

# Unlocking Innovative Work Behaviour Through Bibliometric Analysis

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## Abstract

The sole purpose of this article is to discover the information stored within the term 'innovative work behaviour (IWB),' with a specific focus on types of documents, contributions by nations/regions, journals, authors and keywords. The authors have used VOSviewer version 1.6.19 and R-Studios for conducting bibliometric analysis as an approach to represent the growth for this area during a specified period. The findings of the article reveal that IWB has developed into coherent research theme from past decades. Through analysis, various trends can be assessed, for example, the frequently used keywords (innovation, innovative work behavior), top nations/regions (U.S.A., Italy). The study concurs with some theoretical insights. Theoretically, bibliometric analysis decodes the collective information of the established field. IWB is used inter-changeably with 'conception', but it has a distinct character of its own which can be used for understanding and continuous development, this is necessary to ensure enhancement in the organization. Moreover, it provides an opportunity for researchers to dive in the present state of IWB. The study also aids in the lookout for future research direction. Present study has used bibliometric analysis to review time-based development (publications, keywords, institutions) in IWB for a period of more than 20 years, that is, 2001–2022. In conclusion, this bibliometric analysis offers an inclusive overview of the status of IWB research, which could assist an enhanced understanding of the development in this field in the past years.

## Keywords

Innovation, innovative work behavior, work engagement, psychological, empowerment, creativity, innovative work behaviour

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## Introduction

The development of mankind has originated need for various aspects. These aspects vary from person to person. The heterogeneous needs enrooted the seed of creativity. 'Change' has been constant over the years. *Knowledge* is a sustainable resource for all beings (Deb, 2021; Del Giudice et al., 2017; El-Kassar et al., 2022) and as the wide user of knowledge, mankind frequently inclines to create something new. Innovative work behaviour (IWB) is critical to the advancement of workplaces, people, economies and in countries that must adapt to change and competition while also increasing the organization value (Ausat et al., 2022; Koednok & Sungsanit, 2018). Creativity is *omnipresent*, that is, it can occur anywhere necessitated. The pre-requisites for innovation are creative visions and notions (Rietzschel & Ritter, 2018). The branch that deals with the management of innovation at different workplaces is coined as *innovation studies* (Anderson & King, 1991). The company's competitiveness has a significant influence on creativity. In case of business a consistent creativity can be witnessed over many years (Berg, 2016; Groza et al., 2016). Innovation is the finest strategy to survive in the shifting culture (Kleysen & Street, 2001). Organizational creativity is characterized as the source of innovation because the process of creativity maps the road for new ideas, commodities and solutions (Amabile et al., 1996; Amabile & Pratt, 2016; Perry-Smith, 2006; Valaei et al., 2017). The innovation-oriented literature talks about the significant input, that is, *creativity*, which ensures a long-run existence and upgradation of the entity (Botelho, 2020; Nguyen et al., 2023). Employee are an important asset to an organization and in order to enhance innovation in the operations/process/method, organization needs to rely on their employees (Chen et al., 2023; Ramamoorthy et al., 2005). The encouragement and support of every employee to discover and uncover strategies to reach goals and complete tasks is vital to the company's development of innovation (Szczepańska-Woszczyna & Dacko-Pikiewicz, 2014). In the words of various researchers, 'A series of intentional constructing, outlining, and applying new ideas that boost work-role, group, or organisational performance is referred to as innovative work behaviour (IWB)' (Bos-Nehles et al., 2017; De Jong & Den Hartog, 2010; Janssen, 2000; Mustafa et al., 2021; Purwanto, 2022; Scott & Bruce, 1994; Waheed et al., 2023). IWB surrounds itself with three distinct processes, that is, setting up a new notion, idea generation (Linsey et al., 2005; Yilmaz et al., 2016); obtaining external aid, idea promotion; creating a blueprint of idea, idea application (Radaelli et al., 2014). Hence, it can be concluded that an organization has a wholesome effect of IWB on its outcome (Baer et al., 2003; Janssen, 2001). Another important feature of IWB is its connection to learn at all levels, which can be characterized as successful applications with significant lessons (Høyrup, 2010).

In 1969, the term bibliometric was coined (Pritchard, 1969). Bibliometric or Scientometric is a quantitative analysis application constructed of mathematical and statistical tool of analysis. These have been widely used to identify research clusters and growth prospects in a certain area (Nederhof, 2006). Various

disciplines have implemented bibliometric analysis to gain an insight in analysis of performance (Montero-Díaz et al., 2018). In other words, bibliometric can be put as a tool which shifts the analysis from a narrower (one publication, scientist or institute) to a broader (domestic or international) view with an add-on of excising the trend (Shi et al., 2020). The bibliometric analysis also works as a yardstick for measuring the academic influence (Heberger et al., 2010). Bibliometric can be considered as a map to find new trends, which will support scholars to design and plan the future study (Zhang, 2020).

Bibliometric has a wide range of applications. Many studies looked at elements, such as productive authors, influential journals, publishing data, affiliations and countries, when evaluating publication statistical characteristics (Chen et al., 2018). The paper reports on bibliometric analysis of IWB in research published from (2001–2022). The number of articles published, the evolution of terminology, citation methods, the most productive writers and journals in the topic of IWB are all taken into account. Current themes in the research and development of IWB, as well as the status and development trend of IWB, were analysed based on bibliometric analysis of contents. The study below produces various results, the prime conduct was overviewing the fields in which IWB was studied, if IWB occurs in more than one field than IWB can be declared interdisciplinary or multidisciplinary. The relevance of journals will be traced by journal analysis. The analysis of journals will also display the multiple themes in the field of IWB. The research productivity or publishing pattern of an author will be analysed using the analysis of authors (Culnan, 1986). To monitor the contribution of institutions, analysis of institutions will be conducted. Different clusters of IWB will be traced via keywords co-occurrence analysis, co-authorship analysis or co-citation analysis (Kraus et al., 2020). The rise of interest of scholars in bibliometric with the origination of different analysis tools like *Gephi*, *Leximancer* and *VOSviewer* (providing practical analysis) have attributed to the compilation and a smooth access of various database (Scopus and Web of Science) with an availability of large number of data. Indeed, the bibliometric methodology has been used in business research in a range of domains, including business strategy (Kumar et al., 2021a), electronic commerce (Kumar et al., 2021b), finance (Durisin & Puzone, 2009; Linnenluecke et al., 2017; Xu et al., 2018), human resources, management (Ellegaard & Wallin, 2015; Zupic & Čater, 2015) and marketing (Backhaus et al., 2011; Donthu et al., 2020; Hu et al., 2019; Samiee & Chabowski, 2012).

The most significant research gaps in the area of IWB have been completely addressed by the current study. Notably, previous scholarly attempts did not cover the most recent time frame, namely the year 2022, indicating a time gap in previous studies (Hassan et al., 2021; Peerzadah et al., 2023; Salam & Senin, 2022). The ‘Web of Science’ was mostly used as the database in earlier research in this field (Peng et al., 2021). Furthermore, it is remarkable that evaluations of bibliographic coupling based on institutional affiliations are still a novel area that has to be investigated in the aforementioned subject.

## Objectives

The present study aims to enclose the following:

- To disclose the type of documents and number of publications from the year 2001 and 2022
- To assess inter-disciplinary subjects in the domain of IWB
- To trace the leading contributors (language, country, institutions, journals, and authors)
- To unveil trending keywords in this field

## Methodology

### *The Database*

As suggested in previous studies, there exists various database for bibliometric studies (Web of Science, Scopus, Dimensions) (Huang et al., 2023; Kumpulainen & Seppänen, 2022). In order to bridge the research gap, Scopus was used as the database in the present study as it contains publications from different disciplines, years, regions, institutions as it is the best database for peer-reviewed quotations and bibliography summaries (Jiménez-García et al., 2020). The data were accessed on 25 May 2023. The Scopus database is used for bibliometric analysis of various areas in social science discipline. There are more than 20,000 peer-reviewed journals, 370 book series and 5.5 million academic articles in the collection. The search for the related documents were done using the search key as ‘INNOVATIVE WORK BEHAVIOUR’.

A total of 8,382 appeared for the search out of which the data was restricted to the year 2001–2022. This limitation resulted to the count of 7,685 documents. The search string for the above is inserted below as,

TITLE-ABS-KEY(innovative work behaviour)AND ( LIMIT-TO (DOCTYPE, “ar”) OR LIMIT-TO (DOCTYPE, “cp”) OR LIMIT-TO ( DOCTYPE, “re”) OR LIMIT-TO (DOCTYPE, “ch”) OR LIMIT-TO ( DOCTYPE, “bk”) OR LIMIT-TO (DOCTYPE, “cr”) OR LIMIT-TO ( DOCTYPE, “ed”) OR LIMIT-TO (DOCTYPE, “no”) OR LIMIT-TO (DOCTYPE, “er”) OR LIMIT-TO (DOCTYPE, “sh”) OR LIMIT-TO (DOCTYPE, “dp”) OR LIMIT-TO (DOCTYPE, “le”) AND (EXCLUDE (PUBYEAR,2023) OR EXCLUDE (PUBYEAR,2000) OR EXCLUDE (PUBYEAR,1999) OR EXCLUDE (PUBYEAR,1998) OR EXCLUDE (PUBYEAR,1997) OR EXCLUDE (PUBYEAR,1996) OR EXCLUDE (PUBYEAR,1995) OR EXCLUDE (PUBYEAR,1994) OR EXCLUDE (PUBYEAR,1993) OR EXCLUDE (PUBYEAR,1992) OR EXCLUDE (PUBYEAR,1991) OR EXCLUDE (PUBYEAR,1990) OR EXCLUDE (PUBYEAR,1989) OR EXCLUDE (PUBYEAR,1988) OR EXCLUDE (PUBYEAR,1987) OR EXCLUDE (PUBYEAR,1986) OR EXCLUDE (PUBYEAR,1985) OR EXCLUDE (PUBYEAR,1984) OR EXCLUDE (PUBYEAR,1983) OR EXCLUDE (PUBYEAR,1982) OR

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 EXCLUDE (PUBYEAR,1970) OR EXCLUDE (PUBYEAR,1969))

### Methods of Analysis

The statistical tool conferred for analysis is, an evaluating and quantifying tool used to acknowledge number & growth drift of a particular subject or a set of methodologies used to analyse or measure texts and information, referred as *bibliometric* (Bahuguna et al., 2023; Ellegaard, 2018; Hung, 2012; Liu et al., 2022). Bibliometric is a science in which quantitative approaches are used in various disciplines and are based on numerous features of written articles, such as subject, author, citations, title and so on (Hussain et al., 2011; Kannan & Thanuskodi, 2019). The use of statistical or mathematical methods aids in reaching the objective related to the literature in the specified area. The keywords are significantly focused to establish a concrete definition related to IWB, many keywords with small variations are used for the same purpose. Through quantitative examination of the change regulation of literature information and quantity structure, the research progress of a given field may be assessed and evaluated in a systematic manner (Mao et al., 2018). The selection of the literature for bibliometric studies is an important factor to assure validity and consistency (Lamboglia et al., 2020). Performance analysis (research and publication performance) and science mapping (structures and dynamics) are two of the most common applications of bibliometric approaches (Cobo et al., 2011; Zupic & Čater, 2015). There exists many software to conduct the bibliometric analysis 'Bibexcel, CiteSpace, CitNetExplorer, VOSviewer' (Moral-Muñoz et al., 2020). VOSviewer is a tool for constructing and visualising bibliometric networks, developed by *Nees Jan van Eck* and *Ludo Waltman*. The rationale of selecting VOSviewer and Bibliometrix package over competing software can be traced in its special advantages. Since it is extremely effective at doing *co-authorship* and *bibliographic coupling* analyses, crucial for our study. Its ability to handle large datasets effectively produces dynamic visualizations providing unparalleled analytical insights. Furthermore, the credibility of VOS Viewer in academic circles supports the validity and methodological soundness of the present research. The present research employees VOS viewer software version 1.6.19 and Bibliometrix package, R v.4.3.1 to conduct the study.

### *h Series Index and Impact Factor*

The year 2005 brought the term *h-index* (Hirsch, 2005), which instantly gravitated informetric community. The prime focus towards creation of *h-index* is to

acknowledge the achievement of scientist in various field. In other words, the *h*-index is used to quantify the work contributed by the scientists in their respective fields (Guns & Rousseau, 2009; Kamrani et al., 2021). With the commenced idea of taking various co-authors into consideration. *h*-index can be calculated on the basis of citations and publications produced. The *h*-index is used to test the productivity junction with other bibliometric measures (Batista et al., 2006; Bertran et al., 2020; Van Raan, 2006):

*h*-index is always  $\leq$  total numbers of papers published

In 1955, *Eugene Garfield*, for the very first time, inscribed about *impact factor* (IF) in a magazine known as '*Science Magazine*' (Garfield, 1955). Not only do average IFs vary over time, but they also vary by field (Althouse et al., 2009). The IF of a journal is used as a proxy for the quality and projected impact of all papers published in that journal. The quasi-qualitative nature of IF and its high accessibility, since it is immediately offered by ISI (Institute for Scientific Information) for the most global and prominent journals, which are some of the reasons for its success (Bordons et al., 2002). IF as a bibliometric indicator employs the cautious usage as the final IF is decided after considering many other variables (Scully & Lodge, 2005). Before calculating an IF all the complexities must be understood as a slight error could paint a completely wrong picture (Seglen, 1997).

The 2022 impact factor of a journal would be calculated as follows:

2022 impact factor =  $A/B$ .

where A = the number of times that all items published in that journal in 2020 and 2021 were cited by indexed publications during 2022.

B = the total number of 'citable items' published by that journal in 2020 and 2021. ('Citable items' for this calculation are usually articles, reviews, proceedings, or notes; not editorials or letters to the editor).

Source: uic.edu

## Visualizations

The visualization for the study is constructed with the help of VOSviewer version 1.6.19 and Bibliometrix package for R v.4.3.1. Simply put, visualizations assists in a better analysis and understanding of bibliometric results (Jiang et al., 2019; Wheeldon & Ahlberg, 2011). The research constituents (collaborations, co-authorship and keywords) can also be better examined through visualization (Muhammad et al., 2022). VOSviewer provides an option for three different types of visualizations, that is, the network visualization, the overlay visualization and

the density visualization. The present study selects the network visualization for all the visualizations.

## Results

### *Analysis of Characteristics of Documents*

Tables 1 and 2 concur the first objective. To arrive at preliminary results produced from different types of documents and to track the number of documents produced. We simply sift and analyse the data. In total, 12 types of documents were available. Table 1 displays the 12 types of documents, that is, 7,685 reports in the area of IWB. The number of articles totalled to 4,881, which accounts for 63.51% and opted frequently. Documents like, editorial (0.32%), note (0.26%), letter (0.012%), etc., were comparatively less significant.

The selection criteria of IWB displayed the result, which summed to 7,685 documents. Table 2 displays the total contribution from 2001–2022. The maximum publication can be viewed in the year 2022 and the minimum in 2001. Every year displays a different number of publications, following an increasing trend. The sources for these publications can be traced to various reputed journals, (see, *Sustainability Switzerland*, *Frontiers in Psychology*, *SAE Technical Papers*, *Engineering Structures*, etc.).

### *Analysis of Subjects*

This part achieves the second objective of identifying *inter-disciplinary* streams in the area of IWB. Table 3 displays the subject-wise analysis of IWB. Ten

**Table 1.** Document Type Information During 2001–2022.

| Sl. No | Document Type     | Number | Percentage |
|--------|-------------------|--------|------------|
| 1.     | Article           | 4,881  | 63.51      |
| 2.     | Conference paper  | 1,880  | 24.4       |
| 3.     | Review            | 401    | 5.21       |
| 4.     | Book chapter      | 307    | 3.99       |
| 5.     | Book              | 166    | 2.16       |
| 6.     | Conference review | 47     | 0.61       |
| 7.     | Editorial         | 25     | 0.32       |
| 8.     | Note              | 20     | 0.26       |
| 9.     | Short survey      | 9      | 0.11       |
| 10.    | Erratum           | 9      | 0.11       |
| 11.    | Data paper        | 1      | 0.012      |
| 12.    | Letter            | 1      | 0.012      |

**Table 2.** Chronological Publication from 2001–2022.

| Publishing Year | Total Publications | Percentage | Publishing Year | Total Publications | Percentage |
|-----------------|--------------------|------------|-----------------|--------------------|------------|
| 2001            | 32                 | 0.41       | 2012            | 293                | 3.81       |
| 2002            | 51                 | 0.66       | 2013            | 347                | 4.51       |
| 2003            | 65                 | 0.84       | 2014            | 428                | 5.56       |
| 2004            | 83                 | 1.08       | 2015            | 403                | 5.24       |
| 2005            | 103                | 1.34       | 2016            | 441                | 5.73       |
| 2006            | 136                | 1.76       | 2017            | 572                | 7.44       |
| 2007            | 138                | 1.79       | 2018            | 502                | 6.53       |
| 2008            | 157                | 2.04       | 2019            | 659                | 8.57       |
| 2009            | 180                | 2.34       | 2020            | 808                | 10.5       |
| 2010            | 199                | 2.58       | 2021            | 845                | 10.9       |
| 2011            | 291                | 3.78       | 2022            | 952                | 12.3       |

**Table 3.** Analysis of Subjects.

| Sl. No | Subjects                            | Total Article Contribution |
|--------|-------------------------------------|----------------------------|
| 1.     | Engineering                         | 2,505                      |
| 2.     | Social sciences                     | 1,277                      |
| 3.     | Business, management and accounting | 1,229                      |
| 4.     | Computer science                    | 1,192                      |
| 5.     | Materials science                   | 1,106                      |
| 6.     | Medicine                            | 1,005                      |
| 7.     | Physics and ssstronomy              | 685                        |
| 8.     | Energy                              | 586                        |
| 9.     | Psychology                          | 571                        |
| 10.    | Environmental science               | 545                        |

**Source:** Scopus.

different subjects cover the term ‘IWB’, where the top three subjects are engineering (32.59%), social sciences (16.61%) and business, and management and accounting (15.9%). The subject with smallest publication in the field of IWB is environmental science (7.09%).

### *Analysis of Language, Country, Institutions, Journals and Authors*

The third goal, identifying the top contributors in the area of IWB, is achieved in this portion of the study. The area of IWB is published in 23 different languages, where the majority of publications are ranged in the English (97.15%) language.

**Table 4.** Language Information of Periodical Articles During 2001–2022.

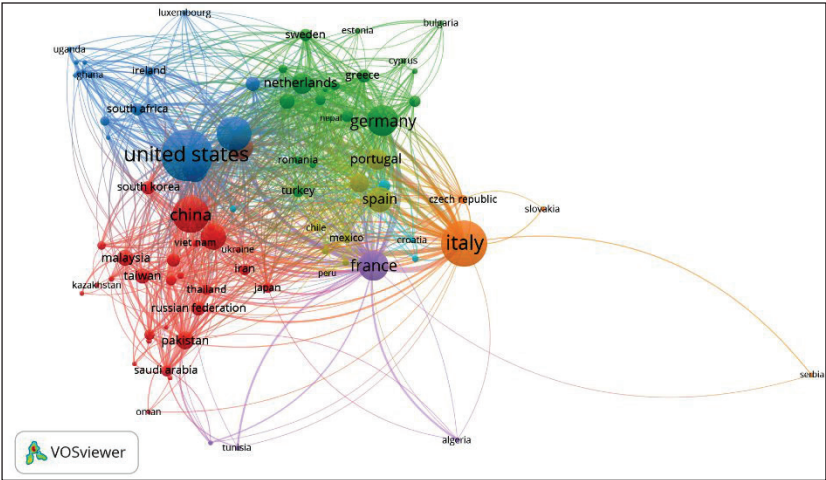
| Language   | Article Count | Percentage | Language  | Article Count | Percentage |
|------------|---------------|------------|-----------|---------------|------------|
| English    | 7,466         | 97.15      | Bosnian   | 02            | 0.02       |
| German     | 49            | 0.63       | Romanian  | 02            | 0.02       |
| Spanish    | 40            | 0.52       | Ukrainian | 02            | 0.02       |
| French     | 38            | 0.49       | Greek     | 02            | 0.02       |
| Russian    | 37            | 0.48       | Afrikaans | 01            | 0.01       |
| Chinese    | 34            | 0.44       | Japanese  | 01            | 0.01       |
| Italian    | 26            | 0.33       | Moldavian | 01            | 0.01       |
| Portuguese | 22            | 0.28       | Moldovan  | 01            | 0.01       |
| Dutch      | 04            | 0.05       | Persian   | 01            | 0.01       |
| Malay      | 03            | 0.03       | Polish    | 01            | 0.01       |
| Slovenian  | 03            | 0.03       | Slovak    | 01            | 0.01       |
| Czech      | 03            | 0.03       | Croatian  | 01            | 0.01       |

**Table 5.** Publication from the Top Countries/Regions (2001–2021).

| Country        | Total Publications | Total Publications Ranking & Percentage % | Country     | Total Publications | Total Publications Ranking & Percentage % |
|----------------|--------------------|-------------------------------------------|-------------|--------------------|-------------------------------------------|
| USA            | 1,467              | 1 (18.71)                                 | India       | 337                | 8 (4.54)                                  |
| Italy          | 1,137              | 2 (14.54)                                 | Australia   | 328                | 9 (4.30)                                  |
| China          | 668                | 3 (9.17)                                  | Canada      | 317                | 10 (4.14)                                 |
|                |                    |                                           | Netherlands | 236                | 11 (3.03)                                 |
| United Kingdom | 647                | 4 (8.26)                                  | Portugal    | 222                | 12 (3.00)                                 |
| Germany        | 512                | 5 (6.57)                                  | Brazil      | 187                | 13 (2.47)                                 |
| France         | 507                | 6 (6.48)                                  | Pakistan    | 158                | 14 (2.19)                                 |
| Spain          | 345                | 7 (4.60)                                  | Malaysia    | 135                | 15 (1.78)                                 |

Out of 7,685 documents, 7,466 documents were in English. Table 4 shows the various languages (German, French, Spanish, Russian, Chinese, etc.) in which publications are produced. The rationale behind English being the primary language for publication is that it is the most prevalently used language in research and is widely spoken/understood around the world (Adler & Johnson, 2000; Brambrink et al., 2000; Chiu & Ho, 2005).

Table 5 represents the contribution done in the field of IWB, geographically. This analysis encloses the diversity in the field of IWB and partially fulfils our third objective of discovering *the leading countries* in this field. From the global perspective, the leading countries in this field are United States America (1,467), Italy (1,137), China (668), United Kingdom (647) and Germany (512). Western



**Figure 1.** Country Wise Collaboration of Authors.

**Source:** VOSviewer.

countries contribute significantly in the field of IWB, while Asian countries contributes less.

Collaborations (among authors/experts) result into new discoveries and insights. Collaboration imparts creativity (Sampaio et al., 2016). Figure 1 showcases the *inter-country co-authorship analysis* of countries in the field of IWB. The analysis reveals the number of associations of one country’s authors with other country (Khandelwal et al., 2021). The figure has various aspects. Only countries with a minimum of 5 documents and 10 citations were selected. The eight bigger circles in the figure represents the countries (USA, Italy and China), where the majority of collaborations has taken place among the authors in the respective field while the 1,134 links represent collaboration among various countries present in the figure. United States have 1,520 documents in collaborations with a link strength of 723, which is the highest among all, followed by Italy with 1,180 documents and 587 link strength, China with 748 documents and 415 link strength. The figure also conveys the lack of research in developing countries.

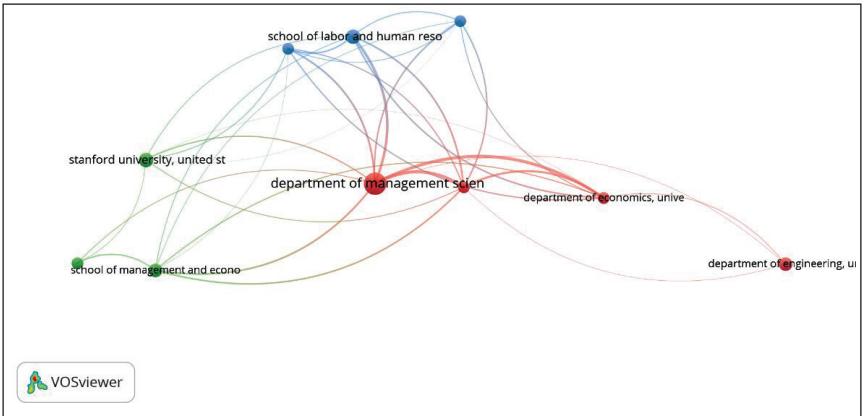
The total institutions around the world that publishes in the field of IWB sums up to 11,766. Table 6 enumerates the leading 15 institutions in the relevant field, between 2001 and 2022. The major contribution can be assessed from the European Continent (Italy *Politecnico di Milano*, *Politecnico di Torino*, *Università degli Studi di Firenze*, Paris CNRS Centre National de la Recherche Scientifique). The contribution from the developing country is in a scant position, indicating low density of research.

Figure 2 portrays the *bibliographic coupling* of the institutions in the field of IWB. Bibliographic coupling explains how two different documents cite a

**Table 6.** Most Productive Institutions.

| Sl. No | Institute                                                | Tp  |
|--------|----------------------------------------------------------|-----|
| 1.     | Politecnico di Milano, Italy                             | 115 |
| 2.     | CNRS Centre National de la Recherche Scientifique, Paris | 114 |
| 3.     | Politecnico di Torino, Italy                             | 94  |
| 4.     | Università degli Studi di Firenze, Italy                 | 78  |
| 5.     | Università degli Studi di Napoli Federico II, Italy      | 78  |
| 6.     | Consiglio Nazionale delle Ricerche, Italy                | 76  |
| 7.     | Alma Mater Studiorum Università di Bologna, Italy        | 68  |
| 8.     | Ministry of Education China                              | 57  |
| 9.     | Universidade do Minho, Italy                             | 49  |
| 10.    | Università degli Studi di Padova, Italy                  | 49  |
| 11.    | Universidade de Lisboa, Portugal                         | 48  |
| 12.    | Chinese Academy of Sciences                              | 44  |
| 13.    | Universidade do Porto, Portugal                          | 41  |
| 14.    | University of Toronto, Canada                            | 41  |
| 15.    | Università degli Studi di Perugia, Italy                 | 40  |

**Source:** Scopus.



**Figure 2.** Bibliographic Coupling of Institution.

**Source:** VOSviewer.

common document (Maseda et al., 2022). This study seeks the bibliographic coupling of the institutions, which means how two different institution references the publication of the same institution. Thus, explaining how a citation provides the information of similarities among documents. An assumption that underlies bibliographic coupling is that the two documents which referenced the third documents are related. The same can be also viewed in the cluster. The minimum

**Table 7.** Most Influential Journals.

| Sl. No | Journal                                                                  | TP | IF   | SJR   | SNIP  |
|--------|--------------------------------------------------------------------------|----|------|-------|-------|
| 1.     | <i>Sustainability Switzerland</i>                                        | 64 | 3.88 | 0.664 | 1.198 |
| 2.     | <i>Frontiers in Psychology</i>                                           | 48 | 4.23 | 0.891 | 1.422 |
| 3.     | <i>SAE Technical Papers</i>                                              | 43 | 1.1  | 0.240 | 0.368 |
| 4.     | <i>Engineering Structures</i>                                            | 34 | 5.58 | 1.607 | 2.177 |
| 5.     | <i>Construction and Building Materials</i>                               | 33 | 7.69 | 1.888 | 2.214 |
| 6.     | <i>European Journal of Innovation Management</i>                         | 29 | 5.45 | 1.142 | 1.861 |
| 7.     | <i>International Journal of Environmental Research and Public Health</i> | 29 | 4.61 | 0.828 | 1.280 |
| 8.     | <i>Creativity and Innovation Management</i>                              | 27 | 3.64 | 0.986 | 1.395 |
| 9.     | <i>Nuclear Engineering and Design</i>                                    | 26 | 1.9  | 0.853 | 1.234 |
| 10.    | <i>Energies</i>                                                          | 25 | 3.25 | 0.632 | 1.025 |

**Source:** Compiled from Scopus and Websites, respectively.

**Note:** The authors have only taken 10 journals in consideration and has excluded conference proceeding, book, book series and trade journal. The impact factor was collected from the official websites of the journal as on May 25th 2023.

threshold for the documents were kept to 5. The visualization provides three clusters with 33 links and total link strength of 189. The top three institution that majors in coupling and cluster is the Department of management sciences (Hazara University, Pakistan) followed by School of Economics and Management (Tongji University, China) and Department of Economics (University of Insubria, Italy).

The publications made in the field of IWB is published in more than 100 journals. The first 10 journals with their total papers, impact factor, SJR and SNIP are enlisted in Table 7. The IF identifies the significance of a journal. SJR creates a distinction amid a journal's popularity and prestige, and the ratio of degree of topicality and citation impact of a journal (Colledge et al., 2010). The journals quantity up to 4.65% of the total publications. The top three journals with most articles are *Sustainability Switzerland*, *Frontiers in Psychology* and *SAE Technical Papers*. Another way to look at this table is from the IF column. The IF of all the journals is displayed which indicates the citing frequency of a publication from a particular journal. IF also helps in the ranking of the journals. Thus, on the basis of IF, the top three journals are *Construction and Building Materials*, *Engineering Structures* and *European Journal of Innovation Management*.

Figure 3 shows the citation analysis of different journals in the field of IWB. Out of 4,407 journals, more than 150 journals were cited more than 50 times. *Creativity and Innovation Management* was cited more than 2,000 times followed by the *Journal of Occupational and Organization Psychology* with 1,880 citations and *Fuel* with 1,399 citations.

As can be acknowledged from Table 8, top 10 authors were affiliated to four countries namely Pakistan, Italy, France and Germany. The majority of the authors belong to European continent. The articles published by these authors ranges from

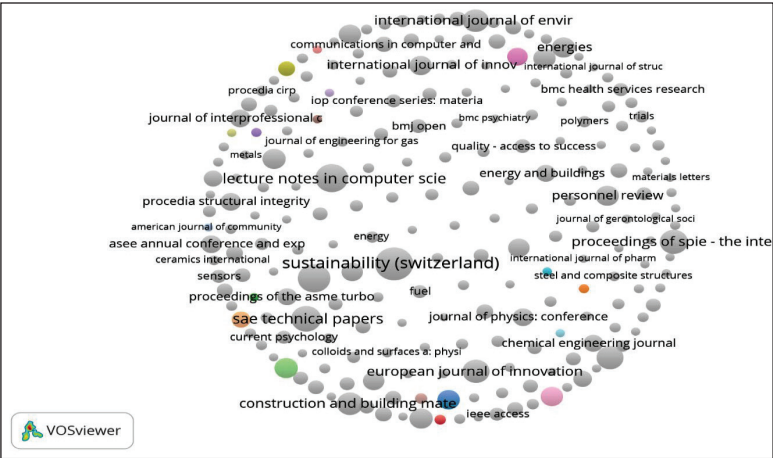


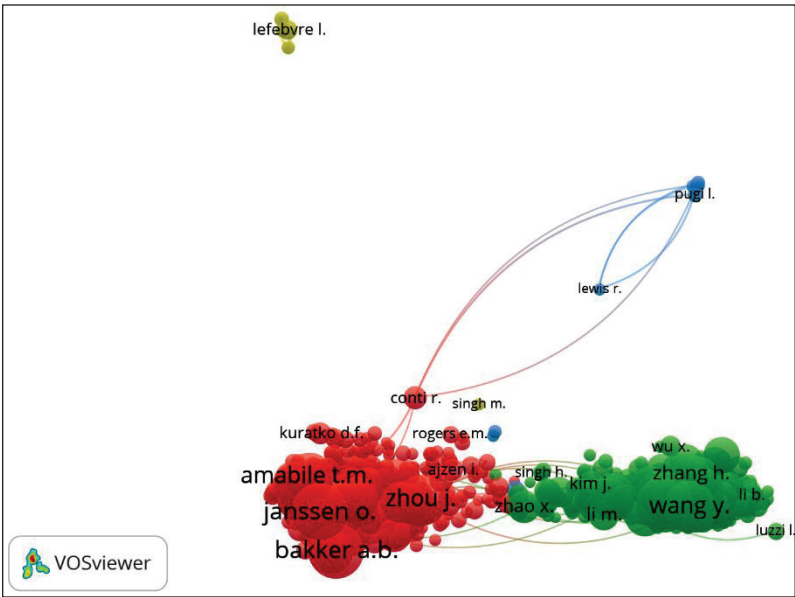
Figure 3. Citation Analysis of Journals.

Sources: VOSviewer.

Table 8. Analysis of Authors.

| Sl. No | Author                | Scopus Author ID | Total Publication | h-Index | Current Affiliation                | Country  |
|--------|-----------------------|------------------|-------------------|---------|------------------------------------|----------|
| 1.     | Afsar, Bilal          | 56400641800      | 24                | 29      | Hazara University Pakistan         | Pakistan |
| 2.     | Meli, Enrico          | 24776636200      | 22                | 27      | Università degli Studi di Firenze  | Italy    |
| 3.     | Rindi, Andrea         | 6701872687       | 20                | 22      | Università degli Studi di Firenze  | Italy    |
| 4.     | Battistelli, Adalgisa | 24723811600      | 18                | 19      | Laboratoire de Psychologie         | France   |
| 5.     | Pugi, Luca            | 6506926785       | 17                | 27      | Università degli Studi di Firenze  | Italy    |
| 6.     | Odoardi, Carlo        | 55562150100      | 16                | 12      | Università degli Studi di Firenze  | Italy    |
| 7.     | Montani, Francesco    | 55560660700      | 13                | 17      | Alma Mater Studiorum Università di | Italy    |
| 8.     | Mulder, Regina H.     | 15056816300      | 12                | 17      | Universität Regensburg, Regensburg | Germany  |
| 9.     | Cammi, Antonio        | 8290404800       | 11                | 26      | Politecnico di Milano, Milan       | Italy    |
| 10.    | Gerhard Messmann      | 36608598200      | 11                | 22      | Universität Regensburg,            | Germany  |

Source: Scopus.



**Figure 4.** Co-Citation Visualization.

**Source:** VOSviewer.

the year 2001 to 2022. Afsar, Bilal is the top ranked author among all, affiliated from Pakistan with a contribution of 24 articles and the highest *h*-index among all of 29, followed by Meli, Enrico affiliated from Università degli Studi di Firenze, Italy with an article contribution of 22 publication and *h*-index of 27.

Co-citation analysis aids the understanding for cognitive structure (Surwase et al., 2011). In author's co-citation analysis *frequently cited authors* can be traced, the unit of analysis is co-cited and frequently cited authors (Osareh, 1996). Figure 4 represents the co-citation visualization of authors in the field of IWB. The number of citation of an author plays a very significant role. There are 4 clusters, where the cluster in red represents the authors with highest citations (Janssen 1,249 citations, Bakker 1,185 citations). The authors in red (539 authors) and green (448 authors) clusters are the authors who have more than 500 citations.

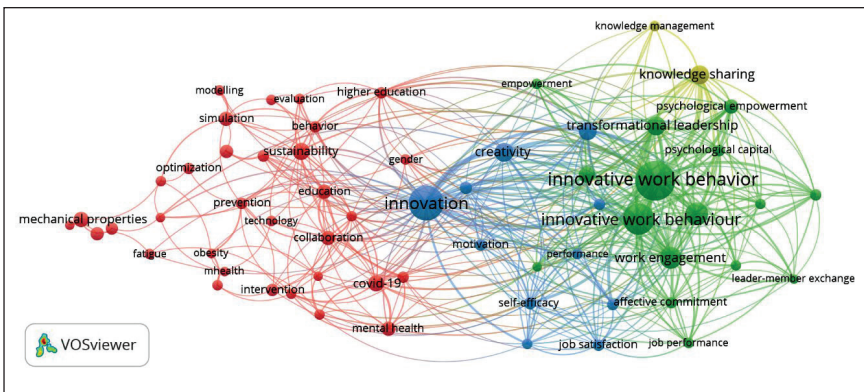
**Analysis of Keywords**

This section accomplishes the last objective of the study. Keywords describe the authors' perceptions of the most essential terms in their publications (Pesta et al., 2018). Table 9 aims to identify the most common keywords used to discover the articles in the field of IWB. To analyse the keyword below 'author's keywords' were taken to consideration. In the presence of 7,685 articles a total number of 6,527 keyword appeared. Only 697 keywords appeared more than

**Table 9.** Analysis of Keywords.

| Sl. No | Keywords                    | Occurrences |
|--------|-----------------------------|-------------|
| 1.     | Innovative work behavior    | 326         |
| 2.     | Innovation                  | 251         |
| 3.     | Innovative work behaviour   | 204         |
| 4.     | Innovative behavior         | 105         |
| 5.     | Work engagement             | 96          |
| 6.     | Transformational leadership | 75          |
| 7.     | Knowledge sharing           | 74          |
| 8.     | Creativity                  | 72          |
| 9.     | Leadership                  | 68          |
| 10.    | Innovative behaviour        | 57          |

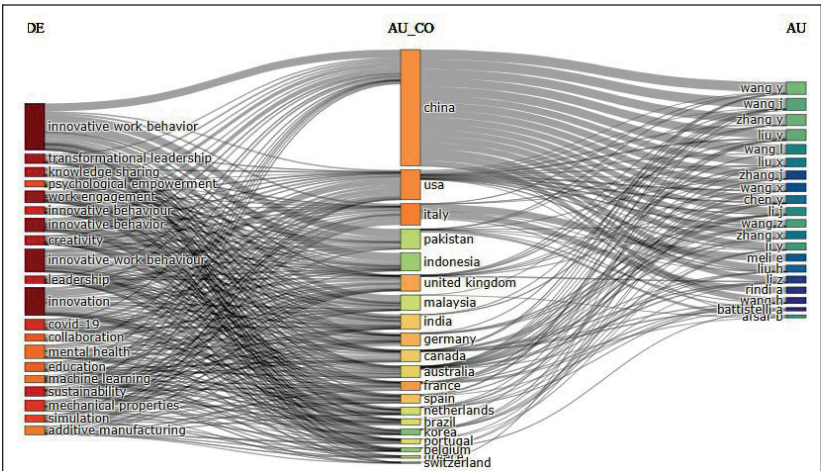
**Source:** VOSviewer.

**Figure 5.** Analysis of Keywords.

**Source:** VOSviewer.

20 times. Only 697 keywords were found to have a frequency of more than 20 occurrences, with 'innovative work behavior' (326), 'innovation' (251), and 'innovative work behaviour' (204) ranking as the top three most frequently used/appeared keywords.

The co-occurrence of keywords is based on the concept of 'presence', 'occurring frequency' or 'similar keywords'. There exist three methods to search keywords, on the basis of all keywords, author keywords and indexed keyword (Su & Lee, 2010). Figure 5 shows the link strength of 1,120 among 62 items in the four clusters. The distance among the nodes describes the relation, which means the shorter the node, the stronger the relationship and vice versa. The keywords also categories the nomenclature according to the region/territory (e.g., behavior and behaviour).



**Figure 6.** A Three-Field Plot Showing the Network Between Keywords (Left), Countries (Middle) and Authors (Right) for Innovative Work Behaviour.

**Source:** Bibliometrix.

This part of the study presents the bird-eye view of the publication pattern of IWB. The three-field plot (Sankey Diagram) analysis sheds light on the intricate interaction between keywords, countries and authors of the maximum cited references for the 20 most researched terms in the domain of IWB. The height of the nodes (countries) is proportional to the frequency of using a certain keyword within the field. Figure 6 describes that keywords, such as innovative work behaviour, transformational leadership, knowledge sharing, psychological empowerment, work engagement, innovative behaviour, creativity, as the main centre of interest in this field for the countries like China, U.S.A. and Italy.

## Conclusion

The study presents the bibliometric analysis on innovative work behavior during 2001–2022. The database selected for the study was Scopus. A total of 8,382 documents appeared for the search term out of which 7,685 documents were selected for the study. The study is aligned with the objectives. The first section of the study deals with the elaboration about the methodology selected for the study, that is, VOSviewer version 1.6.19 and Bibliometric Analysis. The second part discloses the various results of innovative work behavior. Analysis of documents is the first section of result, where the number of documents produced per year is presented with different types of documents (articles, notes etc.). Followed by the analysis of subjects were the subjects involved in the field of innovative work behavior was explored (engineering, social sciences, etc.). Analysis of language, country, institutions, journals and authors are identified next. As an add-on, the

study also presents different visualizations such as, inter-country co-authorship analysis, bibliographic coupling, citation analysis and keywords analysis of the relevant area. This information is significant in exploring the field of innovative work behavior. The institution with the most publications is Politecnico di Milano in Italy, and it can be inferred from this that the majority of institutions active in the field of IWB are also found in the European continent. In the inter-country co-authorship United States of America, Italy and China are the significant countries with majority collaborations with other countries. The author with the most output is Bilal Afsar from Hazara University in Pakistan, and *Sustainability Switzerland* is the journal with the most publications and has been cited more than 200 times. Keywords like 'innovative work behavior', 'innovation', 'innovative work behaviour' appeared for more than 200 times in the searched articles. These keywords also serve as the hot-spots for further studies. The publication trends and inter-disciplinary tables (Tables 2 and 3) displays the rising trend, denoting the increasing interest of researchers in the field. Global interest in this area can also be traced by institution- and country-specific research on IWB. This study also advocates for 'Geographical Diversity' since the institutions, journals and countries are from different parts of the globe. This variation implies a different viewpoint on innovative work behavior from different parts of the world. The visual depiction to illustrate the interrelationships among keywords, countries and authors through Sankey diagram within the framework of extensively cited references within the IWB domain. The visualization underscores pivotal keywords that hold centrality in the field. Notably, certain countries, including China, the United States and Italy, emerge as noticeable contributors to research pertaining to these focal keywords.

## Implications, Limitations and Direction for Future Research

A thorough study on bibliometric analysis imbibes various implications. However, the certainty of implications of bibliometric analysis will always vary with the scope. Some of the implications built on the basis of the present study are as follows:

- Influential studies: Through bibliometric analysis, a variety of authors, publications and their areas of expertise can be tracked. Because of this implication, bibliometric analysis is appropriate across a wide range of subjects.
- Study roadmap: The analysis aids in determining the investigation's context. Different types of visualization serve in locating the hotspots and gaps in the trending information, improving comprehension of the subject.
- Numeric approach: The number of publications, citations of a journal/article/authors, co-authorships and co-citations can indicate the volume of research completed to date and establish a standard for different institutions and nations to meet.

The study offers various advantages but some limitations are always present. The limitations can be interpreted as the passage for future research. The period of study was from 2001 to 2022. Future researchers could increase the time period for more comprehensive outcomes. In the bibliometric analysis all factors, such as journal, authors, subjects, type of documents, institutions and countries, were analysed except funding/sponsor, future researchers can also take this significant factor in account. The database opted for the study was Scopus, other database like web of science, dimensions and google scholar were not taken into consideration, this can be used as an opportunity by future researchers to choose other database for the study.

A vast area of study has been uncovered in the field of innovative work behavior in previous studies (e.g., innovative work behavior and work engagement, knowledge sharing, organizational culture, leadership, employee skills and aptitudes) (Middleton & Hall, 2021). The major studies can also be witnessed from the developed nation and not from the developing economies. IWB has been confined to a very few subjects; hence, this narrows exploration. Thus, future researcher can shift their focus to gauge the innovative work behavior in the situations of emerging nations and subjects, respectively.

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