



ANALYSING TWO DECADES OF INNOVATION IN PH.D. RESEARCH: TRACING TRENDS VIA BIBLIOMETRIC ANALYSIS AND CHARTING A RESEARCH ROADMAP FOR THE FUTURE

Shikha

(Research Scholar), Faculty of Commerce & Management, SGT University, Gurugram
(Haryana)

Dr Gunjan Tripathi

Assistant Professor, SGT University, Gurugram (122006), Haryana.

ABSTRACT

Purpose: Innovation in universities research scholars and developing their creativity can contribute to the development of new ideas and solutions that can benefit society as a whole. The aim of this study is therefore to review papers in the field innovation in universities provide a bibliometric analysis from 2004 to 2023. The bibliometric analysis tracks the current research trends and provides a roadmap for future endeavours in the area.

Methodology/Approach: This study has used Scopus database; the data is extracted for bibliographic analysis through VOS viewer software and R-studio. The extracted data is analysed and results are produced.

Results and Conclusion: It includes the information and findings from the top producing nations, journals, sources, authors, institutions, most referenced publications and published author. Study includes the table of Indian studies which have been done in our study. Also, provide a research gap for future study.

Originality: This study's significant element is that it gives an overview of the dynamics and trends of innovation in universities which may benefit scholars and practitioners in understanding the future direction related to innovation in universities.

Keywords: Psychological Capital, Innovation, University structure, Academic Leadership and PhD Scholar.

INTRODUCTION

Innovation: Development relies heavily on innovation, which transforms academia, business, and society. As stated by Bingham C.B (2007), Countries' ability to innovate, create new manufacturing techniques and technologies, expand the markets for products and services, and, in a global environment, deal with many issues pertaining to health, education, and employment will become increasingly important in determining their future prosperity. The notion of "innovation systems" was first presented in the late 1980s to investigate how knowledge and innovation impact economic growth in evolutionary systems, where learning processes and institutions play a crucial role (Freeman, 1987; Freeman and Lundvall, 1992). In order to better understand how institutional structures could support interactions between economic players in both market and non-market knowledge transfer, the systems viewpoint was applied (Carlsson, 2003). The idea was expanded

upon to become "National innovation systems" (NIS) are groups of innovation actors (industries, universities, research facilities, financial institutions, governments, and so on) and a summary of their interactions (Freeman, 1988; Dosi et al, 1988; Lundvall, 1988, 1992; Nelson, 1993; Edquist, 1997, 2005). These efforts seek to advance discussions and the adoption of educational policies that support students' creative growth. Strong beneficial associations have been established between entrepreneurial innovation and the efficacy of entrepreneurship education (Wang et al., 2022).

Cheung, Roskams, and Fisher (2006), for instance, state that offering opportunities for creativity training has evolved into an essential component of higher education. Students that are adaptable, creative, and critical must be encouraged in higher education (Bingham C.B 2007). Leaders in American and European business, as well as the governments of nations like China and Japan, have recommended fostering creativity in university courses (Strom & Strom, 2002). According to (Jackson 2006), Because "Since the goal of higher education is to assist students in realizing their full potential at this stage, encouraging creativity in students should be a clear component of their time in college." then supporting creativity in the classroom is crucial. Jackson also stresses the necessity for higher education to recognise the critical role that creativity plays in preparing students for the unpredictable and complex workforce, where being able to apply one's, imagination is essential Ph.D. holders are essential to the research area in the modern period for a number of reasons, including publication, innovative thinking, knowledge advancement, and specialisation and competence. Higher education experts have suggested that productive postdoctoral researchers and PhD candidates must possess creativity (Walsh et al. 2013). PhD students need to be creative in order to effectively complete their thesis and provide a unique contribution to the literature, according to Walsh et al. (2013) and Lovetts (2005). The authors of this study look for PhD scholars' research papers on innovation. After searching through the databases, it was found that the majority of the studies focused on PhD students' inventiveness. A more thorough examination showed that the terms "innovation" and "creativity" were not well defined and that their usage overlapped.

Research question 1: Can we integrate Creativity and Innovation.

While the production of novel and practical ideas has historically been considered the definition of creativity (Amabile, 1996; Oldham & Cummings, 1996; Shalley & Zhou, 2008; West & Farr, 1990), innovation is typically defined as both the first stage—the generation of original ideas—and the second—the application of those ideas. In contrast to creativity, which is focused on absolute, "true," novelty, it has also been proposed notions that are relatively fresh, accepted, and modified from other organizations but are not yet part of the unit of adoption are also included in that innovation. (Anderson et al., 2004). Essentially, because innovation promotes concept implementation, and creativity stresses idea development, Innovation is frequently seen to precede creativity (Amabile, 1996; Mumford & Gustafson, 1988; West, 2002a, 2002b).

There is still disagreement among academics on the precise definition of creativity and innovation, despite the fact that different studies have used somewhat varied operationalizations of each concept (West & Farr, 1990). Certain academics have argued for a more distinct and rigorous

conceptual distinction between creativity and invention (Oldham & Cummings, 1996; Rank, Pace, & Frese, 2004). While relatively novel ideas, or those that have been appropriated and changed from other organizations but are fresh to the unit of adoption, can also be considered innovative.—creativity is focused on absolute, "true" novelty (Anderson et al., 2014). We would point out that concepts can be accurately rated along a spectrum of radicalness and novelty, and that innovation can encompass both radically new and utterly fresh concepts as well as concepts that are less innovative and more incremental. Essentially, creativity is frequently considered the precursor to innovation since it focuses on idea development, whereas innovation prioritises concept execution (West, 2002a, 2002b; Mumford & Gustafson, 1988; Amabile, 1996). Some writers, however, disagree, arguing instead that creativity occurs cyclically and recursively during the entire ideation and execution process (Paulus, 2002). We would point out that conceptions may be precisely measured along a continuum to determine how fresh and radical they are, and that innovations can include concepts that are less revolutionary and more incremental in nature as well as concepts that are radically new and entirely original (King 1992, Zaltman, Duncan, & Holbek, 1973). Additionally, it has been proposed that creativity primarily includes innovation represents mostly inter-individual social behaviours in the workplace, as opposed to intra-individual cognitive processes (Rank et al., 2004). Because creativity and innovation are connected concepts, the hunt for creativity in university research is covered in this paper using the keywords "creativity," "creative behaviours," and "innovation." Suominen and Jussila (2009) have identified several elements of organizational innovation capacity constructs, including organizational atmosphere and culture, structure and leadership, procedures, and instruments for generating ideas and innovations, and Ronde and Hussler's (2005) assertion that invention is a social, evolutionary process of group learning. According to Guwatudde, D (2015), innovation skills have been defined too narrowly and with too few attributes that affect innovation.

Research question 2: What are the potential predictors of PhD students' innovativeness?

Both internal and external forces influence innovation. (Shalley and Gilson 2004).) The central tenet of the Componential Theory of Organizational Creativity and Innovation is that components that foster creativity are impacted by work settings, which in turn influences creativity (Amabile, 1997). Various actors that typically engage during the innovation process are included in the components (individuals and enterprises, government agencies, institutions of the institutions that comprise the institutional infrastructure include trade associations, financial institutions, and higher education and research.

Psychological Capital Three main internal factors—expertise, creative-thinking ability, and intrinsic motivation are responsible for the creativity of an individual or small team. Though the other components of the component theory of creativity model have not gotten as much research attention as the psychological mechanism component, the motivation component of the model has some empirical support as a psychological process that underlies how the workplace affects workers' creative thinking (Shalley, Zhou, & Oldham 2004; Zhou & Shalley, 2010). One of the instruments (or "capitals") needed by researchers to carry out imaginative and sustained research is psychological capital (PsyCap) (Luthans F. 2007). The term psychological capital, or PsyCap

for short, describes a person's positive psychological state, which is comprised of four elements: resilience, self-efficacy, optimism, and hope. These four PsyCap elements work together to create a good psychological state that can improve a person's performance in a variety of settings, including the workplace, school, and interpersonal interactions. An increasing amount of research has been done on " Positive organizational behavior (POB) is defined as "the study and implementation of positive oriented human resource qualities and psychological capacities that can be assessed, developed, and effectively managed for performance improvement" (Luthans, 2002, p. 59). High PsyCap individuals have faith in their ability to complete tasks successfully (efficacy), focus their energy on goals and make proactive plans for alternate routes to task completion (hope), endure in the face of difficulties (resiliency), and assign responsibility for both positive and negative outcomes to external factors (optimism).

(Luthans and Youssef 2004; Luthans et al. 2007b) A psychological resource known as psychological capital has the potential to inspire creativity and original thought in others. Gaining a competitive edge requires both individuals and corporations to recognize and invest in psychological capital. As a result, we have discovered that psychological capital at the individual level influences innovation and creativity more. The model developed by Spreitzer et al. (2005) further highlights the tight relationship between individual creativity and the organisational culture. The primary elements of the broader work environment that impact employee creativity are the incentives within the organisation to innovate, resources (financial, time, and human), and managerial strategies like providing challenging work and encouraging supervisory behaviour (Amabile, 1997; Amabile & Conti, 1999). Therefore, the two main external elements in an academic setting are the university's structure and supervisory leadership.

University Structure Participants in the initiative included representatives from 42 higher education institutions spread across 21 different nations, or two universities per country. Creativity in Higher Education, were carried out by the European University Association. With an emphasis on a variety of subjects, including. This project's goal was to look into the factors— such as innovative teaching and learning practices, higher education institutions' structures and leadership—that could either foster or impede creativity in a university setting, and other relevant topics (Olsen, J. P. (2007). It is the responsibility of universities and other higher education institutions (HEIs) to act as catalysts for social change. in an era of climate change and significant societal change. "University structure" describes how different parts of a university or other higher education establishment are arranged in a hierarchical manner. The administrative, academic, and support departments that collaborate to carry out the university's goal of teaching, research, and community engagement are usually included in this structure. Academic institutions that aspire to and actively pursue environmental change are seen to be "innovative universities." F. Vught (1999). Any university's centres, institutes, and departments carry out its research goal by performing original research, obtaining funding for the project, and publishing the results in academic publications. Prior studies (Banshal et al., 2019) indicate that national institutions and central universities in India typically do more research than private universities

(procedural diversity). According to a British Council assessment from 2015, only a small number of private institutions were eager to participate in international collaboration, while just a few public universities (state and central) focused on curriculum development. Universities may not always react in the same way to social, political, and cultural challenges. (Inamdar, N., and Kirloskar, P., 2022.) Therefore, a fundamental element in supporting a range of academic activities, such as teaching, research, and service, is the design of the university's organisational structure.

Academic Supervisory Leadership One of the most important elements influencing an individual's creativity, according to Organisational Behaviour theory, is the direct leadership of a supervisor (Egan, 2005; Zhang & Bartol, 2010; Shalley, Zhou & Oldham, 2004; Zhou & Shalley, 2003). Several studies that have examined contextual predictors of creativity (Tierney, Farmer, and Graen 1999; Oldham and Cummings 1996; Tierney and Farmer 2002; Mumford et al. 2002; Rosing, Frese and Bausch 2011; Zacher and Rosing in press) have focused on the influence of supervisors. According to this study, PhD students who believe their advising professor exhibits both transformational and transactional leadership qualities will attempt to emulate their professor and show greater levels of creativity in return. This claim is based on the literature on followers' identification with their leaders. (Haslam, Reicher, and Platow 2011). PhD candidates who believe their advisor is passive-avoidant, on the other hand, need to be less creative. Academic supervisors of postgraduate students were advised by Bargar and Duncan (1990) to adhere to the following guidelines in order to encourage their students' creative dissertation work by helping them understand the complexity and unpredictable nature of the creativity production process; building a friendly and equal relationship between teachers and students that will promote effective communication; helping students choose research topics that suit their skills; fostering their professional and personal development; boosting student autonomy and responsibility during the creativity production process; proposing mutually agreed-upon shared objectives; and creating an environment where students are conducting research (Meng, Y., & Zhao, C. (2018)). ASL should be favourably correlated with postgraduate creativity because, in accordance with the above definition of the concept, empowering, taking into consideration, motivating, and developing leadership behaviours creates a highly conducive environment for creative education and production. Many academics studying creativity concur with this conclusion. For instance, a direct leader exhibiting empowering behaviours can give creators the independence, equality, and autonomy necessary for creative production and development, according to Amabile, Schatzel, Moneta, & Kramer (2004), Shin and Zhou (2003), Zhang and Bartol (2010), Zhang and Zhou (2014), Chen, Li and Tang (2009), Carmeli, Gelbard, and Reiter-Palmon (2013), and Gupta and Singh (2014); Developing behaviours create knowledge, skills, cognitive patterns, and dispositions for the development and production of creativity; considering behaviours shield creators from emotional swings and outside distractions and enable them to focus on the production and development of creativity; and motivating behaviours pique creators' interests, curiosities, and excitement for creative endeavours. Moreover, a large body of empirical research provide proof for these conclusions. For instance, self-efficacy, psychological empowerment, creativity, and

intrinsic motivation are all positively correlated with empowering behaviours (Amabile et al., 2004; Zhang & Bartol, 2010; Zhang & Zhou, 2014). Postgraduate creativity in higher education is positively impacted by ASL.

Forming research questions, getting ready for research, coming up with problem solutions, validating problem solutions, and presenting research findings are the componential theory of creativity describes the five sub-processes that take place repeatedly in any order until a creative product is achieved (Amabile, 1983; Amabile et al., 1996; Amabile & Mueller, 2008). All sub-processes are determined by intrinsic psychological capital, university structure, and supervisory leadership. Therefore, we suggest that psychological capital, an internal element, and external factors like university structure and academic supervisory leadership, are significant antecedents of innovation that help to create, preserve, and enhance scholars' creative abilities.

METHODOLOGY To achieve our research goals, we conducted a bibliometric analysis of research papers to recognize the body of available research papers related to creativity of research scholars. The first step of this method is to find the articles related to the topic, gather them from various databases and conduct a bibliometric analysis to map the most important themes and fields on the core topic.

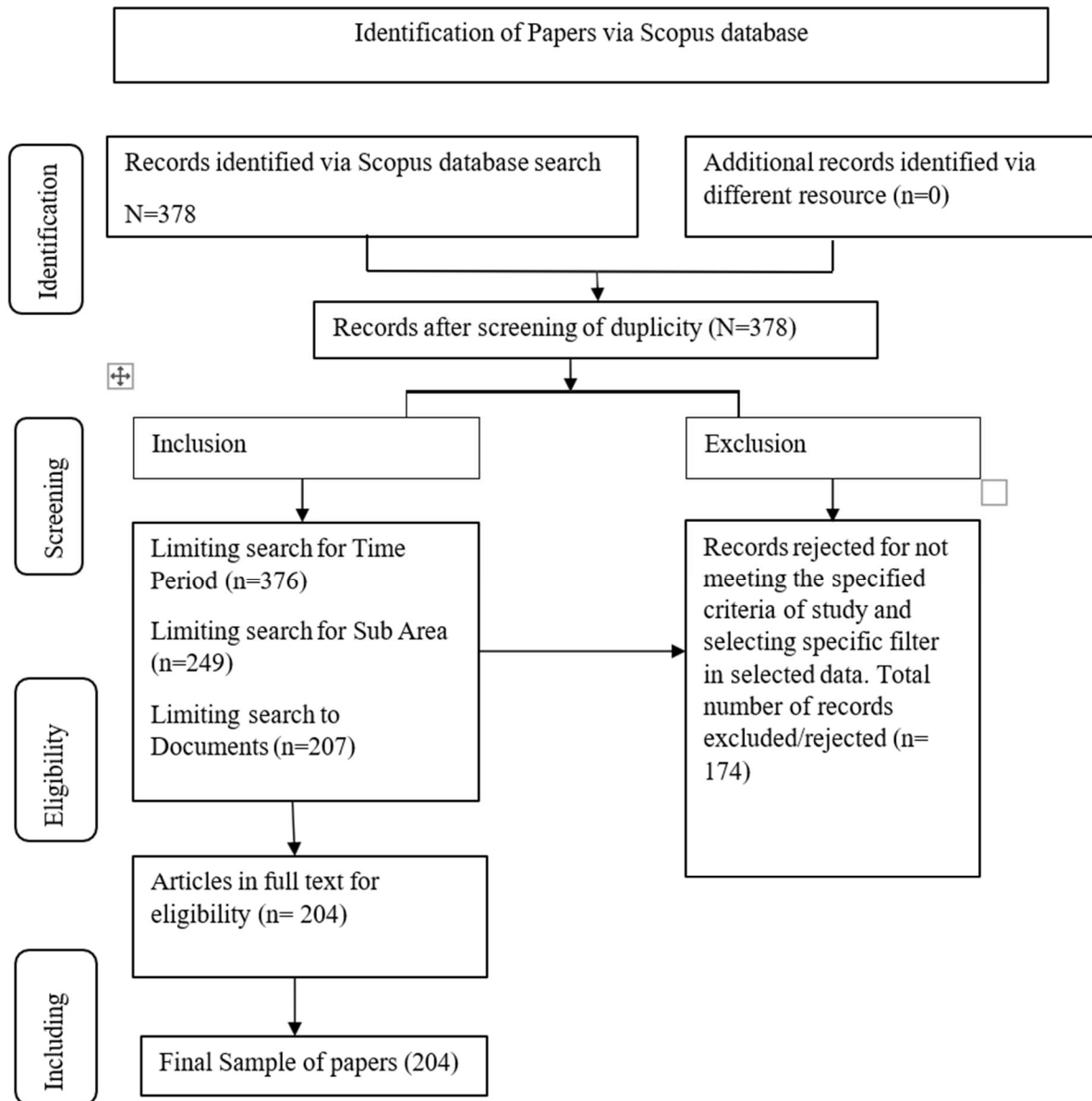


Figure 1. The process of detecting and choosing the documents using the PRISMA approach

Search strategy and data collection: -

We searched the Scopus database using keywords associated with research researchers' originality in order to find the relevant articles for our goal. Using two operators i.e., "AND" & "OR". We use the string ("University structure" OR "Psychological capital" OR "Research scholar" OR "PhD scholar" OR "Academic leadership" OR "Supervisory leadership") AND ("innovation" OR "creativity" OR "creative behaviour") in the title, abstract and keywords.

The search was performed in September 2023 and we obtained 376 articles. Filtering this initial dataset out, English articles belonging to business management and accounting, social science and Psychology in the source type i.e., journal, we finally retrieved 204 articles for the analysis.

After extracting data, researcher analysed the documents on year-on-year basis (Figure 2). It shows that from which year this topic starts growing. The stage of growth is from 2020 with 27 documents, then 2021 with 24 documents, 2022 with 44 documents, 2023 with 35 documents. It indicates that there is increment of documents on the topic creativity of research scholars.

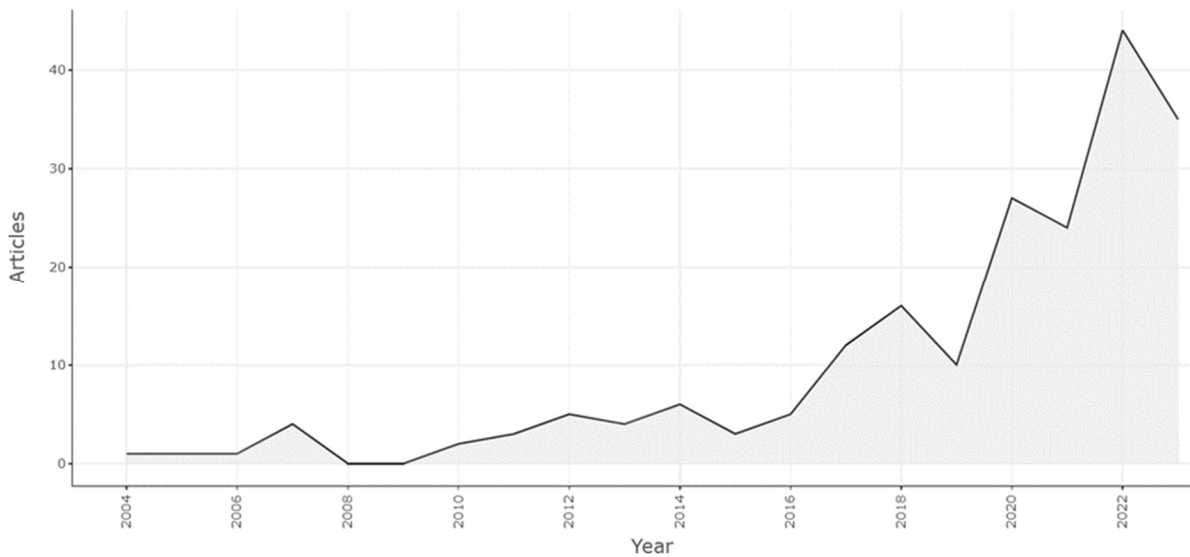


Figure 2. Annual Scientific Production

DATA ANALYSIS

To describe the analysis briefly the VOSviewer and R-Studio software is used and then results are presented and discussed. In this study, to analyze the data that is exported from the Scopus database we used VOSviewer for the bibliographic maps based on the citation data and co- occurrence data (Van Eck and Walt-man,2010) Many lines or arcs used on VOSViewer software to map a graphically representation of the relationship among the variety of emphases as articles, authors, organizations, and nations. Lines are used to attach the nodes/items that have important connection between them. These elements of visualisation are intended to simplify researcher evaluation of bibliometric analysis results through the use of physical circumstances and each cluster is represented by different colour to differentiate the nodes. (Wong, 2018).

The following sections present the results generated by VOSviewer.

1. **Co-authorship analysis:** - Analysing the co-authorship of articles to determine how closely related authors, institutions, and countries are by counting and studying the amount of collaboration on the authorship of articles.
2. **Co-occurrences analysis:** - A co-occurrence analysis is the process of exploring similarities between the most commonly used terms and concepts in studies in order to gain insight into the researchers' common interests.
3. **Citation analysis:** - Analysis of citation is the process of assessing how strong the links between articles, authors, journals, institutions and nations are by measuring the number of times they cited one another.

For the reasons described above, a bibliometric study was performed by assessing and organizing the pertinent literature pertaining to research academics' originality. An extensive look into the existing publications on creativity of research scholars will be presented by addressing the following three research questions:

- What is the distribution pattern of published annual documents on innovation of research scholars?
- What or who are the main contributors in terms of journals, authors, countries, and documents related to the creativity of research scholars?
- What are the most frequently discussed themes and the corresponding evolving trends on creativity of research scholars?



Figure 3. Main information of the dataset

Figure 3. shows that There was a total of 204 articles from 145 sources in the Scopus database from 2004-2023 with an average of 17.52 citation per document. Out of total 584 authors, 23 authors were responsible for single-authored documents, generating international co- authorship of 24.02%. In the meantime, it was noted that 663 author keywords, words or phrases commonly found in the titles of an article's references, and the article itself, in addition to 663 keywords plus, were generated from the data gathered.

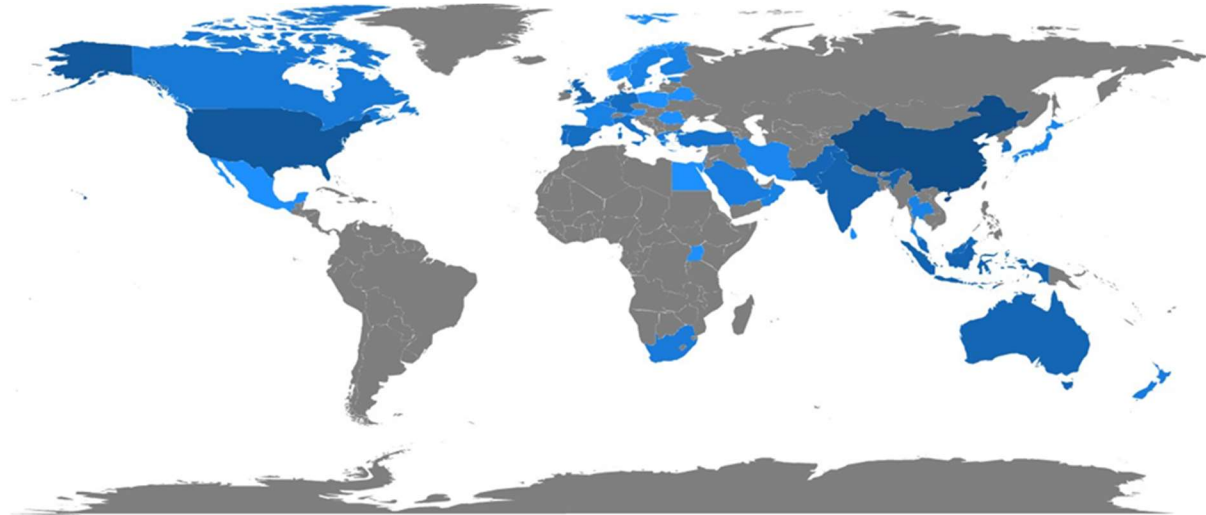


Figure 4. Country scientific production

Figure 4. pertains the top 10 corresponding countries with the domain of creativity of research scholars. Fig 4. Shows a visualized map of the countries and table figure 5. explain the exact number of papers which published by the related countries.

region	Freq
CHINA	211
USA	86
INDIA	39
INDONESIA	33
AUSTRALIA	27
UK	26
PAKISTAN	25
MALAYSIA	21
PORTUGAL	18
GERMANY	14

Figure 5. Top 10 most influencing countries

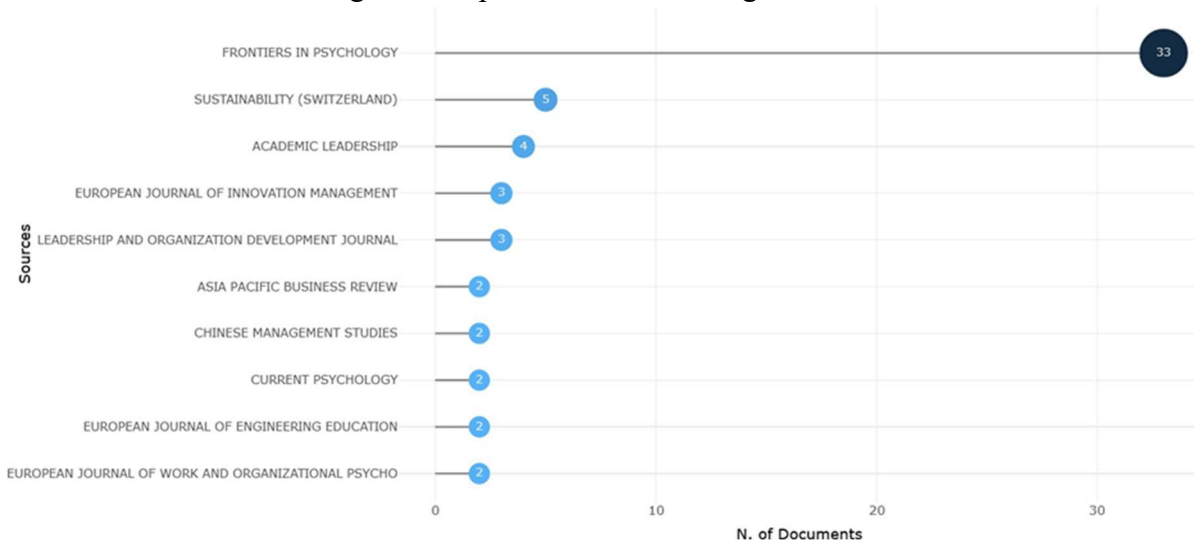


Figure 6. Main relevant sources

The most relevant sources refer to a scholarly or academic publication that is considered to be the most appropriate and respected forum for publishing research related to a particular topic or field of study. Figure 6. shows the most relevant journals in which Frontiers in Psychology with 33 articles Sustainability (Switzerland) with 5 articles and Academic Leadership Journal with 4 Articles.



Figure 7. Word cloud

Terms	Frequency
human	13
innovation	12
leadership	11
psychology	10
humans	8
article	5
education	5
female	5
learning	5
creativity	4

Figure 8. Table of word cloud

Figure 7. shows the graphical representation of word cloud. Word cloud explain the number of mostused keywords in the relevant domain i.e., creative behavior of research scholars. In this figure, top 5 keywords are human with 13 frequencies, innovation with 12 frequencies, leadership with 11 frequencies psychology with 10 frequency and humans with 8 frequencies.

References	Year	Research Design	Research Methodology	Variable	Outcome
Aggarwal S.	2023	Exploratory Research (SLR)		Psychological Capital	According to the research study, organizational culture and PsyCap have a beneficial interaction that affects a number of variables, such as job performance, burnout, creativity, and organizational citizenship behavior.
Sujatha M.;	2023	Bibliometric analysis &	Vosviewer	Psychological capital	The association between employees'

Mukherjee U.; Singh N.; Bamel U.		SLR			creative performance behaviors (CPBs) and their organization-based self-esteem (OBSE) is totally mediated by psychological capital.
Joshi P.; Tewari V.; Kumar S.; Singh A.	2023	Bibliometric analysis & SLR	Vosviewer	Psychological Capital	The study's conclusions will serve as a guide for researchers, academics, and industry professionals to understand the current level of knowledge in the field of "BCT application for SD" and choose the best path of action to follow in order to achieve the UNSDGs by 2030.
Sujatha M.; Mukherjee U.; Singh N.; Bamel U.	2023	Descriptive study	SEM	Psychological capital	The association between employees' creative performance behaviors (CPBs) and their organization-based self-esteem (OBSE) is totally mediated by psychological capital.
Samanta S.; Rautaray B.; Swain D.K.	2023	Bibliometric Analysis & SLR	Vosviewer	Innovation	The results of this study will give IJIS readers information on noteworthy contributions, highly cited articles, prolific writers, geographic distribution of papers, co-occurrence of keywords, and bibliographic coupling.
Kirloskar P.; Inamdar N.	2022	Literature Review		University Structure	The research offers valuable perspectives for leaders in higher education and policymakers. It emphasizes the importance of taking into account the structural variations among universities when evaluating the efficacy of policies and the degree of institutional global participation.
Firoz M.; Chaudhary R.	2022	Descriptive study	Multiple hierarchical regressions	Psychological capital	The results demonstrate that, although loneliness in the workplace has a negative influence on organizational civic behavior and creative performance, it has a favorable impact on work-family conflict and reveals a strong moderating effect of psychological capital on these connections.
Kumar D.; Upadhyay Y.; Yadav R.; Goyal A.K. Sundaram R.; Sharma R.; Shakya A. Upadhyay Y.; Kumar D.	2022	Descriptive Study		Psychological capital	The outcome demonstrates how mastery orientation partially mediates the favorable association between psychological capital and creative work practices.
	2020			Digital transformatio	
	2020	Descriptive study		Psychological capital	The findings imply that PsyCap mediates, to some extent, the impact of leader-member exchange (LMX) on workers'

Wu M.; Siswanto I.; Mahfud T.	2018	Descriptive Study		Psychological Capital	creativity. Furthermore, there is a noteworthy relationship between high PsyCap and high-quality LMX.
					The findings demonstrate how emotional creativity, psychological capital, and imagination work together to greatly influence pupils' capacity for creative thought.
Dutta A.; Banerjee S.	2018			Microfinance entrepreneur	
Meena L.; Alamelu R.; Amudha R.; Nalini R.; Cresenta Shakila Motha L.	2017	Descriptive study	Chi-Square & one way	Innovation	
			ANOVA		
Agarwal P.; Farndale E.	2017	Descriptive study		Psychological capital	The importance of psychological mechanisms is highlighted by the data, which support the mediating links.
Rao M.S.	2016	Literature review		Innovation	The findings show that in order to reinvent Indian management education in accordance with international standards and produce managers and leaders of the highest caliber, all stakeholders—industry educators, students, educational institutions, the government, and thought leaders—must provide assistance.
Gupta V.; Singh S.	2014	Survey Based Study	SPSS	leadership, psychological capital and	The results of this study showed that the association between creative
				employee creative performance behaviors	performance behaviors and leadership is totally mediated by psychological capital. Positively behaving R&D executives are more likely to support the positive psychological growth of their subordinates. Greater creative behaviors are exhibited by workers with stronger psychological capital, increasing the likelihood of innovative results.
Raqshin S.; Nirjar A.	2012	Exploratory study	Case study	Psychological capital	It is discovered that the psychological concept known as "PsyCap" can be used to improve a person's capacity for innovation.

Table 1. Descriptive Data of Indian study

Co-Authorship analysis

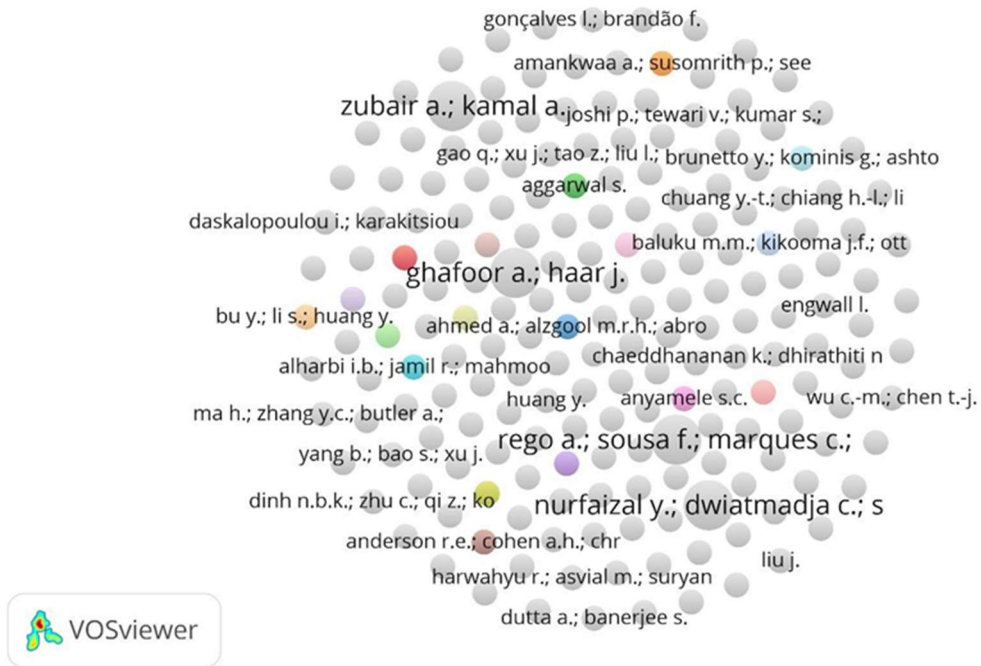


Figure 9. Co-Authorship analysis by authors

Co-authorship nanlysis simply define as the involvement of two or more authors. Figure 9.

shows the co-authorship analysis by authors which contains 197 clusters. The top five most productive authors in this domain are Agarwal p, farndale e. with 90 papers, cai w. lysova e.i, bossink b.a. with 53 and baluku m.m, kikooma j.f. with 25 papers.

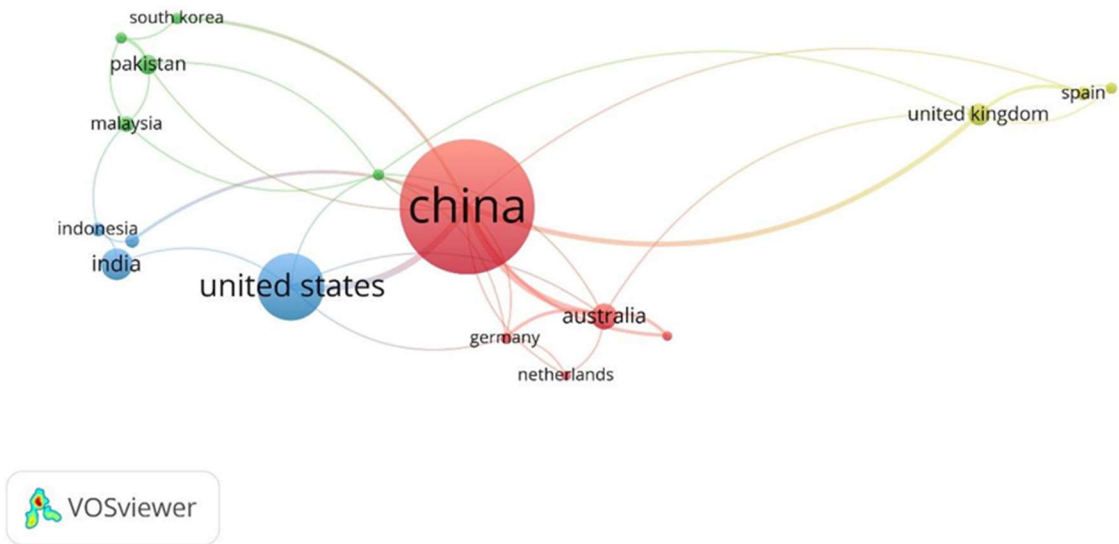


Figure 10. Co-Authorship by countries

Researcher analyze which countries collaborate in publishing related to creativity of research scholars, in order to analyze the international collaboration situation. Figure 10. shows that there are 17 items i.e. countries, 4 clusters, 35 links and 50 total link strength. Top producing countries

related to this study are China with 68 documents, 808 citations and 22 total link strength, Australia with 13 documents, 141 citations and 12 total link strength and then followed by United states with 34 documents, 964 citations and 8 total link strength.

Figure 11. shows the co-occurrence analysis by keywords, out of 881 keywords, 67 meet the threshold (and there are 9 clusters, 367 links and 626 total link strength) because we consider online that papers which includes keywords with minimum three frequency. Most frequently used keywords are psychological capital with 94 occurrence and 159 total link strength, innovation with 27 occurrence and 62 total link strength and creativity with 26 occurrence and 63 total link strength.

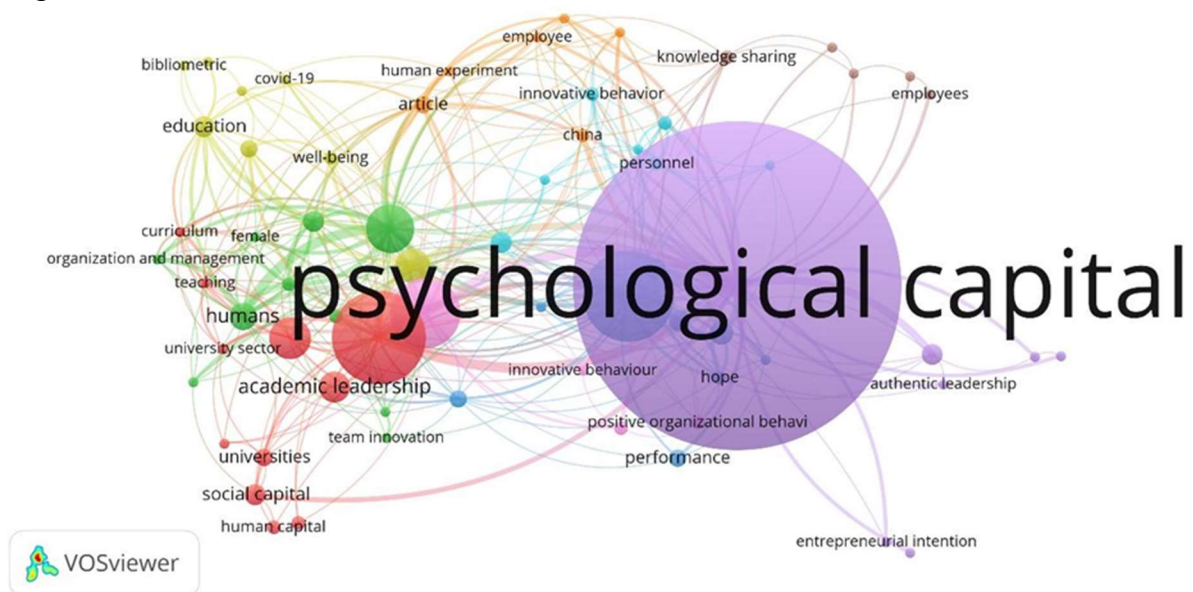


Figure 11. Co-occurrence by keywords

Future Research Scopes: -

Despite the knowledge of the advantages of innovation for individuals and their own achievement as well as for society, the development of innovation is not prioritized in education, with the probable exception of isolated programs in particular nations. Within higher education (Cropley, 2005; Gibson, 2010; Hosseini, 2011; Nakano, S., & Watkins, M. W. (2013); Alencar & Fleith, 2010), as well as in elementary and secondary education (Alencar, 2007; Bermejo, Ruiz, Prieto, Ferrándiz, & Sainz, 2017; Pfeiffer & Wechsler, 2013; Renzulli, 2005; Runco, 2004), creative abilities are frequently suppressed. Based on empirical research, it appears that an individual's creativity decreases as their years of formal schooling increase. Innovation was not given the credit it deserved and was considered inferior in many of the fields taught in English institutions. Alencar, E. M. L. S., Fleith, D. S., & Pereira, N. (2017) also noted a lack of enthusiasm for encouraging creativity in academic courses, highlighting the fact that innovation in Brazilian institutions is given little to no attention. It's often acknowledged by fusing concepts and inventive work from the past, innovations can assist in resolving issues in the future (Bartel & Garud, 2009). Wang et al. (2022) found a strong positive association between the effectiveness of entrepreneurship

education and entrepreneurial ingenuity. Research on scholars and innovation is a fairly specialised field. The concept of the "knowledge triangle," which relates to university research, teaching, and innovation (Terçanlı & Jongbloed, 2022; Turcinovic, 2013), explains how creativity and interaction are involved in innovation. Many studies that show how the innovation process is messy, repetitious, and sometimes involves taking multiple side steps in addition to taking two steps forward and one step backward over time provide some empirical support (King, 1993; Van de Ven, Angle, & Poole, 1989). One option is to look into a study that creates a roadmap for innovation in education. Jackson (2006) identified several potential obstacles to the flourishing of creativity in higher education, including the attitudes and opposition of professors and students; organisational factors of a structural, cultural, and procedural nature; time and other resources; and government regulations. Future studies on the factors that promote and hinder innovation in research and education could therefore open the door to more effective policymaking that would hasten universities' adoption of innovation.

According to the Triple Helix thesis, in a knowledge society, new institutional and social forms for the production, transfer, and application of knowledge can be created through giving universities a bigger role and combining elements from the public and private sectors. This will promote innovation and economic growth. (Etzkowitz and Leydesdorff, 1995) Higher education institutions can support this creative transformation process. In 2023, Marczevska M. and colleagues (Keleş 2011) highlighted Organisational performance is enhanced by the observable, developable, and effectively controllable uses of psychological capital that are linked to human resources' potential and psychological capacity. The psychological and physical engagement of human resources (workers, employees, managers, and so forth) is essential to an organization's performance and ability to achieve its objectives, and efficient management will provide it a competitive edge. Psycap's function in teams and organisations is the subject of a growing body of research (McKenny, Short, & Payne, 2013; Walumbwa, Luthans, Avey, & Oke, 2011). Luthans, Avolio, Avey, et al. (2007) state that PsyCap has higher correlations with performance outcomes; however, more research is necessary to fully comprehend psychological capital's overall impact, as psychological capital as a whole can have a greater impact on creativity than any one of its constituent parts (Luthans et al. 2007a).

In addition to individual characteristics, an employee's work environment, which includes leadership, affects their invention and creativity (Amabile Conti, Coon, Lazenby, and Herron 1996). Though there have been a few early outliers (Rutheford 1992; Middlehurst and Elton 1992), the idea of leadership in higher education is still relatively new, and there aren't many empirical research available. For instance, in their critical evaluation of the literature on academic leadership, Rayner et al. (2010) noted that very little empirical study has been done on the topic of professors' leadership. In a similar vein, Macfarlane (2011) pointed out that the leadership responsibilities of professors have received less attention in research on leadership in higher education than those of senior managers, such as department heads and faculty deans. Nevertheless, no study has looked at these subjects at the same time in a university setting using trustworthy and established scales. It should also investigate the factors that predict ASL, including the organizational characteristics

of universities, the group characteristics of research teams, the individual factors of academic supervisors, the dyadic factors of academic supervisors and research scholars, and other aspects relating to social culture, high education policy, and other relevant areas.

Notably, three recent research carried out in China have attempted to provide insight into the internal psychological process behind the relationship that exists between supervisory characteristics and creativity. This research specifically showed that the associations between supervisory styles (Gu et al. 2017), academic supervisor leadership (Meng and Zhao 2018), abusive supervision (Meng et al. 2017), and creativity can be mediated by self-efficacy and intrinsic drive. In order to elucidate the mediators and moderators of ASL, psychological capital, university structure, and creativity, more research is required. The effectiveness of creativity education and production depends on our ability to recognise these distinct elements and comprehend the ways in which they interact. These kinds of studies are quite uncommon in underdeveloped countries, particularly in India. According to Figure 5, 39 studies on our keywords—academic leadership, university structure, research scholar, and innovation—have been finished in India. 17 of these papers have an Indian association after being filtered. The majority of research focuses on psychological capital. The above table shows that research on PhD holders is quite uncommon.

Limitations: Just three elements have been examined in relation to innovation in this study. Various other actors who often engage during the invention process may be included in the components. Further research can be done on the relationships and networking interactions between system components, which are mainly the result of technology transfer or acquisition. Examples of these relationships include collaborative leadership, collaborative replacement, and collaboration and conflict moderation.

Implications: Planning interventions, like training programs, that may boost students' creativity requires a better understanding of the relationship between various perceptions of professors' leadership and creativity, as previous research (Walsh et al. 2013; Lovitts 2005; Fenge 2012) suggests that creativity plays a significant function in PhD students' success, both in terms of the results of their future careers and the scientific worth of their research and theses. As stated by Liu (2014), research scientists must to be aware of their obligations about the cultivation and generation of creativity. Furthermore, new academic supervisors are not given access to leadership or other management training programs. Practically speaking, this study recommends that in order to foster PhD student innovation, institutions provide transformational leadership trainings for their faculty members and that faculty members work to raise their students' perceptions of transformational leadership. Previous studies have shown that followers' opinions of transformational leadership and their role in the leadership process can be affected (Barling, Weber, and Kelloway 1996; Frese, Beimeel, and Schoenborn 2003). Lapidot, Y., Kark, R., & Shamir, B. (2007)). A study on variety in the Indian higher education system creates opportunities for more investigation of the diverse approaches taken by different colleges to foster creativity.

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