

The Research Patterns of Creativity and Innovation

The Period of 2010-2019

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Abstract—The emerging interest in creativity and innovation subjects have increased attention to the exploration of their relationship with organization culture, entrepreneurship, leadership, and education. The current bibliometric study was employed to identify and synthesize the results from studies exploring domains of creativity and innovation. Authors analyzed the papers published in highly ranked and cited by the journals which indexed and ranked in Web of Science Core Collection, in the period of 2010 to 2019. Major findings in this study include: (a) the number for journals published in 2010 significantly increased by 2019; (b) there are three leading countries publishing research in the creativity and innovation field, including the USA, PR China and England; (c) there are three prominent fields by subject category, including the management and business, leading field with 58.92% articles, a psychological area with 15.14% articles, and engineering and environmental studies 8.65% articles; (d) Creativity and Innovation Management Journal is leading in publishing studies on creativity and innovations (11 records, 6% of published studies). Although findings were dispersed widely in sub-contexts, the review suggests that there are strong relationships between creativity and innovations, along with concepts and environment, culture, organizational characteristics, individual features, entrepreneurship, and leadership.

Keywords—Bibliometric, creativity, innovation, organization culture, organization climate, Web of Science

1 Introduction

The relationships between creativity and innovation have been indicated as essential in various fields. The recent studies explored creativity and innovations at multiple levels, concerning organizational, cultural, and environmental factors. The other group of studies investigated the relationships between creativity, innovation and different types of leadership. The strong relationship between creativity and innovations has been explored [1], [2]. Previous studies on the importance of work characteristics, organizational climate and creativity supportive environment indicated that they influence significantly on workers' creativity [3], initiative [4] knowledge generation [5], and innovation performance [6], [7].

The literature on innovation and individual's creativity, self-efficacy, and entrepreneurial culture stated that there are significant relationships between business models, perceived creativity, and innovation performance [14], [19], [21], [15]. The studies on leadership discovered that transformational leaders influence the organizational climate to support innovation and enhance employee creativity [27], [28]. Studies on creativity and education stated its strong relationships in engineering education and problem-solving tasks [35], [36]. Nevertheless, it has been stated that despite the significant contribution that creativity and innovation made to the development of technology, there is a gap between creativity, innovation, and engineering [35]. Recent researches on various factors, including organizational, cultural, and environmental, showed their crucial influence both on creativity and innovation [16], [17].

Despite diverse data related to creativity and innovations field, it has been indicated the need for in-depth and global analysis of the actual trends and patterns among published papers. The current bibliometric analysis contributes to the discourse by examining highly ranked studies to explore the scientific publication patterns for creativity and innovation domains within the last decade. Besides, this paper presents an analysis of the descriptive patterns and the most significant trends of the published studies within the same research period with various research fields.

2 Literature Review

Recently scholars from diverse research areas, including general management and human resource management, entrepreneurship and leadership, organization and employee, education and motivation, focused on examining the relationship between creativity and innovation. The most cited studies were classified by research interest and its connection with creativity and innovation.

Anderson et al. have suggested the integrative definition based on some generative theories of innovation and creativity [1]. Continuously, the in-depth analysis was applied to include various levels of innovation, such as individual, team, organizational, and multilevel innovation [1]. Similar research focused on team innovation as a process, where stages of creativity and implementation were discriminated [2].

The potential connection between creativity, innovation and organization with its atmosphere, structure, and employees were studied by Sleuwaegen and Boiardi [3], Binnewies and Gromer [4], and Sok and O'Cass [6]. Green innovation strategy has a positive impact on both green organizational identity and green creativity [7].

The connection between a creativity-supporting work environment and product innovation performance was examined by Dul and Ceylan [5]. The importance of meeting organizational goals concerning knowledge generation, creativity and innovation performance was analyzed in a case study by Auernhammer and Hall [8].

The research conducted by Ratten [10] examined cloud computing services as an example of the application of technology innovations and creativity. In contrast, a study by Schulz et al. [11] explored tools which foster creativity in innovation processes via representational methods. Also, a study by Giannopoulou et al. [12] focused on what establishes capabilities aimed to strengthen creativity in service

innovation in a practice-based context. Consequently, Wang and Miao underlined the mediating impact of innovation implementation, which can be reinforced by an innovative organizational culture [13].

Baron and Tang explored the combined effects of an entrepreneur's creativity, positive affect and environmental dynamism [14]. Edwards-Schachter et al. focused on the effect of creativity and innovation at entrepreneurial culture [15]. At the same time, Williams and McGuire discussed the impact of culture at entrepreneurial activity, economic outcomes and national innovation [16].

To explore the importance of organizational, cultural, and environmental determinants in the relationship between creativity and innovation, Sarooghi et al. conducted a meta-analysis [17]. The study by Dentchev et al. investigated the diversity of sustainable business models, including creativity, innovation, social and corporate intrapreneurship [18]. The study by Ahlin et al. [19] explored the entrepreneurial self-efficacy as a significant incentive for entrepreneurs' creativity and firm innovation.

The recent studies focused on exploring creativity, innovation, and entrepreneurship in China [20], [21]. Similar research explored significant Chinese policies to recognize the importance of innovation and creativity for economic and social development [22].

The marketing program on creativity in product innovation teams was explored by Im [23]. Amabile and Pratt prepared a modified version of the model of creativity and innovation in organizations [24]. Consequently, Horng et al. endeavour to recognize the connection between creativity and innovative physical design on the example of real restaurants [25].

The association between transformational leadership, employees' creativity and the innovation-supportive atmosphere were explored by Jaiswal and Dhar [26], and Khalili [27]. It has been identified the connections between senior managers' transformational leadership and the atmosphere for creativity on the one hand and employees' attitude towards innovation on the other [28].

Chen and Hou investigated the impact of atmosphere for innovation and ethical leadership on creativity [29], while Yoshida et al. examined effects of servant leadership on both team innovation and employee creativity [30]. Cerne et al. developed a multilevel model of the interplay between authentic leadership and innovation at the team level [31].

The significance of human resource management (HRM) in the enhancing of employee creativity and organization innovation [32], as well as different types of employee-experienced HRM systems that influence employee creativity [33], have been explored.

Oman et al. focused on the interplay between education and creativity, in particular on a novel method of assessing and encouraging creativity among engineering design students [34]. Cropley argued that both innovation and creativity strongly depend on the ability to reinforce the development of novel and efficient technological solutions to the problems [35]. Other studies explored students' attitude towards problem-based learning, creativity and critical thinking [9], [36]. In contrast, Valaei et al. argued that learning strategies and creativity enhance innovation in small and medium-sized enterprises [37].

Motivation is considered as a significant factor in fostering creativity and innovation [38]. Moreover, the stimulation of creativity reinforces innovation and initiates a complex interrelation between innovation and organizational creativity [39].

Some of the recent studies explored the particular fields, such as relationships between innovation, creativity and cancer treatments [40], diversity [41], or haute cuisine [42]. A study by Perry-Smith examined four stages of the idea's life [43], while Elerud-Tryde and Hooge explored the idea generation as significant support for the innovation process [44].

Some of studies show that existing relationships between creativity, critical thinking and gender are complex and influenced by other variables such as personality [45], social environment, educational system, technology usage and knowledge generation, teacher's philosophy etc. [46, 47]. The impact of creativity and pervasive learning in contemporary education needs more exploration [9]. Identifying both benefits and risks related to enhancing creativity with the help of technology in modern educational paradigm should be studied.

3 Methodology

3.1 Bibliometric study and data collection strategy

Bibliometric, as a research method, is defined as the use of statistical methods to analyze the bibliometric publications data which has been commonly used in library and information science field, and related to scientometric. Analysis of literature with the proven methodology of bibliometric tools support to highlights the understandings of the topics in more details. Publication data retrieved from the Web of Science Core Collection database with below search strategy [48, 49, 50, 51, 52].

TITLE: ("*creative*" AND "*innovate*")
Timespan=2010-2019: Indexes=SCI-EXPANDED, SSCI
Results: 284 publications found (in all document types)
Refined by: DOCUMENT TYPES: (ARTICLE)
Final Results: 185 peer-reviewed journal articles reached.

3.2 Research questions

In order to find out the pattern of research domains in creativity and innovation, the following research questions were formed below;

RQ1. What are the Descriptive publication patterns for the research domains?

RO2. What are the publication trends in terms of most productive/active authors, countries and journal sources?

RO3. What are the citation results for the articles?

4 Results

4.1 Descriptive findings of publication profiles

The search results show that the total of 181 peer-reviewed journal papers (98%) was written in English language, by 455 authors/co-authors from different countries (leading the USA, PR of China, England, Taiwan, Australia, Germany and Netherlands, in a total of 47 countries around the world).

Figure 1 shows the distribution of the number of articles published per year (period of 2010-2019). The linear trend line shows upward movement that illustrates the increased publication interest for the topic. The year 2015 has the highest number of publications. On the contrary, the year 2013, 2016 and 2018 were slightly below the trend line according to publications record.

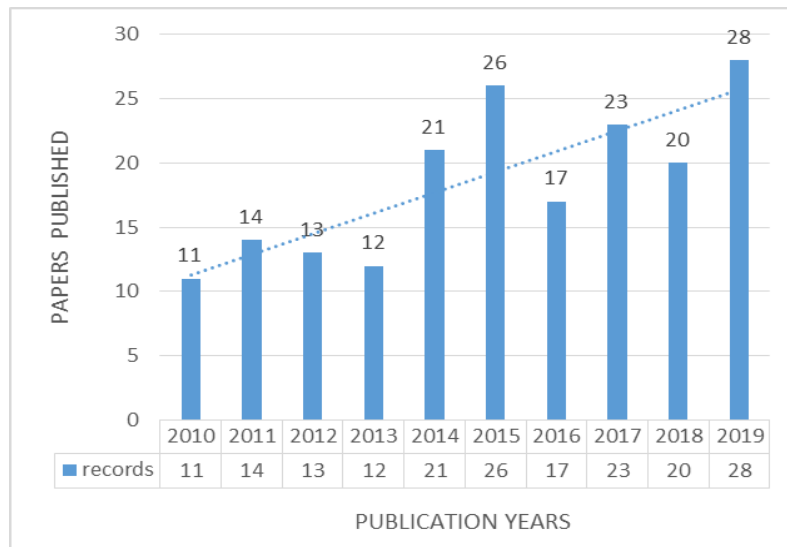


Fig. 1. The trend of publication count by years (2010-2019)

The journal articles published on "Creativity and Innovation" from 2010 to 2019 have been categorized under several WoS subject areas and presented in Table 1. Majority of the publications have been found in management, business, education/educational research, and applied psychology categories in the database. The management and business are the leading field with 109 articles (58.92%); followed by psychology field (applied, educational and multidisciplinary) 28 articles (15.14%), engineering and environmental studies 16 articles (8.65%).

Table 1. WoS subject categories

WoS subject categories	Records	% of 185
Management	74	40.00
Business	35	18.92
Education Educational Research	19	10.27
Psychology Applied	12	6.49
Education Scientific Disciplines	11	5.95
Engineering Multidisciplinary	9	4.87
Hospitality Leisure Sport Tourism	9	4.87
Psychology Multidisciplinary	9	4.87
Environmental Studies	7	3.78
Psychology Educational	7	3.78

4.2 Publication trends: Authors, countries-institutions and journals

Figure 2 shows most productive authors. Although there is no difference among publication records by per author/co-author, but some of the them slightly top on the list. Those who published 3 articles (1.62% of 185 papers) were namely Rezaei S, Valaei N., and Zhou J; with 2 articles (1.08% of 185 papers) Baas M, Bjork J, Bramwell A, Cerne M, Del-Corte-Lora V, Hammershoj LG, Khalili A, Litchfield RC, Mascia D, Molina-Morales FX, Nijstad BA, Su Q, Tsai CY, Tsai KH, Vallet-Bellmunt TM, Wolfe D. There are 435 authors/co-authors whose names appeared in 1 article. The total author/co-authors presented was 455.

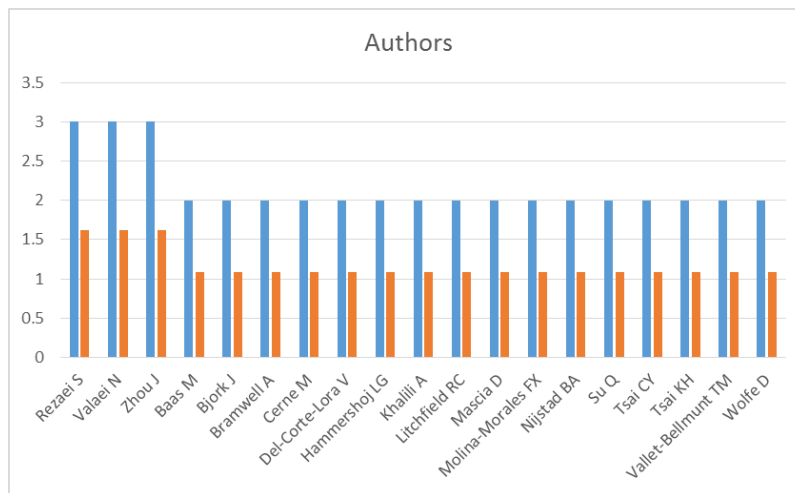


Fig. 2. Top Authors (who has more than 2 papers)

Figure 3 shows the most productive countries by publications. The leading countries collaborated research in the creativity and innovation research field are the USA institutions with 49 records (26.49%) on top of the list, followed by PR China with 23 records (12.43%), where England has 21 papers (8.65%), Taiwan 16 papers (8.65%),

Australia 14 papers (7.57%), Germany 13 papers (7.03%), and Netherlands 10 papers (5.41%). As total of 76% of the country distribution represented.

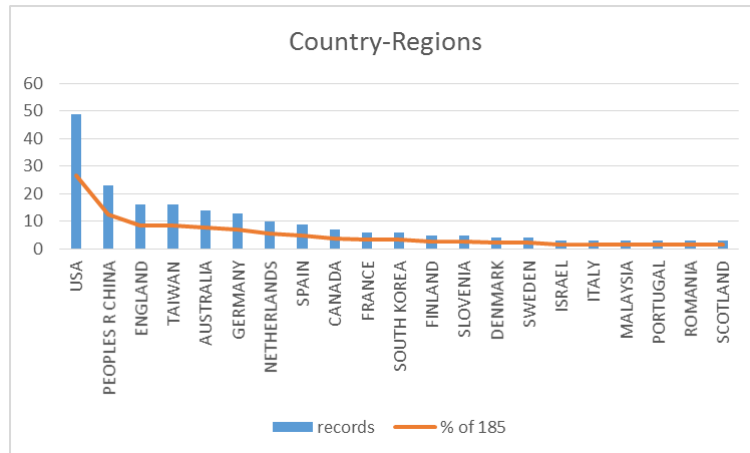


Fig. 3. Most productive Country-Regions by publication counts

According to findings the contributed institutions are functioning in various countries around the globe.

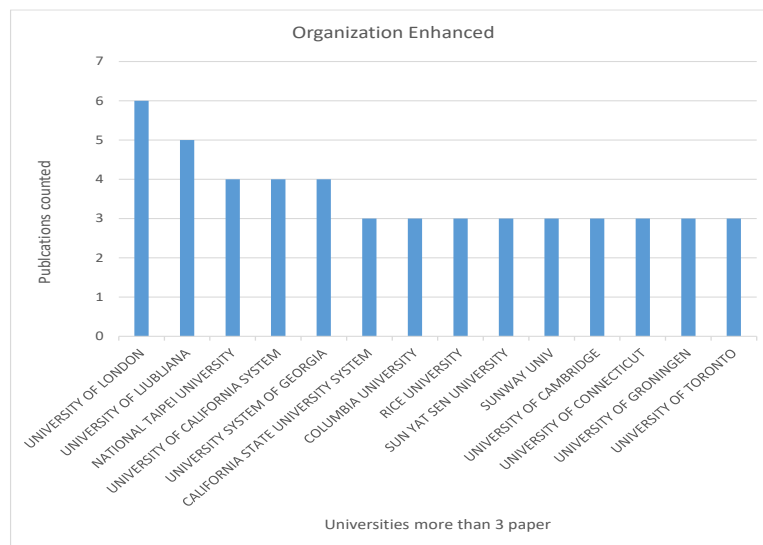


Fig. 4. Most productive Organizations by publication count

Table 2 shows the publication frequency in the journals which published research on creativity and innovation. The Journal Creativity and Innovation Management published significantly more papers (11 papers, 5.95%). There is no significance in

terms of the activity of the other journals the top contributed journals namely Creativity Research Journal, International Journal of Engineering Education, Journal of Business Research, Thinking Skills and Creativity could be found as frequently published the studies on creativity and innovation among the data retrieved from WoS database. Although there are not a significant number of articles published in one or few journals, it seems that journals published a similar amount of the papers, respectively. Table 2 shows the publication frequency of journals, and five journals have categorized as higher the number of publications in the field (more than five articles ranked in the records).

Table 2. WoS subject categories

Source (Journal) Titles	Records	% of 185
Creativity and Innovation Management	11	5.95
Creativity Research Journal	5	2.70
International Journal of Engineering Education	5	2.70
Journal of Business Research	5	2.70
Thinking Skills and Creativity	5	2.70
Journal of Management	3	1.62
Psychology of Aesthetics Creativity and The Arts	3	1.62
Technology Analysis Strategic Management	3	1.62
European Journal of Innovation Management	2	1.08
Innovation Management Policy Practice	2	1.08
Innovation Organization Management	2	1.08
Int. J of Contemporary Hospitality Management	2	1.08
Int. J of Technology and Design Education	2	1.08
Int. J of Urban and Regional Research	2	1.08
Journal of Business Venturing	2	1.08
Journal of Cleaner Production	2	1.08
Journal of Clinical Nursing	2	1.08
Journal of Creative Behavior	2	1.08
Journal of Product Innovation Management	2	1.08
Management Decision	2	1.08
Research in Organizational Behavior	2	1.08
Research Policy	2	1.08
Small Business Economics	2	1.08
Social Behavior and Personality	2	1.08
Sustainability	2	1.08

4.3 Citation results

Citation report for 185 article results from Web of Science Core Collection between 2010 and 2019, and statistics show that h-index 28; average citations per item 18.88; the sum of times cited 3,485; without self-citations 4.193; citing articles 4.075; without self-citations 3,368 counted. Figure 5 illustrates the total citation distribution throughout the period of the research. The citation figures start 2010 to reach at 1,079 in total by the year 2019. Citation count by years followed as; 2010 is 1; 2011 is 16;

2012 is 43; 2013 is 71; 2014 is 132; 2015 is 242; 2016 is 453; 2017 is 593; 2018 is 821 and 2019 is 1079. The top five papers citation counts were in order; 603, 200, 160, 137 and 90. The average citations of top five authors are 238 counts.

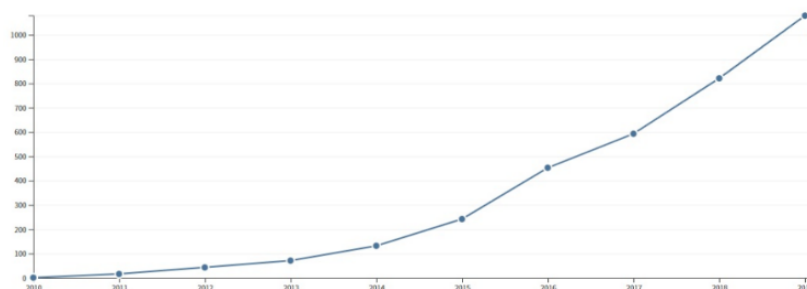


Fig. 5. Total citation counts per year (2010-2019)

5 Analysis and Discussion

The current study aimed to present a bibliometric analysis of all the scientific articles published by the journals which indexed and ranked in Web of Science Core Collection the period of 2010 to 2019. The structure of this study to explore and identify the main research domain of "creativity and innovation" in relation to various fields in scholarly publication. Therefore, research questions have been formed to understand and find out the outputs in publication patterns according to database results.

According to results, the majority of analyzed papers presented empirical studies while only a few papers were prepared as review or meta-analysis. Empirical studies mainly discussed gained results [14, 2, 15, 23, 26, 30, 32], or sometimes the possibility of its implementation [5, 16, 19, 29, 31].

Some of the studies suggested new research opportunities to further explore of organizational creativity and innovation [8, 39, 42]. The other studies developed new or modified existing tools [11], methods [25, 34], solutions [37] or models on enhancing creativity and innovation [14, 16, 23, 24, 29, 31, 38, 43]. Studies conducted by Sarooghi et al. [17] analyzed empirical papers (meta-analysis), while studies by De Drue et al. [38] and Anderson et al. [1] published comprehensive reviews.

Bibliometric research outcome would clearly state that the number of articles published in the research topic has been increased in the period from 2015 to 2019 than the average publication (22.8 average articles per year). According to results, the study shows that the leading countries publishing research in the creativity and innovation field are the USA, PR China and England. Among Journals the leading in publishing studies on creativity and innovations is Creativity and Innovation Management Journal.

Concerning the limitations of this study, our bibliometric search strategy was broad so that the further analysis might be focused on the cross-sectional association between various variables including creativity, innovation and types of leadership in

different environments factors. In addition, the workers' creativity and the initiative have to be explored more detailed, since they can be considered as a significant factor influencing innovations in the organization. The last point to be explored is the interrelation between workers' attitude and innovation performance.

Future research should focus on increasing the evidence on how to the interrelation between creativity and innovation can be used in the way of increasing efficiency in educational, organizational, psychological, engineering and other spheres. Our study indicates the importance of conducting more studies exploring on the practical effectiveness of using creativity for improving individual innovation performance, idea generation etc. In this study, it has been taken an essential step in examining the scientific publication patterns for the creativity and innovation domains from 2010 through 2019. Presented results attempted to close the gap between theoretical and practical spheres in domains where creativity and innovations play a significant role. Considering trends and patterns of existing publication in this domain will allow researchers and practitioners to be aware of the most actual existing need in gaining data, and it is implementing in practice.

The results obtained in our study also emphasize the need for more studies on the efficiency of using creativity in practice for improving individual innovation performance, idea generation etc. This article is relevant for researchers, academics, and practitioners in different disciplines as well as who works and contributes to the field of information studies, management-business, psychology and interdisciplinary studies.

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