, projects are also constrained by cost and time (Kline and Rosenberg 2010). The very nature of projects is that projects have to deliver to their clients and stakeholders quickly, constrained by cost and performance pressure (Svejvig and Andersen 2015), and such a nature and pressure have also caused projects to fail significantly.

Innovation, especially radical, requires the careful experimentation, testing, and commercialization of new ideas (Adams et al. 2006). Thus, this makes innovation for organizations and projects costly and time-consuming (Hidalgo and Albors 2008). However,

in recent years, more creative approaches have been used by organizations, especially to undertake and channel their innovation activities, which is being referred to as ambidextrous innovation (Gerlach et al. 2020). Ambidextrous innovation is the organization's dynamic capability to undertake and balance exploratory innovative activities in which radical innovation is being introduced and exploitative activities in which incremental innovation is being introduced in the projects. The resolution of the paradox of exploratory and exploitive innovation is central to ambidextrous innovation (O'Reilly and Tushman 2011). It allows organizations to gain continuous knowledge and experience that would ultimately help them sustain their competitive advantage (Zhang et al. 2020). Further, ambidextrous innovation will enable organizations to continue the innovation continuously without any break, and such continuity in the innovative activities can result in positive and continuous organizational performance (Zhang et al. 2021b). Ambidextrous innovation is also promising as it can also pave a way for the project to reduce the number of failures (Guzzini and Iacobucci 2017). Thus, due to the apparent benefit of ambidexterity, project management scholars and practitioners have also started to take an interest in project ambidexterity (Haider et al. 2023).

The nascent literature suggests that project managers are highly keen and interested in ambidexterity (Zhang et al. 2021a). The ambidexterity provides a valuable framework for the project managers to improve their cost efficiency, reduce project failures, develop ways to complete the deliverables on time, and achieve higher stakeholder satisfaction (Haider et al. 2023). Further, the literature, especially empirical literature, also suggests that ambidexterity at the project level can also be a necessary and essential milestone for project managers (Di Muro et al. 2021) as it helps managers to find a solution to apparent and short-term problems and utilize such knowledge and experience to detect and develop a solution of recurring and long-term issues (Rosing and Zacher 2023). The literature also suggests that the project is an ideal case study of ambidextrous innovation and the balancing of exploratory and exploitive innovation paradoxes (Binci et al. 2023). The projects are well suited to employ exploitive innovation methods using their knowledge and experience continuously (Zhang et al. 2021a). Further, projects can simultaneously parallel exploitive activities and may acquire internal and external knowledge and expertise to undertake explorative activities (Haider et al. 2023).

However, such empirical evidence suggests a promising future for projects incorporating ambidexterity to improve efficiency and effectiveness. Research on project management and ambidextrous innovation needs to be further advanced. The project structure is well suited to ambidexterity compared to traditional organization structure (Rosing and Zacher 2023). However, more confirmation from the literature is required. Further, due to differences in the resources, knowledge, and experience, insight into key enablers and key exhibitors, which can affect the project's ability to incorporate and embed ambidexterity, is also needed. Finally, empirical research such as that by Haider et al. (2023); Zhang et al. (2021b); Di Muro et al. (2021); Hald and Nordio (2021); and Sun et al. (2020) has found that ambidexterity impacts project performance positively; such claims should be validated from the broader literature, which will serve as an anchor point for future researchers and managers to confirm the effect of ambidexterity.

Finally, the general theory of ambidexterity is underpinned by various interconnected and interdisciplinary theories, making it crucial to delve deeper into its theoretical foundations. This exploration is necessary to enhance the theoretical relevance of research on project-level ambidexterity and to provide future researchers with a robust theoretical framework for their empirical studies. By uncovering the theoretical bases of project-level ambidexterity, researchers can ensure that their studies are grounded in well-established theories, which will strengthen the academic rigor and credibility of their work. To achieve this objective, a systematic literature review (SLR) is indispensable. The SLR methodology is well suited for gathering and synthesizing high-quality literature insights, enabling researchers to identify, evaluate, and interpret all relevant research available on a particular topic in a comprehensive and unbiased manner (Paul et al. 2021). This research, therefore,

aims to conduct an SLR to collect and analyze scientific literature on the phenomena of project management and ambidextrous innovation. By doing so, it seeks to provide a detailed theoretical understanding that will not only clarify the current academic landscape but also offer a solid foundation for future empirical investigations. This approach will contribute significantly to saturating the academic knowledge in this area and enhancing its theoretical relevance, ultimately supporting the development of more effective project management and innovation strategies.

The key objectives of the present research are to

- To identify the main categories and research areas of research on ambidextrous innovation in project management.
- To identify the enablers of ambidextrous innovation in project management.
- To identify usual barriers and challenges facing ambidextrous innovation in project management.
- To identify the impact of contemporary research studying ambidextrous innovation on practitioners within project teams and organizations.
- To identify areas of future research on ambidextrous innovation that would benefit project team success.

2. Review of Existing Literature

2.1. Project Management

Project management can be defined as a management framework for organizing, leading, and overseeing actions with the aim to achieve the goals and objectives as part of the projects (Levitt 2011). Project management seems to have emerged as an important management framework with the capacity to manage risks, stimulate innovation, and maximize resources in order to achieve the organization's strategic objectives (Lock 2020). Project management started with the heavy engineering and construction industry, but with time, it is being adopted into a variety of industries, including manufacturing, IT, healthcare, and finance (Pollack 2007).

The project management literature suggests that, consistent with traditional management philosophy, the planning process in the projects takes the central stage for project success (White and Fortune 2002). In the planning stage, project managers attempt to set the goals, deliverables, and scope of the project. Further, project managers also attempt to identify the key stakeholders who will play an important part in contributing to the success of the projects (Barbalho et al. 2019). Therefore, project managers are required to set and develop all significant requirements satisfying the needs and demands of these key stakeholders (Mallak et al. 1991). Moreover, conducting thorough risk assessments and effectively allocating resources to specific deliverables and components are crucial to ensuring project success. Further, as project management started to become popular and depending on the needs and nature of the project, several new and innovative project management methodologies such as agile have emerged, which offer distinct frameworks for organizing and carrying out projects (Dybå et al. 2014). Finally, digitization of project management has resulted in many software and online tools, such as task trackers, Gantt charts, and Kanban boards, allowing for quick decision-making to resolve deviations from the plan and provide real-time monitoring of project progress (Akturk and Erhun 1999).

Agile project management can be defined as a project management methodology that focuses on iterative development, collaboration, and adaptability to manage complexity of project efficiently (Dybå et al. 2014). The principle of agility in project management has made a significant contribution in helping projects to manage various pressures such as time, costs and failure (Fernandez and Fernandez 2008). The agility in projects is also crucial for ambidextrous innovation, as agility provides projects with the ability to balance exploitation and exploration by promoting flexibility, continuous feedback, and incremental progress (Clauss et al. 2021).

2.2. Ambidextrous Innovation

The ambidextrous innovation is the organization's dynamic capability to undertake and balance exploratory innovative activities in which radical innovation is being introduced and exploitative activities in which incremental innovation is being introduced in the projects. The resolution of exploratory and exploitive innovation is central to ambidextrous innovation (O'Reilly and Tushman 2011).

The idea of ambidextrous innovation originated from the realization that in order for businesses to stay competitive in ever-changing market situations, they need to not only use their current resources and skills but also investigate new avenues and technological advancements (Chakma et al. 2021). Therefore, utilizing the existing resources efficiently can be referred to as exploitation, and investigating and finding new avenues can be referred to as exploration (Scott 2014).

The literature suggests that exploitative innovation is all about exploiting already-existing knowledge, skills, and resources in order to boost productivity, enhance cost efficiency, and improve the quality of products and services (Mueller et al. 2013). Exploitive innovation concentrates on maximizing the value that may be extracted from existing resources and business models (Heidhues et al. 2016). Exploitive innovation can also be referred to as incremental innovation in which the key objective is to achieve operational excellence, process optimization, and gradual increases in productivity (Lennerts et al. 2020). On the other hand, the idea of exploratory innovation is to develop new ideas, products, services, and procedures. Exploratory innovation entails venturing into uncharted territory, which offers a potential for disruptive innovations (De Visser and Faems 2015). Exploratory innovation requires a lot of resources towards R&D, a supportive culture and diverse thinking, and cultivating an environment where failure is accepted as a crucial step on the path to invention (Enkel et al. 2017).

Finally, ambidextrous innovation in the context of project management also requires a dual focus on short-term and long-term project goals and objectives. The short-term project goals align with exploitative innovation, which must emphasize operational excellence, process optimization, and incremental improvements to deliver immediate value (Haider et al. 2023). Further, long-term project goals, conversely, are aligned with exploratory innovation, which comprehensively focuses on research and development, fostering a supportive culture for innovation, and encouraging diverse thinking to generate disruptive innovations that can redefine markets and create new growth trajectories (Zhang et al. 2021b). Addressing both types of invention is necessary for managing ambidextrous innovation in projects successfully. In order to achieve short-term objectives, exploitative innovation is prioritized, which can lead to improved operational efficiencies and higher-quality goods and services, thereby giving businesses a competitive advantage. Meanwhile, exploratory innovation is essential for long-term objectives since it entails investment and the acceptance that failure is a necessary part of the innovation process (Killen et al. 2023).

3. Research Method

The present research aims to synthesize an understanding of ambidextrous innovation techniques utilized in the project and related organizations, such as construction and software development companies (Binci et al. 2023). The concept of ambidextrous innovation gained significant attention from practitioners and scholars (Wei et al. 2011). Various empirical studies (Petro et al. 2020; Binci et al. 2023; Sailer 2019; Turner et al. 2015; Ojiako et al. 2023) have been undertaken in the setting of project management. However, a systematic literature review study is needed to build the synthesized understanding that guides further research toward ambidextrous innovation in a project setting. Although some systematic literature review studies by (Kafetzopoulos 2022; Chakma et al. 2021) have been undertaken, most of these studies have not explicitly captured the instance of project management and the setting in which ambidexterity is studied. Therefore, a gap in the literature exists, which calls for undertaking a systematic literature review study on ambidexterity and project management. To launch the periodic review of earlier studies in

ambidextrous innovation and project management, the present research has adopted the PRISMA guidelines provided by Tranfield et al. (2003). The systematic review guidelines by Tranfield et al. (2003) are considered comprehensive guidelines that scholars of management science research widely use. Tranfield et al. (2003) suggest three stages to conduct a systematic review of literature the planning stage, the review stage, and the reporting stage.

3.1. Planning Stages

The planning stage is the first stage in undertaking the systematic literature review, as suggested by Tranfield et al. (2003). In the planning stage, the authors carefully followed the guidelines and protocols enshrined in Tranfield et al. (2003) to set a clear direction for the systematic review study process and procedure. First, straightforward research questions have been developed to specify and narrow the objectives. The research questions provide an anchor point in the scope of our systematic review study. Table 1 lists the research questions developed for the current research study. Second, present research by following guidelines presented by scholars in management science (Paul and Criado 2020; Paul et al. 2017), who have selected the research database to search and extract the relevant and high-quality literature. These databases include Web of Science and SCOPUS. Web of Science and SCOPUS are databases containing high-quality peer-reviewed scientific literature. Further, to support the statement, the present research has decided to extract only literature in the form of research papers written in English. Third, extracting the relevant literature from the research databases depends much on the set of keyword strings that have been used. It is suggested that researchers utilize keywords that help them capture the literature relevant to the research questions to be answered (Paul et al. 2017). Secondly, relevant and appropriate keywords are also necessary to avoid all pertinent literature inconsistent with the scope of the study (Paul and Criado 2020). Table 2 lists the keywords developed for the present systematic review study to search and extract the literature.

Table 1. Research questions.

S.No	Research Questions
1	What are the main categories (and their characteristics) that have been identified in research studies that addressed ambidextrous innovation in project management?
2	What are the inhibitors and enablers of ambidextrous innovation in project management?
3	What are the usual barriers and challenges facing ambidextrous innovation in project management?
4	What is the impact of contemporary research studying ambidextrous innovation on practitioners within project teams and organizations?
5	What areas could be further researched on ambidextrous innovation that would benefit project team success?

Table 2. Search keywords strings.

S.No	Keywords	Research Area
1.	"ambidextrous innovation" OR "ambidexterity" OR "dual innovation" OR "balancing exploration and exploitation" OR "innovation paradox" OR "simultaneous exploration and exploitation" OR "innovative capabilities" OR "innovative strategies" OR "innovative practices"	Ambidextrous Innovation

Table 2. *Cont.*

S.No	Keywords	Research Area
	AND	
2.	"project management" OR "project organizations" OR "strategic project management" OR "project success" OR "project performance" OR "project efficiency" OR "innovation in projects" OR "innovation in PMOs" OR "managing innovation in projects" OR "project development" OR "project implementation" OR "project planning"	Project Management
	AND	
3.	project OR ambidexterity OR "ambidextrous project" OR "project innovation" OR "innovative projects" OR "project-based innovation"	Ambidextrous Innovation and Project Management

3.2. Conducting Stage

The present research executed the review conducting stage in which all the steps designed in the planning stage have been implemented as suggested in Figure 1. The first step being implemented was to use the keywords developed in Table 2 to search the literature in a Web of Science and SCOPUS database. The researchers used these keywords along with the AND and OR operators, as mentioned in Table 2. The results from Web of Science (n = 165) and SCOPUS (n = 218) show 383 articles have been extracted after limiting the search to research papers written in English. Further, researchers employed the bibliometrix tool developed by Aria and Cuccurullo (2017). The bibliometrix is a state-of-the-art tool for analyzing bibliometric data from Web of Science, SCOPUS, and other critical academic databases. The bibliometrix tool is based on the powerful programming language of R (Aria and Cuccurullo 2017) and helps extract the relevant bibliometric results with proper interactive visualizations. Using the simple code executed into the bibliometrix library of R, the researcher removed the 58 duplicate publications, resulting in 195. However, our original results show that we have been able to extract the 383 articles, and bibliometrics was only able to retain 195 articles after removing duplicates. Upon further investigation, it turns out that bibliometrix removed publications that do not contain the appropriate quality and standards, which further simplifies our process of filtering data. Further, using bibliometrix, the present research has undertaken various descriptive analyses of extracted publications after removing the duplicates. Further, a comprehensive analysis of the yielded research papers was undertaken by carefully reading the abstract of each paper. The papers that significantly studied ambidextrous innovation in the project management context using any research design, i.e., qualitative, quantitative, and experimental, were retained, and the rest were discarded. After applying such criteria, 96 papers were discarded, and those papers seem not to discuss ambidextrous innovation significantly or do not discuss the context of project management, project teams, and project settings. The result after such an operation is 99. Each article was carefully read by the researchers, and a further 27 articles were removed due to not answering the research question significantly. This resulted in our review being based on 71 research articles. Each of the 71 papers was reviewed using the review framework. The review framework is a comprehensive guideline to review each paper. The review aims to check each paper to answer the research questions developed and extract the recommendations for future researchers to advance ambidextrous innovation in project management.

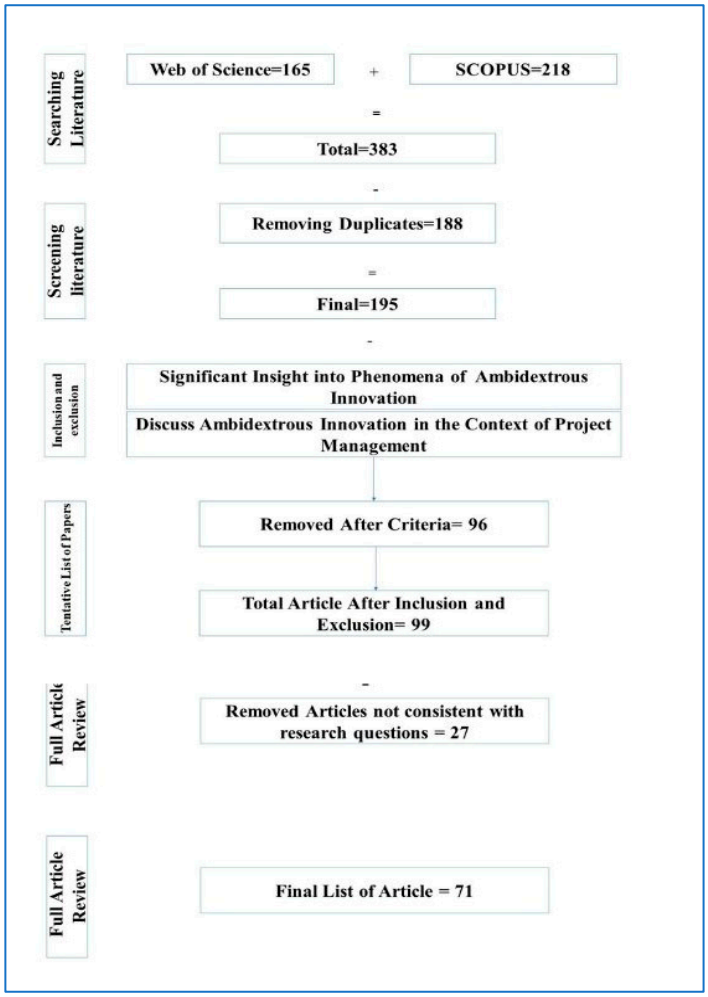

Figure 1. Systematic Review Framework.

3.3. Reporting Stage

The present research, by following the guidelines of Tranfield et al. (2003), has divided the results reporting into two stages. The first stage of results reporting includes the descriptive statistics on research publication data, which present research extracted from SCOPUS and Web of Science. The majority of descriptive results are yielded using the bibliometrix library on R. The second stage consists of results obtained by comprehensively reviewing each relevant paper to answer the research questions developed and identify future research recommendations. Section 4 discusses the descriptive analysis, and Section 5 discusses the broader discussion from reviewing the research papers.

4. Descriptive Statistics

The following section reports the results of the descriptive statistics of the literature data found from running search keywords and strings into SCOPUS and Web of Science. The data reported here are developed using the bibliometrix tool based on the R programming language.

4.1. Top Cited Papers

We have some of the most significant papers in every research stream and area contributing to the literature as shown in Figure 2. One of the key methods of finding those papers is by looking at their citations. The bibliometrix tool has helped us yield the list of the most significant research papers in ambidextrous innovation and project management by their citations. The results show that Tiwana (2008) is one of the most widely

acclaimed research papers in ambidextrous innovation and project management. Tiwana (2008) discusses the role of the alliance ambidexterity in which bridging ties complement the structural ties.

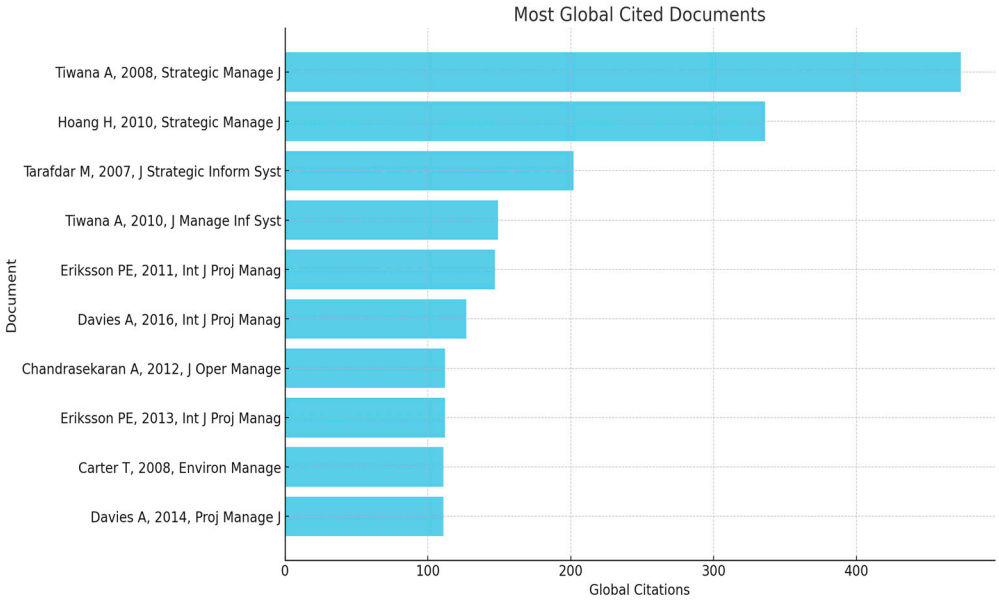

Figure 2. Top cited papers.

4.2. Top Cited Authors

The bibliometric tool has also enabled us to extract the most prolific authors who have contributed significantly to the research stream of ambidextrous innovation and project management. Figure 3 shows the list of such prolific authors and the number of publications. Prof. Dr. Neil W Turner, a professor of project management at Cranfield University, United Kingdom, has been one of the most prolific authors in the research stream of project management and ambidextrous innovation, having authored and co-authored nine research papers.

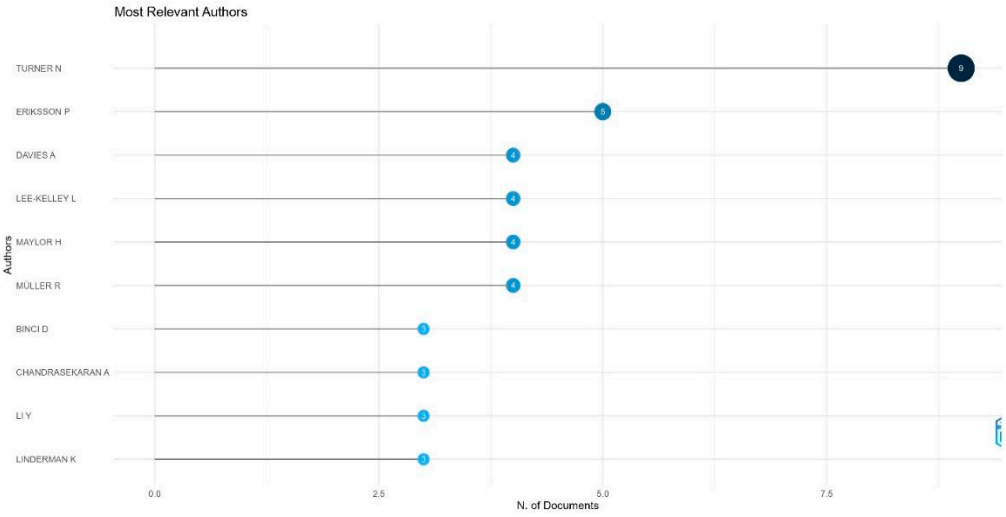

Figure 3. Most Prolific Authors.

4.3. Time of Publications

The third important insight extracted from the bibliometric tool from the literature data is the time series analysis of publication catering to the research stream of ambidextrous

innovation and project management. As shown in Figure 4, the results suggest that discussions on project management and ambidexterity in the academic literature started as early as 1999, when the first such publication appeared. However, the significant interests and attention of the academic community in the research stream of project management and ambidextrous innovation started from 2010 to 2020, with the highest number of research publications. However, the year 2022 may have seen some drop in the number of publications. This can be due to various reasons, but the most probable reason is that the year 2020–2021 saw a pandemic, which may have halted the researchers' efforts to collect the data, especially field experiments and interviews with project managers, but the ending year of 2023 has the highest number of research publications in the research stream. Thus, it can be argued that project-level ambidexterity is gaining much greater attention; the present review study will further contribute to the current discussion and future research in the area.

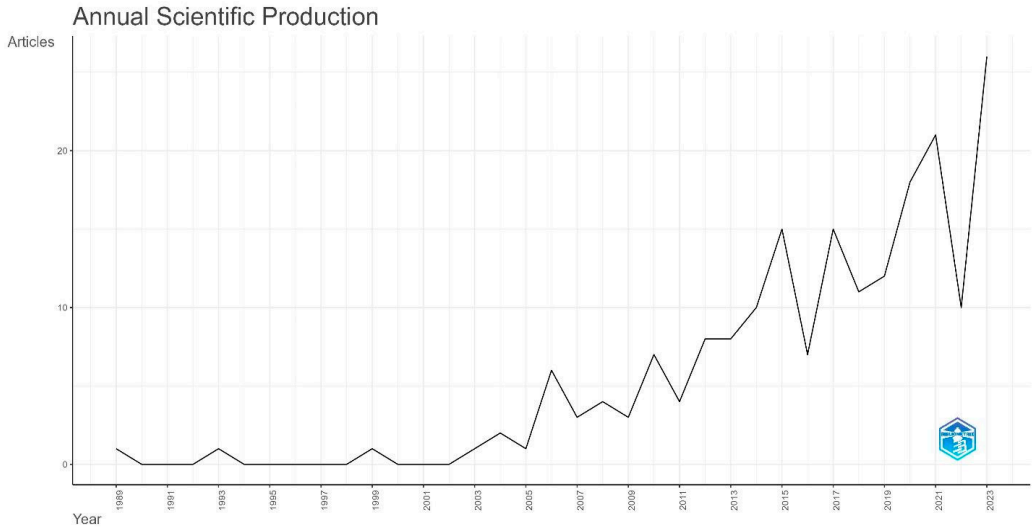

Figure 4. Timeline of Publications.

4.4. Top Countries

Figures 5 and 6 shows the country of affiliation of research publications extracted from the SCOPUS and Web of Science research database. The insight into the country has been extracted using the bibliometric tool. The findings suggest that the top five countries from where authors have been publishing their research are the United Kingdom, the United States of America, China, Sweden, and Italy. The list shows that, except for China, most research publications have been from authors affiliated with the developed western world. However, the practice of project management is now widespread all around the globe. Therefore, an empirical research gap can easily be detected here, which calls us to research non-western and developing countries such as the Global South. The findings and empirical data from such countries may uncover essential patterns contributing to the theory and practices of project-level ambidexterity.

Regarding the countries where authors have been researching the phenomena of project management and ambidextrous innovation, Figure 7 shows the heatmap. The heatmap shows the wide range of the empirical gap that can be targeted to understand the phenomena of ambidexterity at the project level by incorporating cultural and economic elements into research and empirical models.

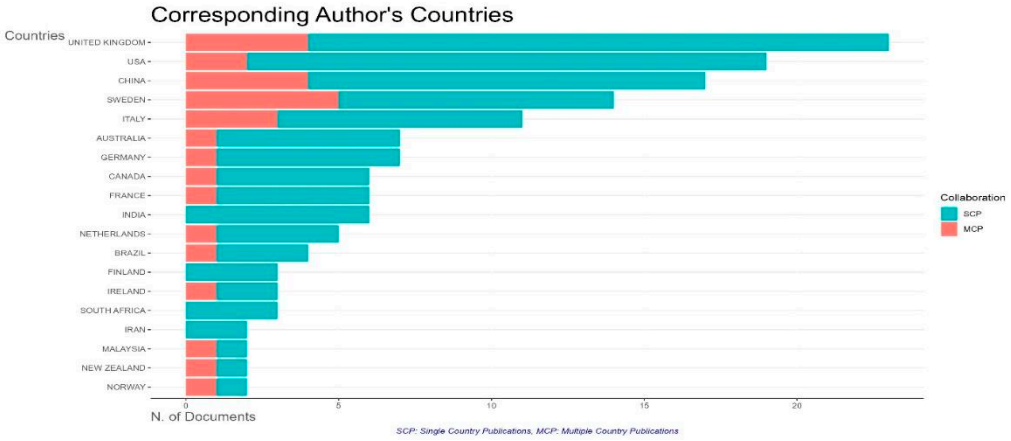

Figure 5. Top countries.

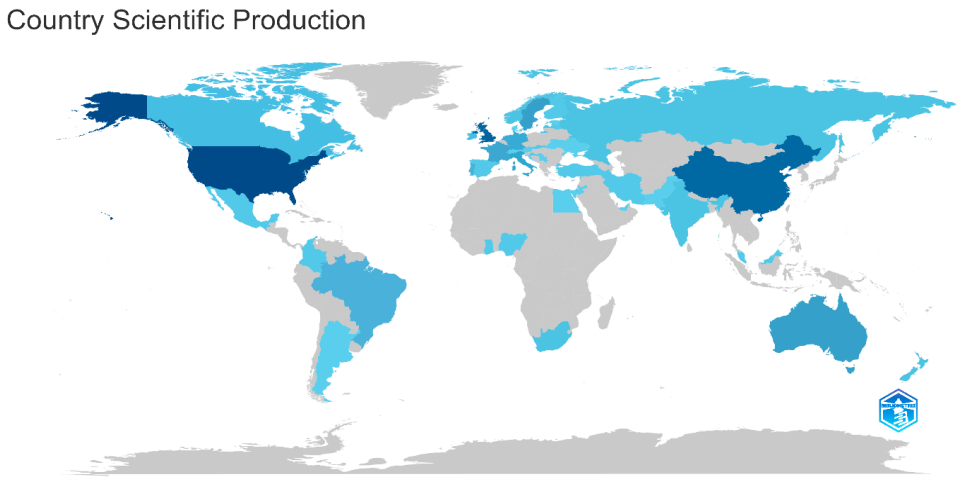

Figure 6. Heatmap.

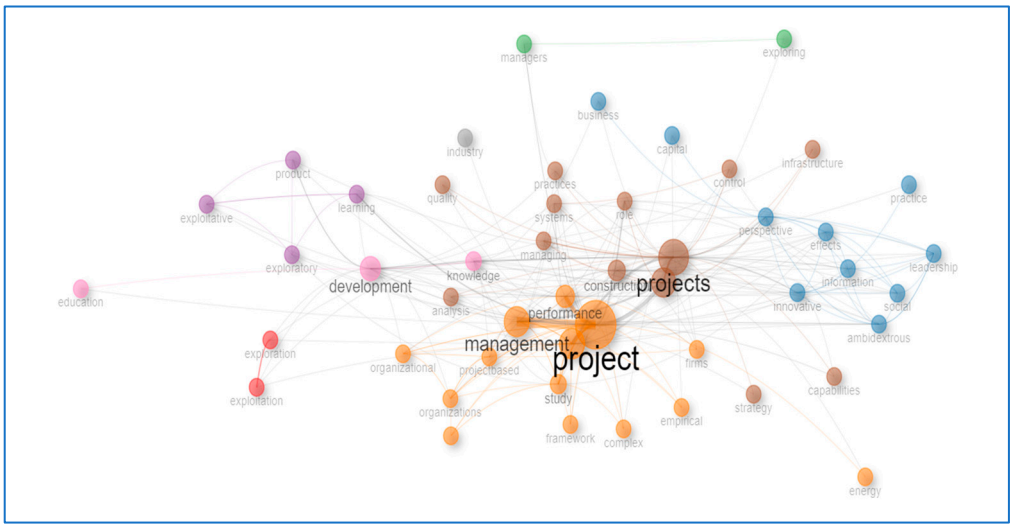

Figure 7. Cluster Analysis.

4.5. Keyword Cluster Analyss

The final insight extracted from the bibliometrix tool is the network of keywords forming different conceptual clusters. The results of the keyword networks and the con-

ceptual clusters are presented in Figure 7. This visualization provides a comprehensive overview of the prominent themes and their interconnections within the research domain of ambidextrous innovation.

The results show that the most dominant cluster is related to the management and performance of the project itself. Keywords such as "management," "performance," and "project" are centrally positioned and densely interconnected, suggesting that a significant portion of the research focuses on how ambidextrous innovation can be leveraged to enhance project outcomes. This cluster underscores the critical role of effective project management practices in driving innovation and achieving superior performance. It highlights the importance of integrating innovative processes within project management frameworks to ensure that projects not only meet their objectives but also contribute to broader organizational goals.

The second most significant cluster, which is visible in the network, depicts keywords such as leadership, capital, information, and business. This cluster reflects the thematic application of various organizational factors that influence ambidextrous innovation. Leadership emerges as a pivotal element, indicating that effective leadership is crucial in fostering an environment conducive to innovation. Additionally, the presence of keywords like "capital" and "information" suggests that both financial and informational resources are critical in supporting innovative initiatives. This cluster also highlights the role of organizational culture and socialization processes in facilitating innovation, suggesting that organizations must cultivate a culture that encourages experimentation and knowledge sharing.

Finally, another cluster significantly discusses the ambidexterity and the paradox of explorative and exploitative innovation related to the projects. This cluster includes keywords like "ambidexterity," "paradox," "exploration," and "exploitation." Thus, it can be inferred that apart from the project management performance, the second-biggest concept is related to the thematic application of organizational factors of leadership, socialization, culture, and capital, which include both financial and human. The presence of this cluster highlights the complexities involved in managing innovation and the need for strategies that can address the inherent tensions between exploration and exploitation. The last significant conceptual research area is how projects manage and balance the paradox of exploration and exploitation.

In addition to the major clusters, several smaller clusters are dispersed throughout the network, indicating emerging or niche areas of research. For instance, some clusters may focus on specific industry applications of ambidextrous innovation, technological advancements, or regional studies. These peripheral clusters suggest that while the core themes are well-established, the field of ambidextrous innovation is dynamic and continuously evolving, with new research directions being explored. The overall structure of the network reveals a high degree of interconnectivity between clusters, indicating that the concepts of ambidextrous innovation, project management, and organizational factors are deeply intertwined. The connections between clusters suggest that advancements in one area (e.g., project management practices) can have significant implications for other areas (e.g., organizational leadership and resource allocation).

5. Discussion

The research on ambidextrous innovation has garnered wide attention from organizational scholars. Ambidextrous innovation is helping managers to develop and sustain a competitive advantage. Project management scholars began to put their interest into ambidexterity. The basic assertion behind such interest of project scholars was the apparent benefits managers could have in their respective projects concerning innovation and performance. The present SLR study has highlighted exciting findings about the theoretical relationship between project management and ambidextrous innovation. The findings of the present research have attempted to revisit the general notion of ambidextrous innovation as a theory from the point of view of project management, discuss the key enablers

behind the project manager's decision towards the ambidexterity and highlight key research areas, including crucial project organizational elements necessary for incorporating ambidexterity in the projects and impact on project performance.

5.1. Theoretical Overview of Project Level Ambidexterity

The literature review suggests that the general theory of ambidexterity, which results from the seminal work of O'Reilly and Tushman (2008), was conceptualized as a dynamic capability of the organization simultaneously exploring and exploiting, enabling a firm to adapt over time. Further, as explained by O'Reilly and Tushman (2008, p. 10), "Exploitation is about efficiency, increasing productivity, control, certainty, and variance reduction. Exploration is about search, discovery, autonomy, innovation and embracing variation". However, consistent with the theoretical assertions and assumptions of O'Reilly and Tushman (2008), the present research has explored various sets of theoretical assumptions that revolve around balancing the exploration and exploitation resulting in the attainment of the project-level ambidexterity. Table 3 depicts the theoretical basis of the project ambidexterity.

Table 3. Theoretical Review.

S.No	Theory	Definition	Project Ambidexterity
1.	**Complexity Theory**	The ability of a firm to adapt to the environment and cope with its changes.	The complexity theory illustrates how to overcome the complexity of projects, such as resource constraints, client demands, and stakeholder satisfaction, by incorporating ambidexterity (Havermans et al. 2015; Leybourne and Sainter 2012).
2.	**Organizational Control Theory**	The ability of the firm to communicate, exercise authority, and overcome resistance	The control theory illustrates that projects can effectively utilize resources to balance exploitation and exploration to enhance performance (Dreesen and Hansen 2018; Tiwana 2010).
3.	**Dynamic Capability**	An ability of an organization to adapt to its resources effectively.	The dynamic capability view illustrates that projects can mix their resource deployment by balancing exploitation and exploration (Skyttermoen and Wedum 2023; Kashan and Mohannak 2014; Davies et al. 2016; Alshawabkeh et al. 2020).
4.	**Institutional Theory**	Adoption of formal organization includes policies, vision, mission and objective.	The institutional theory helps projects formalize exploration and exploitation activities with adequate balance to achieve the desired level of innovation (Müller et al. 2015; Kuitert et al. 2016).
5.	**Organization Theory**	The study of the social structure of the organization.	The organization theory helps the project to devise teams with an appropriate boundary for the exploration and exploitation (Eriksson et al. 2014; Jetter and Albar 2015; Lindskog 2022; Ahlfänger et al. 2022; Sun et al. 2020).
6.	**Organizational Learning Theory**	Process creating, transferring knowledge, training, and development of intellectual capital.	The organizational learning theory is the basis of active knowledge acquisition and sharing within the project teams to develop ideas for both exploration and exploitation (Sumanarathna and Rowlinson 2019; Huang et al. 2015; Breunig and Lombardo 2016).
7.	**Paradox Theory**	Paradox theory explains paradox as opposite but mutually exclusive factors in the organization.	The paradox theory postulates that exploration and exploitation activities within the project are necessary to achieve a certain level of ambidexterity that will enhance performance and innovation (Love et al. 2018; Garcias et al. 2015).

Therefore, by building upon theoretical insights from literature, the present research proposes that project-level ambidexterity can be defined as project organization dynamic capability that seeks to effectively balance and integrate the opposing yet complementary

activities of exploration and exploitation activities that help the project to navigate the project-level complexities in a way that allow it to achieve the desired project performance. The comprehensive definition of project-level ambidexterity encompasses the essential elements illustrated in the theoretical literature.

5.2. Main Research Areas Identified in the Literature

The research on ambidextrous innovation and project management is attracting attention from researchers and managers. Ambidextrous innovation is being rapidly adopted in project management to resolve various issues, such as undertaking an innovation itself and project performance. The present research has dived deep into the existing literature, and it has attempted to develop core research areas on which the current literature is focusing. The existing research areas being focused on in the current literature help us to underscore the current development in the area and identify the key areas that need to be focused on for future research recommendations.

The primary research topics found in the literature—knowledge management, innovation and management, and striking a balance between exploration and exploitation at the project level—align with the clusters found in the cluster analysis. The dominant cluster emphasizes performance and project management, which is in line with the literature's focus on incorporating ambidextrous innovation into project frameworks to improve results. The literature's examination of the crucial functions that knowledge, capital, and leadership play in promoting innovation is consistent with the secondary cluster on organizational variables. Additionally, the literature's emphasis on resolving the conflict between these two innovation techniques is reflected in the cluster tackling the dilemma of exploration and exploitation. The correlation shown between the literature and cluster analysis highlights the comprehensive aspect of the research, emphasizing the interdependence of these issues within the domains of project management and ambidextrous innovation.

5.2.1. Innovation and Management

Innovation is becoming a key objective that a project has to achieve in order to perform in an uncertain, complex, and cost-time constrained environment. However, for projects, undertaking innovation in such a complex environment has been a problem (McCarthy et al. 2017; Alhosani and Al Marri 2020; Kraner and Kraner 2018; Lei et al. 2023; Love et al. 2018; Dreesen and Hansen 2018; Lee-Kelley 2018; Fortuna et al. 2023). The existing researchers have rightly pointed out a need for a project to incorporate innovation into their products and services through a framework of ambidextrous innovation (Fang et al. 2021; Lee et al. 2009; Lee et al. 2007). The present research has concluded from the literature that ambidextrous innovation plays an important role in providing a roadmap and framework for project managers to implement the component of innovation into their projects (Hakkarainen et al. 2006; Andersson and Johansson 2010).

Ambidextrous innovation, through its paradoxical exploration and exploitation practices, helps project managers to channelize both their human and financial resources efficiently and effectively (Turner et al. 2013; Kashan and Mohannak 2014; Robertson et al. 2011). The ambidextrous innovation enabled the project managers to identify the most crucial problems, constraints, issues, and opportunities that needed instant attention. Thus, exploitation innovation activities can be deployed by the managers to resolve current issues and tap upon instant opportunities (Lindskog 2022; Maniak and Midler 2014). Further, ambidextrous innovation also enables managers to document and list down a set of recurrent problems, issues, and opportunities. These recurrent problems, opportunities, and issues have the potential to significantly impact the project's organization's long-term performance (Jetter and Albar 2015). Therefore, exploration innovation activities can be better deployed in such situations. The exploration innovation enables managers to assemble resources (both financial and human) to address recurrent problems, issues, and any opportunity of a strategic nature with an innovative mindset (Chandrasekaran and Mishra 2012; Chandrasekaran et al. 2015; Eriksson et al. 2016). Such an innovative

mindset provides the required patience, supportive culture that appreciates new ideas, and team empowerment to experiment and test such ideas that help them to develop radical innovation that addresses the core of the project's innovation needs (Solís-Molina et al. 2020; Love et al. 2018).

5.2.2. Balancing Exploration and Exploitation at Project Level

The current and existing literature has recognized the boundary constraints of ambidextrous innovation (Rezania et al. 2019; Alhosani and Al Marri 2020). The boundary constraints of the ambidextrous refer to prioritization and focus toward either explorative innovation or exploitative innovation (Kraner and Kraner 2018; Skyttermoen and Wedum 2023; Oleksandr et al. 2020; Lei et al. 2023). The existing literature has recognized such tension between explorative and exploitative innovation (Binci et al. 2023; Love et al. 2018). The current research summarizes that, although both exploratory and exploitative innovation are complimentary in nature, the paradox of balance between both of them may create a conflict that should be resolved (Meng et al. 2021; Chmielarz 2023; Fortuna et al. 2023; Fang et al. 2021). Such conflict can be resolved by addressing the boundary issues between explorative and exploitative innovation. Although existing literature has not focused deeply on the resolution of boundary issues between exploration and exploitation (Ding 2012; Kuitert et al. 2016; Maniak and Midler 2014), some strategies can be considered in the project management context (Binci et al. 2020; Liu et al. 2012; Müller et al. 2015; Solís-Molina et al. 2020).

The important strategies that have been discussed and suggested in the existing literature with the aim to reconcile the boundary issues between explorative and exploitative innovation pertains to the team structure (Zhang et al. 2021a; Kraner and Kraner 2018; Lei et al. 2023), integration (Lee et al. 2009; Liu et al. 2012), and alignment (Lee et al. 2007; Chandrasekaran and Mishra 2012). The literature suggests that a collaborative and inclusive team structure has the ability to automatically eliminate the boundary constraints between explorative and exploitative teams (Zhang et al. 2021a; Kraner and Kraner 2018; Eriksson et al. 2017). The collaborative and inclusive team structure naturally reconciles the boundary issues between explorative and exploitative teams (Lei et al. 2023; Lee et al. 2009). Further, it also helps the team to build better integration of tasks, goals, and objectives aimed at undertaking ambidextrous innovation within the projects (Liu et al. 2012). Furthermore, team alignment is suggested to be an important strategy in the literature. Team alignment refers to the degree and strength of the relationship between team members to work on the shared goals and objectives (Lee et al. 2007). The literature suggests that team alignment can be a highly effective strategy in reducing the boundary issues between explorative and exploitative innovation teams (Chandrasekaran and Mishra 2012). The team alignment significantly creates a sense of the shared ambidextrous innovation objective (Chandrasekaran and Mishra 2012; Chandrasekaran et al. 2015).

5.2.3. Knowledge Management

The present research's findings suggest that knowledge management is a significant research area that has been focused on by researching ambidextrous innovation and project management. The results as presented in Table 4 has found a consensus among the researchers that ambidextrous innovation, in general, and in the specific context of the project level, requires a stock of knowledge (Binci et al. 2023; Binci et al. 2020; Liu et al. 2012; Eriksson et al. 2014). The literature suggests that knowledge is vital in both exploratory and exploitative activities (Müller et al. 2015; Dymenko 2008; Sun et al. 2020; Turner et al. 2014). Knowledge provides a much-needed way forward to plan, prototype, test, and commercialize ambidextrous innovation, and both exploratory and exploitative activities (Napier et al. 2011; Ekambaram et al. 2018; Al-Hanshi et al. 2022). The present research has synthesized that critical knowledge management-related variables that pave the way for ambidextrous innovation are knowledge sharing (Davies et al. 2023; Hakkarainen et al. 2006; Dymenko 2008; Turner et al. 2013), organizational capital (Human, Social,

and Intellectual), and capacity development (Kashan and Mohannak 2014; Tiwana 2010; Breunig and Lombardo 2016; Majoor 2015; Zhang et al. 2022; Turner et al. 2014; Killen et al. 2023; Lindskog 2022; Leybourne and Sainter 2012; Al-Hanshi et al. 2022; Chandrasekaran and Mishra 2012; Che Ibrahim et al. 2017; Eriksson et al. 2016; Huang et al. 2015).

Table 4. Knowledge management—a theme.

S.No	Knowledge Management Factor	Role
	Knowledge Sharing	Knowledge sharing can make available critical knowledge necessary for the team to undertake exploitative and explorative activities.
	Organizational Capital	Organizational capital, referred to here, is the human, intellectual, and social capital. These three types of organizational capital can develop team competency, making it easy for them to undertake explorative and exploitative activities.
	Learning and Capacity Development	Learning and capacity development is an essential and deriving factor that empowers the team to experiment with new ideas for exploration and exploitation.

The literature has put an important emphasis on both knowledge sharing and acquisition (Davies et al. 2023). The literature suggests that knowledge-sharing activities help teams responsible for ambidextrous innovation to make available critical knowledge necessary for the team to undertake either exploitative or explorative activities (Hakkarainen et al. 2006). Further, the active process of knowledge sharing makes an important and critical contribution, which builds the project team's ability to build and experiment with new ideas (Dymenko 2008; Turner et al. 2013). Apart from knowledge sharing, the literature also suggests the importance of organizational capital. Organizational capital, as the current literature suggests, can be divided into three distinct types, i.e., human, intellectual, and social capital. The social, intellectual, and human capital can help teams to develop varying levels of competency in understanding stakeholder requirements, using knowledge to develop and experiment with ambidextrous innovation solutions and making it easy for team to undertake and balance explorative and exploitative activities (Kashan and Mohannak 2014; Tiwana 2010; Breunig and Lombardo 2016; Majoor 2015; Zhang et al. 2022; Turner et al. 2014). Continuous learning and training is referred to as key to developing human, intellectual, and social capital. Finally, capacity development is also regarded as an essential and deriving factor in ambidextrous innovation in projects. The capacity development through the active learning and knowledge management process empowers the team to experiment with new ideas for exploration and exploitation (Killen et al. 2023; Lindskog 2022; Leybourne and Sainter 2012; Al-Hanshi et al. 2022; Chandrasekaran and Mishra 2012; Che Ibrahim et al. 2017; Eriksson et al. 2016; Huang et al. 2015).

5.2.4. Organizational Culture and Leadership

The fourth most important research areas that have been yielded as a result of the current review study are organizational culture and leadership. The present research has concluded organizational culture and leadership as one of the most critical, significant, and widely discussed research areas with respect to ambidextrous innovation in project management (Rezania et al. 2019; Alhosani and Al Marri 2020; Kraner and Kraner 2018). The present review research has synthesized that an organizational culture of the project undertaking ambidextrous innovation seems to be the key factor that can contribute towards achieving exploration, exploitation, and the desired level of ambidexterity (Skyttermoen and Wedum 2023; Oleksandr et al. 2020; Lei et al. 2023; Binci et al. 2023; Love et al. 2018; Meng et al. 2021; Chmielarz 2023; Fortuna et al. 2023; Fang et al. 2021; Binci et al. 2020; Liu

et al. 2012; Müller et al. 2015). The present SLR has revealed important insights that the culture of the organization, which stresses learning and development, empowerment, and experimentation, is better able to design and develop explorative and exploitative solutions for the stakeholders (Ding 2012; Kuitert et al. 2016; Maniak and Midler 2014). Therefore, researchers have been testing a variety of cultural variables' impacts on a project's ability to incorporate ambidextrous innovation.

The present review study has further synthesized key cultural factors such as Organizational Capacity of the Project Team Management, Top Management Support Leadership, and Motivation. The organizational capacity is the cultural element that encompasses the availability of human resources, knowledge, and financial resources to undertake exploratory and exploitative innovative activities of ambidextrous innovation (Oleksandr et al. 2020; Haider et al. 2023). The literature further suggests that the capacity of organizations undertaking ambidextrous innovation can enhance the level of ambidexterity and performance of the projects (Chmielarz 2023; Ding 2012; Kuitert et al. 2016; Ahn et al. 2006). Further, although team management is discussed as a key element of balancing exploration and exploitation paradox, it is also being studied in the literature, which contributes to the enhancement of ambidexterity in organizations. The effective management team is discussed in light of key factors such as the effective utilization and development of the team, as well as its integration and alignment to achieve ambidexterity. Further, the literature has also discussed the support of top management and motivation as key drivers in incorporating ambidextrous innovation into project management (Majoor 2015; Zhang et al. 2022; Havermans et al. 2015; Killen et al. 2023). The current literature effectively suggests that leadership and motivation also play a crucial role in ambidextrous innovation as top management makes critical decisions on resource allocation, mixing, and deployment to achieve ambidexterity. Further, from a motivation standpoint, leadership plays a critical role in developing a vision, mission, and objective regarding ambidexterity and motivating the team to work towards achieving such goals (Herod and Kovach 2015; Ahlfänger et al. 2022; Chen et al. 2017; Che Ibrahim et al. 2017; Huang et al. 2015).

5.2.5. Project Performance

The last and important area in which researchers focus is the impact of ambidextrous innovation on the project itself. The present research has attempted to summarize and synthesize the thematic impact of ambidextrous innovation on the projects. The results of our analysis have suggested that ambidextrous innovation can have a significant impact on both operation and financial project performance (Alshawabkeh et al. 2020) and innovation performance (Dreesen and Hansen 2018). The review results suggest that most managers attempt to incorporate ambidexterity at the project level due to performance pressure (Lee-Kelley 2018). Exploitation enables them to develop a solution that enhances the performance in the short term (Longo and Narduzzo 2017), while exploration enables project managers to secure the project performance in the longer term (Tiwana 2008; Herod and Kovach 2015). Further, the present research has revealed another important insight from the literature with regard to innovation itself. The research has revealed that project managers are also important in ambidextrous innovation as they help to incorporate an effective framework of undertaking an innovation itself into the projects. Thus, it can be argued that ambidextrous innovation is going to be the preferred innovation framework in project management.

The literature suggests that the performance of the project under time and resource constraints pushes managers to adopt and seek ambidextrous innovation. The literature synthesizes that ambidextrous innovation helps to achieve key performance metrics such as cost-effectiveness (Ahlfänger et al. 2022), time adherence (Ekambaram et al. 2018), project quality (Nunes and Abreu 2020), and stakeholder satisfaction. The literature also suggests that projects identify the areas for exploration and exploitation and allocate resources financially and in teams (Jetter and Albar 2015). Such activity helps them enhance projects'

efficacy and efficiency at various levels (Berggren 2019). Thus, ambidexterity improves project results, streamlines their activities, and eventually meets their strategic goals.

The present SLR study has revealed that ambidexterity in the project contributes significantly to project innovation (Lièvre 2019; Burton et al. 2012; Lee et al. 2007; Ahn et al. 2006; Sun et al. 2020; Havermans et al. 2015; Chen et al. 2017). It can be concluded that ambidextrous innovation is the most effective framework for projects to undertake innovation within projects (Reischl et al. 2022). The present SLR study has revealed that ambidextrous innovation in the project has enabled them to anticipate and assess the trends, needs, and demands of clients and related stakeholders. Such anticipation of the needs and demands becomes the driving force in the project to assemble the team, collect and analyze the knowledge, and test the exploitative and explorative solutions within the projects (Ding 2012; Che Ibrahim et al. 2017). It has also been revealed from the literature that ambidexterity improves a project's ability to create innovative solutions and stay competitive in the quickly changing business environment of today by fostering a culture that values experimentation, learning, and adaptability (Napier et al. 2011; Maniak and Midler 2014).

5.3. Key Enablers

The aim and objective of the present research in its review of ambidextrous innovation in project management was to develop and synthesize the list of key enablers. The enablers pertain to the idea that certain key variables and factors in project management can enhance the ability of projects to undertake ambidextrous innovation within such projects. The results of the present research study suggest that the following are key enablers that can significantly enhance the project's ability to undertake the ambidextrous innovation. The results are presented in Table 5.

Table 5. Key enablers.

Key Enablers	Descriptions	References
Agility	Flexible and agile projects are in a better position to explore new knowledge and exploit the existing knowledge for undertaking an innovation	(Lee et al. 2007; Hakkarainen et al. 2006; Ding 2012; Lièvre 2019)
Project Complexity and Innovation Culture	Complex projects will push project managers to seek new ideas to solve the problems and exploit existing knowledge to tap upon existing issues and problems being undertaken.	(Meng et al. 2021; Sumanarathna and Rowlinson 2019; Alhosani and Al Marri 2020; Kraner and Kraner 2018)
Learning	Learning will help the project to build the stock of knowledge that can be employed readily in order explore new ideas and exploit existing products and services.	(Lindskog 2022; Reischl et al. 2022; Herod and Kovach 2015; Lei et al. 2023)
Team Dynamics	Effective team cohesion and integration are considered to be important enablers as team cohesion and integration make it easy for projects to implement ambidextrous innovation	(Fortuna et al. 2023; Fang et al. 2021; Dreesen and Hansen 2018)
Organization Support Structure	The organizational support structure is highly essential in fostering ambidextrous innovation within projects. This would include top management support, motivation, and leadership	(Turner et al. 2014; Lee et al. 2009; Love et al. 2018; Oleksandr et al. 2020; Rezania et al. 2019)

5.3.1. Agility

The result of SLR emphasizes agility as the critical enabler of ambidextrous innovation in projects. Agility is considered a crucial facilitator of ambidextrous innovation. The project's ability to quickly adjust and react to changes in its external environment is essential for ambidextrous innovation. Agility in a project embeds flexibility, making exploration and exploitation activities easy. The literature further suggests that projects find it easy to balance exploration and exploitation when a project is agile. It enables projects to quickly change course in response to new possibilities or evolving market conditions while guaranteeing continuing operations' stability and effectiveness. This agility is essential for projects to meet the two demands of innovation, which include discovering new opportunities and making the most of already-existing advantages. Essentially, the quest for ambidextrous innovation in project management revolves around agility. Due to its ability to make exploration and exploitation easier, projects are better able to manage the complicated business climate of today, which leads to long-term growth and a competitive edge (Lee et al. 2007; Hakkarainen et al. 2006; Ding 2012; Lièvre 2019).

5.3.2. Project Complexity and Innovation Culture

The thorough literature analysis suggests that project complexity can be a significant enabler of ambidextrous innovation in project management. Although complexity frequently brings problems, it also gives unique opportunities for projects to incorporate ambidextrous innovation. Project complexity is a complex interaction of several project-related elements inside the project environment, such as different stakeholder dynamics, technological complexities, and unpredictable external effects. Project complexity can encourage ambidextrous innovation. Teams working on complex projects need to use a diversified strategy to overcome a variety of obstacles and uncertainties. By doing this, individuals and teams develop a resilient and adaptive attitude, crucial for encouraging ambidextrous innovations. Complex projects are dynamic and require constant learning and exploration, which pushes teams to look for novel ways and solutions (Chandrasekaran and Mishra 2012; Lee-Kelley 2018).

Furthermore, a project's complexity frequently results from how it integrates a variety of skills and resources. This fosters an innovative culture within project teams by creating an environment for synthesizing new ideas. Moreover, managing intricate projects requires a balanced strategy that simultaneously prioritizes exploration and exploitation. Teams must be skilled at taking advantage of new opportunities in uncharted territory while maintaining their current expertise. Thus, the complexity of a project serves as a testing ground for ambidextrous innovation, pushing teams to go beyond conventional limits and adopt a comprehensive approach to project management. Using project complexity, projects may open up novel pathways for innovation, teamwork, and value generation, resulting in long-term prosperity in a constantly changing environment (Meng et al. 2021; Sumanarathna and Rowlinson 2019; Alhosani and Al Marri 2020; Kraner and Kraner 2018).

5.3.3. Learning

Based on our review of the literature, learning has been identified as a critical enabler for ambidextrous innovation in project management. Fundamentally, learning is the ability of people and organizations to gain new information, abilities, and perspectives and use them to promote ongoing development and adaptation. In the context of ambidextrous innovation, learning is a complex process. First of all, it provides a basis for investigation, allowing project teams to have a comprehensive grasp of new trends, technologies, and market dynamics. By actively experimenting and gaining information, teams broaden their toolkit and techniques, cultivating an environment of inquiry and discovery. Moreover, learning is necessary for efficient exploitation since it helps teams maximize resources, systems, and processes that already exist. Through constant refinement and incremental improvements, it will lead to improved performance and value generation (Lindskog 2022; Reischl et al. 2022; Herod and Kovach 2015; Lei et al. 2023).

Additionally, learning serves as a link between exploration and exploitation, making it easier to share best practices and insights across disciplines. Teams that participate in exploratory activities produce insightful information and useful knowledge that can be used to improve current procedures and operations. Similarly, knowledge obtained from exploitation activities may guide subsequent research projects, resulting in a positive feedback loop that fosters creativity and learning. Crucially, encouraging ambidextrous behavior in project teams depends on creating a culture that values learning. Employers who place a high priority on learning provide their staff members with the encouragement, tools, and resources they need to pursue innovation and ongoing growth. By nurturing a culture of experimentation, reflection, and knowledge sharing, organizations can unleash the full potential of their teams and drive sustained innovation and growth (Lindskog 2022; Reischl et al. 2022; Herod and Kovach 2015; Lei et al. 2023).

5.3.4. Team Dynamics

Based on our literature review research, team dynamics have been identified as a critical enabler for ambidextrous innovation in project management. The intricate connections, communication styles, and collaborative procedures that exist within project teams are all a part of team dynamics, and they have an impact on how well the teams are able to balance exploration and exploitation operations. Fundamentally, ambidextrous innovation necessitates that project teams function within a dynamic, cooperative atmosphere that nurtures innovativeness and productivity. This balance is made possible by strong team dynamics, which encourage strong communication, mutual trust, and teamwork among team members (Che Ibrahim et al. 2017; Eriksson et al. 2016; Liu et al. 2012).

Team dynamics have a major role in enabling ambidextrous innovation via encouraging a culture of psychological safety and risk-taking. Exploration and exploitation are fostered in a team atmosphere when members are free to voice their concerns, experiment with new ideas, and communicate their thoughts without fear of retaliation or condemnation. Effective team dynamics also encourage multidisciplinary cooperation and a diversity of viewpoints, both of which are critical for coming up with creative solutions to challenging issues. Teams may use the synergies between exploration and exploitation to promote breakthrough innovation by assembling individuals with diverse backgrounds, experiences, and thought processes (Fortuna et al. 2023; Fang et al. 2021; Dreesen and Hansen 2018).

Furthermore, effective coordination and integration of activities across all stages of the innovation process are made possible by strong team relationships. To maximize the effectiveness of their work, team members must be able to work together efficiently to transition between exploration and exploitation tasks through defined roles, responsibilities, and communication channels. Furthermore, team dynamics have an impact on members' motivation and engagement, both of which are essential for maintaining ambidextrous behavior over time. A sense of ownership and dedication to the project's success is fostered when team members are united around a common goal, encouraged by strong leadership, and acknowledged for their efforts (Fortuna et al. 2023; Fang et al. 2021; Dreesen and Hansen 2018).

5.3.5. Organization Support Structure

The present review also concludes that the organizational support structure is one of the most important enablers of ambidextrous innovation in project management. An organization's support structure consists of the culture, leadership styles, and rules within the project organization. Project teams need a supportive organizational framework to foster ambidextrous innovation. It offers the infrastructure and resources required to support exploration and exploitation activities, including financial resources, access to technology, and knowledge to assist innovation endeavors and guarantee the completion of ongoing projects. In addition, the supportive structure of an organization affects how decision-making power and autonomy are distributed across project teams. Giving teams

the freedom to decide for themselves and take measured risks encourages a sense of accountability and ownership, stimulating innovation and creativity at the project level. Organizational support frameworks can also make it easier for employees to collaborate and share expertise across several departments. Through dismantling organizational values and encouraging cross-functional collaboration, projects may use the combined knowledge and skills to stimulate innovation (Berggren 2019; Solís-Molina et al. 2020; Davies et al. 2016; Al-Hanshi et al. 2022; Napier et al. 2011; Maniak and Midler 2014).

Finally, leadership is also essential in the support system of ambidextrous innovation. Setting the objectives and goals for innovation, motivating, advising, and supporting project teams are all important tasks leaders perform. Ambidextrous innovation is incredibly effectively driven by transformational leaders who inspire vision, empower their employees, and cultivate an experimental culture inside their projects. Furthermore, the organizational support structure shapes the performance measures and incentive schemes that direct project teams' actions. Incentives that align with the objectives of ambidextrous innovation motivate teams to put long-term value creation ahead of immediate benefits and promote innovation and continual development (Turner et al. 2014; Lee et al. 2009; Love et al. 2018; Oleksandr et al. 2020; Rezania et al. 2019).

5.4. Key Barriers

The ambidextrous innovation in project management also faces multiple obstacles and barriers. The present research has attempted to synthesize the list of such barriers that have been impeding the project's ability to undertake the ambidextrous innovation. The results are presented in Table 6.

Table 6. Barriers.

S.No	Key Barriers	Descriptive	References
1	Resource Allocation and Prioritization	Difficulty in allocating resources and prioritizing between exploration and exploitation activities due to complex decision-making requirements.	(Rezania et al. 2019; Zhang et al. 2021a; Alhosani and Al Marri 2020)
2	Project Management Constraints	Impact of time, resource, and scope limitations on the ability to undertake ambidextrous innovation within project management.	(Lee-Kelley 2018; Burton et al. 2012; Fang et al. 2021)
3	Lack of Project Flexibility	Inflexible project structures hinder adaptation to changing conditions and impede the promotion of an innovative culture.	(Sun et al. 2020; Binci et al. 2023; Dreesen and Hansen 2018)

5.4.1. Resource Allocation and Prioritization of the Exploration and Exploitation

One of the key barriers that have been synthesized from the current literature discussion is being categorized as both resource allocation towards ambidextrous innovation and prioritization of exploration versus exploitation activities in the projects. The strategic use of human and financial resources for different projects inside a company is a very important decision that can determine the project's success or failure. The task of striking a balance between exploitation, which is concentrated on maximizing current resources, and exploration, which entails exploring uncharted territory and promoting innovation, makes resource allocation more complex. Therefore, a sophisticated and innovative approach to decision-making, where the allocation of resources is informed by variables including

organizational competencies, market dynamics, and strategic objectives, is required (Love et al. 2018; Binci et al. 2023; Haider et al. 2023).

In reality, prioritizing exploration versus exploitation and effective resource allocation necessitates a strategic alignment between organization objectives and project management's immediate needs. Decision-makers may deploy resources wisely by establishing clear criteria for assessing project viability, which should include elements like technological feasibility, market potential, and alignment with strategic objectives. Furthermore, promoting a culture that values trial and error, education, and flexibility is crucial to promoting creativity and guaranteeing effective use of available resources. Organizations may position themselves to flourish in dynamic settings while optimizing the value generated from their project management endeavors by adopting a well-rounded approach to exploration and exploitation and putting strong resource allocation mechanisms in place (Rezania et al. 2019; Zhang et al. 2021a; Alhosani and Al Marri 2020).

5.4.2. Project Management Constrains

The three factors of time, resources, and scope are fundamental limitations of all project management, and they also significantly impact the ability to undertake ambidextrous innovation. Time restrictions that create an instance of urgency force project managers to emphasize efficiency and delivery speed. Time constraints are commonly expressed through deadlines and project timelines. Therefore, when it comes to ambidextrous innovation, time constraints put limitations that might make it more difficult to explore new ideas and experiment with them. In a similar vein, resource constraints, which include financial, human, and material resources, are also major obstacles to the development of both exploratory and exploitative endeavors. Projects may be more likely to give priority to exploitation activities meant to optimize current goods in situations when resources are limited or closely allocated. However, exploratory activities may be completely ignored in such situations (Lee-Kelley 2018; Burton et al. 2012; Fang et al. 2021).

Furthermore, scope limitations draw lines around the activities and deliverables of a project, which has a significant impact on project goals and resource allocation. Rigidly defined project scopes might limit options for exploration, restricting creativity and impeding the discovery of new enterprises in the quest for ambidextrous innovation. On the other hand, large project scopes might put a burden on resources and hinder project effectiveness, making it more difficult for the company to successfully strike a balance between exploration and exploitation. A comprehensive approach to project management is required to navigate these limitations. Project organizations may develop a culture of ambidextrous innovation and overcome conventional limitations by using flexible project management frameworks, encouraging cross-functional cooperation, and embracing iterative methods for project execution (Lee et al. 2009; Turner et al. 2013).

5.4.3. Lack of Project Flexibility

One significant obstacle impeding the development of ambidextrous innovation inside project management is the lack of project flexibility. Rigid projects with inflexible structures frequently find it difficult to adjust to changes in project goals, scope, or market conditions. Such a situation makes it harder for the project to adjust to changing conditions. Such a lack of flexibility limits the project organization's ability to balance exploration and exploitation operations simultaneously. Furthermore, inflexible projects might hinder experimentation and originality, making them more likely to promote an innovative culture. Therefore, the project must embrace agile processes and iterative approaches, which provide quick adaptability to shifting needs and market conditions, in order to overcome this hurdle. Flexibility in project planning and execution must be given top priority. Thus, project organizations may boost their capacity for ambidextrous innovation and limit the effect of project inflexibility by fostering a culture of resilience and adaptation among their project teams (Sun et al. 2020; Binci et al. 2023; Dreesen and Hansen 2018).

5.5. Key Impact

The past literature also suggests synthesizing the impact of ambidexterity at the project level. The present research has attempted to summarize and synthesize the thematic impact of ambidexterity. The results of the present review study suggest two key research areas of the impact of embedding ambidexterity at the project level as shown in the Figure 8. These two research areas include project performance, both operational and financial (Alshawabkeh et al. 2020), and innovation performance (Dreesen and Hansen 2018). The results of the review suggest that most managers attempt to incorporate ambidexterity at the project level due to performance pressure (Lee-Kelley 2018). Exploitation enables them to develop a solution that enhances the performance in the short term (Longo and Narduzzo 2017), while exploration enables project managers to secure the project performance in the longer term (Tiwana 2008; Herod and Kovach 2015).

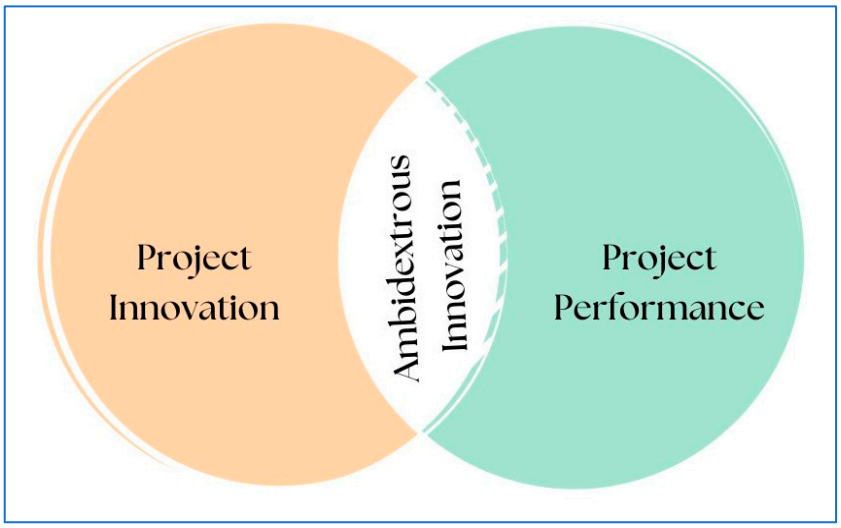

Figure 8. Key impacts.

5.5.1. Project Performance

One of the key effects of project-level ambidexterity is the effective management of the project and its performance based on key metrics such as cost-effectiveness (Ahlfänger et al. 2022), time adherence (Ekambaram et al. 2018), project quality (Nunes and Abreu 2020), and stakeholder satisfaction. The literature suggests that projects are identifying the areas for both exploration and exploitation and undertaking decisions to allocate resources both on the team and financially (Jetter and Albar 2015). Such activity helps them to enhance the efficacy and efficiency of projects at various levels (Berggren 2019). Thus, ambidexterity improves project results, streamlines their activities, and eventually meets their strategic goals.

5.5.2. Innovation Performance

The present SLR study has revealed that ambidexterity in the project contributes significantly to project innovation (Lièvre 2019; Burton et al. 2012; Lee et al. 2007; Ahn et al. 2006; Sun et al. 2020; Havermans et al. 2015; Chen et al. 2017). It can be concluded that ambidexterity is the most effective framework for projects to undertake innovation within projects (Reischl et al. 2022). The present SLR study has revealed that ambidexterity in the project has enabled them to anticipate and assess the trends, needs, and demands of both client and related stakeholders. Such anticipation of needs and demand becomes the driving force in the project to assemble the team, collect and analyze the knowledge, and test both exploitative and explorative solutions within the projects (Ding 2012; Che Ibrahim et al. 2017). It has also been revealed from the literature that ambidexterity improves a project's ability to create innovative solutions and stay competitive in the quickly changing

business environment of today by fostering a culture that values experimentation, learning, and adaptability (Napier et al. 2011; Maniak and Midler 2014).

6. Conclusions and Theoretical Contributions

The current SLR has attempted to study ambidexterity at the project level and to understand its impact on project performance and innovativeness. The aspect of innovation which has emerged as a result of the present review study is seemed to be highly interesting. The results from the existing literature have suggested that ambidexterity, as for as innovation is concerned, in the project management can enhance the performance of projects (Alshawabkeh et al. 2020; Dreesen and Hansen 2018; Lee-Kelley 2018; Longo and Narduzzo 2017; Lièvre 2019). However, it was necessary to explore from the current literature the ways in which such performance is enhanced. Our review and analysis have suggested that the project innovation aspect seems quite interesting from three different perspectives as a key tool to enhance the performance.

First, although academicians and practitioners have emphasized both innovations in the project, there is a lack of an actionable framework to which the project can reply to undertake innovation. The present review research at least demonstrates that ambidexterity can provide an actionable framework for projects to carry out innovation. However, more research is still needed on the aspect in which ambidexterity can actively be utilized for project innovation.

Secondly, one key insight that has been uncovered is the theorization of the project ambidexterity. The theorization of O'Reilly and Tushman (2008) has proposed a project organization dynamic capability that seeks to effectively balance and integrate the opposing yet complementary activities of exploration and exploitation activities that help the project to navigate the project-level complexities in a way that allow it to achieve the desired project performance. The present research has attempted to set theoretical boundaries of project ambidexterity by specifically stressing the balancing of exploratory and exploitation innovation paradoxes. The comprehensive theoretical review has revealed a richness of the theoretical grounding of the concept of project ambidexterity. Although a measurement scale of the project ambidexterity has not been found, future researchers are encouraged to channel their efforts towards developing one in order to advance the empirical research in the area.

Finally, we have attempted to build set drivers and enablers of project-level ambidexterity. We have found that critical aspects such as organization culture, innovation activities, knowledge management, and agility of project organization can play a significant role in enhancing and achieving the desired level of ambidexterity. The present SLR concluded that project-level ambidexterity necessitates a nuanced understanding of these drivers and enablers. The present research concludes that building an adaptable organizational culture is essential to developing ambidexterity. Additionally, our study highlights how innovative activities play a critical role in fostering the dual nature of exploration and exploitation inside projects, which paves the way for long-term competitive advantage. Furthermore, efficient knowledge management becomes crucial in enabling the smooth exchange of best practices and insights throughout project teams. Lastly, project organizations' adaptability becomes critical in navigating tumultuous waters and seizing emerging possibilities in a period marked by unparalleled instability and unpredictability. In conclusion, our research advances the theoretical knowledge of project-level ambidexterity and provides practitioners with useful information to improve their project management skills in a setting that is becoming more and more dynamic.

This study makes important theoretical contributions by bridging the knowledge gap between multidisciplinary theories of ambidexterity and their real-world application in project management. Through an organized analysis and synthesis of the current literature, this research offers a thorough theoretical framework that clarifies the concepts of project-level ambidexterity. By elucidating how ambidextrous innovation techniques may be successfully incorporated into project management practices, this paradigm enriches the

scholarly conversation. Additionally, it provides a strong framework for next empirical research, guaranteeing that later investigations are based on sound theoretical precepts. This advances the area of study and gives a more profound understanding of the mechanisms underlying successful innovation and project performance.

7. Future Research Recommendations

The present study has offered various research recommendations for future research to advance the stream of the research.

- The present research has effectively called for the development of a measurement instrument that helps measure project-level ambidexterity based on the enabler identified in the present research. The measurement instrument will be provided as a valuable contribution to the literature as it will advance empirical research.
- Most of the research on ambidextrous innovation in project management has been conducted in the western world; there is a need for research that considers the cultural, social, and economic context of developing countries such as the Middle East.
- Given that the present literature is limited to certain geo-cultural aspects, it is imperative to expand the current literature to incorporate cross-cultural and cross-industrial data. Therefore, more empirical study is needed to fully understand how ambidextrous innovation fits within project management. Therefore, future research should look at how cultural factors affect ambidextrous innovation within project teams and organizations.
- Furthermore, investigating a range of businesses will reveal sector-specific obstacles and prospects for ambidextrous innovation, thereby offering significant perspectives on refining project management approaches in a variety of settings. Researchers can identify the methods by which ambidextrous innovation affects project outcomes through empirical investigations, providing insight into elements including organizational culture, team dynamics, leadership philosophies, and resource allocation techniques.
- The culture both at the organization and team level appears to be an interesting phenomenon. So, future studies should put a priority on empirically examining team and organizational culture and how they affect innovation ambidexterity at the project level. This includes longitudinal studies that document the cultural aspects, comparative assessments between different industries and organizational sizes, and mixed-method approaches.
- Further, in order to develop robust literature on ambidextrous behaviors in project management, it is imperative that a variety of research approaches be used, such as grounded theory and action research. The review has highlighted that empirical qualitative research methods in the phenomena of project ambidexterity is lacking. Although secondary data analysis, field research, experimental investigations, and survey questionnaires provide insightful information, grounded theory and action research methodologies have distinct benefits, especially when it comes to capturing cross-cultural and cross-industrial settings. Through the investigation and creation of theories based on empirical evidence, insights from the experiences and viewpoints of project managers may be directly gleaned through the use of grounded theory. In a similar vein, action research enables an iterative process of inquiry and intervention in real-world project settings, allowing the production of insightful information. Researchers can contribute to the present literature with a more nuanced and contextually relevant knowledge of ambidextrous innovation in project management by incorporating grounded theory and action research with other empirical methodologies.

Further, an important insight with regard to cluster analysis, which identifies important themes and gaps in the existing literature on ambidextrous innovation and project management, also offers a clearer road map for future research initiatives. The need for a measuring tool to evaluate project-level ambidexterity is highlighted by the dominating cluster on project management and performance. Doing so would improve empirical

research and add significantly to the body of literature. The secondary cluster pertaining to organizational elements, including capital and leadership, is in line with the suggestion that these dynamics be investigated in various cultural, social, and economic contexts, especially in developing nations. In addition, the cluster that has been discovered to tackle the dilemma of exploration and exploitation lends credence to the need for cross-cultural and cross-industrial research to comprehend the ways in which cultural elements impact ambidextrous innovation in project teams and organizations. Furthermore, the existence of smaller, peripheral clusters points to sector-specific challenges and possibilities, supporting the suggestion that different business sectors be looked at in order to improve project management techniques. Lastly, the cluster analysis's emphasis on team and organizational culture emphasizes the significance of empirical research on these topics as well as the benefits of using a variety of research techniques, including action research and grounded theory, to capture the complex and contextually relevant knowledge of ambidextrous innovation in project management.

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