EMERGING SCIENTOMETRIC SOFTWARE TOOLS: AN OVERVIEW

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Abstract:- *A vast quantity of data in different formats is generated either directly or indirectly in the rapidly expanding fields of scientific research and development, information and communication technology, and technology. Numerous scholarly publications are published daily by academicians and research scientists worldwide, contributing to the academic and scientific community. Bibliometric software was developed in response to the widespread use of computerized data processing among scholars following the advent of computer technology. Certain goods are commercial products, whereas others are freeware or opensource software. Analyzing data from a few open-source bibliometric and Scientometric packages (Tools) will be the focus of this study.*

Keywords:- *Scientometric, Bibliometrics, Science Mapping and Visualization Tools, Bibexcel, Publish or Perish, Citespace II, CiteNetExplorer, VOSviewer, Biblioshiny*

Introduction:-

Bibliometrics reveals its theory in relation to the Bibliography of Research Outlook; it serves as an element of measurement for information sources and, ultimately, emerges as a method to be employed by the scientific method. From now on, bibliometrics considers the correlation between novel components and the prognosis of information forecasts statistical approaches on research outputs, it assesses logical development. As a result, it raises the degree of improvement in various disciplines Based on the reports that researchers utilize, this study evaluates how data are used. Bibliographic references from publications found in bibliographies and information sources are used to complete these studies within a predetermined time range. These bibliographic resources provide adequate details on the key documents to consider in important bibliometric research. To perform statistical analyses (metrics) of diverse offline and online datasets, the study usessoftware tools.

Scientometrics: -

The term "scientometrics" comes from the Russian word (naukometriya) and was created by V. Alimov and Z.M. Mulchenko1969. The term is mainly used to study all aspects of scientific and technical literature. This concept gained wide recognition in 1978

when Tiber Braun founded the magazine Scientometric in Hungary. According to the subtitle, scientometrics covers all quantitative aspects of science, science communication and science policy.

ScientometricToolsandPurposes:- Scientometric tools are essential for accurate literature analysis. In scientometrics, qualitative and quantitative analyses is performed using scientometric tools such as citation mapping, visualization, bibliographic linking, co-author network, co-word mapping, etc.

Authormap - For Citation Mapping and Visualization.Explores author Relationships through Co-citationpatterns.
Bibcouple.exe - For Visualization of the bibliographic coupling among authorsusing WoS set
Bibexcel - For analyzing bibliographic data and used for co-citation, bibliographic coupling, mapping and clustering analysis
BibJourn.exe - For Visualization of the bibliographic coupling in terms of cited journals
Citespace - For Visualizing Patterns and trends
inscientific literature Clean PoP - Tool is designed toclean results systematically.
co-auth.exe - Visualization of the co authorship network
Full text.exe - Softwarefor co-word mapping of full text
Hist Cite - To analyze and visualize the bibliography
Int Coll.exe - For Visualization of international collaboration
ISI - For organizing set downloaded from the Web of-Science into databases for relational database management
Patent Pictures - It'spatentlygoodnews
PublishorPerish – Retrieves andanalyzes academic citationsfrom Google
ScholarTl.exe - Co-word mapping of texts
Biblioshiny - Allows users to perform relevant bibliometric and visual analyses on an interactive web interface
VOSviewer - software package especially developed for building and representing
bibliometric networks.

Datbases Used for Scientometrics: -

WoS database :- The **Web of Science** (**WoS**; previously known as **Web of Knowledge**) is a paid-access platform that provides (typically via the internet) access to multiple databases that provide reference and citation data from academic journals, conference proceedings, and other documents in various academic disciplines. Until 1997, it was originally produced by the Institute for Scientific Information. It is currently owned by ClarivateWos and it is software tools.

Scopus database:- Scopus is Elsevier's abstract and citation database launched in 2004. Scopus covers 36,377 titles (22,794 active titles and 13,583 inactive titles) from 11,678 publishers, of which 34,346 are peer-reviewed journals in following top-level subject fields: life sciences, social sciences, physical sciences and health sciences. It covers three types of sources: book series, journals, and trade journals. Scopus also allows patent searches in the dedicated patent database Lexis-Nexis, albeit with a limited functionality.

All journals covered in the Scopus database are reviewed for sufficiently high quality each year according to four types of numerical quality measure for each title *h*-Index, CiteScore, SJR (SCImago Journal Rank) and SNIP (source normalized impact per paper). For this reason, the journals listed in Scopus requirement for peer review quality established by several research grant agencies for their grant recipients and by degree accreditation boards in numerous countries.

Pour is classified scientometric techniques into univariate, bivariate and multivariate statistical techniques. Univariate techniques are based on events or direct counts such as the number of publications, patents or specific data elements such as addresses, citations or keywords. This technique is also known as scalar technique. Scale indicators are used to monitor the state of the science and technology system. Two-dimensional techniques are based on the occurrence of certain data elements, such as keywords, classification codes, citations, and address counts.

This technique is also known as relational technique. Multivariate statistical techniques are used to describe scientific universes. Continuous and discontinuous are two methods of multivariate statistical techniques. Continuous methods represent structural or relational properties of data in the form of maps. Maps are strategic indicators of the relevant locations of documents in the information space. In scientific-technical networks, the level of observation is reduced by discontinuous methods.

Cite Space:- was developed at Drexel University (USA) and it can be freely downloaded. It is a software tool developed to detect, analyze, and visualize patterns and trends in scientific literature. Its primary goalis to facilitate the analysis of emerging trends in a knowledge domain. CiteSpace can read different formats of bibliographic sources, such as WoS, PubMed, arXiv, and SAO/NASA Astrophysics Data System (ADS). Furthermore, CiteSpace is able to read grants data such as NSF Awards and patent data from Derwent Innovations Index.Technology Studies(CWTS).The tool allows citation networks to be imported directly from the Web of Science database. Citation networks can be explored interactively, for instance by drilling down into a network and by identifying clusters of closely related publications.

Cite Net Explore is a software tool for visualizing and analyzing citation networks of scientific publications. It was developed by NeesJanvanEckandLudoWaltmanat Leiden University's CentreforScienceand Technology Studies(CWTS).The tool allows citation networks to be imported directly from the Web of Science database. Citation networks can

be explored interactively, for instance by drilling down into a network and by identifying clusters of closely related publications.

VOSviewer:- is a software package specifically developed for building and representing bibliometric networks, giving graphical representation of such network maps. It is the easiest way to represent large maps with zoom-in facility.Labeled algorithms, and densityvisualizationsareusedforrepresenting the information. The software tool developed at Centre for Science and Technology Studies, Leiden Universityanditisfreeavailabletothe bibliometric research community. \

Although VOSviewer can be used to construct and visualize bibliometric maps of any type of co- occurrence data, the software tool does not allow any co-occurrence matrix from the bibliometric data to be extracted and built. To archive this, an external process is needed. Furthermore, the software tool has no pre- processing modules to prepare the data forlater analysis.

Biblioshiny:- Biblioshiny allows users to perform relevant bibliometric and visual analyses on an interactive web interface, greatly reducing the user information input intensity and usage threshold.Bibliometrixwas developed by Massimo Aria and Corrado Cuccurullo.

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Application of Scientometrics: -

Scientometrics as a technique has wide applications in identifying thematic research trends, author and research collaboration trends, core periodical publications, aging and decay of scientific literature, which is useful for evaluating coverage in secondary journals, studying author productivity and influence. research, dissemination of scientific publications of a scientific organization, citation studies, etc. In addition, Scientometric could be used to identify emerging research areas.

In this paper Scientometric researcher used the tool Biblioshiny software to generate Maps, Tables and Graphs:-biblioshiny is a shiny app providing a web-interface for bibliometric.It supports scholars in easy use of the main features of bibliometric:-

Main Features:-

(i) Data importing and conversion to data frame collection, Data gathering using Dimensions, WOS, SCOPUS, PubMed collection
(ii) Data filtering
(iii) Analytics and Plots for four different level metrics:
- Sources

- Authors
- Documents
- Clustering by Coupling

The Scholar used ***sample collection data*** for Scientometrics analysis, mapping and visualization, in this sample collection data 898 documents are found and analyzed as per the scope of research.

Fig 1. To 11 generated using biblioshiny software and used the sample data from biblioshiny

Fig 1. This is the snapshot of Biblioshiny app

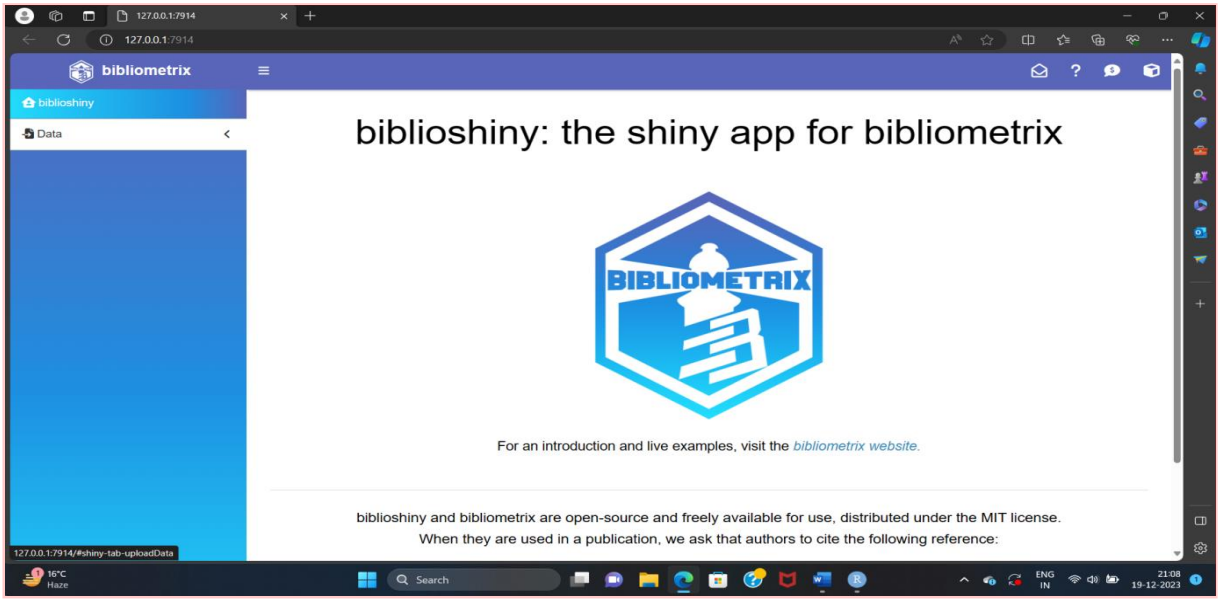


Table1. Generated the Sample Collection data

Main Information

Description	Results
MAIN INFORMATION ABOUT DATA	
Timespan	1985:2020
Sources (Journals, Books, etc.)	281
Documents	898
Annual Growth Rate %	14.05
Document Average Age	8.2
Average citations per doc	37.12
References	43935
DOCUMENT CONTENTS	
Keywords Plus (ID)	1918
Author's Keywords (DE)	2243
AUTHORS	
Authors	2079
Authors of single-authored docs	112

AUTHORS COLLABORATION	
Single-authored docs	121
Co-Authors per Doc	2.96
International co-authorships %	36.41
DOCUMENT TYPES	
article	862
article; book chapter	1
article; early access	9
article; proceedings paper	26

Fig 1. Annual Scientific production

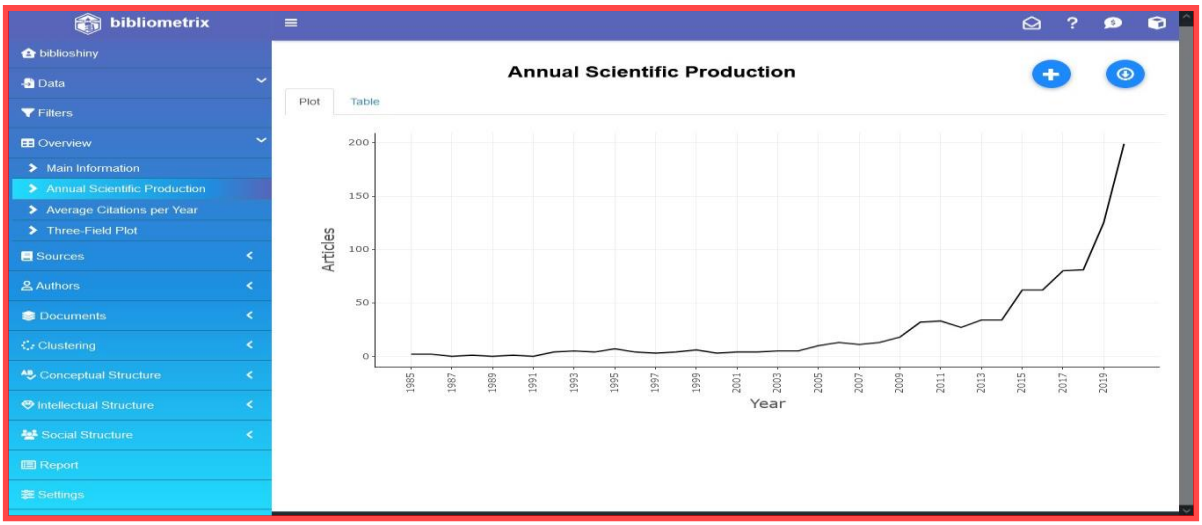


Fig 2. Average Citations per year

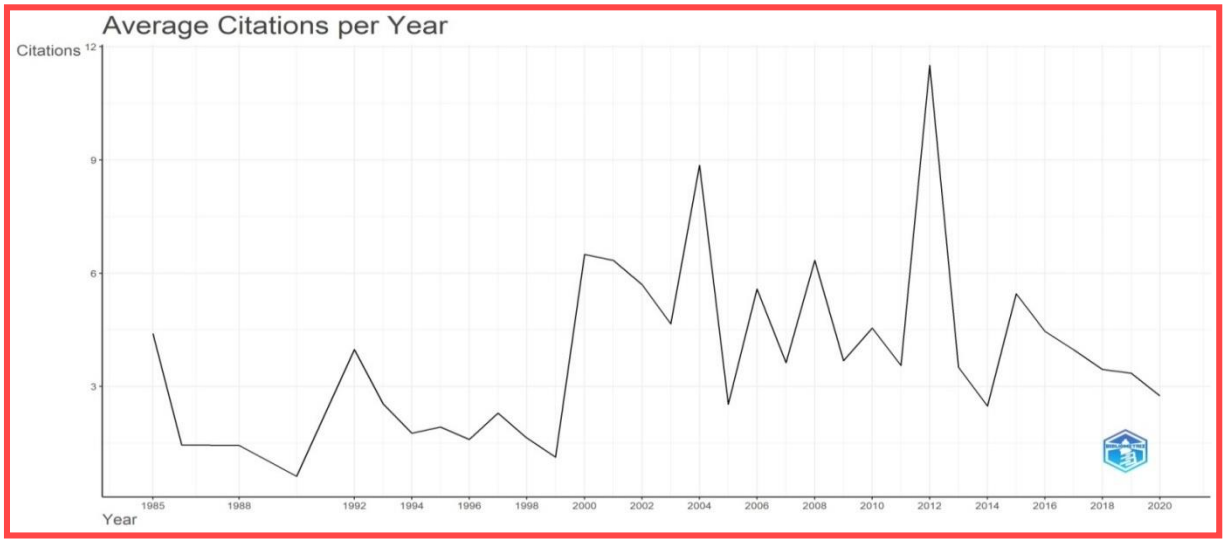


Fig 3. Left Field –References; Middle Field –Authors; Right Field –Keywords (20 records)

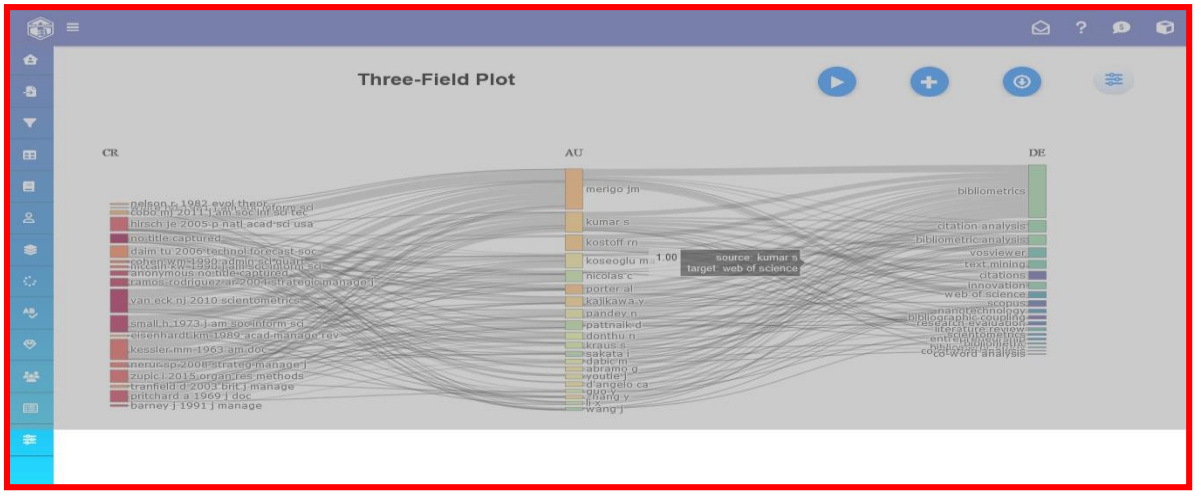


Fig 4. Country Collaboration Network

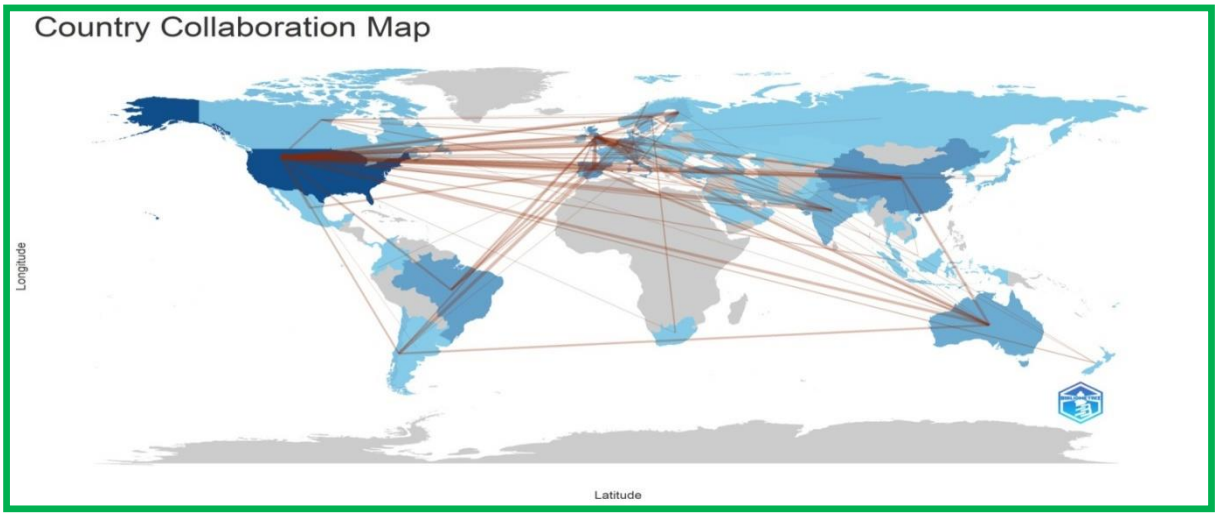


Fig 5. Clustering by Coupling

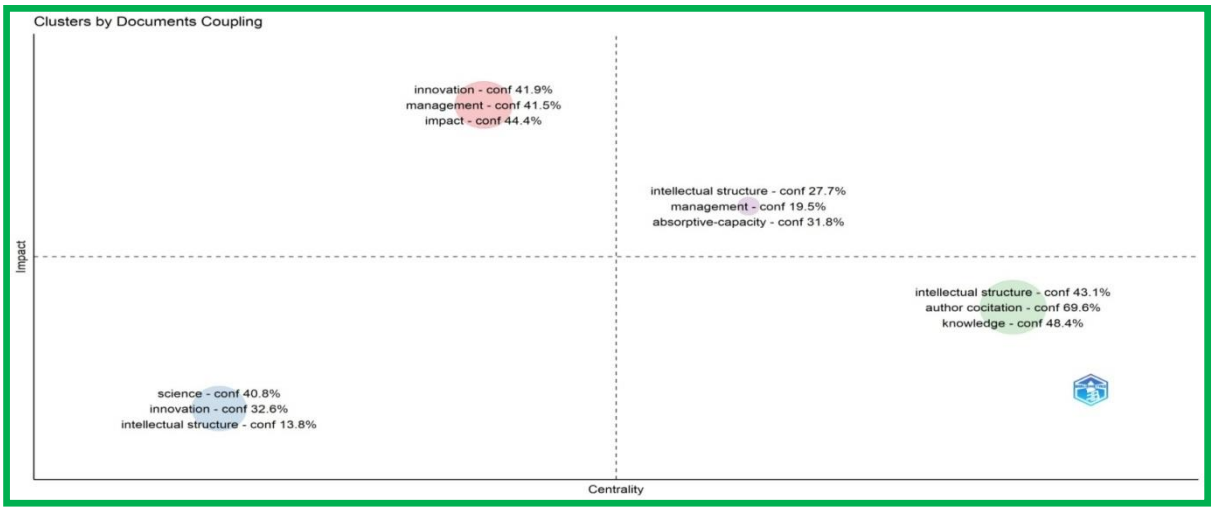


Fig 6: Lokta's Law application for the Scientific productivity of Authors

Fig 7: Application of Bradford's Law

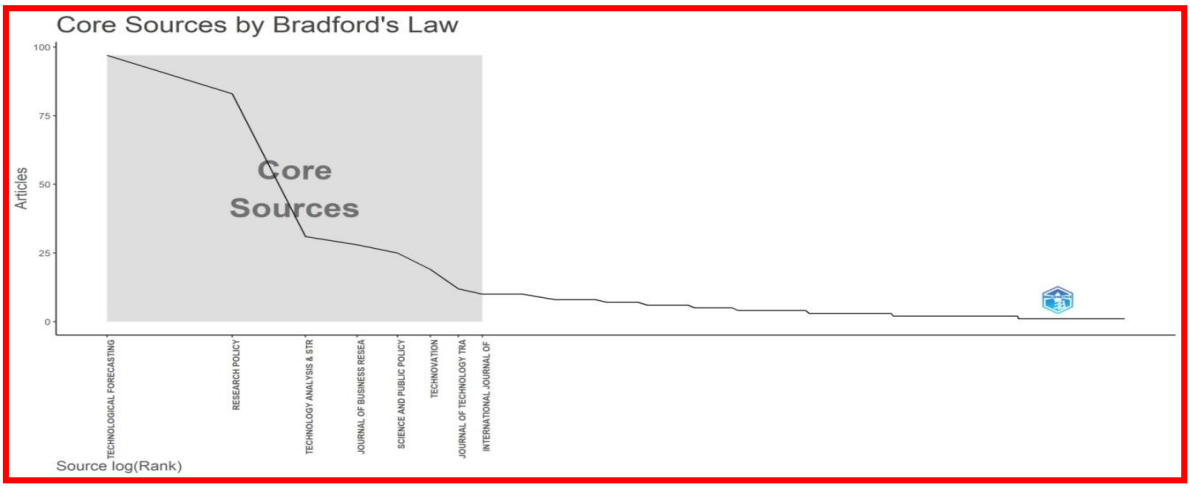


Fig 8: Co-Citation Network

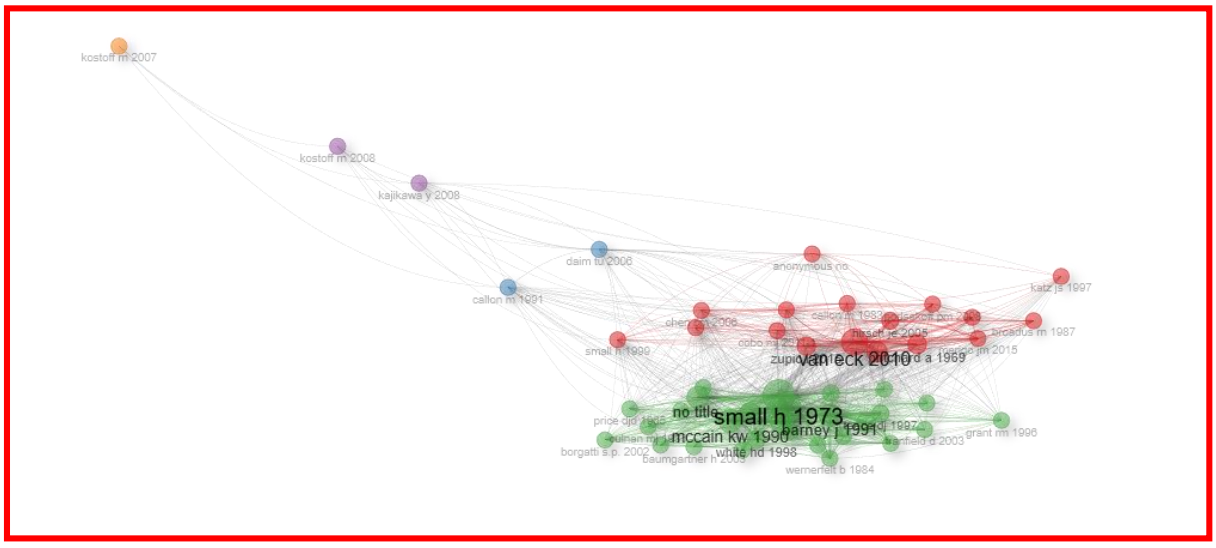


Fig 9: Productivity-Trend Topics

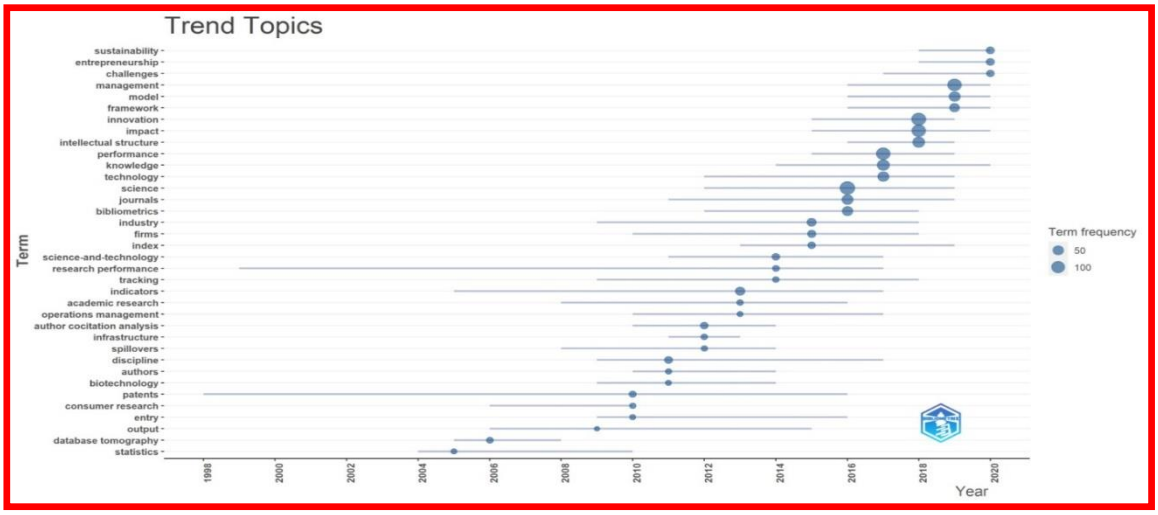


Fig 10: Most relevant words

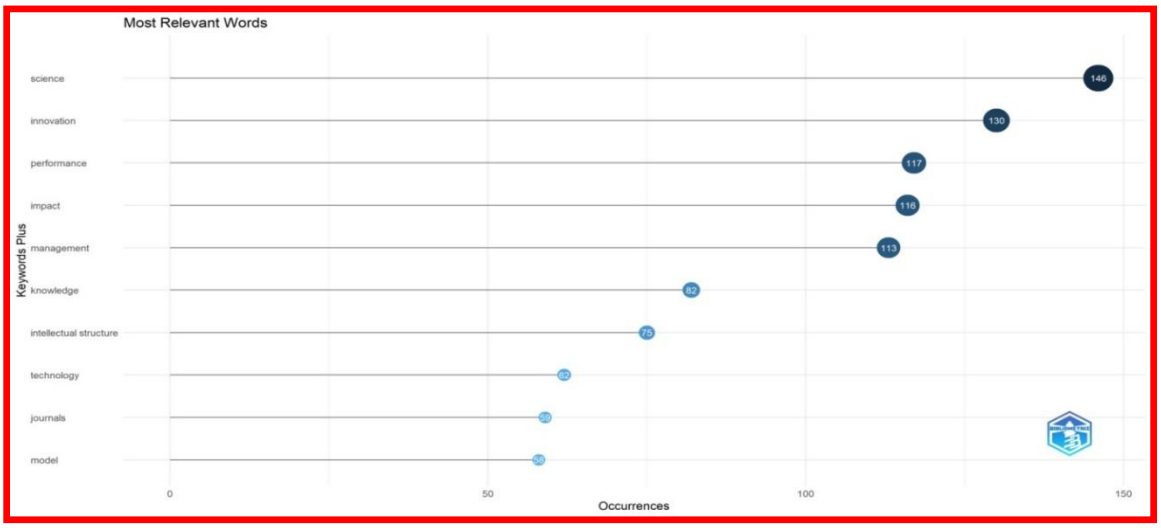
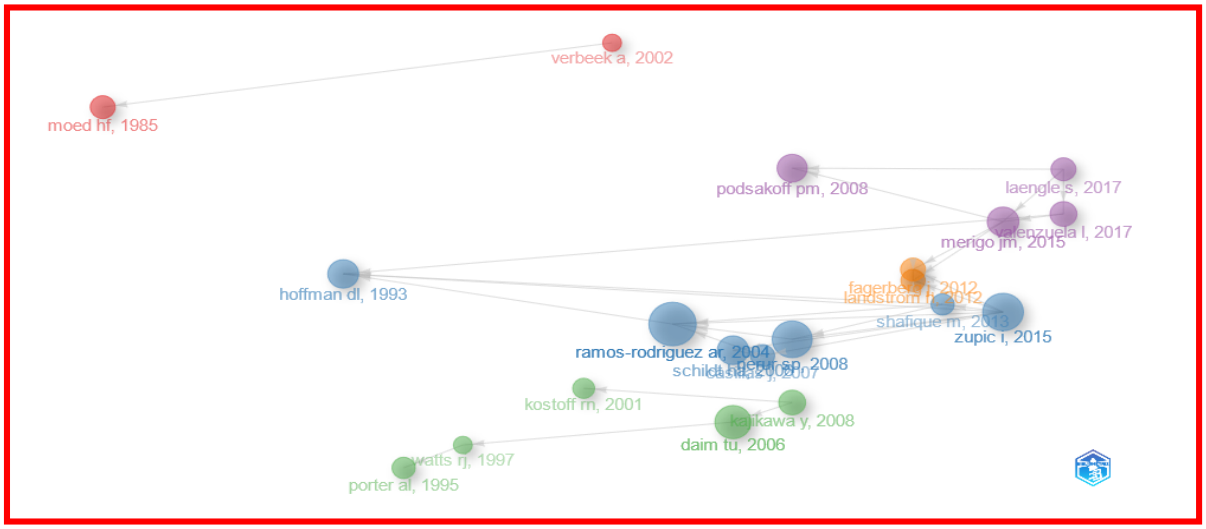


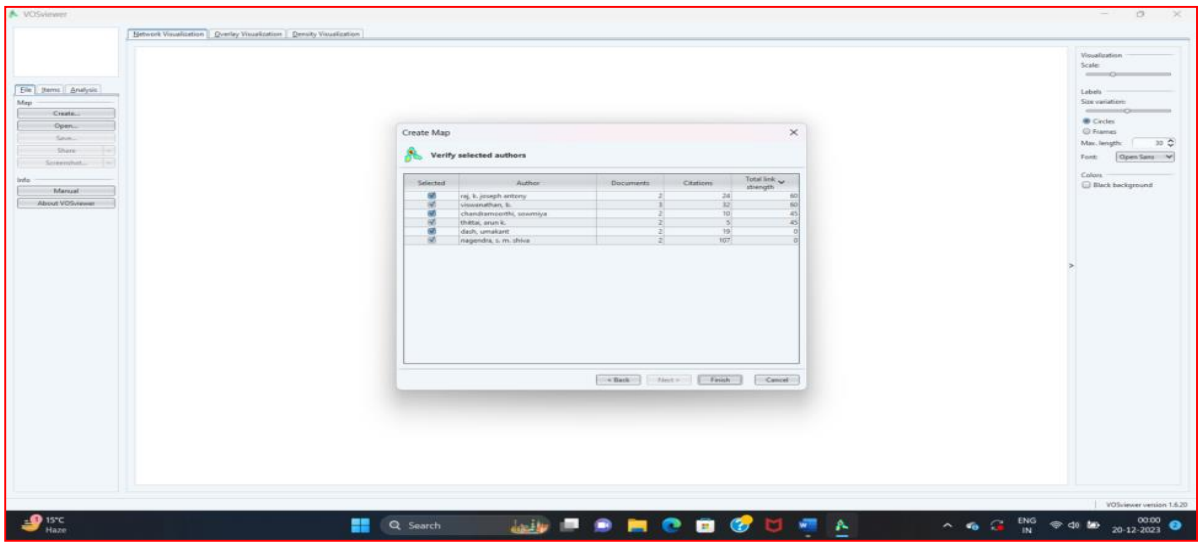
Fig 11: Intellectual Structure-Historiography

VOSviewer



VOSviewer is a free Java based program, primarily developed by Nees Jan van Eck and Ludo Waltman at Centre for Science and Technology Studies (CWTS), Leiden University used for data analyses and constructing bibliometric networks visualisation. VOSviewer creates network maps of individual publications, co-authorship, co-citation network, keywords co-occurrence networks, etc. For constructing and visualizing co-occurrence networks of important terms extracted from a body ofscientific literature. VOSviewer usesitsinbuilt text mining function.

Fig 5.This is the Snapshot of VOSviewer



Conclusion: -

Software tools allow us to create various bibliometric networks, there is no software that can decode them all. Although there are no software tools that can create all the different types of bibliometric networks, Bibexcel, Cite Space, and VOSviewer can create most of them. In contrast, CiteNetExplorer cannot build many of them; it focuses only on the visualization of bibliometric maps. Publish or Perish only focuses on two types of bibliometric networks. Although CiteNetExplorer, andBiblioshiny can create maps using a data tag field, the way it represents documents using a vector space model makes it difficult to create maps using other fields, such as a bibliographic link. Bibexcel and Publish or Perish cannot focus on map visualization.Programmers have different analysis methods (although some are common) that allow the analyst to find different information.

Finally, because the visualizations are different for everyone, different views can be created from the field to help interpret and analyse the results. This collaboration between tools creates a positive synergy that allows us to extract the information hidden behind the data.In this paper Researcher used biblioshiny for analysis and interpretation of the research productivity taken sample data in biblioshiny and explained how to export the Scientific productivity data form WOS filterisation and generation of Maps, Graphs and Tables as per scope of Research.

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