Project Completion Report

"INFLUENCE OF GOVERNMENT POLICIES AND FUNDING ON THE RESEARCH OUTPUT OF GOVERNMENT AND PRIVATE INSTITUTIONS IN INDIA: A BIBLIOMETRIC AND SCIENTOMETRIC STUDY"

DST PROJECT NO. DST/NSTMIS/05/41/2017-18

Study Sponsored by

National Science and Technology Management Information System (NSTMIS)

Department of Science & Technology

Government of India

(August 2021)

Implemented by

SHEEBA PAKKAN

MANIPAL ACADEMY OF HIGHER EDUCATION

Manipal, Karnataka

PREFACE

As quoted by Albert Szent-Gyorgyi – "Research is to see what everybody else has seen, and to think what nobody else has thought."

Chapter – 1 starts with an introduction to the present status of research in India with the need and the necessity of funding. Research being the prime source of human development has played a crucial role throughout human evolution. Ideally, funding for research and education activities are directly proportional to its strategic directions/implementations and hence the quality of the outcome. The objectives of the study are given in chapter 1.

Chapter –II explore the status the proposed research topic with several literatures available to enhance the present study.

Chapter – III Discussed about the methodology used for the analysis of the data aquired.

Chapter – IV –This research tried to link the Indian government funding to the UN's 17 sustainable development goals and tried to relate and evaluate a ten-year outcome in terms of publication and quality. Research outcome as an impact of funded research has been calculated, analysed and visualized. It will give an idea of which funding agency is funding for the promotion of 16 SDGs and it can be a guide when allocating fund in future research areas.

Chapter – V: Result and Discussion - This report explores the major funding agencies who allotted research funds in the high priority areas in India by analyzing the funding acknowledgement section of the research articles retrieved from Elsevier's Scopus, where it was observed that the Department of Science and Technology (DST) is the most prominent funding agency in India followed by Department of Biotechnology (DBT), Council of Scientific and Industrial Research (CSIR) and University Grants Commission (UGC

Chapter – VI – Discusses the Findings/Summary and Recommendations after the analysis of the retrieved data.

ACKNOWLEDGEMENT

The Pricinpal Investigator (PI) would like to express our sincere gratitude to all members of the NSTMIS committee and special thanks to Dr H.B. Singh and Dr A. N. Ray and Dr Pramod Kr. Arya for their continuous support for the smooth implementation of the present project. Thanks to the Directors, Directorate of Research, Manipal Academy of Higher Education, Manipal, for providing all support to finish the project successfully.

PI would like to acknowledge Elsevier, Scopus, SciVal and the funding agency's NSTMIS website for allowing me to access the databases and data for the smooth conduct of the project. PI would like to acknowledge Mr Shubham Tripathi, Research Assistant who helped for the data collection and analysis. My sincere thanks to all the institutions who have patiently contributed by being a part of the discussion and replying with filled questionnaires. Behind every successful research, there will be motivating support from the family members PI would like to acknowledge them on this occasion.

Thanks and regards,

Sheeba Pakkan

Bibliometrician

Manipal Academy of Higher Education

Karnataka

Table of Contents

Executive Summary

Vision 2030 for sustainable development is a global commitment and "action plan for people, earth and growth". It is fundamental, comprehensive and inseparable, with the added requirement of leaving no one behind. It consists of 17 Sustainable Development Goals (SDGs) that are integrated and inseparable and bridge the three dimensions (economic, environmental and social) of sustainable growth; and show the scope and purpose of the current universal agenda. Research plays an important role in shaping the future and hence investigating the effect of this research on the UN's 17 sustainable development goals for the betterment of mankind. Although the SDGs are divided into 17 distinct components, the objectives are inextricably linked, creating an indivisible structure, achieving one objective or aim can aid in the achievement of other objectives.

Importance of this study

Impact study of research helps to focus on the main purpose of research instead of just the research process. How research is done, communicated, and evaluated have brought a lot of barriers between research itself and those who may benefit from it. Reducing those barriers will help apply the research to make changes in the real world. Focusing on research impact, thus, helps us to ensure that we get the best possible returns from an investment that we- as a society- make in research. This study explores the major funding agencies who allotted research funds in the high priority areas in India by analyzing the funding acknowledgement section of the research articles retrieved from Elsevier's Scopus where it was observed that the Department of Science and Technology (DST) is the most prominent funding agency in India followed by Department of Biotechnology (DBT), Council of Scientific and Industrial Research (CSIR) and University Grants Commission (UGC). Also, a practical approach to describe the impact of research work using quality metrics like the number of citations received, View counts, Field weighted citation and Field weighted view impact is made in this

paper where the results showed that the quality of the funded research was greater. But there were some of the funding agencies' publications that had the highest number of citation count and impact despite having a smaller number of publications and thus it is not only the huge number of Scholarly Outputs that matters when computing the Quality of the publications. The study is important because it will give an idea to formulate a policy and strategize the funding area in line with 16 SDGs.

Among the survey population, 50% are doing the awareness classes on the importance of research grants, grant writing, budgeting, legal aspects of grants etc., 83% of the survey population is circulating the fund calls to the institutions. 87% are not having a research grant management tool in their institution, but 70% are aware of the importance of grants in the university ranking, 73% of the population doesn't have a research policy or strategic planning for the promotion of the research fund related activities. The important note here for the funding agencies is that while going for open access publication most of the time researchers had to avoid the acknowledgement part so that they can avail the article processing charge (APC) fee waiver given by the publisher. This can be avoided by providing budget provisions while sanctioning the research grant to the PI. Implementation of provision This will be a great initiative from the funding agencies if they make provisions to handle APC charges while budgeting. While quantifying the research output impact we can easily track all funding data from the acknowledgement as data is the brain of intellectual implementation to societal excellence.

Objectives of the study

1. To quantify the growth of a scientific publication in terms of government funds and policies.

2. To evaluate the productivity and quality of research of an individual, organization and the state of Karnataka in terms of the needs, capacities and funding policies relevant to India.
3. Development of models (metrics) for measuring outputs of S & T investments.
4. Development of suitable indicators, including not only publications, citations, and patents, but also other performance-markers- for example, institute/scientist location, age, per capita funding by Government etc.- for R & D assessment. This is highly significant for developing countries where young scientists trained/returning from abroad find placements in relatively new institutions and are thus handicapped by lack of funding, collaboration possibilities etc.
5. Development of an approach to gauge the value added to R & D efforts by government funding of public and private universities/national labs in the State of Karnataka.
6. A method for assessment of direct and indirect benefits of R & D on research output by public and private universities/national labs in the State of Karnataka.

Methodology details

Research Approach

Mixed method design -Sequential Explanatory Design (Quan – Qual)

Phase 1 - Database/ bibliometric survey (quantitative)

Phase 2 -Survey on information on government research funding and technical hitches experienced by researchers. (quantitative)

Sampling Design

70 institutions are selected for the collection of data.

Data Collection

The triangulation strategy will be used in this study are a combination of the following data sources:

Bibliometric Review- The use of publication lists retrieved from the suitable indexing and abstracting database (Scopus), Analytical database (SciVal). Web site search of the intuitions may also consider getting the data

Survey Questionnaire - Survey on information on government research funding and technical hitches for researchers.

Results & Discussions

United Nation's vision 2030, with its 17 sustainable development goals, lays out an ambitious blueprint for our planet's long-term viability. It constitutes a significant shift in policy toward research, giving the scientific fraternity a socially and politically determined mandate to contribute to the attainment of the SDGs and that research will be among the key important action plan for vision 2030, the efforts were made in this study to explore the impact of this research on the quality education and funding in India. Funding distribution in the state of Karnataka is quantified and plotted based on the Subject area. The allocation to institutions by different Indian funding agencies during the year April 2005 to March 2010 and from April 2010 to March 2017 is collected and plotted using Tableau software. This report explores the major funding agencies who allotted research funds in the high priority areas in India by analyzing the funding acknowledgement section of the research articles retrieved from Elsevier's Scopus where it was observed that the Department of Science and Technology (DST) is the most prominent funding agency in India followed by Department of Biotechnology (DBT), Council of Scientific and Industrial Research (CSIR) and University Grants Commission (UGC). Also, a practical approach to describe the impact of research work using quality metrics like the number of citations received, View counts, Field weighted citation and Field weighted view impact is made in this paper where the results showed that the quality of the highest funded research was greater. Keeping the high quality and quantity metrics we have tried to create a ranking for funding agencies taking the data from the Scopus

database and analysing it using the SciVal analytical tool. Top funding agencies like DST, DBT, CSIR, DSIR, and UGC ranked 1st in quantity and quality both. The ranking is satisfying the funding amount they have given for the last ten years to the Indian institutions.

Policy implication, Suggestions & Recommendations:

- Evaluate the outcome of funding in realtion to SDGs for future research grant allocations.
- Considering budgeting allocation for Article Processing Charges to promote Open Acess publishing to improve citations.
- Make it mandatory to acknowledge the funding agency (even after the completion of the project) for prolonged research continued in the funded research area.
- Fund distribution should be generous to all other research institutions (Private/State institutions) at par with premier institutions.
- Need of a Grants Office in all the Institutions who are applying for research grant from funding agencies.

CHAPTER - I

1. Introduction

The mission of Government funding bodies is to financially support high-quality scientific research as a science policy, to strengthen the position of science and research in the country. The different government funding agencies cover different disciplines to promote research in all areas relevant to nation-building. Scientific research thus being an important part of Nation-building, it is essential to assess the influence and the impact it produces to achieve the Sustainable Development Goals (SDG) of a nation. For the past two decades, the governmental R&D funding in India has remained static at about 0.7% of GDP; disappointingly the private sector in the country spends less than 0.2% of GDP on R&D activities. Together, this is much less than the >2% of GDP spent on R&D activities by developed countries across the globe [1]. In February this year, though the government announced a 10% rise in its science spending to 536.2 billion rupees (US$8.4 billion) for the financial year 2018–19 over the previous year, experts have pointed out that this is not much, because of the factoring in of inflation [2]. But, Ashutosh Sharma, Department of Science and Technology (DST) told Nature India that funds for research had almost doubled in 2017-2018 from what they were in 2014-2015. Even after the so-called“unprecedented,” increase in funding, there are many facts that have to be addressed seriously as pointed out by Lakhotia, S. C, in his editorial "Organizational bottlenecks and an unhealthy ecosystem” [1]. Ashutosh Sharma himself has stressed many points contributing to deficiencies in the funding of scientific research, like delays in disbursing funds, incomplete or faulty paperwork by researchers, unduly complex application and review processes for grants, financial review etc. [2]. Very often, even a year after grants are approved, scientists don't receive the money, which affects not only the progress of their research but also the long term career prospects of the young scientists working with them, as pointed out by Lingadahalli Subrahmanya Shashidhara, Geneticist, INSA Fellow and Chair of Biology at the

Indian Institute of Science Education and Research, Pune, to Nature India. Given the above overall scientific funding environment, there is an essential and urgent demand for a comprehensive study on research funding, and quality of research in specified areas of global importance. The importance of a comprehensive study of research impacts from research funding, for achieving sustainable development goals and nation-building, is thus self-evident in the present context.

2. Objectives of the Study

1. To quantify the growth of a scientific publication in terms of government funds and policies.
2. To evaluate the productivity and quality of research of an individual, organization and the state of Karnataka in terms of the needs, capacities and funding policies relevant to India.
3. Development of models (metrics) for measuring outputs of S & T investments.
4. Development of suitable indicators, including not only publications, citations, and patents, but also other performance-markers- for example, institute/scientist location, age, per capita funding by Government etc.- for R & D assessment. This is highly significant for developing countries where young scientists trained/returning from abroad find placements in relatively new institutions and are thus handicapped by lack of funding, collaboration possibilities etc.
5. Development of an approach to gauge the value added to R & D efforts by government funding of public and private universities/national labs in the State of Karnataka.
6. A method for assessment of direct and indirect benefits of R & D on research output by public and private universities/national labs in the State of Karnataka.

3. Limitations

- The limitations in the present study is because of the COVID 19 pandemic and the resulting lockdown in the states resulting in the limitation on travel. The survey we have planned to cover the Universities in Karnataka was not successful as either the state or the universities and its local places were under lockdown. The faculty members were not available to conduct a survey.
- LPAC Meeting couldn't happen because of the same situation on COVID 19 pandemic.

CHAPTER- II

2. Review of Literature

Many groups and agencies are doing the impact study on the performance of research funding bodies and research establishments and are coming up with the emerging and societal impact research areas for successful nation-building [3-6]. ERC President Jean-Pierre Bourguignon at the European Science Open Forum in Manchester, UK, announced the results of a pilot investigation of 199 completed projects which says that almost three-quarters of them were deemed to have resulted in a scientific breakthrough or major advance. He emphasises the need of taking the risk by scientists and project reviewers in selecting the right project, and further, checking through impact study to verify it is clear that funders funded the right project.[7] The research impact study is thus becoming more and more acceptable as a measure of successful funding, and as a result, it is becoming professionalised. Research institutions are getting experience in evaluating projects and organising their ideas for upcoming fund calls. Many funding organisations have started developing their evaluation capacities to grapple with the increasing demands. Even when the evaluation work has been given to the external parties, the funding agencies hold full responsibility. It has proved helpful to assess whether the chosen methodology is appropriate and whether the analysis is correct. [8]

Quality of research can be best assessed by using technology transfer or societal impact from contributions to societal wellness. Norwegian Ministry of Education and Research recently introduced a performance-based funding system to ensure quality assurance in research. [9] The intention of the funding model by any government policy should be: to increase the number of quality publications, to produce desirable societal impact, and it should lead to an improvement in the society and life of normal people in the society.

Given adequate funding, the Indian scientists can rise to the demand has been more than demonstrated from the PNE of 1974 to the ASAT of 2019. In this respect, the fact that total

dependence on publications and citations to assess capabilities may not serve to gauge performance fully is amply demonstrated by these two instances. In both these and similar Science and Technology programs, the scientists concerned are constrained to keep their work under wraps, till they become irrelevant, and publications, citations and patents are not available to assess their impact. [10] Given the suggestions put forward in the various evaluations and considerations regarding the achievements mentioned above, the importance of proper assessment of Science & Technology output need not be emphasised any further. In addition to capturing data, one of the important challenges in research evaluation is to connect the information to an evaluator, a grant, an output. One aspect the Indian funding agency needs to concentrate on is providing linkage between datasets. There is an initiative done in the United Nations which is aimed at reducing the burden on evaluators. As Anke Reinhardt explained [8]. these include the monitoring systems of the UK Medical Research Council of the Swiss National Science Foundation which allow direct access to their data from publication databases. Austrian Science Fund is providing an electronic and structured version of final reports. Access to ORCID, Researcher ID, and Scopus Author Id will provide ground access to the researchers and their contributions

The main focus of research impact studies in India so far was on research output and researchers. The regulatory bodies and funding agencies in India have concentrated more on the Impact factor and h-index for evaluation. [12] The need for evaluating funding agencies and their areas of fund allocation was not a priority study till now. Published research data is substantial evidence of any scholarly activity. Recently there have been a few independent evaluations of the influence of Government policies and funding on scientific research in India. [13-16] A “ChintanShibir” held in June 2015 at Dehradun (The Dehradun Declaration) had unveiled the new science policy of the government regarding funding for scientific research. [18]

While the independent evaluations have ascribed the “poor state” of Indian science to grossly inadequate funding by the government, the “ChintanShibir” is planning to ask the research organisations to generate their funding, instead of depending on government support. Research is one of the essential requirements of an institution, and similarly the utilization of funds given by the funding agencies. It requires careful attention, evaluation and study to foresee the successful outcome. [17]. A bibliometric study of the research output from various government and private research institutions who receive research grants from funding agencies, and correlation of that with science policy and research grants, both in public and private sectors is thus of high relevance at present. As has already been recognised by the Department of Science and Technology (DST) and fund calls announced and awarded, such a program requires the development of models and analysis of Science and Technology (S & T) output regarding publications, patents, citations, and targeted work. The need for a refreshing higher education system and the need for evaluation in the policy and funding is noted by UGC and it declared (2017) some of the leading universities as autonomous institutions, which seems to be a further stepping stone in this regard. [12]

However, to the best of our knowledge, there are neither any systematic or comprehensive evaluation methods developed or used by scientific institutions and funding agencies in this country at present nor any sustained efforts being made by any group to update existing methods for data evaluation in this area.

CHAPTER – III

3. Methodology

3.1 Research Approach

Mixed method design -Sequential Explanatory Design (Quan – Qual)

Phase 1 - Database/ bibliometric survey (quantitative)

Phase 2 - Survey on information on government research funding and technical hitches experienced by researchers. (quantitative)

Phase 3 – Focus group discussion for researchers about challenges faced and suggestions to improve the government funding process. (qualitative)

3.2 Sampling Design

70 Universities are selected for the collection of data.

3.3 Data Collection

The triangulation strategy will be used in this study are a combination of the following data sources:

Bibliometric Review- The use of publication lists retrieved from the suitable indexing and abstracting database (Scopus and Web of Science), Analytical database (SciVal) and Reference database (Mendeley) Web site search of the intuitions may also consider getting the data

Survey Questionnaire - Survey on information on government research funding and technical hitches for researchers.

3.4 Plan for Data Analysis

Different methodological approaches and a combination of quantitative and qualitative data will be explored

Quantitative data will be analysed using descriptive and inferential statistics and Qualitative data (FGD) with thematic analysis.

3.5 Data Sources

Model of database search and identifying funding agencies

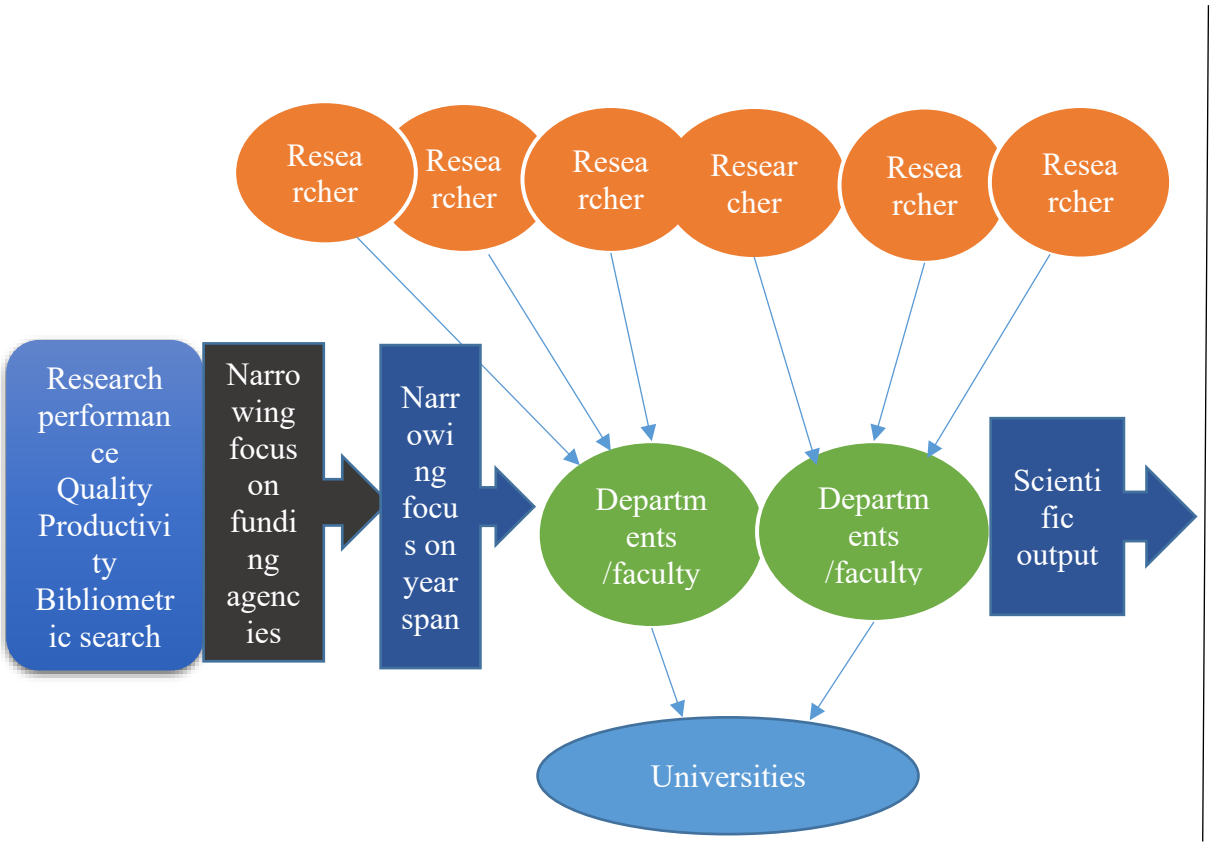

Figure 1: Model of database search

Using the approach of bibliometric, we evaluated the state of funding for research in India and the impact of the same on the quality of the research. the data was extracted from Elsevier's Scopus. The primary issue to be addressed is how to accurately and completely extract funding-supported research articles from the Scopus database. The necessary data was acquired in three stages. Firstly, we identified the keywords, well defined and finalized by subject experts, to retrieve the data, the publications related to the particular Sustainable Development Goal. Secondly, Elsevier's Scopus is used to retrieve the information regarding the publications (e.g., title, authors, their affiliations, year of publication, funding acknowledgement, document type etc.) that were published from 2010 to 2019. We decided to focus on the publications from Indian Institutions. The Funding Acknowledgement section, which contained data regarding

funding agencies and funding numbers reported by authors of the paper, of all research articles from the population were examined to identify publications that reported funding details and the sample was finalized.

The third phase involved the retrieval of data from the SciVal database which provided the information of quality metrics of the publications retrieved from Scopus. There are several metrics available to gauge the quality of the publications. Citation count, Field Weighted Citation Impact and View Count, Field Weighted View Impact were finalized as the metrics for our further study. Finally, the data retrieved from Scopus was matched with the data retrieved from Scival and the final data, containing both the quantitative and qualitative metrics of the publications, was made ready which was used for further analysis.

Data were also extracted from the National Science and Technology Management Information System (NSTMIS) website. This data was regarding the resources that are devoted towards Research and Development in the country. This included the number of grants that are funded by different funding agencies in the country to the institutions belongs to Karnataka.

3.6 Explanation of Metrics used for Impact Study

Scholarly Output:

Scholarly output refers to the overall number of research outputs, which constitute productivity. Scholarly outputs comprise of several sorts of outputs like Journal publications, Book series, Artefacts, Compositions, Reports, whether confidential, technical or commissioned and software [8].

Citation:

Citation is nothing but referring to a published source. The purpose of citation is, to be honest about having referred to a source when writing a report/paper and to avoid plagiarism. The number of citations received by an article is its impact on the subsequent research.

Field-Weighted Citation Impact:

FWCI is the ratio of total citations received and the total citations that are expected based on the average of the subject field.

If FWCI = 1, then citation is just as expected for the global average.

If FWCI > 1, then it means citation is more than expected.

If FWCI < 1. It means the paper is less cited than expected [9].

View Count:

The total usage influence of an item is represented by the Views count: how many views have this entity's articles/publications received? The measure represents the total number of abstract views and full-text links clicked on the publisher's website. These instances include both subscription and trial users' views [19]. When conducting the research, we gain knowledge by looking into different kinds of related papers or publications, some we might download and cite them to our study if they are very much relevant and some which are partially relevant, we might just view it to gain some extra information about the topic.

Field weighted View Impact:

FWVI compares the average of views obtained by every identical paper in the same data universe to the number of views received by an entity's publications. Similar publications in the database are those with the same year of publication, publication type and discipline.

If FWVI = 1, then the view output is just as expected for the global average.

If FWVI > 1, then the publications have been viewed more than expected.

If FWVI < 1, it means the publications have been viewed less than expected [20].

Once the final data was ready, it was exported to Tableau where the visualization was done for all the 16 SDGs. We plotted 'Funding Agencies' Contribution in terms of Publications' where it shows the most prominent Funding Agency to have funded to publish papers related to each SDG in India. 'The Impact of Views and Field Weighted Views on Funded Publications' and

‘The Impact of Citations and Field Weighted Citations on Funded Publications’ was also plotted for each SDG.

CHAPTER - IV

4. Detailed analysis of the Data

Fund Allocation and Allocated Institutions in Karnataka State

Funding distribution is quantified and plotted based on the Subject area. The allocation to institutions by different Indian funding agencies during the year April 2005 to March 2010 and from April 2010 to March 2017 is collected and plotted using Tableau software.

4.1 Fund Allocation and Allocated Institutions' on Agricultural Sciences in Karnataka: April 2005 to March 2010

Department of Biotechnology is the major funding body that allocates funds in the area of agricultural sciences. Agricultural universities get allocated the major funds from the funding agencies. Karnataka Mysore university and Kuvempu University also get benefited from funds in this area.

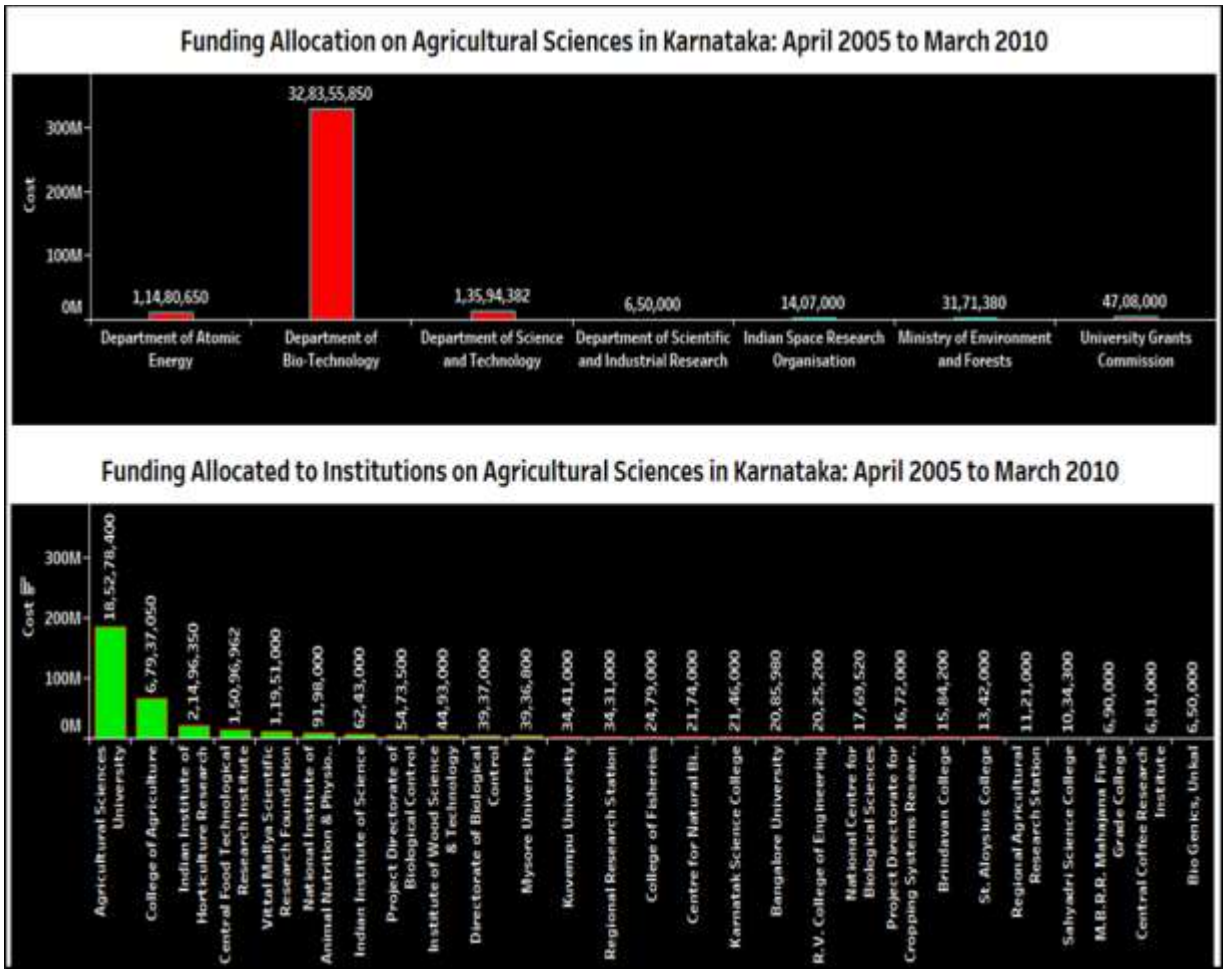

Figure 2: Fund allocation and allocated institutions in the area Agricultural Sciences

4.2 Fund Allocation and Allocated Institutions' on Biological Sciences in Karnataka: April 2005 to March 2010

Department of Biotechnology and Department of Science and technology are the major funding body that allocates funds in the area of Biological sciences. Agricultural universities get allocated the major funds from the funding agencies. Indian Institute of science got the highest funding from 2005 to 2010 in the area of biological sciences. The amount of funding received by other institutions in the Karnataka state during the period 2005-2010 s very less compared to IISc, Bangalore.

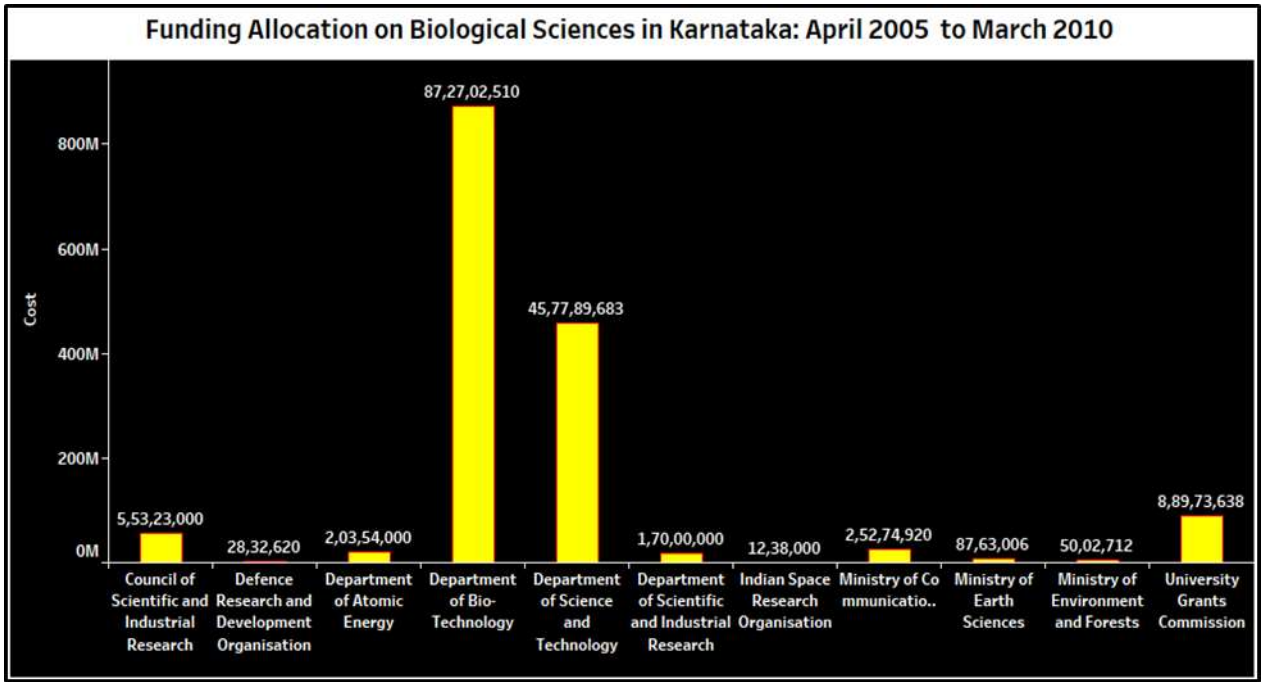

Figure 3: Fund allocation on Biological Sciences

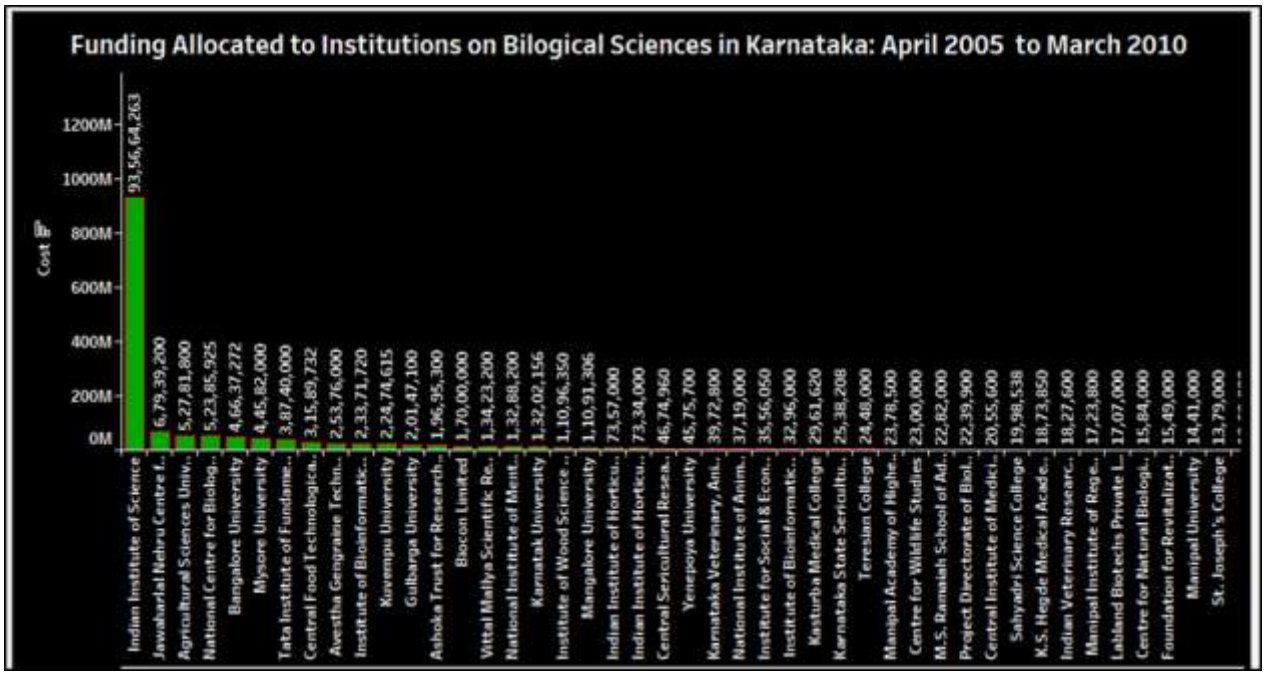

Figure 4: Fund allocated to institutions in the area Biological Sciences

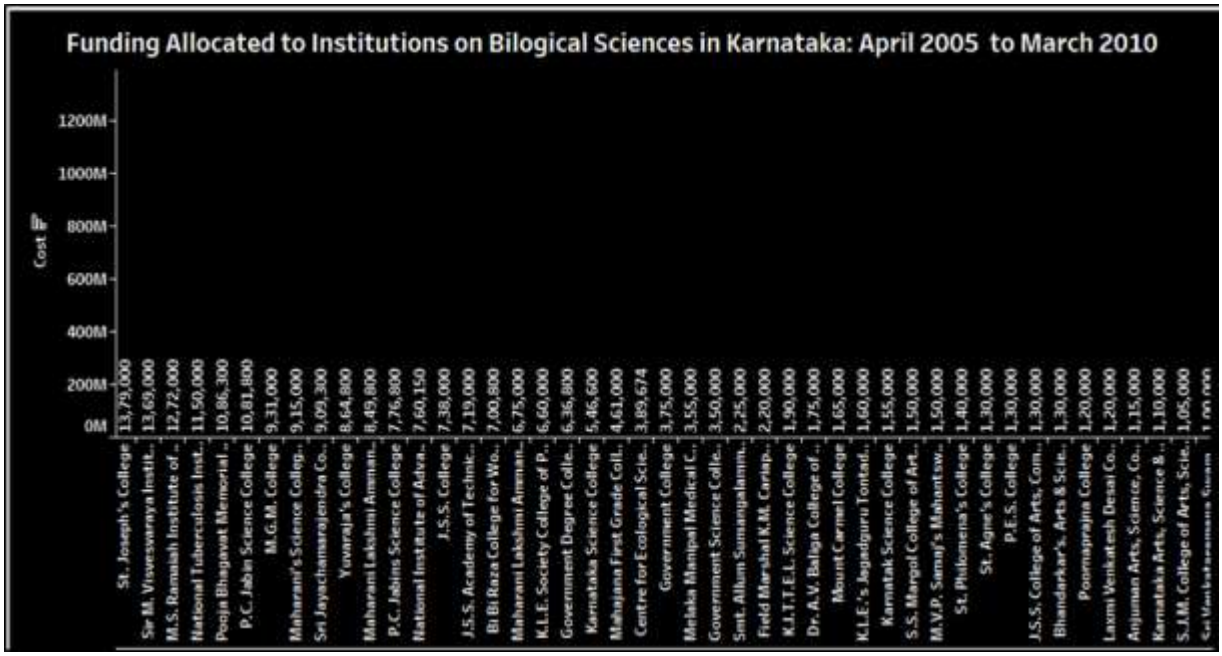

Figure 5: Fund allocated to institutions in the area Biological Sciences

4.3 Fund Allocation and Allocated Institutions' on Chemical Sciences in Karnataka: April 2005 to March 2010

Department of Science and technology is the major funding body that allocates funds in the area of Chemical sciences. UGC and CSIR also contributing to some extend by allocating funds for innovative research.

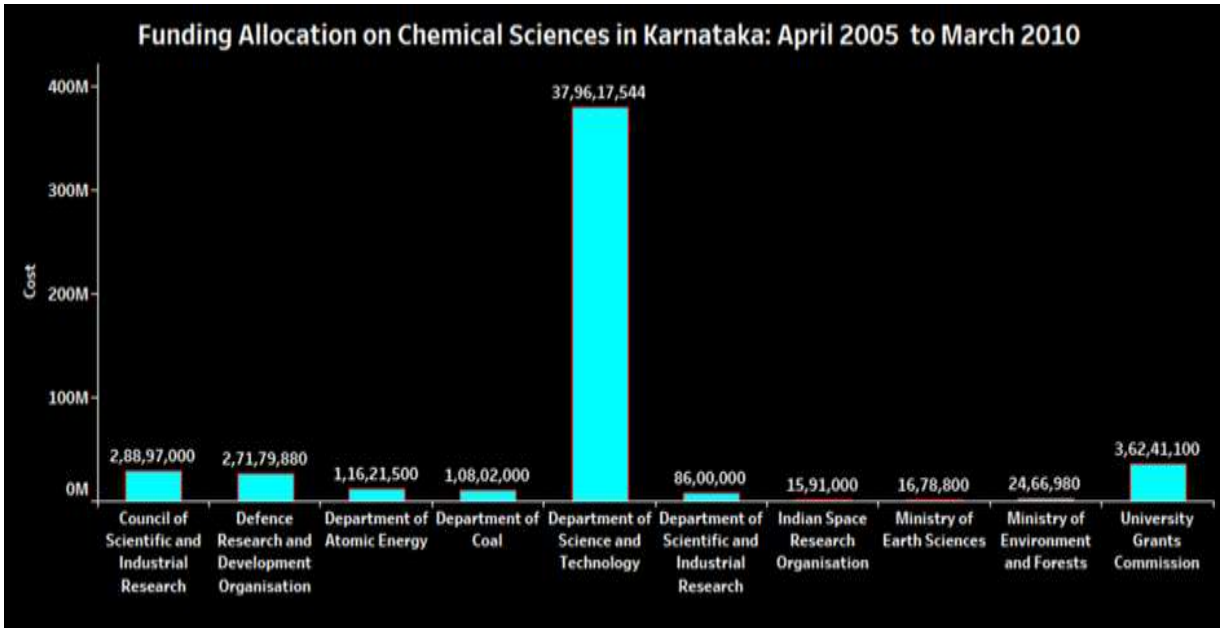

Figure 6: Fund allocation on Chemical Sciences

IISc, Bangalore got allocated the major funds from the funding agencies. Bagalore University and St. John's Research Institutite are following the second and thid posititon in getting the research funding in the area of Chemical sciences.

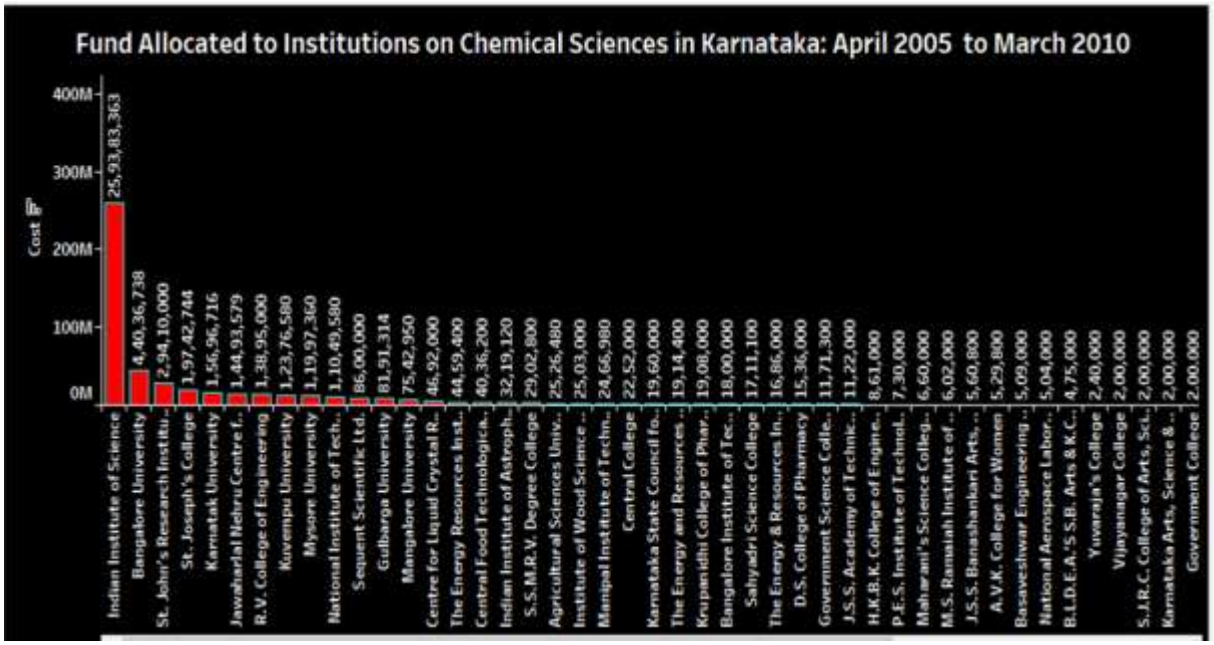

Figure 7: Fund allocated to institutions in the area Chemical Sciences

4.4 Fund Allocation and Allocated Institutions' on Earth Sciences in Karnataka: April 2005 to March 2010

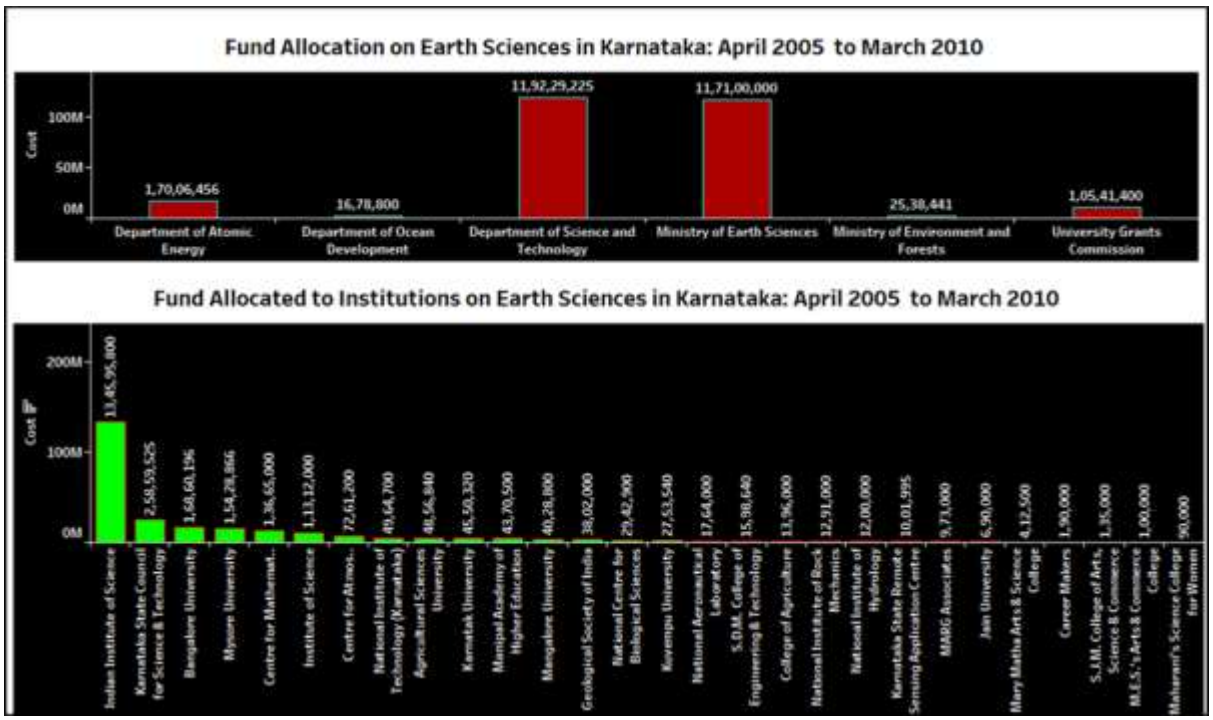

Figure 8: Fund allocation and allocated institutions in the area Earth Sciences

Department of Science and Technology and Ministry of Science, Government of India are the major funding body that allocates funds in the area of Earth Sciences. Department of Atomic Energy and UGC are the two major funding agencies that come next in fund allocation in India on Earth Sciences. Indian Institute of science got the highest funding from 2005 to 2010 followed by the Karnataka State Council for Science and Technology and Bangalore university share some amount during the period.

4.5 Fund Allocation and Allocated Institutions' on Engineering and Technology in Karnataka: April 2005 to March 2010

Compare to other research areas the major funding and research in Karnataka state is focused on Engineering and Technology. Ministry of Communications & IT and Department of Science and Technology are the major funding body that allocates funds in the area of engineering and Technology. DRDO and the Ministry of New & Renewable Energy are falling under the next level of funders in this area.

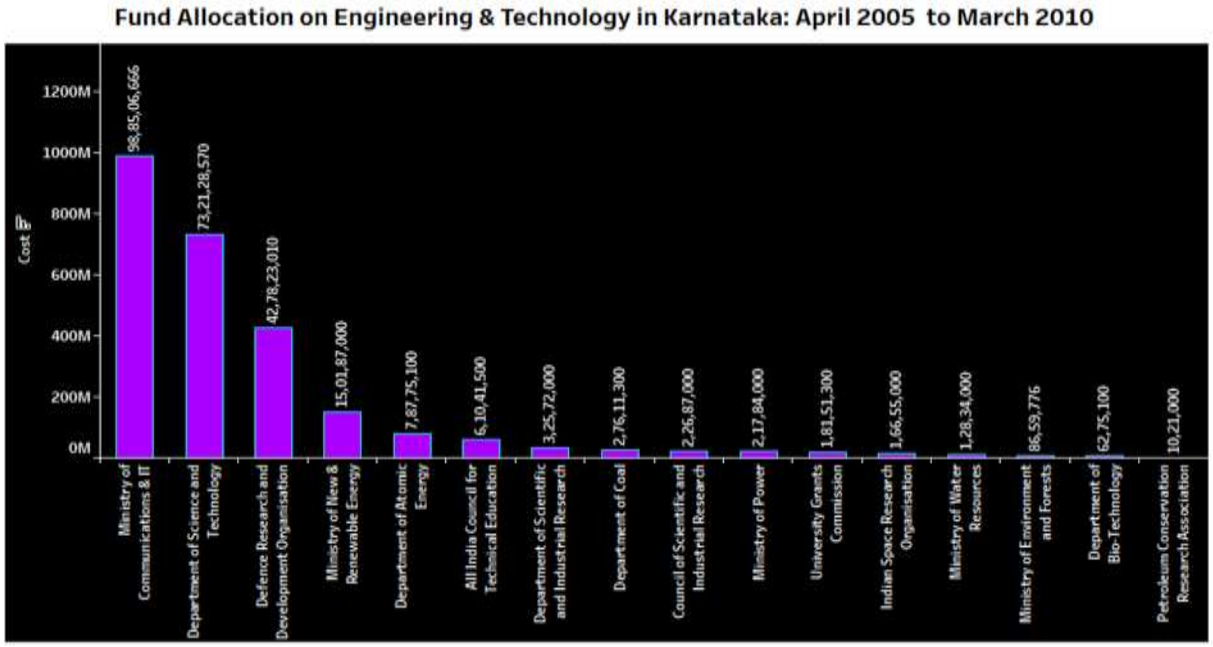

Figure 9: Fund allocation on Engineering & Technology

In the subject area, Engineering & Technology also the major fund goes to the Indian Institute of Science, Bangalore. The number of funds distributed to other institutions is very less in comparison to IISc Bangalore for the years 2005 to 2010.

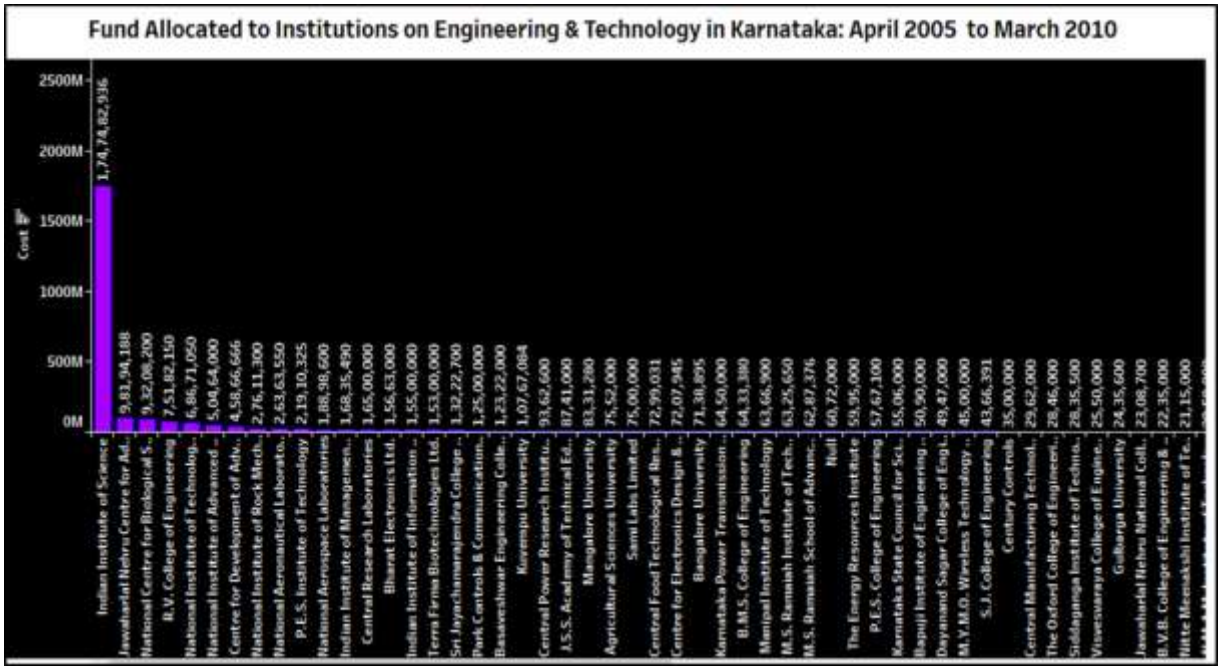

Figure 10: Fund allocated to institutions in the area Engineering & Technology

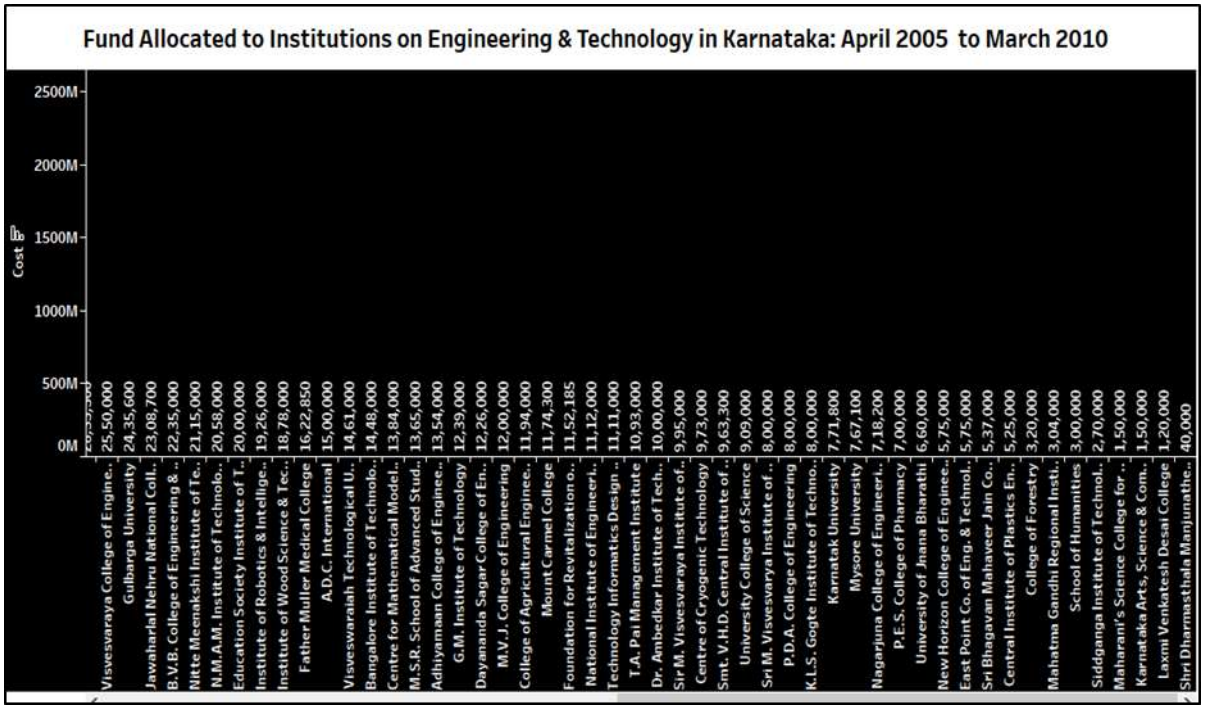

Figure 11: Fund allocated to institutions in the area Engineering & Technology

4.6 Fund Allocation and Allocated Institutions' on Mathematics in Karnataka: April 2005 to March 2010

Department of Science and Technology and Indian Council of Medical Research are the major funding body that allocates funds in the area of Mathematics. DRDO, UGC, CSIR and AICTE

are the other major funding agencies that come next in fund allocation in India on Mathematics during the period 2005-2010.

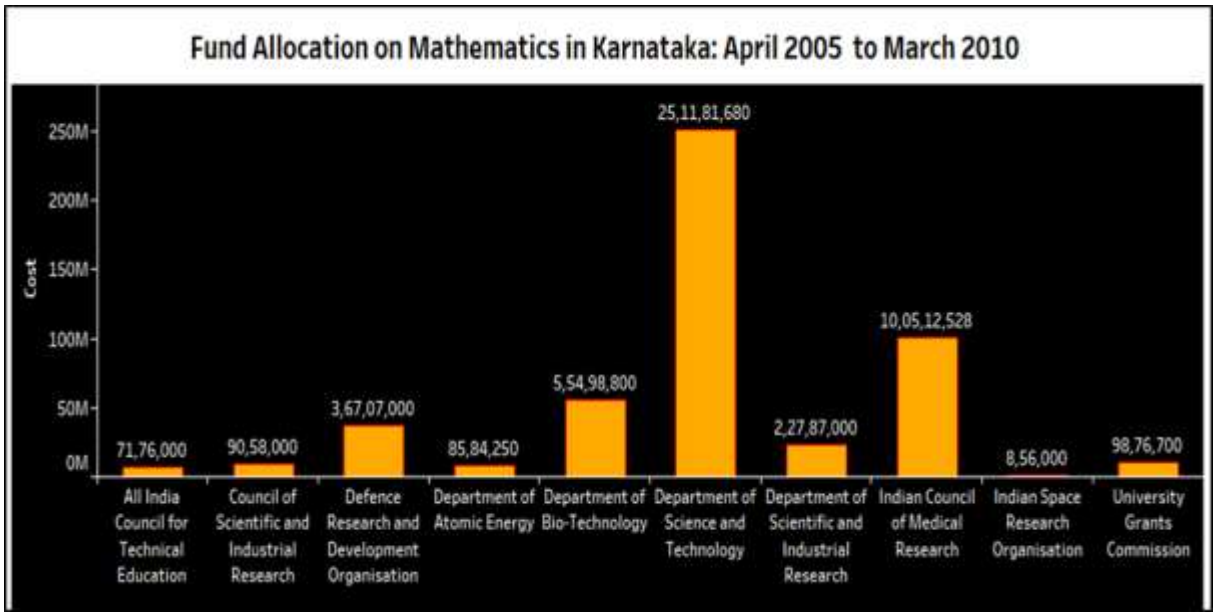

Figure 12: Fund allocation on Mathematics

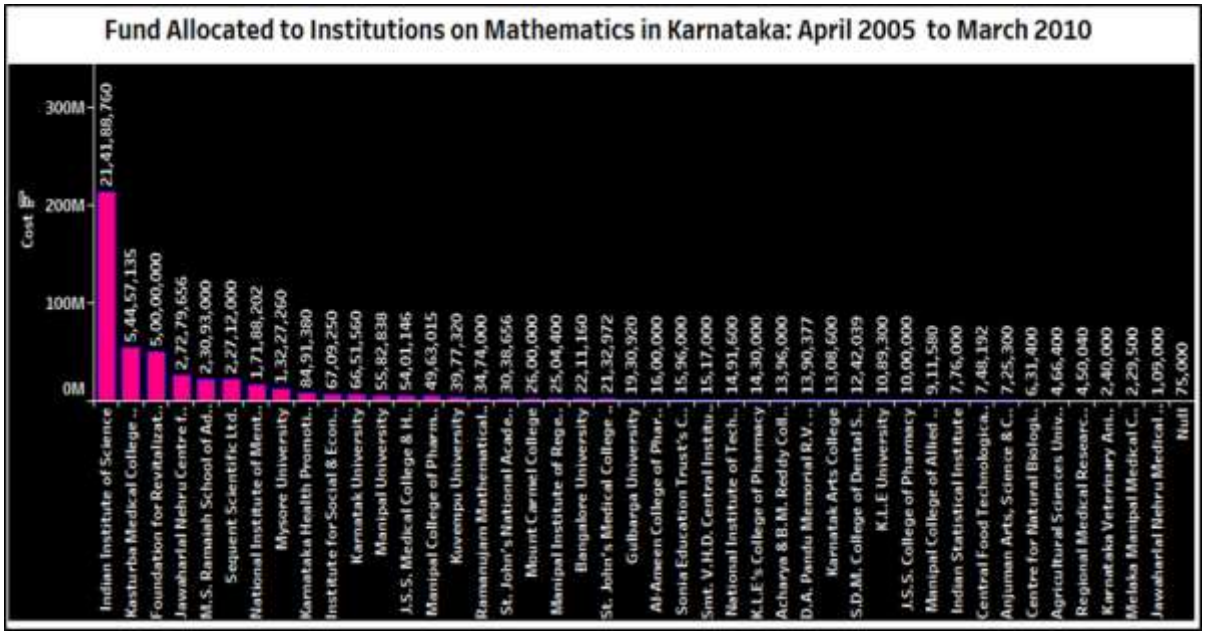

Figure 13: Fund allocated to institutions in the area Mathematics

Indian Institute of Science got the highest funding from 2005 to 2010 followed by Kasturba Medical College, Manipal and Foundation for Revitalization of Local Health traditions share some amount during the period.

4.7 Fund Allocation and Allocated Institutions' on Medical Sciences in Karnataka: April 2005 to March 2010

Compare to other research areas the major funding and research in Karnataka state is focused on Engineering and Technology as well as Medical Sciences. Department of Science and Technology, Department of Biotechnology and Indian Council of Medical Research are the major funding body that allocates funds in the area of Medical Sciences. DSIR, All India Council of Technical Education, and CSIR falling under the next level of funders in this area.

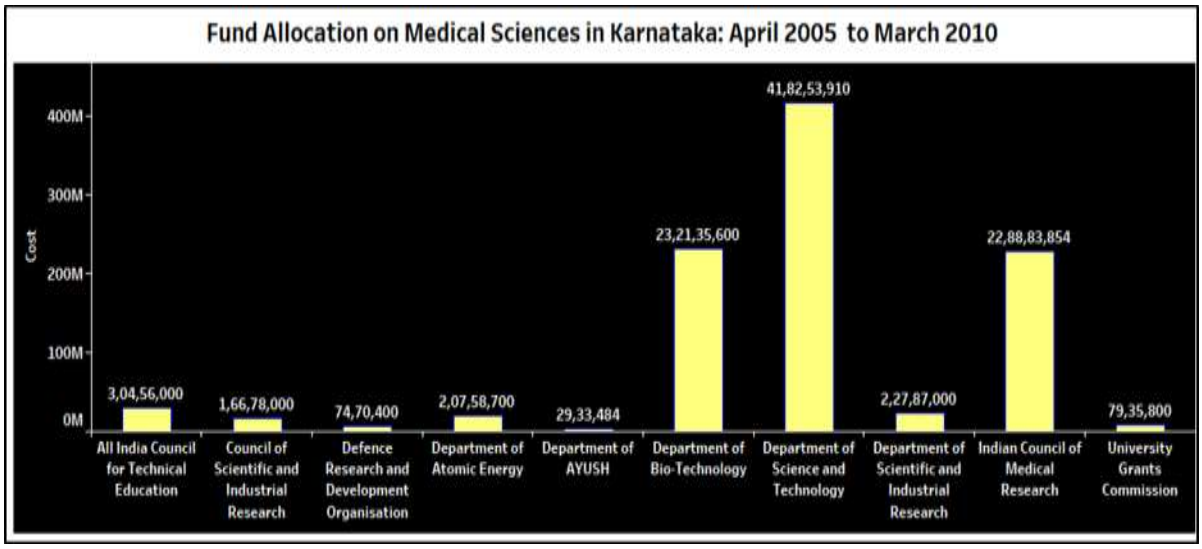

Figure 14: Fund allocation on Medical Sciences

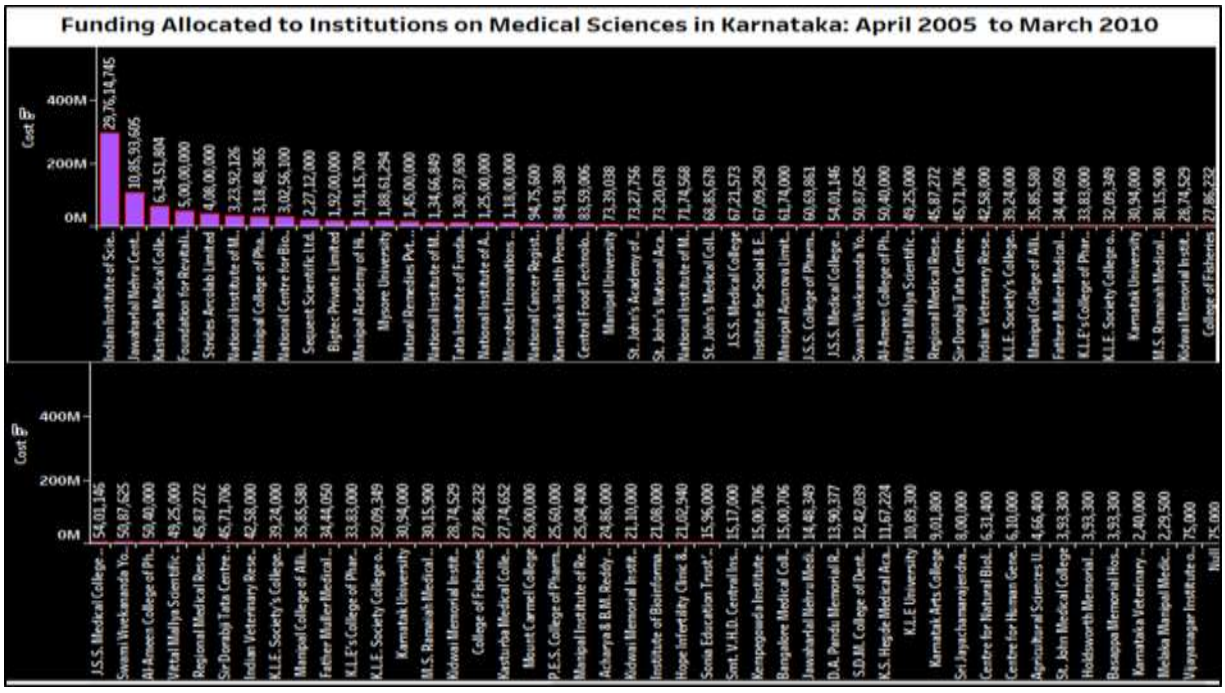

Figure 15: Fund allocated to institutions in the area Medical Sciences

Indian Institute of Science got the highest funding from 2005 to 2010 followed by Kasturba Medical College, Manipal and Jawaharlal Nehru Centre for Advanced Scientific Research share some amount during the period.

4.8 Fund Allocation and Allocated Institutions' on Physical Sciences in Karnataka: April 2005 to March 2010

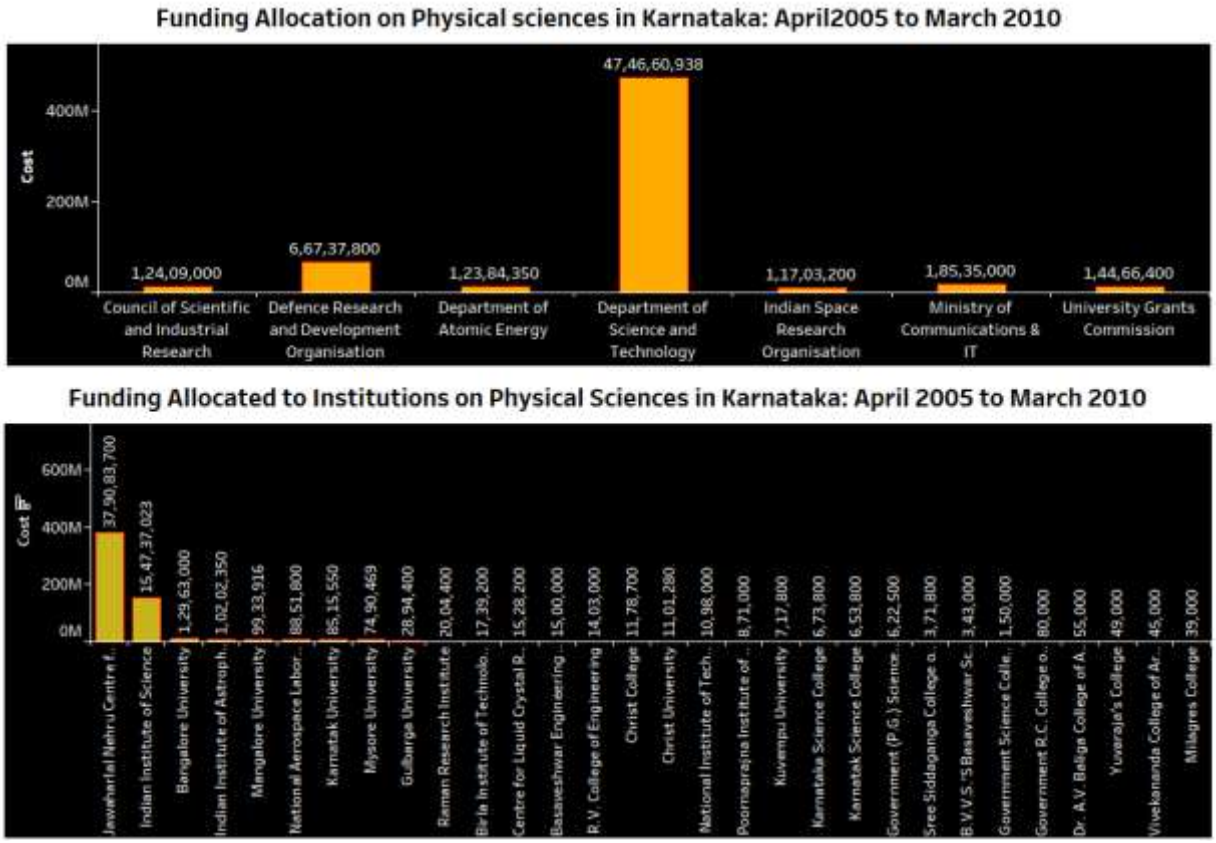

Figure 16: Fund allocation and allocated institutions in the area Physical Sciences

Compare to other research areas the major funders in the physical science stream are the Department of Science and Technology and DRDO. Indian Institute of Science got the highest funding from 2005 to 2010 followed by Kasturba Medical College, Manipal and Jawaharlal Nehru Centre for Advanced Scientific Research share some amount during the period. Leaving IISc in the second position Jawaharlal Nehru Centre for Advanced Scientific Research got the major research funds in the area of physical sciences.

CHAPTER -IV

5. Result and Discussions

5.1 Funding System: History and its Efficiency

The history of funding agencies began when Germany and Connecticut saw the Government investing in science with aim of improving their economies. As technology saw progress in the eighteenth and nineteenth centuries, individual inventors carried out most technological and scientific research using their funds. In the twentieth century, as Corporations developed technologically, scientific research became more systematised. During this time, continuous investments in research and development were considered a key element of success.

Funding systems differ across the globe. Many countries across the globe invest differently in research. More than 4% of South Korea's GDP is spent on research. While many of the developing countries spend less than 1%. The United States spent $456.1 billion on research and development in the year 2013. Switzerland spent CHF 22 billion on research and development in 2015, which accounts for 3.4% of the country's GDP [21-24].

The process of funding a project is quite lengthy and not all researchers who apply for funds receive it. Funding agencies require information about researchers' background, facilities used, equipment needed, time involved and overall outcome or success rate of the research. The grantee is required to write a proposal to fund agencies and the grantor is required to choose the best proposal [23-24].

The process of writing and accepting a grant is difficult for both grantee and grantor because individual grantees would want to apply for research in which they have the best chances and grantors must choose research that fits their scientific principles. There are administration offices in most of the universities which act as a bridge and ease the interaction between funding agencies and researchers.

In India, many funding agencies are available which provide grants for research conducted on various domains. Funding agencies from foreign countries also grant funds to Indian researchers either independently or in the form of collaborations with Indian funding agencies. Department of Science and Technology, Department of Biotechnology, Council of Scientific and Industrial Research, Indian Council of Medical Research, All India Council of Technical Education, Indian Council of Agricultural Research, Science and Engineering Research Board, the Indian Space Research Organization, are few funding agencies in India. [26]

Although the funding agencies provide funds to carry out research, it is also important to understand how these funds are utilised. Most of the funding agencies have made it mandatory for researchers to efficiently use their funds and encourage them to maximise the output for money spent. The outcome of the research can be measured by citation impact, view impact, publication output, number of PhDs awarded, number of patents etc.

5.2 National Education Policy

National Education Policy is a comprehensive framework to manage the development of education in India. The necessity for a policy was first felt in 1964 when the government then was criticised for lacking a vision and philosophy for education. In the same year, a 17-member Education Commission was established to draft a national and coordinated policy on education. Based on the suggestions of this Commission, the first education policy was passed by the parliament in the year 1968 [30].

To bring non-science disciplines of research within its bounds, the NRF will fund research projects across four major disciplines –Sciences; Technology; Social Sciences; Arts and Humanities. NRF aims to resolve the lack of fund allocation, which has often been cited as one of the biggest reasons behind the lack of researchers in India. This study aims to evaluate the funded research works quantitatively and qualitatively.

5.3 Need For Impact Study of Research

Impact study of research helps to focus on the main purpose of research instead of just the research process. How research is done, communicated, and evaluated have brought a lot of barriers between research itself and those who may benefit from it. Reducing those barriers will help apply the research to make changes in the real world. Focusing on research impact, thus, helps us to ensure that we get the best possible returns from an investment that we- as a society- make in research.

6. Exploratory Data Analysis

The study on funding outcome based on scholarly publication conducted through exploratory data analysis has given top 10 funding agencies. They are CSIR, DST, DSIR, DBT, UGC, ICMR, Ministry of Coal, Ministry of new and Renewable Energy and Board of Research in Nuclear Sciences respectively.

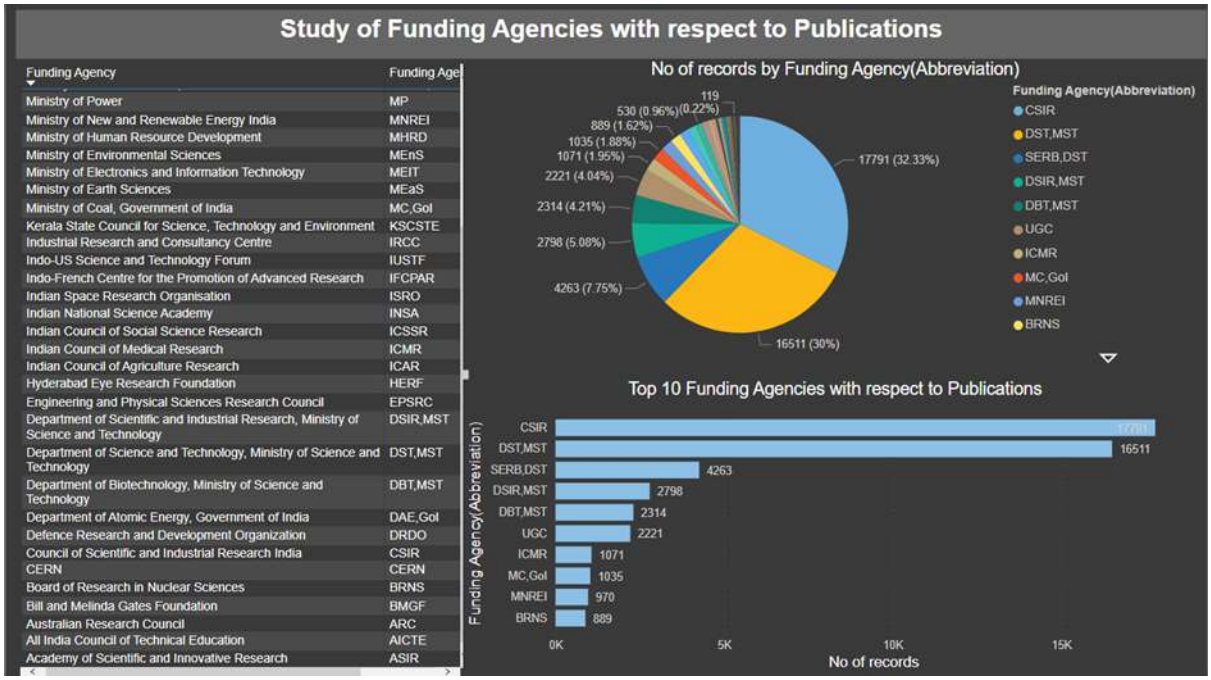

Figure 17: Top 10 Funding Agencies in terms of number of publications

The impact of funded research outcome over ten years (2010-2019) was analyzed with quantity as well as quality metrics and have plotted and explained in detail.

6.1 Impact of Department of Science and Technology Funded Project

The highest research funding agency in India is the Department of Science and Technology (DST), Ministry of Science and Technology. As the highest funding agency, the publication data when quantified full credit goest to DST itself in Figure 3 when we quantified the impact of DST funded project outcome, we could see a slight decrease in the number of publications during the period 2012 to 14 but it started increasing with the highest in number from 2015 to 19. The citation count and view count were highest in the year 2016. Field Weighted Citation Impact (FWCI) indicates a positive sign as it is always more than the world average. In terms of FWVI, till 2016 the performance was excellent with a score more than the world average but from 2017 to 19 it falls under the range 0.86 to 0.98. There is a need for promoting the publications which come out from the funded projects.

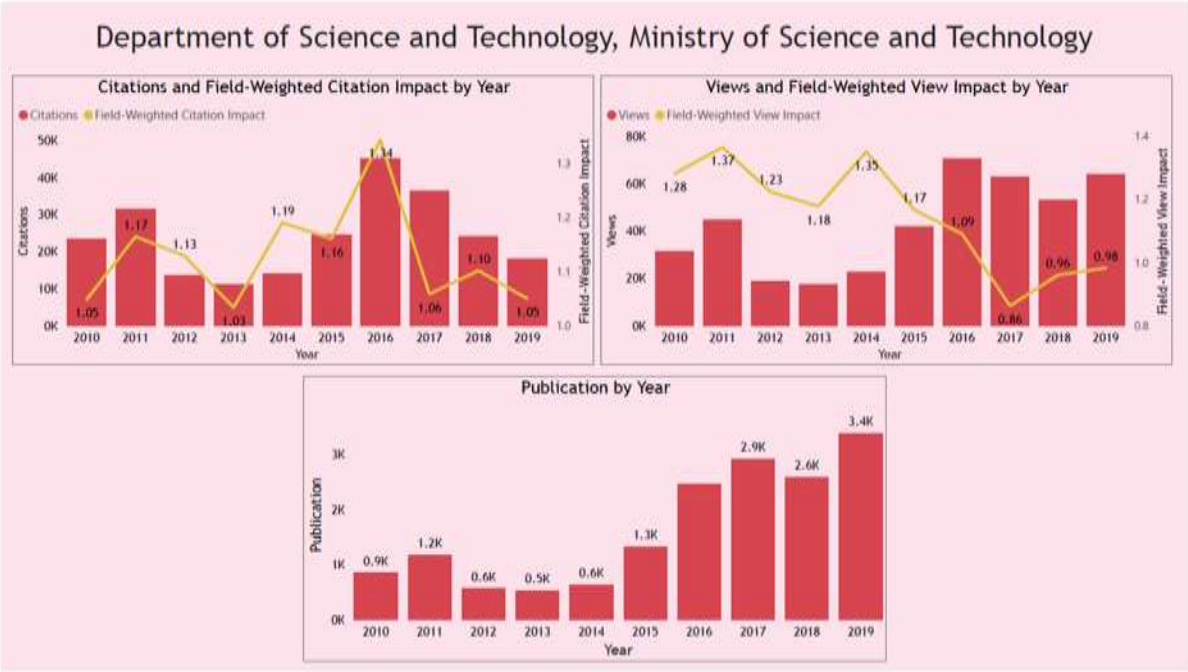

Figure 18: Quantity and Quality metrics of DST

6.2 Impact of Council of Scientific and Industrial Research Funded Project

In figure 19 of CSIR, it was observed that citation and view count were highest in the year 2016. Apart from 2015 all the years the performance of citation falls good to CSIR. Observing the field weighted citation impact (FWCI), it was Very good in 2017 having a score of 1.27

which is .27 percentage more than the world average (1). In comparison to 2018, the publications that come from CSIR funded projects are showing a very good FWCI which is more than the world average 1. The flow of 10 years of data in Field Weighted View Impact (FWVI) also indicates a positive approach. The data falls under the range of 1.18 to 1.01

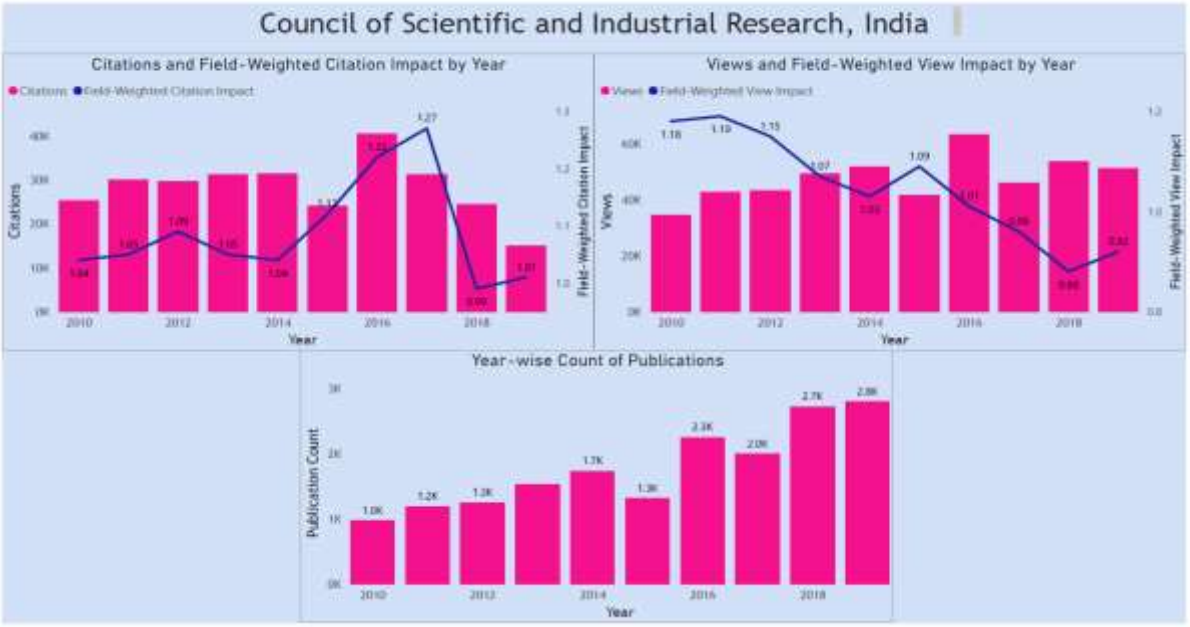

Figure 19: Quantity and Quality metrics of CSIR

which is a good range in comparison to the world average. The count of publications over the years if we see from 2010 to 2019 shows an increasing trend and it is a good sign when comparing the number of funds distributed during the previous five years.

6.3 Impact of DST - SERB Funded Project

To promote basic science research DST started the funding program DST – SERB and every year it is funding a very good amount in the promotion of basic research in India. We could see a good number of publications from the year 2017 to 2019. Citation count was highest in the year 2012 and view count was highest in the year 2019. With more than the world average FWCI, it is making quite evident that the publications are of good quality and FWVI indicates that research works are well recognised through social media.

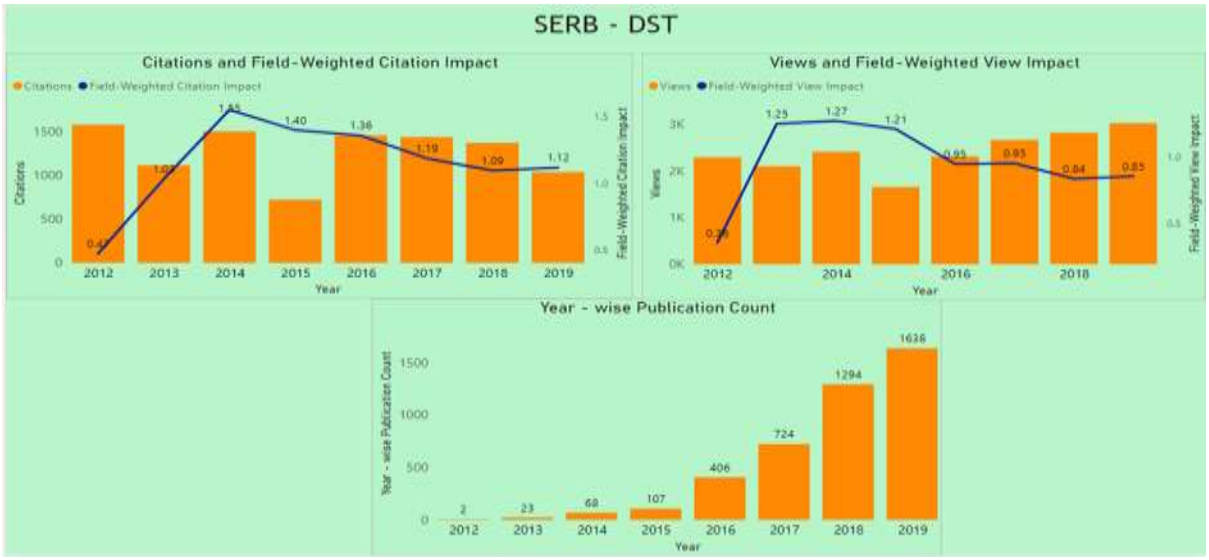

Figure 20: Quantity and Quality metrics of DST - SERB

6.4 Impact of DSIR Funded Project

The publication outcome of the DSIR funded project was distributed quite equally in the last 10 years. The quality metric citation is showing a very good impact and the FWCI is also having a range of 1.02 to 1.47 which is more thn the world average. FWVI is also interestingly excellent and it shows the acceptance of the peers in the publication field.

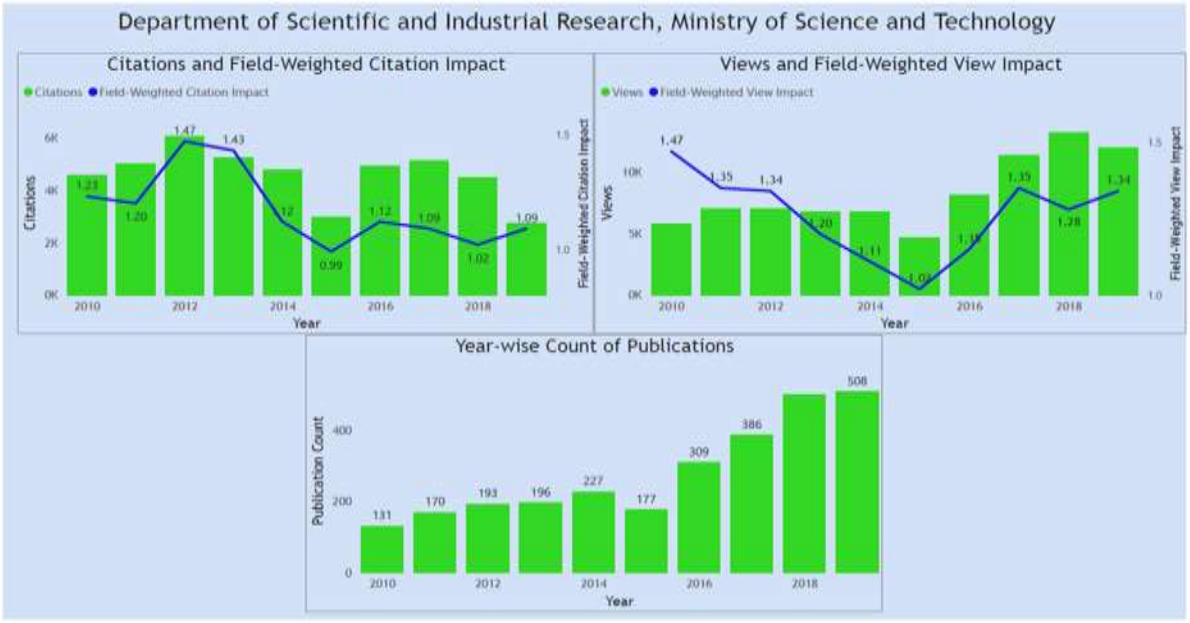

Figure 21: Quantity and Quality metrics of DSIR

6.5 Impact of Department of Biotechnology Funded Project

There is very good research happening in recent years in Biotechnology in India and a very good amount of funding is distributed every year in the area of Biotechnology.

The quality metrics citation, views and FWCI and FWVI are showing a good impact and the quality of the research output. Even though the publication number is less in comparison to other funding agencies the quality of the publication is showing a promising future.

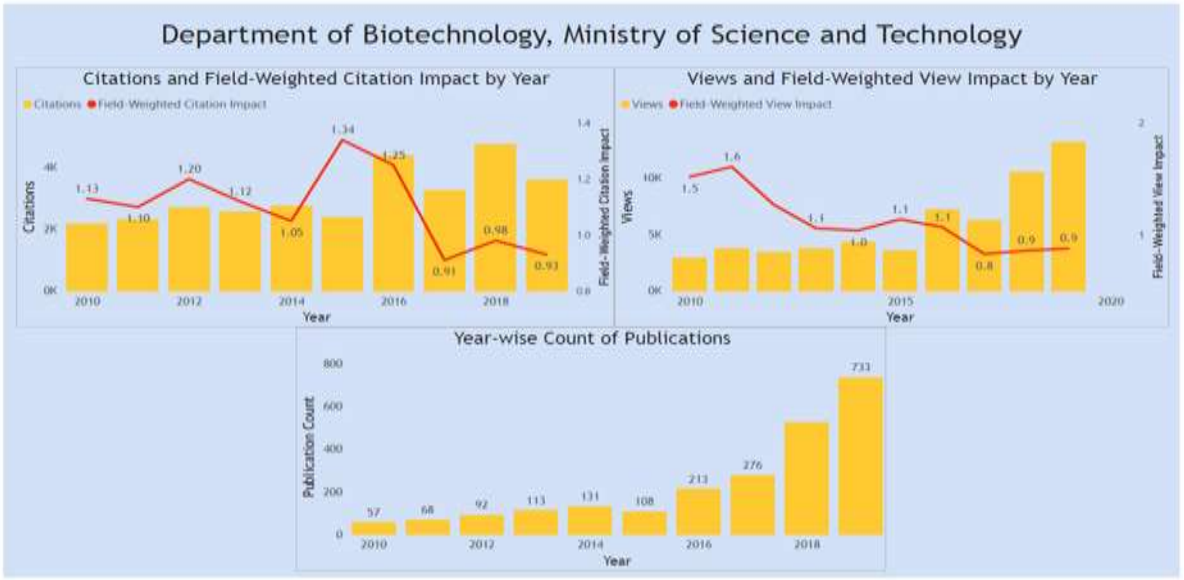

Figure 22: Quantity and Quality metrics of Department of Biotechnology

6.6 Impact of University Grants Commission Funded Project

Funding from UGC is limited to selected institutions in India. The number of publications is increasing by the year from the last 10 years. Citations and Views are also equally increasing over years.

FWCI and FWVI are other quality metrics which is valued keeping 1 as the world average and in the case of UGC funded publications the range 1.09 to 1.37 and 1.05 to 1.48 respectively.

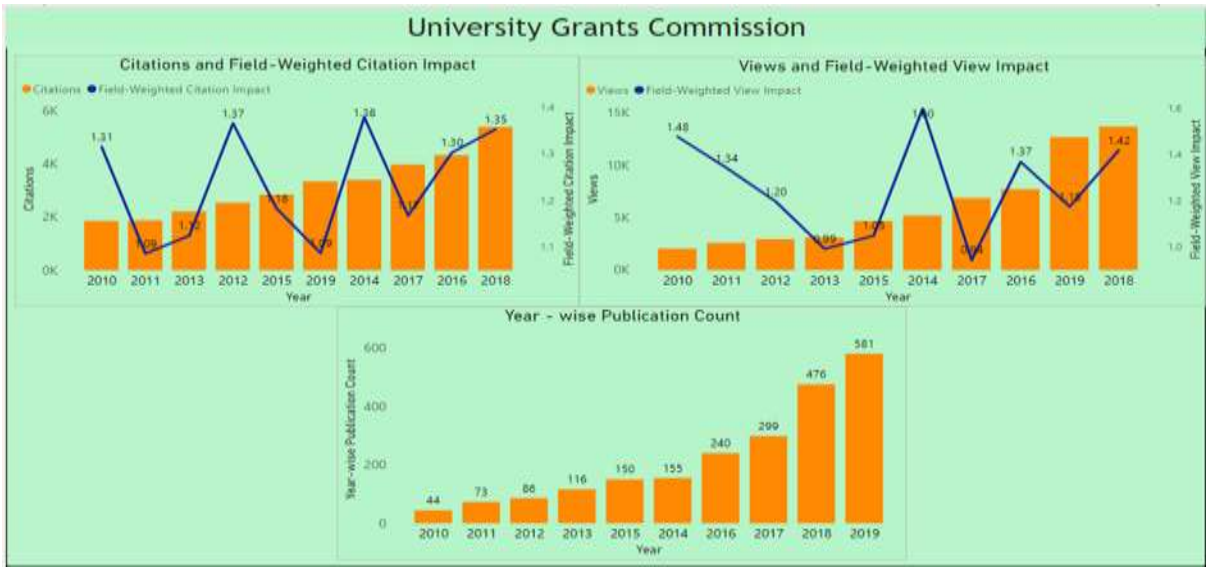

Figure 23: Quantity and Quality metrics of UGC

6.7 Impact of ICMR Funded Project

ICMR is one of the oldest medical research bodies in the world which is for the promotion of biomedical research in India. The publication number captured by the databases shows very few when compared to the other funding agencies. Many a time the lack of details in the database will give lesser data than the expected outcome. The citation count and view count were highest in the year 2015 and 2016. Field Weighted Citation Impact (FWCI) and FWVI show an excellent number of 20.36 and 15.55 in the year 2015, which is 20 and 15 times greater than the world average. There is a very promising chance of improvement if we can properly evaluate the project outcome.

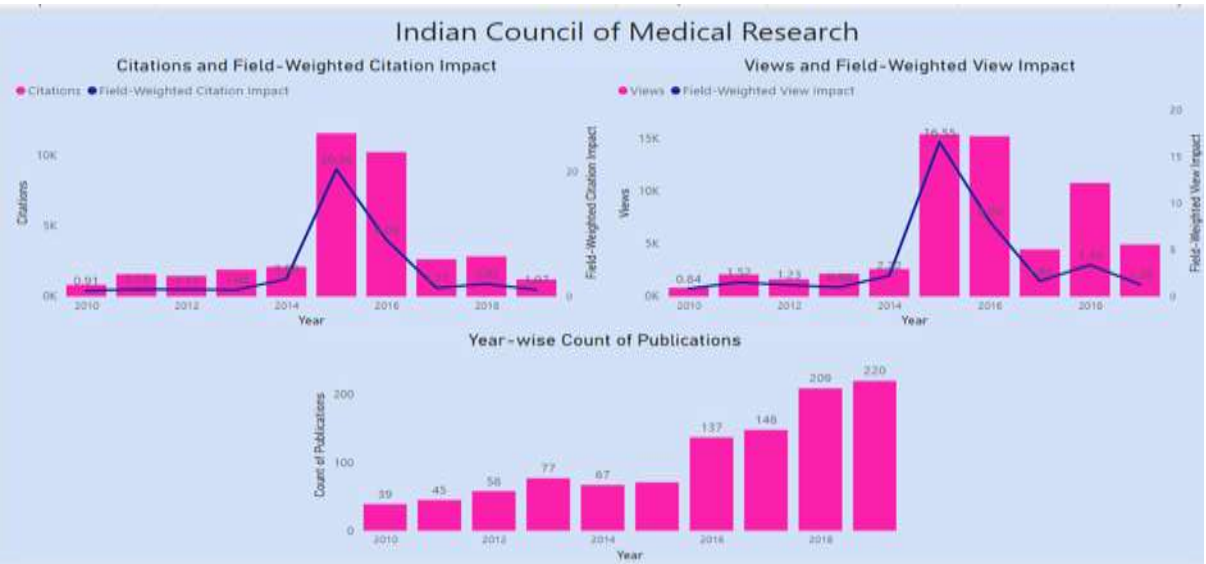

Figure 24: Quantity and Quality metrics of ICMR

6.8 Impact of Ministry of Coal Funded Project

Even though the funding may be related to Coal science research in India, there are a good number of publications we can see and the qualiy of publications is also promising for very bright research in this field. The views and in the impact FWVI is showing that the research is talked about by peers in the social media. The citation numbr and FWCI also shwing a positive impact.

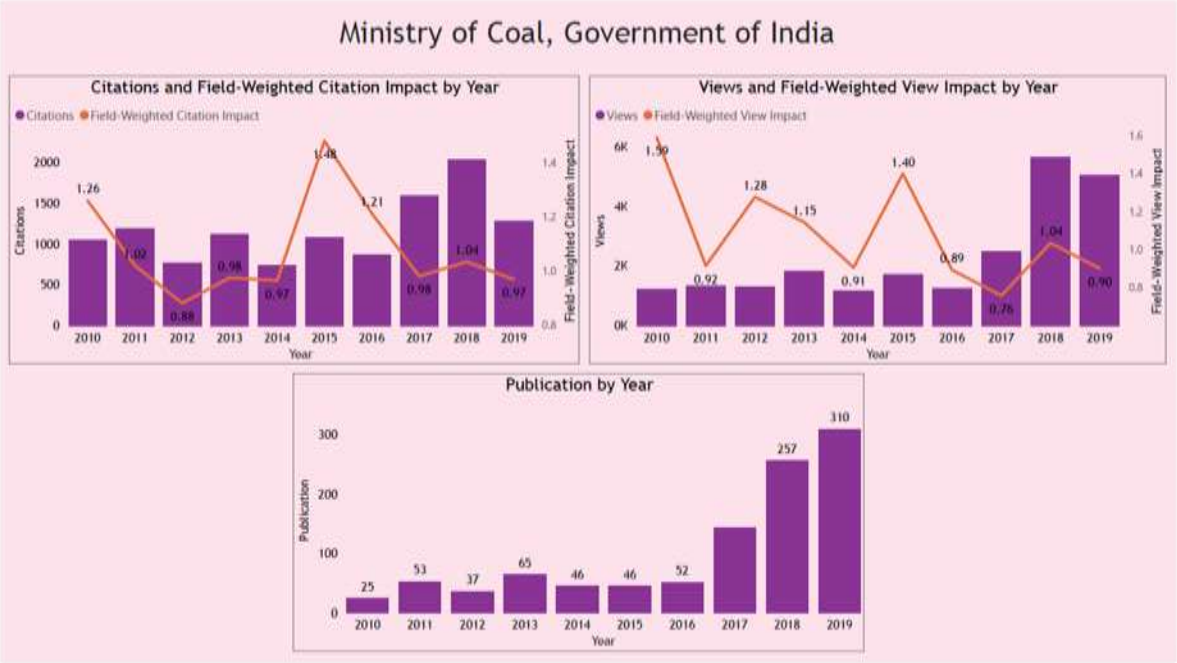

Figure 25: Quantity and Quality metrics of Ministry of Coal

6.9 Impact of New and Renewable Energy Funded Project

SDG 7 Affordable and Clean Energy is a field in 17 SDGs that is always discussed and promoted for societal benefit.

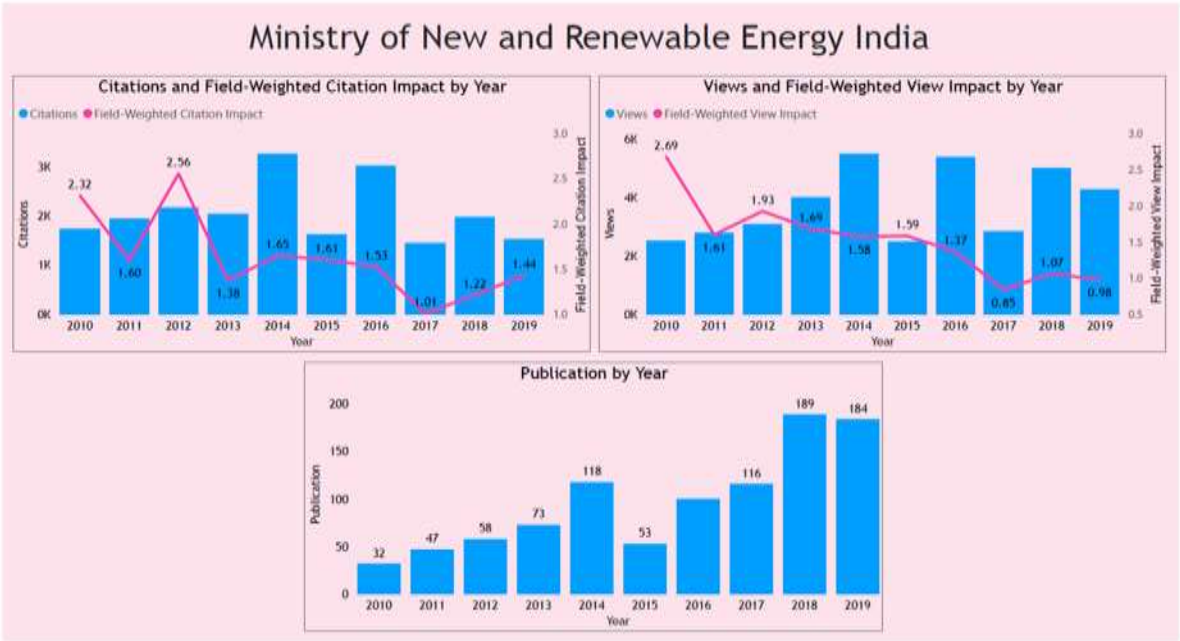

Figure 26: Quantity and Quality metrics of Ministry of New and Renewable Energy

SDG 7 Affordable and Clean Energy is a field in 17 SDGs that is always discussed and promoted for societal benefit. In India Ministry of New and Renewable Energy promotes

research in this area and funding is distributed for this research. There are few publication numbers we can see every year from 2010- 19. The citation and Views are good in numbers and FWCI and FWVI also showing double in number to the world average.

6.10 Impact of Board of Research in Nuclear Sciences

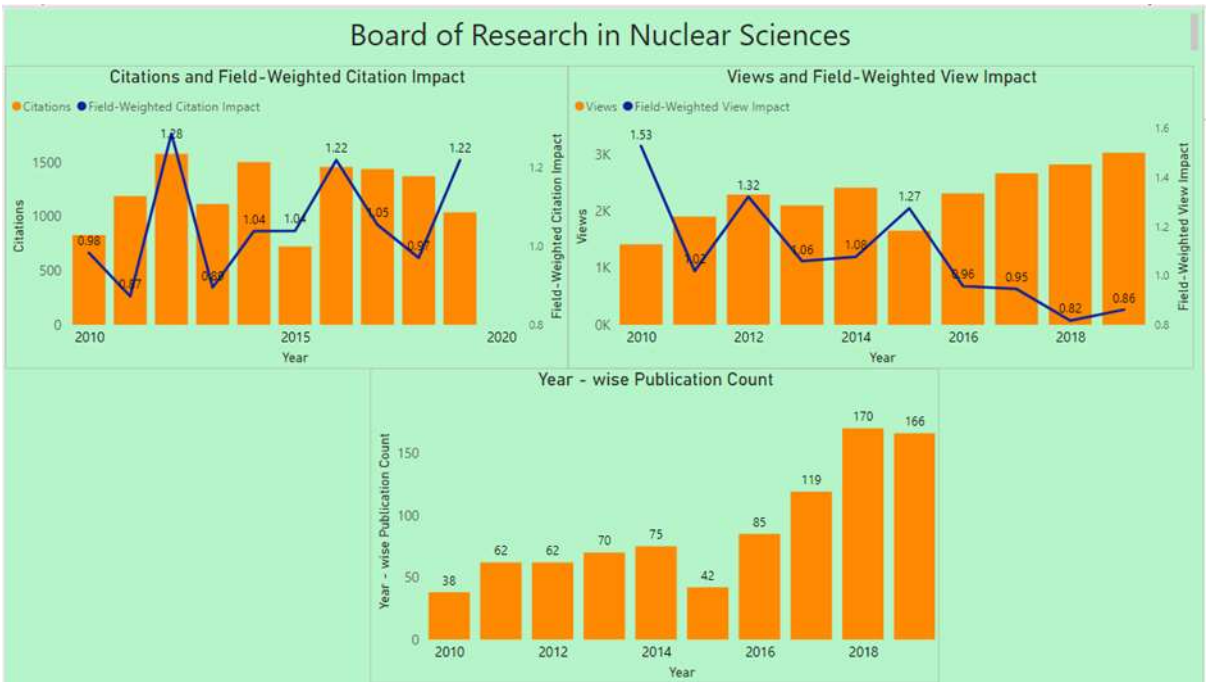

Figure 27: Quantity and Quality metrics of Board of Research in Nuclear Sciences

In figure 27 the impact of the Board of Research in Nuclear Sciences is analyzed. Citation count, as well as view count, were distributed with very good in number from the year 2010 to 19. FWCI indicates a very good quality of work done in the area of research work. FWVI indicates some kind of a less impact over the years in comparison to the work done in the same area but publication number growth is promising when we look at the analyzed data during the last 10 years.

7. Academic Research Funding and its Impact on Society concerning 2030 Agenda for Sustainable Development Goals (SDG)

Vision 2030 for Sustainable Development is “an action plan for people, earth and growth”. It is indeed a basic agenda, all-encompassing, closely linked, with the additional obligation of leaving no one behind which comprises of 17 Sustainable Development Goals (SDGs) that are

interconnected and interwoven and bridge the three pillars (economic, environmental and societal) of sustainable growth. They are the outcome of the most extensive consultation process in UN history reflecting the insights of all the actors globally. These are not the first set of goals aimed at assisting nations in working together to achieve a progressive community.

8. Interlinkage between Education and other Sustainable development Goals

Although the SDGs are divided into 17 distinct components, the objectives are inextricably linked, creating an indivisible structure aimed at achieving integrated sustainability from a structural perspective. On the one hand, achieving one objective or aim can aid in the achievement of other objectives. Goals and their associated targets are linked to shaping a complex web of interconnections. Comprehending the connections among the SDGs and their targets will aid in the identification of possible synergies and trade-offs.[31]

Many of the goals are interconnected and can only be completed if they are all enforced at the same time. Education must be included in national development plans and policies to achieve all the goals since it acts as a base for sustainable growth. We believe that the following SDGs have strong interconnection with SDG 4 for overall sustainable development.

9. Catalyzing Quality Academic Research in all Fields through a new National Research Foundation

Knowledge creation and research are essential for the growth and maintenance of a large and dynamic economy, the vigorous development of society, and the continuous inspiration of a country to reach higher peaks. Countries like India, Greece, Egypt, United States, South Korea, Japan, Germany used to be/are powerful knowledge societies that achieved intellectual development, prosperity and material value, which not only improved their civilization but also established civilizations around the world.[31-32]

It can be said that due to the rapid changes in the world today, such as changes in climate, increasing population, the expansion of digital markets, development of ML and AI, a strong

research ecosystem is more important than ever. The country will need to greatly expand the scope of research, opportunities and achievements in all disciplines to lead in these diversified fields. Today, the importance of research to the health, economy, intelligence, society, environment and technological progress of a country is more important than ever.

Regardless of the crucial importance of research, India's investment in research and innovation currently only accounts for 0.69% of GDP, against 2.8% of the United States, 4.3% - Israel and 4.2% - South Korea [31-32]

The problems that India is facing today, like access to clean water and sanitization facilities for all its citizens, providing good education and healthcare facility, improving transportation, energy and infrastructure will necessitate the execution of approaches that are not only driven by cutting-edge science and technology but also embedded in detailed knowledge of Indian people, their culture. Encountering and acknowledging these problems, high-quality interdisciplinary research across domains will be needed, which should be conducted in India and hence not be imported from anywhere. The potential to perform research on their own makes it much easier for a nation to import and implement related research from other countries [31-33]

Besides that, history, art language and culture contribute significantly to a country's identity, empowerment etc., adding to their significance in solving societal problems. As a consequence, studies in arts and humanities, advances in science, are vital for a country's advancement and enlightenment.

The importance of research and innovation in Indian educational institutions m, especially those involved in higher education, cannot be overstated. Effective learning and teaching activities at the higher level of education occur in an environment where a clear culture of research and knowledge creation is present which is very much evident from the world's

dignified universities throughout history. Contrarily, much of the world's best research has occurred in collaborative university settings.

In diverse fields like languages, healthcare, agriculture, India has a strong history of research and knowledge creation. This must be improved further for India to lead in research and innovation in the twenty-first century as a powerful, progressive knowledge society with being one of the world's 3 largest economies.

As a result, this framework anticipates a holistic approach to improving India's research quality and quantity. This involves major changes in the school curriculum toward a more play-based and discovery-based learning style. Which involves counselling to recognize the interests of the student, their abilities, more support towards promotion of research in universities, the interdisciplinary Higher Education institutions, focus upon comprehensive education, incorporation of the research and internships to students in the curricula of under graduation, governance and regulatory changes required. All these factors play a vital role in the country's development of research culture [27,26,28]

This framework proposes the creation of a National Research Foundation based on these various components, thus truly growing, catalyzing quality research in the country. The NRF's overall aim would be to foster a research culture in educational institutions. The NRF will, in particular, do provide a credible source of merit-based yet fair peer-reviewed research grants. Assisting in the creation of a research culture in the nation by providing sufficient incentives, acknowledging best research, as well as spearheading significant steps to sow and grow research at various levels where the capability of research is minimal. NRF finances the research in every field on a competitive basis. Through close collaboration with government bodies, industry, private entities etc., successful research will be acknowledged and, where appropriate, implemented [31-32].

Agencies that are currently funding research at different levels, such as the Department of Science and Technology, Department of Atomic Energy, Department of Biotechnology, Indian Council of Agriculture Research, Indian Council of Medical Research, Indian Council of Historical Research and University Grants Commission along with different private entities, continues to fund research independently based on their goals, priorities and requirements. Nevertheless, the NRF will work closely with other funding agencies and various scientific, engineering and other academies to assure that their goals are aligned and that no work is duplicated.

10. Sustainable Development Goal and Research funding in India: A Exploratory Data Analysis

10.1 Sustainable Development Goal 1: No Poverty

Poverty as a term has evolved over the years. It includes not only low income and purchasing power but also low achievement in non-monetary areas such as schooling, health, nutrition and other aspects of human growth. Although the proportion of people living in severe poverty is come down by half from 1990 to 2015, there are still many people who are struggling to fulfil their most basic needs [37]. The designing of a model for SDG1 NO POVERTY is an effort to measure progress on abolishing poverty and check how poverty can be abolished so that no one is left behind.

- **The outcome of funded research grant related to No Poverty**

Figure 27 shows three graphs representing the information regarding the funding agencies that have funded publications regarding SDG1, the impact of views and its field-weighted impact on funded publications and the impact of citations and its field-weighted citations on funded publications for the year 2010-2019. Here to interpret Figure 28 we consider only the Indian Funding Agencies.

The highest number of publications were funded by the Council of Scientific and Industrial

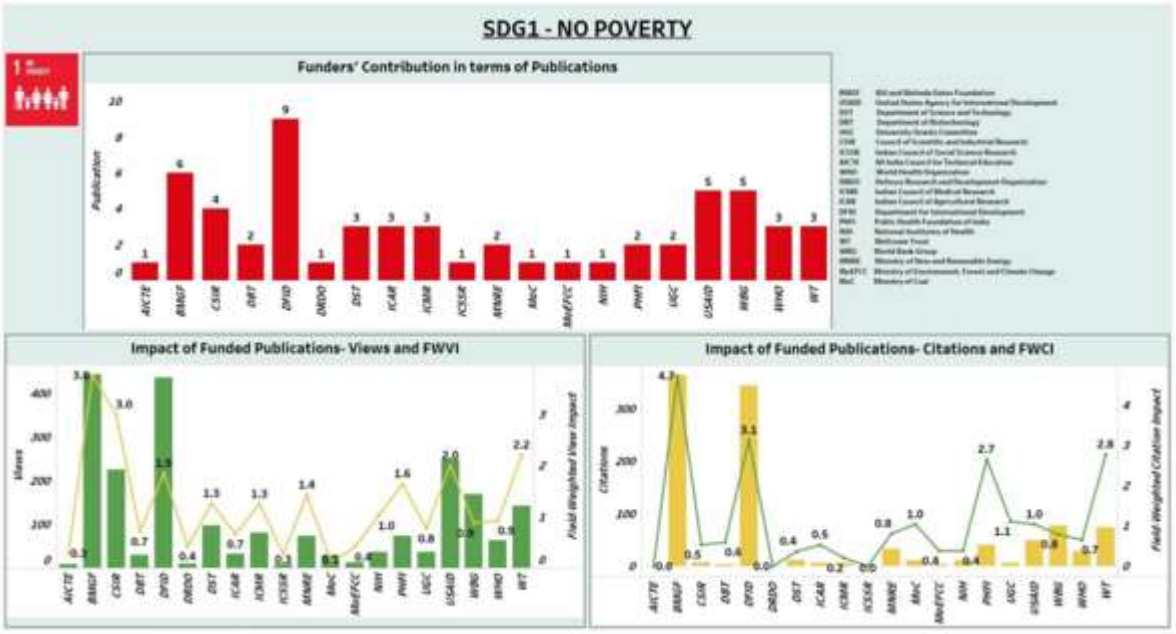

Figure 28: Sustainable Development Goal 1 - No Poverty and Funding Outcome

Research (CSIR) followed by the Department of Science and Technology (DST), Indian Council of Medical Research (ICMR) and Indian Council of Agricultural Research (ICAR) being the well-known funders to fund the publications related to the goal of No Poverty in India. Looking at the impact of the same, the citation count and the field weighted citation impact of CSIR which has funded the highest number of publications is moderate and is not as expected but is having a good number of View count and an incredible impact of 3.

10.2 Sustainable Development Goal 2- Zero Hunger

Sustainable Development Goal 2 aims to achieve Zero Hunger. It exemplifies the intricate interdependence of agricultural production, nourishment, and environmental sustainability through farming.

SDG2 has eight targets and they are as follows:

To put an end to starvation and make sure that all people, especially the poor and those in precarious positions, including babies and women have year-round access to clean, nutritionally balanced, and sufficient food, to put an end to all forms of starvation and to meet the dietary requirements of teenage girls, expecting and nursing women, and the elderly, through safe and equitable land access, other economic opportunities and inputs, awareness,

financial institutions, commodities, and benefits for added value and non-farm work opportunities, to increase the agricultural production and earnings of small-scale food manufacturers, especially women, to implement flexible agricultural practices which increases productivity and sustainability, helps preserve natural habitats, makes space for climate change adaptation, severe weather, water scarcity, heavy rains, and other catastrophes, and gradually enhances quality of soil and land, at the regional, national and global level, to maintain the genetic variability of seedlings, fertilized plants and farmed and tamed cattle, and to encourage access to efficient and equal distribution of profit emerging from the use of resources and related local traditions, to boost funding in agricultural infrastructure, technological innovations, and agricultural experimentation in developing nations to increase agricultural output, to implement strategies to reduce excessive food price fluctuations by ensuring the correct operation of food markets and its by-products, as well as facilitating regular access to market details. [36,38]

- **The outcome of funded research grant related to Zero Hunger**

Figure 29 shows three graphs representing the information regarding the funding agencies that have funded research under SDG2 (Zero Hunger), the impact of views and its field-weighted view impact on funded publications and the impact of citations and its field-weighted citation impact on funded publications for the year 2010-2019. Here to interpret Figure 28, we consider only the Indian Funding Agencies.

We see that for SDG2, the Indian Council of Agricultural Research (ICAR) has funded the highest number of publications followed by the Department of Science and Technology (DST). Now coming down to the impact of Views and Field-Weighted Views, we see that the FWVI of the Indian National Science Academy (INSA) is 2.2 which is more than expected even though it hasn’t funded as many publications when compared to ICAR.

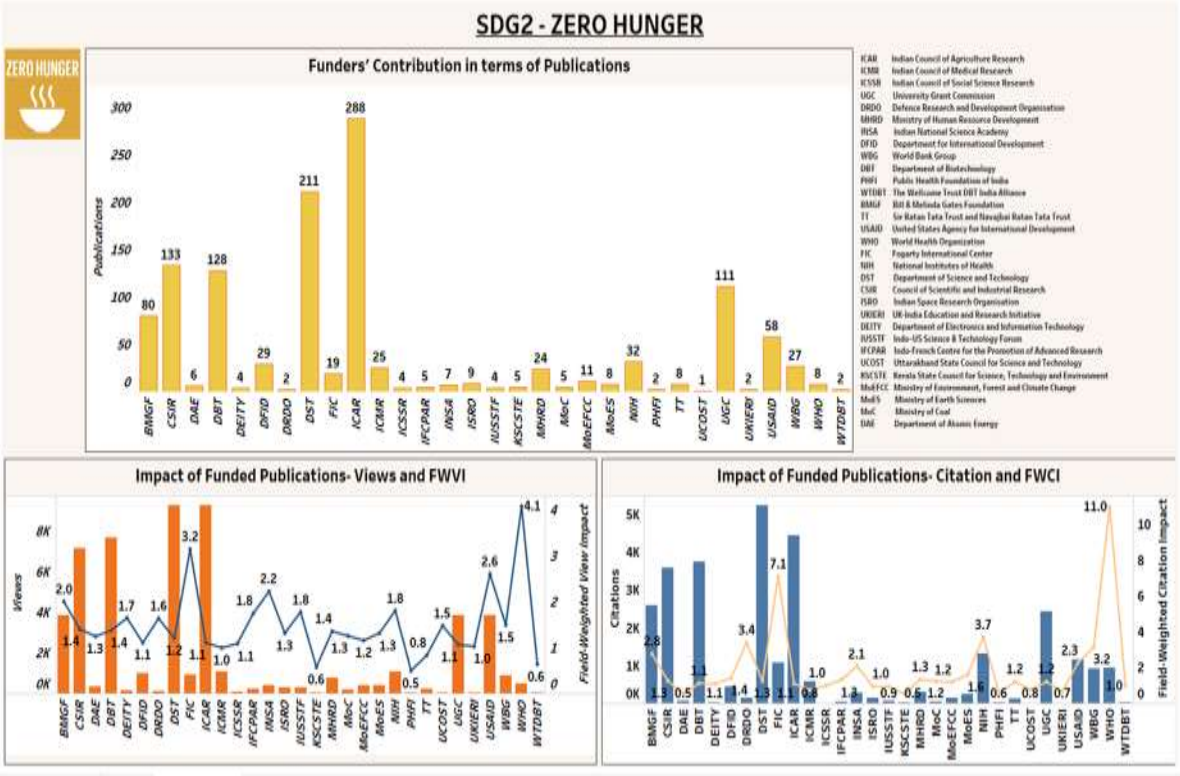

Figure 29: Sustainable Development Goal 2- Zero Hunger and Funding Outcome

The FWVI of ICAR is 1.1 which is also more than the world average. The FWCI of Defence Research and Development Organisation (DRDO) is 3.4 which is more than expected followed by the Ministry of Human Resources Development (MHRD) with an impact score of 1.3.

10.3 Sustainable Development Goal 3: Good Health and Wellbeing

The World Health Organization described health as "a state of full physical, emotional and social welfare and not just the non-existence of disease or infirmity" in its 1948 constitution, and this is the concept adopted for goal 3.

The aim of SDG3 is "to ensure that people of all ages live healthier lives and promote quality of life". Obtaining universal health coverage and proposes to put an end to the premature deaths of babies and children below the age of five and epidemics.

SDG 3 has 13 targets set by United Nations: Aiming at reducing the overall maternal death rate to under 70 per 100,000 births by 2030. Stopping preventable deaths of infants, kids under the age of five, with all nations striving for infant mortality rates of at least 12 per 1,000 births and under-five death rates of at least 25 per 1,000 births. Stopping deadly diseases such as AIDS,

tuberculosis, malaria and many other overlooked diseases and pandemics. Tackling hepatitis, water-borne diseases and infections. Reducing untimely death from non-infectious diseases by one-third by cure and care, while also promoting mental health and well-being. Enhancing drug addiction prevention and recovery, like opiate drug abuse and excessive alcohol use. Ensuring comprehensive access to sexual and reproductive healthcare services like family planning and educating people on the same. Incorporation of reproductive health into national policies and measures. Ensuring comprehensive health coverage for everyone, which involves financial risk security, obtain high-quality basic healthcare services and reliable accessible, high-quality and nominal essential medicines and vaccines for all. Reducing death and illness caused by toxic substances, different kinds of pollution. Reinforcing the World Health Organization Framework Convention on Tobacco Control's enforcement in all nations. Supporting vaccination and medication R&D for transmittable and non-transmittable diseases that primarily shows its impact on developing nations, and ensure nominal access to essential medicines and vaccines. Enhancing every nations' potential for timely cautions, mitigation of risk, monitoring national and global health hazards, mainly in developing nations [39].

- **The outcome of funded research grant related to Good Health and Well-Being**

Figure 30 shows three graphs representing the information regarding the funding agencies that have funded publications regarding SDG3, the impact of views and its field-weighted impact on funded publications and the impact of citations and its field-weighted citations on funded publications for the year 2010-2019. Here to interpret Figure 30, we consider only the Indian Funding Agencies.

The highest number of publications related to Good Health and Well-being was funded by the Department of Science and Technology (DST) followed by the Department of Biotechnology (DBT), Indian Council of Medical Research (ICMR) and Council of Scientific and Industrial Research (CSIR) having FWCI of 1.3, 1.1, 1.1 and 1.2 respectively which are more than the

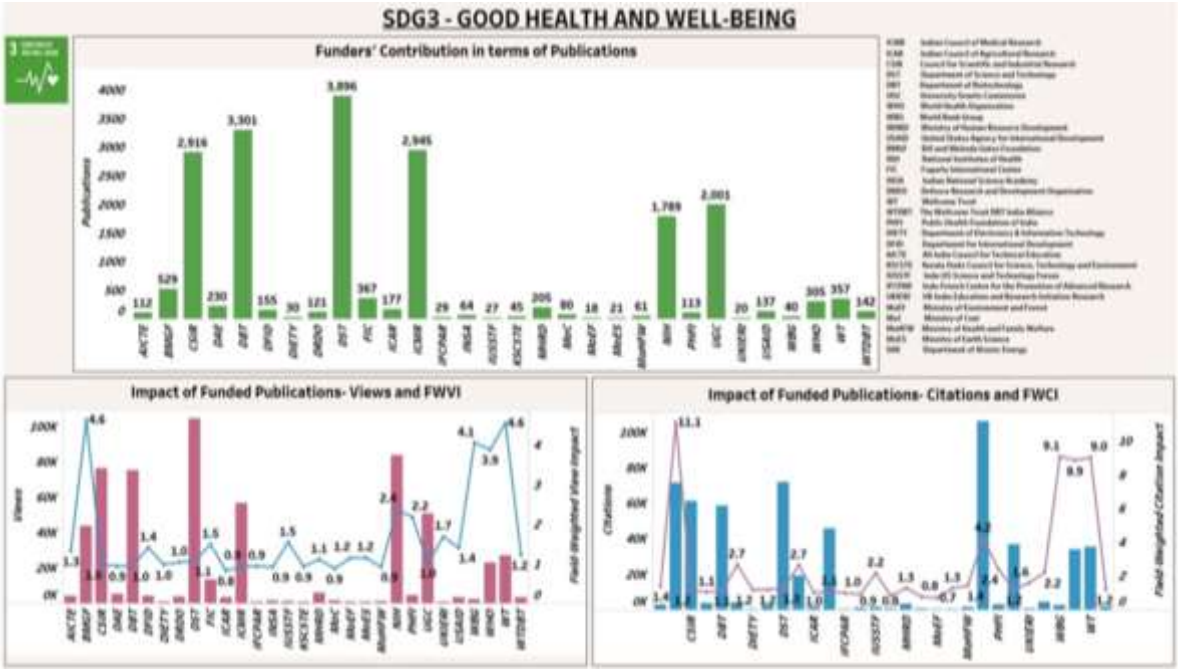

Figure 30: Sustainable Development Goal 3 - Good Health and Well-Being and Funding Outcome

world average but when compared with the number of scholarly outputs the impact seems to be modest and can be more than this. The publications funded by DST are having a good number of View count yet again the impact of 1.1 seems to be moderate and it needs to be more because the issues of infectious disease should be discussed in open platforms. Whereas the publications funded by the Department of Electronics and Information Technology (DEITY) though having a smaller number of View count has a very good FWVI. The research and the outcome have to be discussed among the peers and have to get more FWCI and FWVI than what is scored as of now.

10.4 Sustainable Development Goal 4: Quality Education

Education is a basic human right and an imperative for human dignity. It ensures long-term growth which is not only limited to the underprivileged or developing nations instead affects the entire world as a whole [40]. This was considered by the United Nations as a very critical concern for the betterment of society and included the same as SDG 4 being one of the goals in its universal agenda of sustainable growth.

The mission here is to "ensure inclusive and equitable quality education for all, as well as foster lifelong learning opportunities for all". Which consists of 10 targets to evaluate the progress in achieving the overall goal.

- **The outcome of funded research grant related to Quality Education**

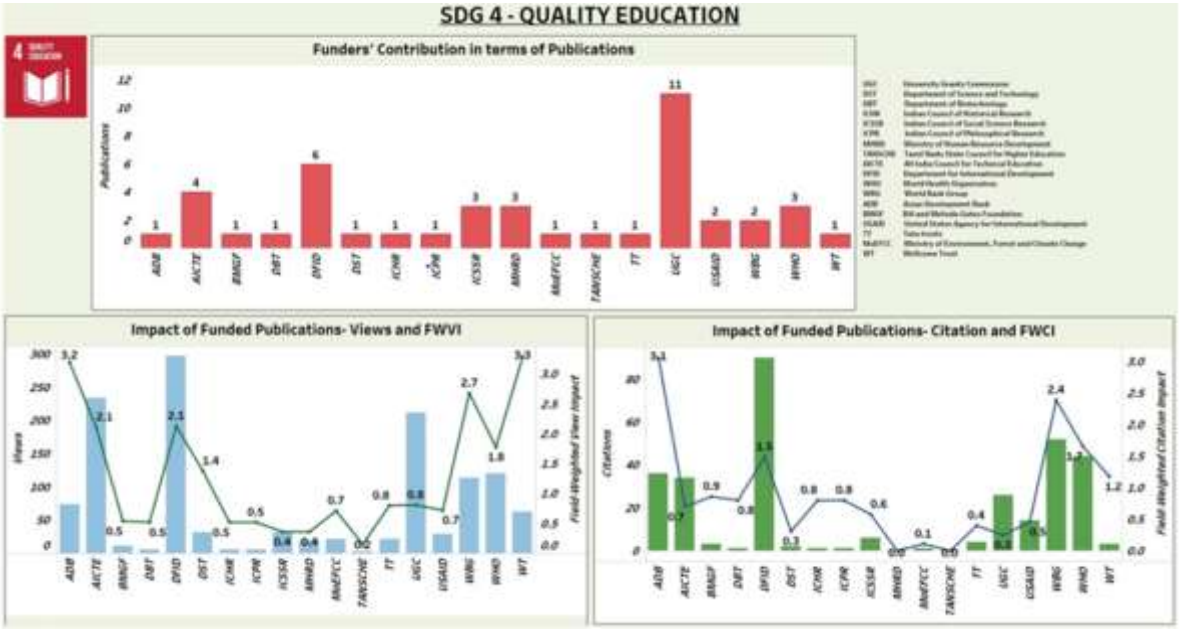

Figure 31: Sustainable Development Goal 4 - Quality Education and Funding Outcome

Figure 31 shows three graphs representing the information regarding the funding agencies that have funded research on SDG4, the impact of views and its field-weighted view impact on funded publications and the impact of citations and its field-weighted citation Impact on funded publications for the year 2010-2019. Here to interpret Figure 31, we consider only the Indian Funding Agencies.

The highest number of publications were funded by the University Grants Commission (UGC) followed by the All India Council for Technical Education (AICTE) being the prominent funders to fund the research related to quality education in India. Looking at the impact of the same, the citation count and the field weighted citation impact for the University grants commission funded research was not reaching the world average but has the highest number of publications. Whereas the view count of both the top funding agencies are at almost par with AICTE having the more impact though the publications were less the view count was high.

10.5 Sustainable Development Goal 5: Gender Equality

The goal here is “to achieve gender equality and empower all women and girls”

The 9 targets of SDG 5 are to put an end to all sorts of inequity against women and girls worldwide, to erase all sorts of violence against women and girls in both public and private environments, including trafficking, sexual and other forms of abuse. It has aimed to end all criminal acts such as child marriage, female genital mutilation, respect and appreciate unpaid care or support and domestic tasks through the provision of public services, facilities, public welfare regulations, promotion of shared household duties within family and spouse as suitable.

- **The outcome of funded research grant related to Gender Equality**

Figure 32 shows three graphs representing the information regarding the funding agencies that have funded research regarding SDG5, the impact of views and its field-weighted impact on funded publications and the impact of citations and its field-weighted citations on funded publications for the year 2010-2019. Here to interpret Figure 32, we consider only the Indian Funding Agencies.

In the analyzed data of SDG5, the Indian Council of Medical Research (ICMR) has the highest number of publications followed by the Department of Science and Technology (DST) and University Grants Commission (UGC) which have produced an equal number of publications. Now coming down to the impact of Views and Field-Weighted Views, we see that the FWVI of the Ministry of Human Resources Development (MHRD) is 3.2 which is three times more than the world average along with this all other funding agencies impact metrics also shows an outcome above the world average. The FWCI of MHRD along with many other funding agencies shows a very promising impact more than the world average. It is a clear indication that the funded research always brings quality publication and an impact more than the world average in every subject area.

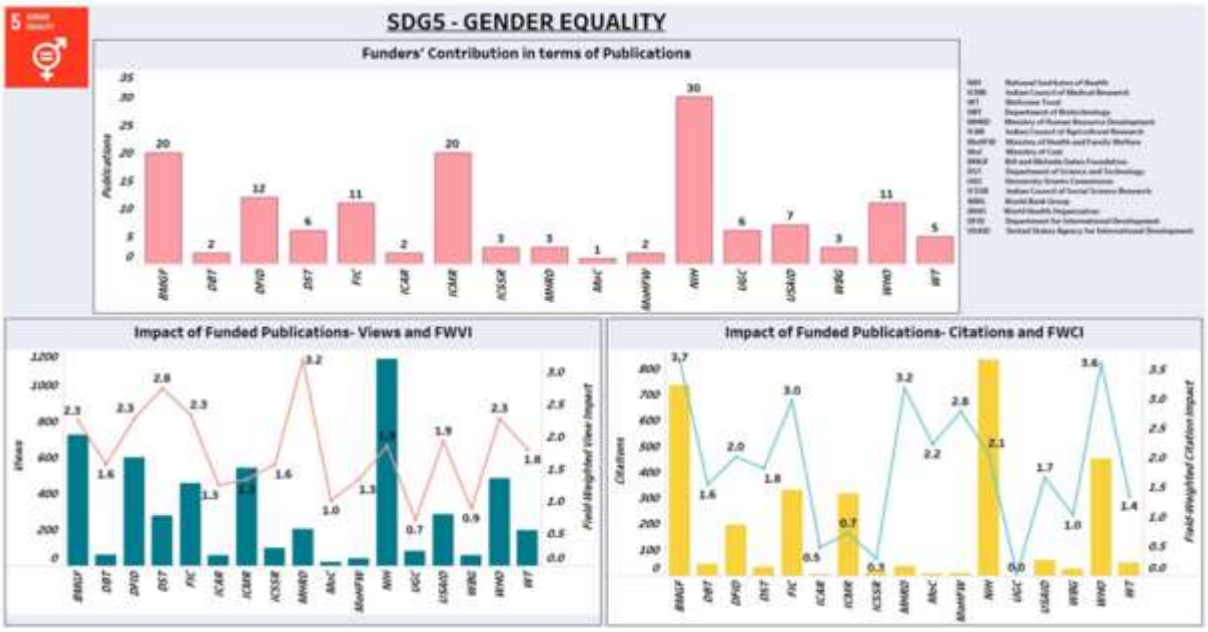

Figure 32: Sustainable Development Goal 5 - Gender Equality and Funding Outcome

10.6 Sustainable Development Goal 6: Clean Water and Sanitation

Access to water, sanitation and hygiene is a human right, yet billions are still faced with daily challenges accessing even the most basic of services. Around 1.8 billion people globally use a source of drinking water that is fecally contaminated. Some 2.4 billion people lack access to basic sanitation services, such as toilets or latrines. Water scarcity affects more than 40 per cent of the global population and is projected to rise. More than 80 per cent of wastewater resulting from human activities is discharged into rivers or sea without any treatment, leading to pollution. [43] This survey report clearly shows the importance of research should happen in this area. SDG 3 and SDG 6 are the most talked topic in this COVID 19 sitation. The importance of hygiene, sanitation, health issues, infections, etc. are the topics of discussion among the scientific communities.

- **The outcome of funded research grant related to Clean Water and Sanitation**

Figure 33 shows three graphs representing the information regarding the funding agencies that have funded and the publications regarding SDG6, the impact of views and its field-weighted impact on funded publications and the impact of citations and its field-weighted citations on

funded publications for the year 2010-2019. Here to interpret Figure 33, we consider only the Indian Funding Agencies.

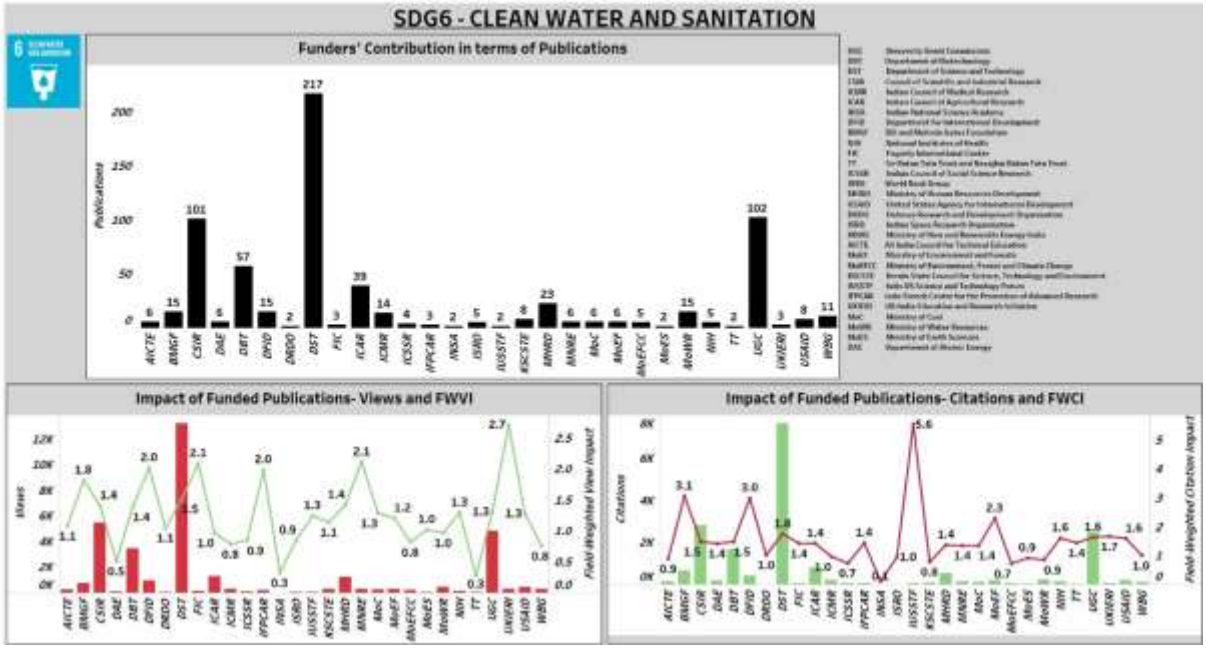

Figure 33: Sustainable Development Goal 6 - Clean Water and Sanitation and Funding Outcome

In the analyzed data of SDG6, the Indian Department of Science and Technology (DST) has the highest number of publications followed by the and University Grants Commission (UGC) and CSIR which have produced an equal number of publications.

Now coming down to the impact of Views and Field-Weighted Views, we see that the FWVI of the DST, CSIR, and UGC is more than 1.5 which is double the number than the world average along with this all other funding agencies impact metrics also shows an outcome above the world average. The FWCI of DST, UGC and CSIR along with many other funding agencies shows a very promising impact more than the world average. It is a clear indication that the funded research always brings quality publication and an impact more than the world average in every subject area.

10.7 Sustainable Development Goal 7: Affordable and Clean Energy

Three key components of sustainable energy – access, quality and implementation of renewable energy are all advancing in Asia-Pacific countries. Providing affordable energy to Asia-Pacific's rising population is a top priority for governments and most countries have set specific

national objectives that are progressively backed by supporting programs and economic policies of the nation. Nevertheless, several obstacles remain, especially when it comes to integrating the urban-rural divide. Other issues include a lack of quantity, quality and efficiency in the power supply, as well as the introduction and enforcement of legislation, as well as energy affordability. As the population is growing, the demand for economic energy is also increasing. Hence an economy that is based on fossil fuels to meet this growing demand is causing a significant change in climate [43].

Goal 7 has five objectives that must be met by 2030: This aims at ensuring that everyone has access to sustainable, secure and modern energy resources by 2030. Expanding proportion of renewable energy in the electricity sector globally by a significant amount. Doubling worldwide pace of energy efficiency development. Enhancing global collaboration by 2030 to make clean energy R&D, such as renewable energy, energy conservation, efficient and clean fossil-fuel technology, to encourage investments in energy infrastructure and clean power innovation. Broadening technology and infrastructure to provide innovative sustainable energy service to all individuals in developing nations, especially the less developed nations by 2030 [40].

- **The outcome of funded research grant related to Affordable and Clean Energy**

Figure 34 shows three graphs representing the information regarding the funding agencies that have funded and the publications regarding SDG7, the impact of views and its field-weighted impact on funded publications and the impact of citations and its field-weighted citations on funded publications for the year 2010-2019. Here to interpret Figure 34, we consider only the Indian Funding Agencies. For the publications related to the vision 2030 for the Affordable and Clean Energy, the Department of Science and Technology scored the highest number of publications followed by the Council for Scientific and Industrial Research being the prominent funders with publications having a good number of citations.

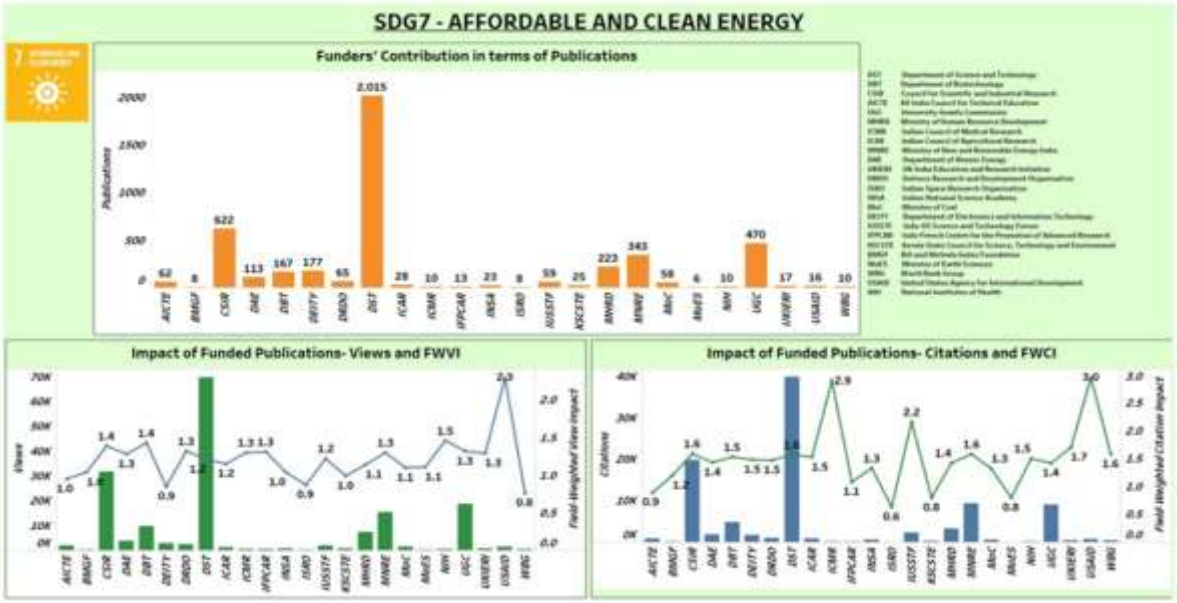

Figure 34: Sustainable Development Goal 7 - Affordable and Clean Energy and Funding Outcome

Field-Weighted Citation Impact for both the prominent funding agencies is at par of 1.6 which is more than the world average. The highest impact was seen with the publications funded by the Indian Council of Medical Research (ICMR) and Indo-US Science and Technology Forum (IUSSTF) where the funded publications are very small in number having the FWCI of 2.9 and 2.2 respectively which is a very good number and shows the quality. Also, when it comes to the impact of Views and FWVI all the funding agencies are having an incredible impact when compared to the world average of 1.

10.8 Sustainable Development Goal 8: Decent Work and Economic Growth

Sustained and integrated economic development, complete and meaningful jobs for all – visions SDG 8. It reconfirms the interdependence of fiscal, social and environmental policies, as well as full employment. Since 2008, annual employment growth averaged just 0.1 per cent against 0.9 per cent from 2000 – 2007 [44]. This goal seeks to promote economic development that is both sustainable and inclusive for all jobholders, regardless of their ethnicity, race or gender. Ensuring increased levels of economic productivity by way of diversifying, technological advancement and innovation.

SDG 8 has 12 targets: Which aims at maintaining per capita economic development in line with national contexts, With a minimum of 7% annual increase of gross domestic product in less developed nations. Diversifying, technological enhancement and development, which boosts economic productivity. Stimulating the formalization, expansion of MSME businesses, growth-oriented approaches that encourage constructive activities, decent employment generation, entrepreneurship, innovation and creativity. Improving global resource efficiency in production and consumption, in line with the 10-year plan of sustainable production and consumption programs, with developed nations leading the way. By 2030, both male and female, including young people and individuals with disabilities will have productive jobs, fair pay for an equivalent job. Reducing the percentage of unemployment. Taking concrete and successful steps to end forced labour, modern-day enslavement and human trafficking as well as the banning and abolition of the most heinous types of child labour, such as procurement and using of children for work by 2030. Securing workers' fundamental rights and enhancing safe working conditions, also migrant workers particularly female migrants and those in uncertain jobs. Enhancing the ability of domestic financial institutes to promote, extend universal access to financial services. Developing and adopting a global plan for youth employment by 2030 as well as the International Labor Organization's Global Jobs Pact [40].

- **The outcome of funded research grant related to Decent Work and Economic Growth**

Figure 35 shows three graphs representing the information regarding the funding agencies that have research publications regarding SDG8, the impact of views and its field-weighted impact on funded publications and the impact of citations and its field-weighted citations on funded publications for the year 2010-2019. Here to interpret Figure 35, we consider only the Indian Funding Agencies.

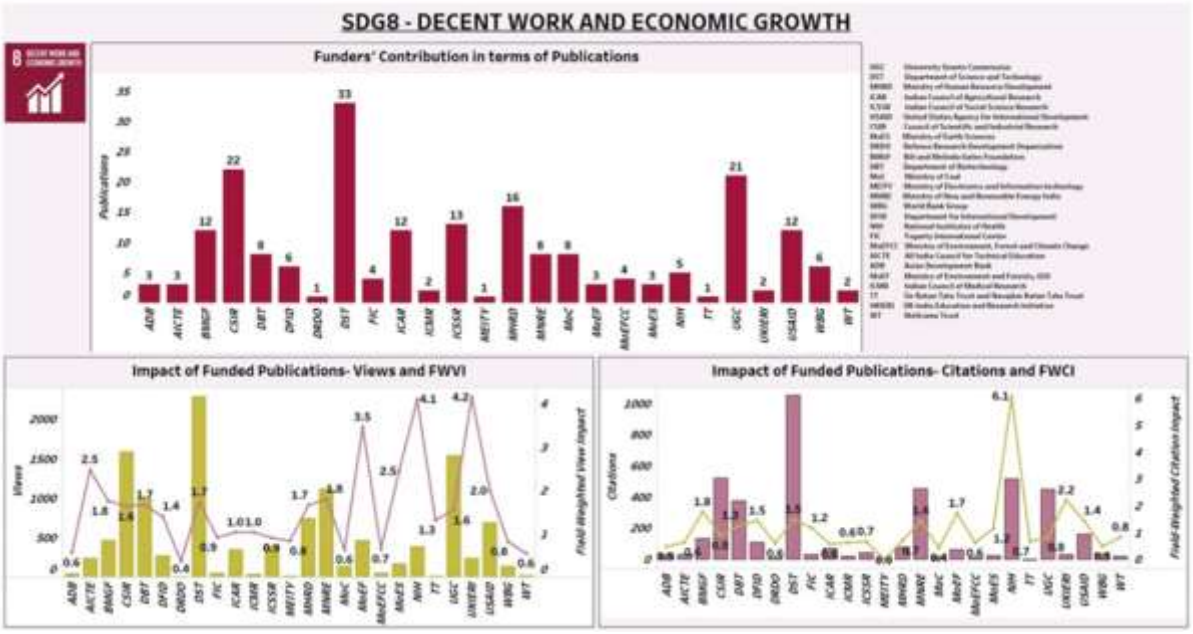

Figure 35: Sustainable Development Goal 8 - Decent Work and Economic Growth and Funding Outcome

The highest number of publications were funded by the Department of Science and Technology (DST) followed by the Council of Scientific and Industrial Research (CSIR) and University Grants Commission (UGC) being the prominent funders to fund the publications related to the goal of Decent Work and Economic Growth in the country. Looking at the impact of the same, publications funded by DST is having a good citation count and the view count and the FWCI and FWVI of the same are more than world average which is quite a good impact. While the publications funded by CSIR, though having a good number of scholarly output and Citation count, the impact of the same is 0.9 which also should have been more than the world average 1. Publications funded by UK India Education and Research Institute (UKIERI) is having an incredible impact on FWCI 2.2 and FWVI 4.2 with a smaller number of publications, citations and views.

10.9 Sustainable Development Goal 9: Industry Innovation and Infrastructure

The tale of industrial growth has shaped the path of our history as a community of countries in significant ways. The industry has revolutionized our economy and spurred huge transformations in our society, from the earliest steam engines to the first assembly lines to

current fully global production networks and procedures. Our development, however, has lagged broad swaths of the population behind due to a lack of sustainable practices and facilities. Several nations have relied on investments in transportation, agriculture, power and information and communications technology to drive economic development and empower communities.

Providing resilient groundwork. Promoting comprehensive and sustainable industrialization, and fostering innovations are all goals of SDG 9 by Awakening vibrant and challenging economic forces that create jobs and wages. Aspiring for flexibility (engineering and infrastructure) as well as urban resilience are all part of this objective. It understands that humankind's potential to connect and interact effectively, transport human and things swiftly, generate new talents, professions and technologies is critical to resolving the 21st century's numerous interconnected economical, societal and environmental concerns [45].

- **The outcome of funded research grant related to Industry, Innovation and Infrastructure**

Figure 36 shows three graphs representing the information regarding the funding agencies that have research publications regarding SDG9, the impact of views and its field-weighted impact on funded publications and the impact of citations and its field-weighted citation impact on publications for the year 2010-2019. Here to interpret Figure 36, we consider only the Indian Funding Agencies.

For the publications related to the vision 2030 for the Industry, Innovation and Infrastructure in the nation, the Department of Science and Technology funded the highest number of

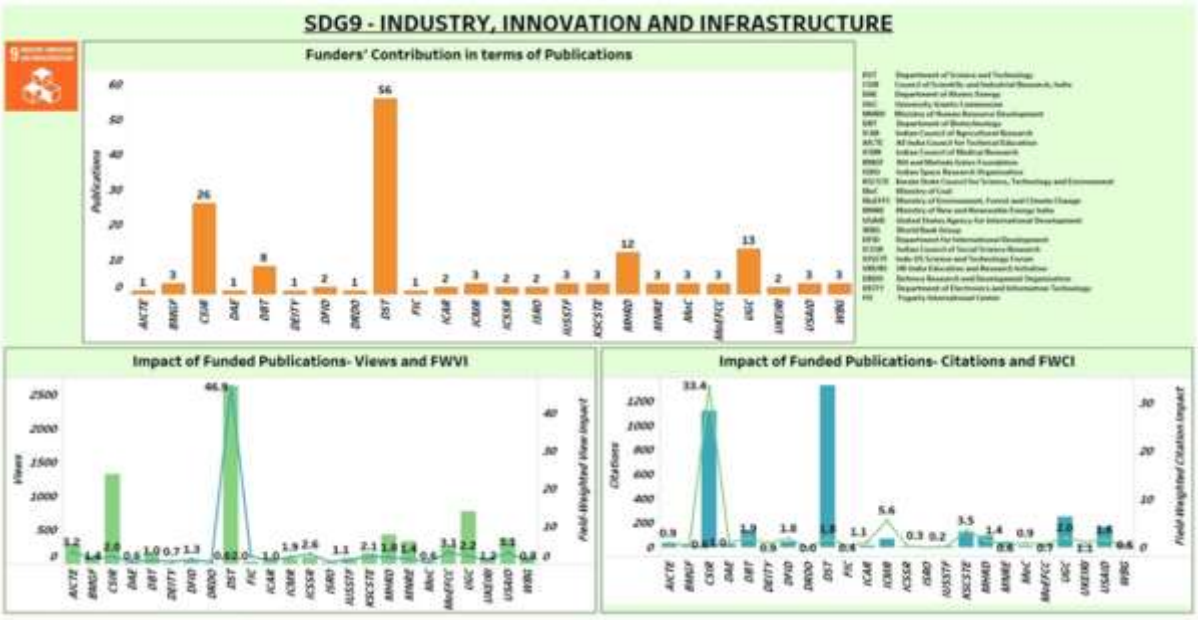

Figure 36: Sustainable Development Goal 9 - Industry, Innovation and Infrastructure and Funding Outcome

publications followed by the Council for Scientific and Industrial Research being the prominent funders with publications having a good number of citations. Field-Weighted Citation Impact for CSIR is 33.4 which is a wonderful impact in comparison to the world average 1. DST is having a greater impact on FWVI that is 46 times greater than the world average 1.

10.10 Sustainable Development Goal 10: Reduced Inequality

The goal here is to "Reduce inequality within and among countries".

This goal has 10 targets and they are achieving and maintaining income growth for the bottom 40% of the population at a rate faster than the national average by 2030, empowering and encouraging all people's social, economic, and political inclusion regardless of age, gender, condition, colour, culture, origin, belief or socioeconomic status by 2030, ensuring equal opportunity to every individual, implementing effective laws to overcome the same. Ensuring that developing countries have a larger say and involvement in worldwide financial decision-making to create more reliable, effective, transparent and genuine institutions [40].

Income disparity is on the rise: the wealthiest 10% of the world control up to 40% of worldwide income, while the poorest 10% gain just 2–7%. Inequality in developing countries has risen by

11% as population growth is taken into account. These inequalities necessarily require effective policies that promote low-income earners and encourage economic opportunity for all people, regardless of gender, colour or nationality.

- **The outcome of funded research grant related to Reduced Inequality**

Figure 37 shows three graphs representing the information regarding the funding agencies that have publications under SDG10, the impact of views and its field-weighted view impact on funded publications and the impact of citations and its field-weighted citation impact on funded publications for the year 2010-2019. Here to interpret Figure 37, we consider only the Indian Funding Agencies.

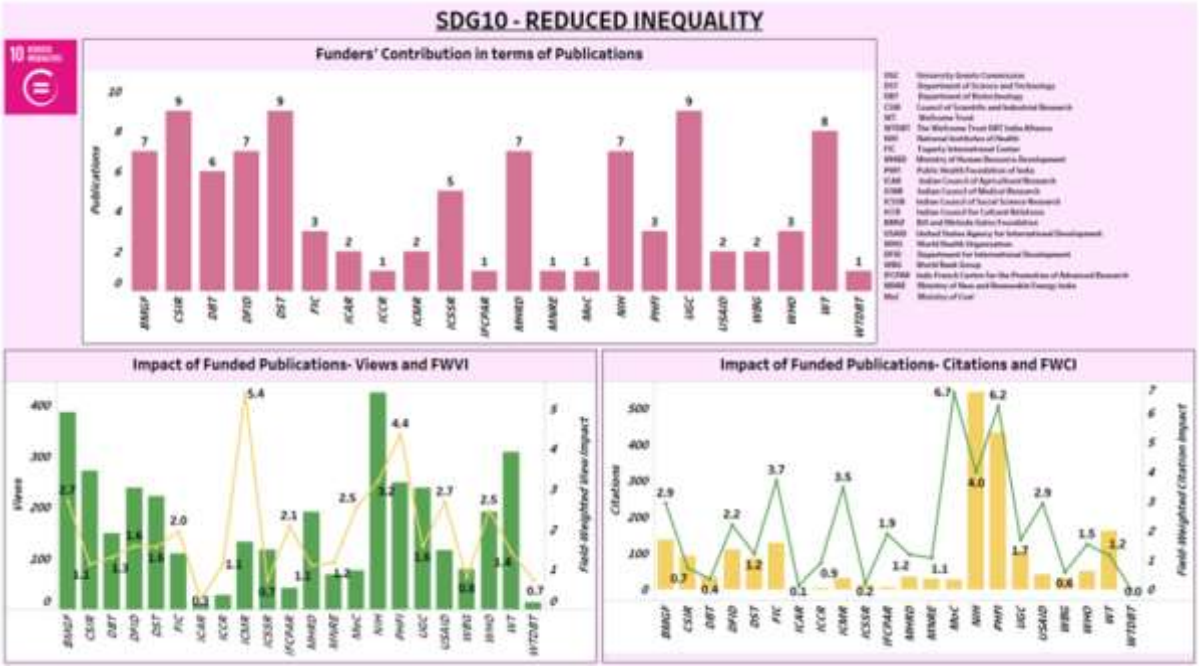

Figure 37: Sustainable Development Goal 10 - Reduced Inequality and Funding Outcome

We see that for SDG10, the Council of Scientific and Industrial Research (CSIR), Department of Science and Technology (DST) and University Grants Commission (UGC) have the highest number of publications followed by the Ministry of Human Resources Development (MHRD). Now coming down to the impact of Views and Field-Weighted Views, we see that the FWVI of the Indian Council of Medical Research (ICMR) is 5.4 which is more than the world average 1 even though they do not have many publications. The FWVI of CSIR, DST and UGC is 1.1,

1.6 and 1.6 respectively which is a good number and more than the world average. The FWCI of the Ministry of Coal (MoC) is 6.7 which is six times more than the world average. CSIR is one of the highest contributing funders has a citation impact of only 0.7 which could have been more than the world average if proper discussions and visibility are given to the publications. DST and UGC being the other two highest contributing funders have a citation impact of 1.2 and 1.7 respectively which is more than the world average.

10.11 Sustainable Development Goal 11: Sustainable Cities and Communities

Half of humanity 3.5 billion people live in cities today, and this number will continue to grow. Because the future will be urban for a majority of people, the solutions to some of the greatest issues facing humans poverty, climate change, healthcare, education must be found in city life. This topic is of great importance to any country researchers and a burning topic to ask for funding. The realtioship between population, life style, food, pollution etc. are topic which comes under this and can be a societal problem which need deep research and solutions.

- **The outcome of funded research grant related to Quality Education**

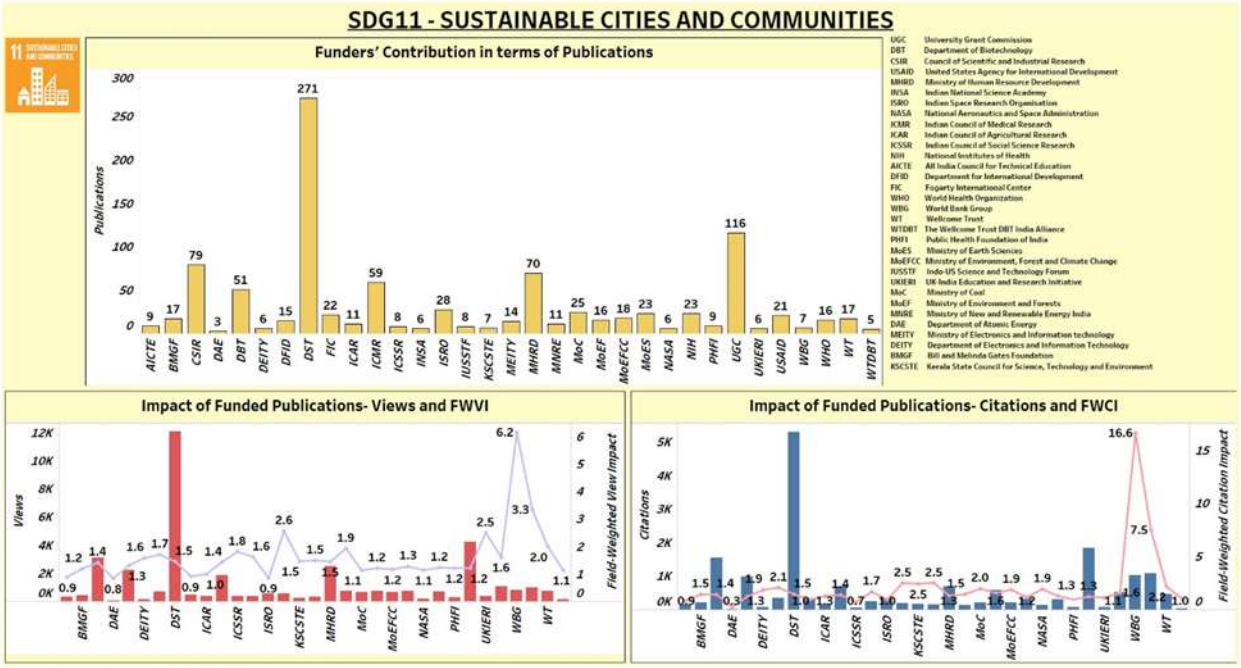

Figure 38: Sustainable Development Goal 11: sustainable cities and communities and Funding outcome

Figure 38 shows three graphs representing the information regarding the funding agencies that have research publications regarding SDG11, the impact of views and its field-weighted impact on funded publications and the impact of citations and its field-weighted citation impact on publications for the year 2010-2019. Here to interpret Figure 38, we consider only the Indian Funding Agencies.

The highest number of publications were funded by the Department of Science and Technology (DST), CSIR, University Grants Commission (UGC) and MHRD and these are the prominent funders in India. Looking at the impact of the same, the citation count and the field weighted citation impact of all the funding agencies looks promising with more than the world average in FWCI. The funders who have funded got the highest number of publications. Whereas the view count and the view impact metrics also showing light on the quality of research work that happened in India.

10.12 Sustainable Development Goal 12: Responsible Consumption and Production

The goal here is about ensuring sustainable production and consumption patterns. Its purpose is to ensure that resources are used efficiently, that energy efficiency is improved, that durable infrastructure is built, that essential services are available to all, that sustainable and quality jobs are available, and that everyone has a better standard of living.

SDG12 has eleven targets to achieve by 2030 and they are as follows:

Implement the 10-year Framework of Programs on Sustainable Consumption and Production Patterns including all countries throughout the globe with developed nations leading it, to efficiently use the natural resources by 2030, to reduce food wastage, including post-harvest wastage and to reduce the wastage of food per capita by 50% at production and consumption levels across the globe, to achieve environment-friendly management of chemicals and all pollutants during their life cycles, compliant with agreed-upon international agreements, drastically decrease their emission to atmosphere, ocean, land to limit their negative effects on

individuals and society, to gradually minimize junk emission through its interception, reduction, and reuse, to motivate businesses to adopt green technology into their supervision session. Assisting developing nations in strengthening their research and engineering capacities which generates employment and encourages local lifestyle and products and to eliminate market perverse incentives that favour wasteful utilization and reduce the potential negative consequences for developing countries in a way that protects the poor and vulnerable populations [40].

- **The outcome of funded research grant related to Responsible Consumption and Production**

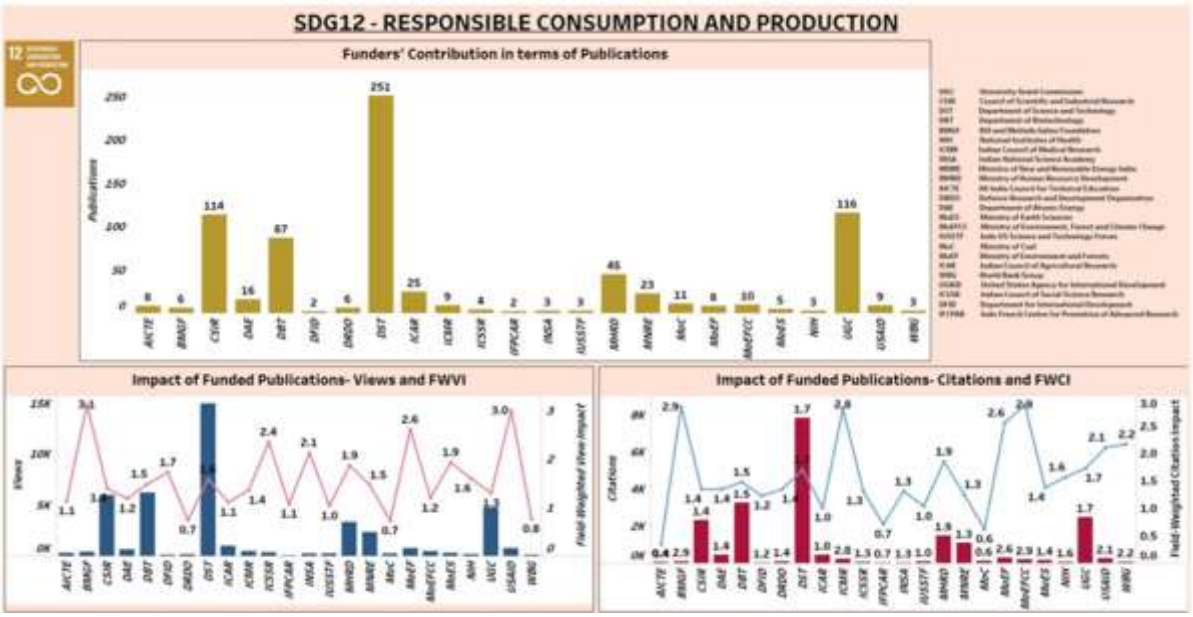

Figure 39: Sustainable Development Goal 12: Responsible Consumption and Production and Funding outcome

Figure 39 shows three graphs representing the information regarding the funding agencies that have funded and the publications regarding SDG12, the impact of views and its field-weighted view impact on funded publications and the impact of citations and its field-weighted citations on funded publications for the year 2010-2019. Here to interpret Figure 39, we consider only the Indian Funding Agencies.

The highest number of publications was first to the credit of the Department of Science and Technology (DST) followed by the University Grants Commission (UGC) and Council of

Scientific and Industrial Research (CSIR) and got the credit being the prominent funders to fund the publications related to the goal of Decent Work and Economic Growth in the country. Looking at the impact of the same, publications funded by DST is having a good citation count and the view count and the FWCI and FWVI of the same are more than the world average which is 1. The Citation and view count of CSIR and UGC and their impact are almost at par. Publications funded by the Indian Council of Medical Research (ICMR) is having a good impact showing FWCI 2.8.

10.13 Sustainable Development Goal 13: Climate Action

Changing climate jeopardizes most of mankind's greatest achievements, including its long-term objectives. Climate change is having a significant impact on our day to day living and the sustainability of our societies. People experience altering atmospheric conditions, increasing sea levels, extreme weather occurrences as a result of climate change. Greenhouse emissions which are caused by humans are causing this change, are rising continuously. Without actions, the earth's average surface temperature is forecasted to climb during the twenty-first century, surpassing 3 degrees Celsius with some parts of the globe forecasted to burn significantly more. The weakest and most marginalized people are the ones who will be most impacted [46].

SDG 13 strives at taking immediate action to combat this climate change and its consequences. The goal comprises targets that must be met by the year 2030. The goals address a wide variety of topics related to climate change such as improving the resilience and adaptation capabilities in the face of climatic condition threats and environmental disasters worldwide. Incorporating global warming countermeasures into federal priorities, plans and strategies. Enhancing climate change actions, adaptability, impact depletion and emergency preparedness through education, awareness campaigns and technical and institutional competence. Standardizing commitments of developed nation members to the framework of United Nations agreement on climate change to mobilize $100 billion per year from all sources by 2030 meeting the demands

of developing nations in the background of constructive adaptation measures and accountability in execution. Supporting systems for building capacity for efficient climate change design and governance, with an emphasis on women, youths and regional and disadvantaged populations [40].

- **The outcome of funded research grant related to Climate Action**

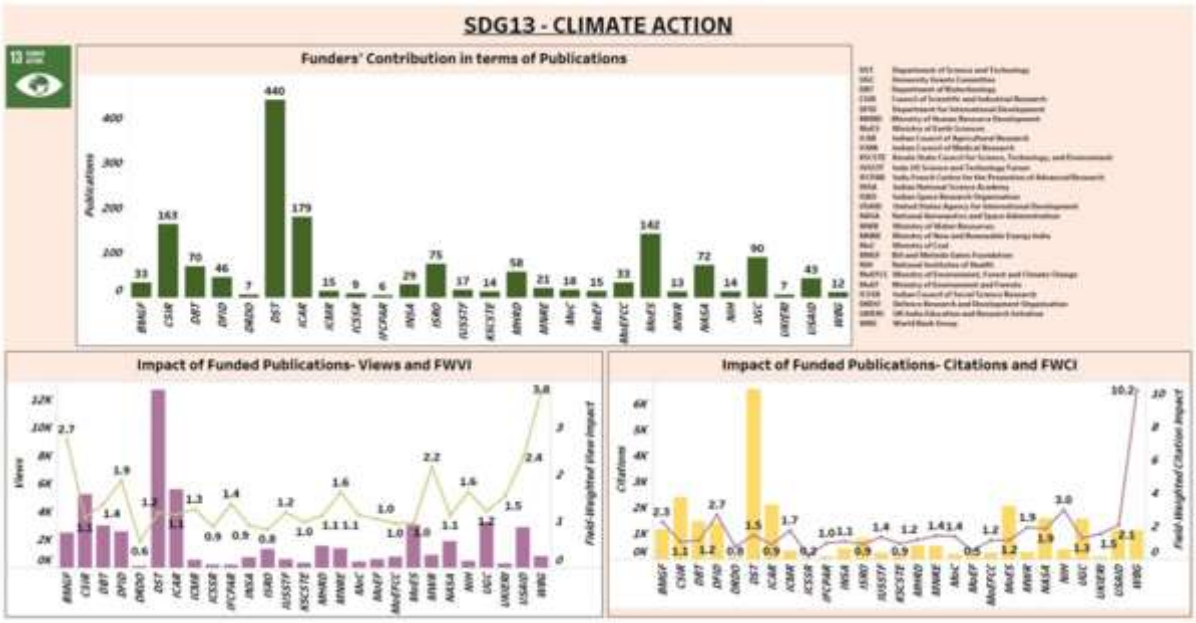

Figure 40: Sustainable Development Goal 13: Climate Action and Funding outcome

Figure 40 shows three graphs representing the information regarding the funding agencies that have funded research and the publications regarding SDG13, the impact of views and its field-weighted view impact on funded publications and the impact of citations and its field-weighted citation impact on funded research publications for the year 2010-2019. Here to interpret Figure 40, we consider only the Indian Funding Agencies.

For the publications related to the vision 2030 for the Climate Action, the Department of Science and Technology scored the highest number of publications followed by the Indian Council of Agricultural Research (ICAR), Council for Scientific and Industrial Research (CSIR) and Ministry of Earth Sciences, Government of India (MoES) being the prominent funders with publications having the good number of citations. Field-Weighted Citation Impact for all the prominent funding agencies are at almost par and are more than the world average,

though the scholarly output for MoES and CSIR is less than that of DST funded publications, the impact of both are considered to be more impactful.

10.14 Sustainable Development Goal 14: Life Below Water

Humans are a land-dwelling species, but we depend more on our oceans than we can imagine. Oceans cover close to three-quarters of the Earth's surface, contain 97% of the Earth's water, and represent 99% of the living space on the planet by volume. Over three billion people depend on marine and coastal biodiversity for their livelihoods. Globally, the market value of marine and coastal resources and industries is estimated at USD 3 trillion per year or close to 5% of global GDP. There can be very important areas that need focussed. The area can be the targets under SDG 14, namely a) marine pollution, b) ocean and climate and c) sustainable use of marine and ocean resources. Sustainable Development Goal 14 commits countries to unite over what is a truly global responsibility – the protection of our oceans and the lives that depend on them. These are the areas that need serious research and funding.

- **The outcome of funded research grant related to Life Below Water**

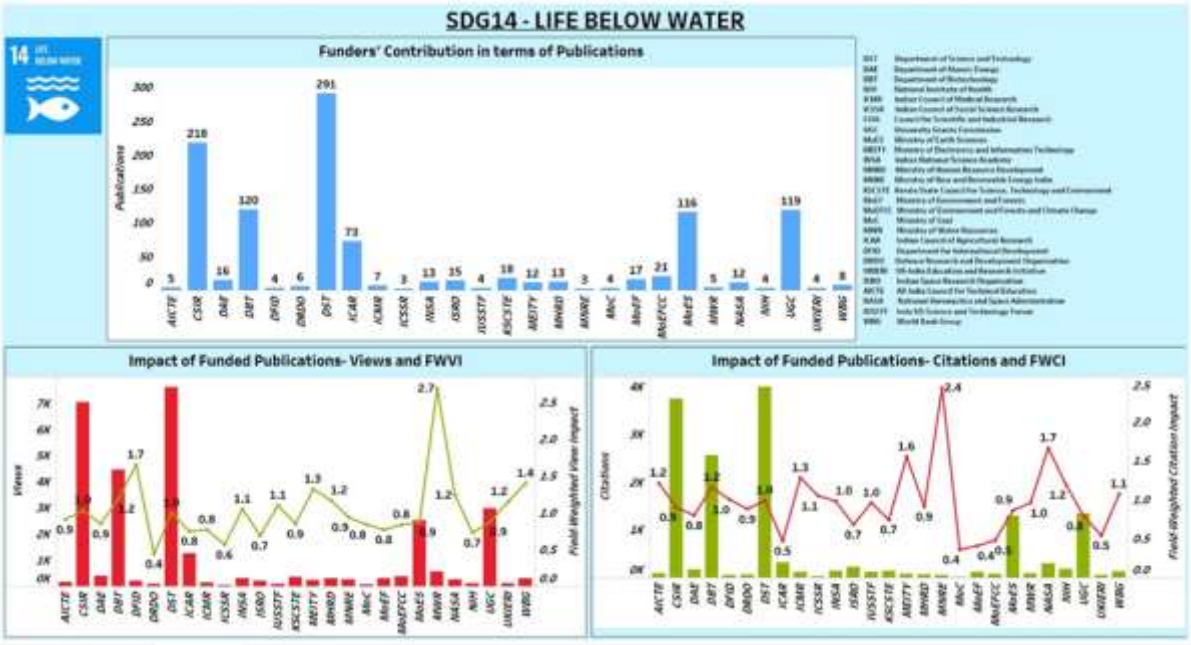

Figure 41: Sustainable Development Goal 14: Life Below water

Figure 41 shows three graphs representing the information regarding the funding agencies that have funded research and the publications regarding SDG14, the impact of views and its field-

weighted view impact on funded publications and the impact of citations and its field-weighted citation impact on funded research publications for the year 2010-2019. Here to interpret Figure 41, we consider only the Indian Funding Agencies.

For the publications related to the vision 2030 for the Life below Water, the Department of Science and Technology scored the highest number of publications followed by the Council for Scientific and Industrial Research (CSIR), DBT, Ministry of Earth Sciences, Government of India (MoES) and UGC being the prominent funders with publications having the good number of citations. Field-Weighted Citation Impact for all the prominent funding agencies are at almost par and are more than the world average, though the scholarly output for MoES and CSIR is less than that of DST funded publications. The impact of all is considered to be more powerful with more than the world average.

10.15 Sustainable Development Goal 15: Life on Land

The protection of our land resources must be a high priority if we are to make a transition to a more sustainable society and the researcers are the thnk tank who do research and tranfsre the result to the society. Forests cover nearly 31 per cent of our planet's land area. From the air we breathe to the water we drink, to the food we eat to the forests which sustain us.

When we think about it, around 1.6 billion people depend on forests for their livelihood. Almost 75 per cent of the worlds poor are affected directly by land degradation. Forestes are home for 80 per cent of all terrestrial species of animals, plants and insects. And of the 8,300 animal breeds known, 8 per cent are extinct and 22 per cent are at risk of extinction. Rapid urbanization, increasingly affluent lifestyles and changing food consumption patterns and overall economic growth trends are increasing the demand for resources and services and exerting increasing pressure on ecosystems all over the Asia-Pacific Region.

- **The outcome of funded research grant related to Life on Land**

Figure 42 shows three graphs representing the information regarding the funding agencies that have funded research and the publications regarding SDG15, the impact of views and its field-weighted view impact on funded publications and the impact of citations and its field-weighted citation impact on funded research publications for the year 2010-2019. Here to interpret Figure 42, we consider only the Indian Funding Agencies.

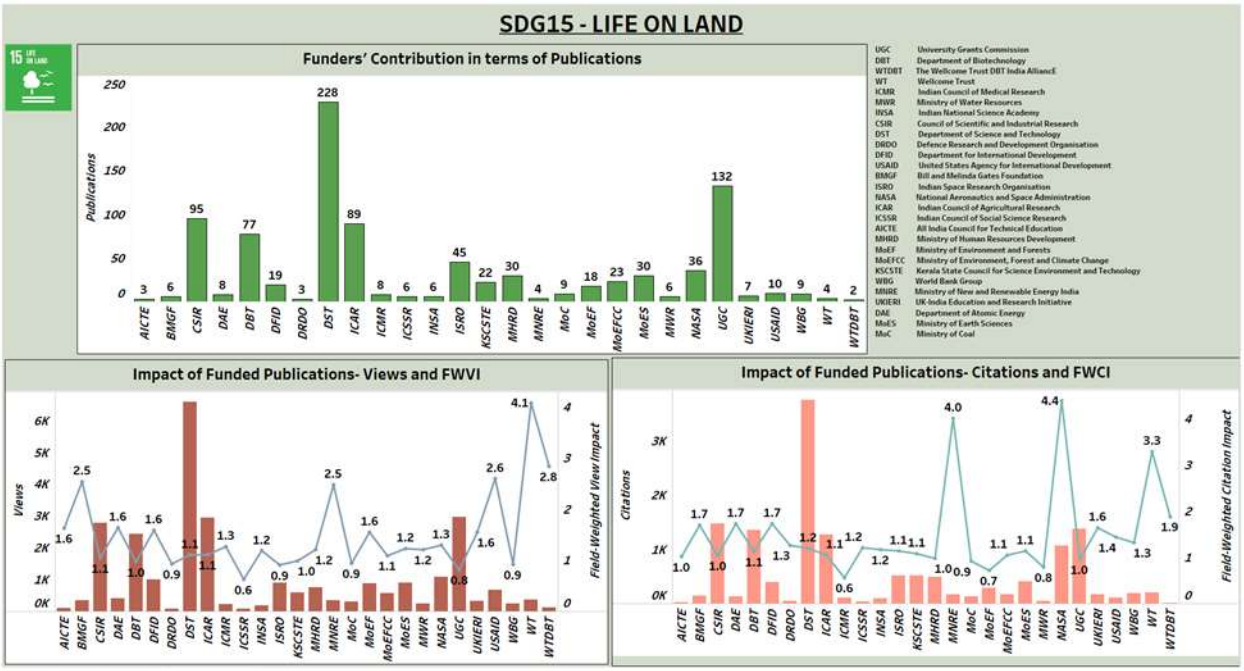

Figure 42: Sustainable Development Goal 15: Life on Land

For the publications related to the vision 2030 for the Life on Land, the Department of Science and Technology scored the highest number of publications followed by CSIR, UGC, DBT, ICAR and ISRO being the prominent funders with publications having a good number of citations. Field-Weighted Citation Impact for all the prominent funding agencies are at almost par and are more than the world average, though the scholarly output for MHRD, ISRO is less than that of DST funded publications. Still, the overall impact is more than the world average.

10.16 Sustainable Development Goal 16: Peace, Justice and Strong Institutions

Sustainable Development 16 is about "Peace, Justice and Strong Institutions".

Any modern democracy requires empathy and a strong moral compass. Oppression, inequality, and corruption continue to be prevalent, ripping at the foundations of society.

SDG 16 has twelve targets and they are as follows:

To reduce all types of aggression and their associated death rates globally, to stop child abuse, oppression, smuggling and other types of violence and torture against children, at the regional and international levels to encourage the law and order and ensure that everybody has fair access to justice, reducing illegal movements of finance and weapons, improving retrieval and restoration of stolen goods, tackling crimes, to lessen corruption and fraud in all aspects to a significant extent, at all stages to create organizations that are reliable, responsible, and open, at all levels to make sure that judgement call is flexible, transparent, interactive, and representative, to expand and boost the involvement of developing countries in global governance institutions, to ensure that everybody has a valid legal identity, like birth registration by 2030, in compliance with national laws and international conventions, to ensure public awareness and participation to information and to uphold their fundamental rights, to strengthen appropriate public institutions, as well as through global cooperation, to build development at all levels to avoid crime and fight terrorism and corruption, particularly in developing countries, for sustainable growth, to promote and uphold equitable laws and regulations [40].

- **The outcome of funded research grant related to Peace, Justice and Strong Institutions**

Figure 43 shows three graphs representing the information regarding the funding agencies that have funded research and the publications regarding SDG16, the impact of views and its field-weighted impact on funded publications and the impact of citations and its field-weighted citation impact on funded publications for the year 2010-2019. Here to interpret Figure 43, we consider only the Indian Funding Agencies.

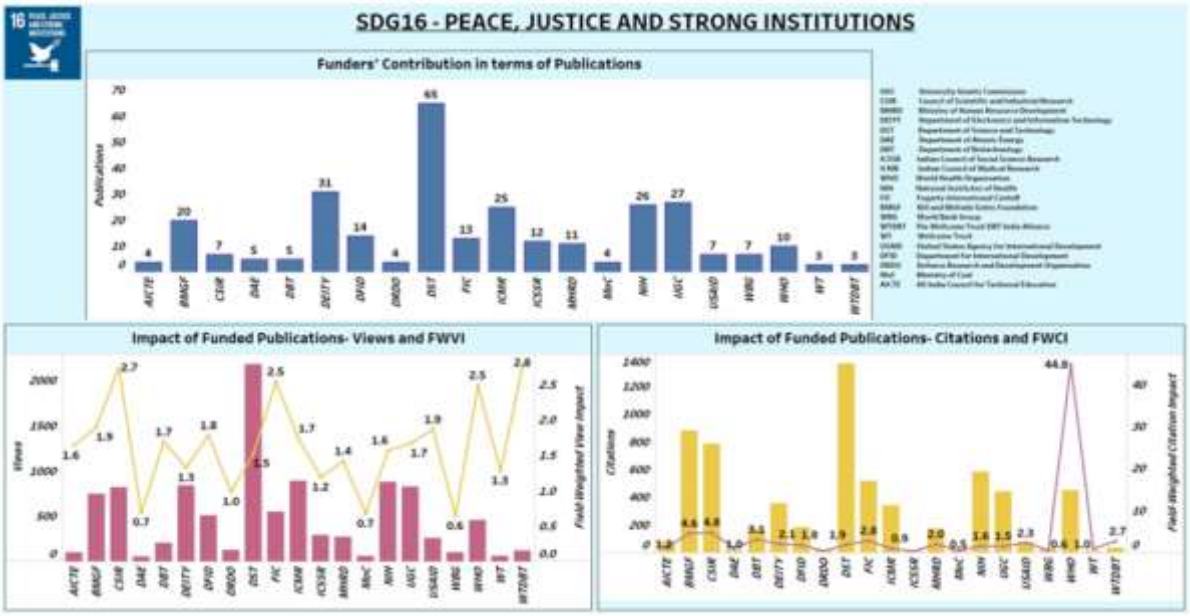

Figure 43: Sustainable Development Goal 16: Peace, Justice and Strong Institutions

We see that for SDG16, the Department of Science and Technology (DST) has funded the highest number of publications followed by the Department of Electronics and Information Technology (DEITY).

Now coming down to the impact of Views and Field-Weighted Views, we see that the FWVI of Wellcome Trust Department of Biotechnology India Alliance (WTDBT) is 2.8 which is double the world average, followed by the Council of Scientific and Industrial Research (CSIR) with 2.7 as the impact score. But we see that even though the publications funded by DST has the highest number of views, their impact is only 1.5 which is more than the world average.

11. Total Publications in India Versus Funded Publications

Figure 44 shows the visual representation of total publications published in India for sustainable development goals versus the funded ones supported by the Indian funding agencies. The ratio of funded publications against the non-funded ones is very small in number. This could be because of many reasons such as factors that influence research funding, the priorities of research funders and associates [47] where there could be a lack of priority for the SDGs.

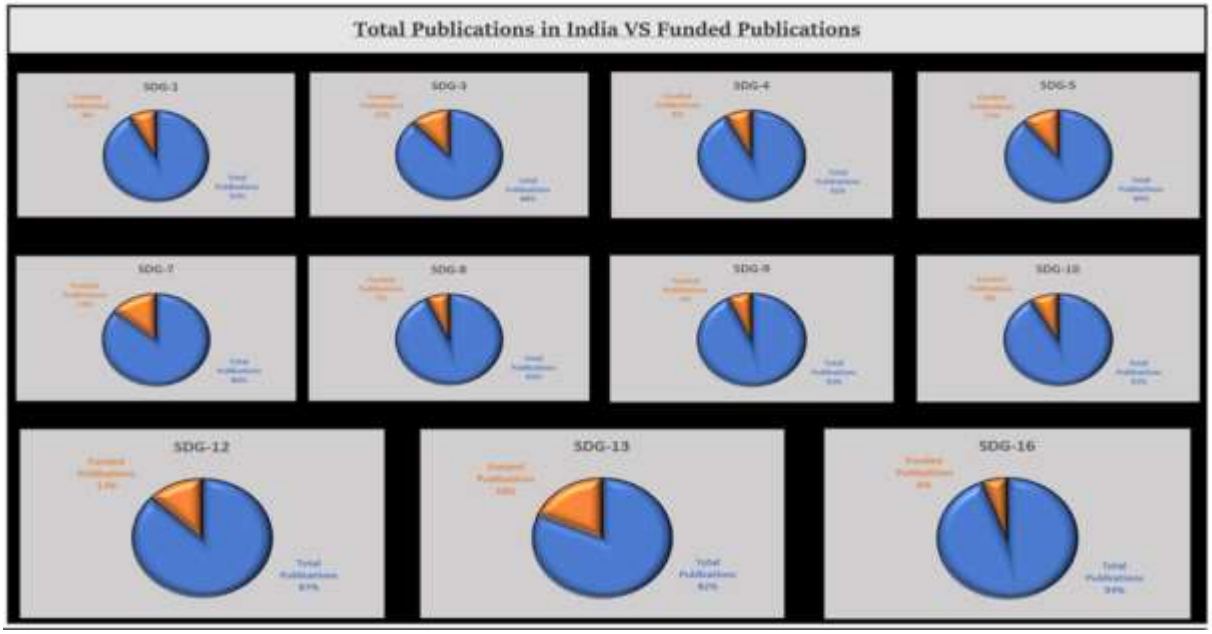

Figure 44: Total Publication in India to SDGs verses Funded Publications

The problem facing while going for pulication and opting to publish in open accces journals. The fee waiver for article processing charges is not accessible to authors who mention the fund details. This kind of problem forces the author while mentioning the fund details in the acknowledgement part while submission. Authors negligence towards reporting fund details etc contributes to the non-reporting of research funds where it becomes very difficult to record the funding details.

For the achievement of UN defined 17 goals of sustainable development, there is a call to scale up to influence through game-changing steps across funding around the world. As we already know, research publications that are funded have a better quality than the ones which are not funded [24], the reason being that they have the money and support to get access to the necessary resources for the study and hence shoot up in the funding of such researches is very crucial. According to (Lakhotia, 2018), a growing number of research proposals are being rejected for funding by government organizations. This situation could indicate either weak proposal quality or a more cutthroat scenario, more prolific researches are more credible for funding. Research should be supplemented with effective collaboration geared towards mutual

learning [48] which enhances funding chances as funding agencies encourage dynamic research collaborations as part of their funding norms.

12. Survey Report

The survey report is not satisfactory because of COVID 19 pandemic situation throughout the country and state. The unavailability of researchers on the campus and lockdown in various regions of the state restricted our survey in meeting the institutional heads, research directors and finance officials of the 30 institutions covered. The data collected using a survey questionnaire and focused group discussions were evaluated, analysed and plotted.

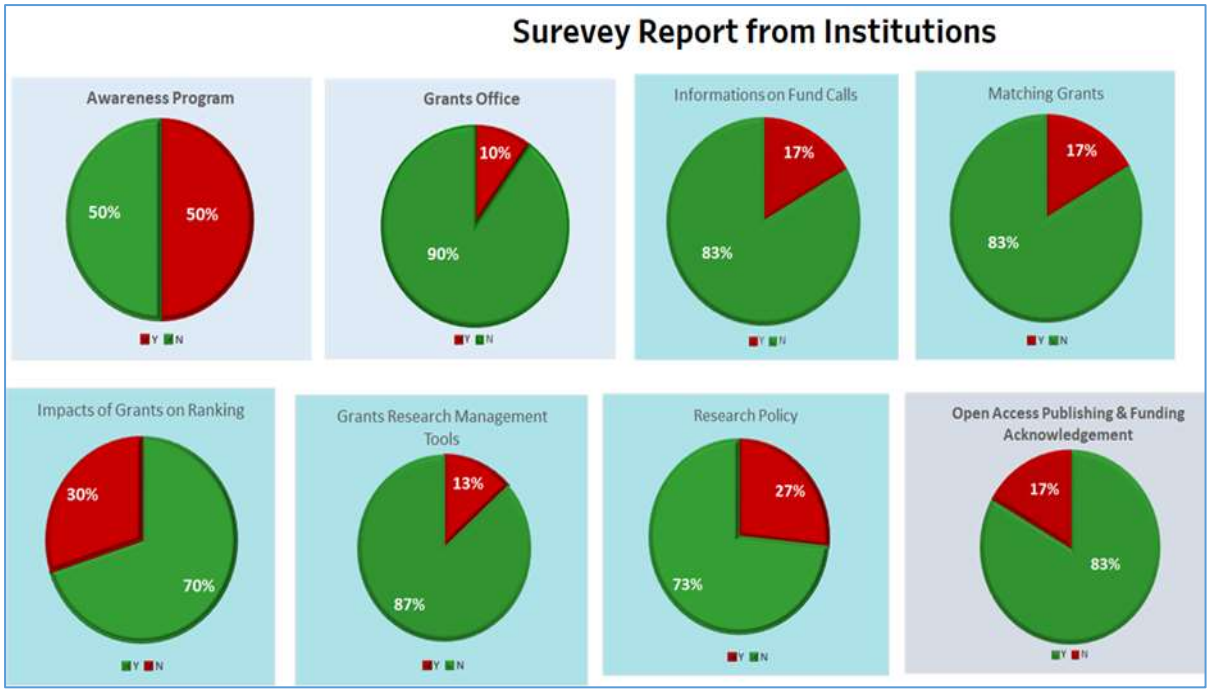

Figure 44: Analysed data for various questions asked to the Institutional Heads

Various questions related to the institutional initiative on research funds and pre and post-grant management such as the awareness on grant calls, setting up of, the importance of grants office, matching grants from institutions, the importance of grants on university reputation and ranking, the need of research policy etc. are discussed and collected during the survey are plotted here. Among the 30 institutions that visited and collected the data major problem, they have expressed is open access publishing and funding acknowledgement. The need for budget provision for publishing in open access journals while allocating a project to a PI. Among 30

institutions visited only 10% are aware of and find out that grants office is needed for the smooth functioning of the grant management system.

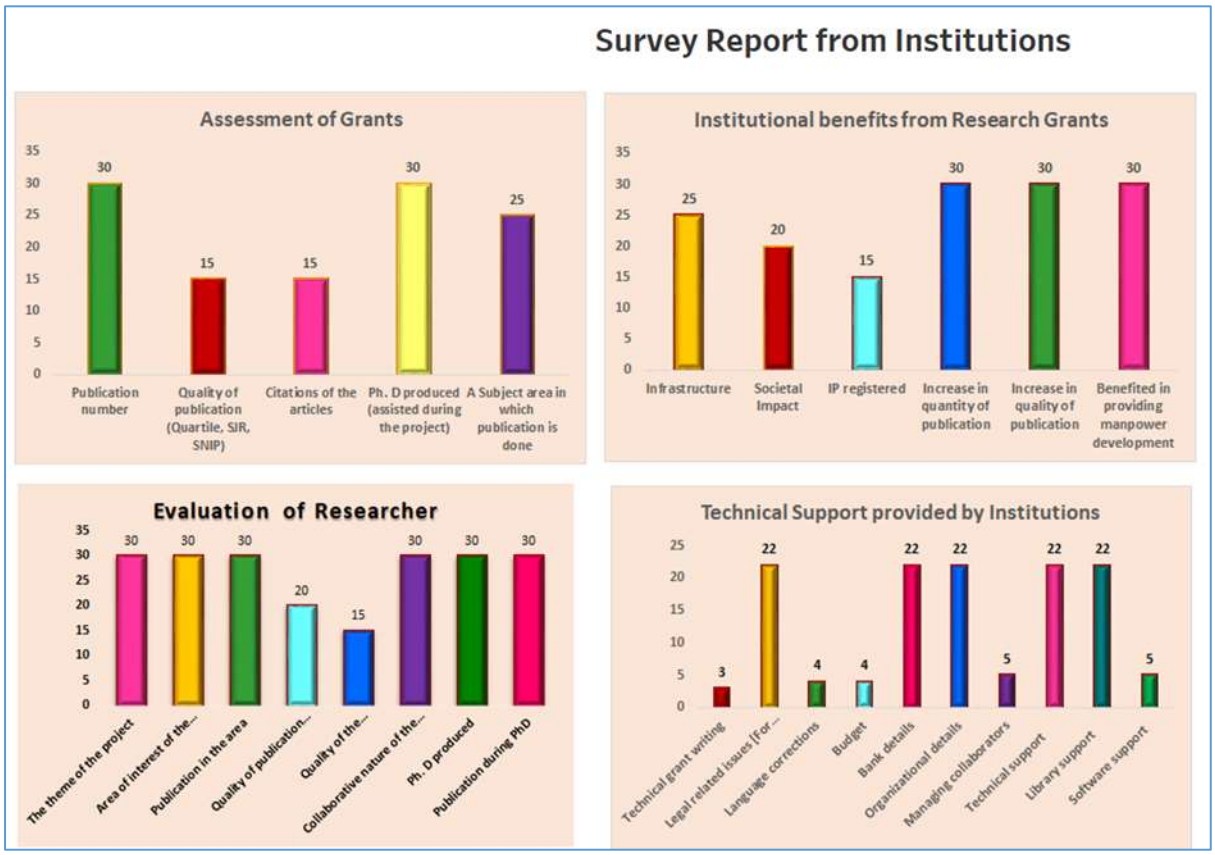

Figure 45: Analysed data for various questions asked to the Institutional Heads

Among the survey population, 50% are doing the awareness classes on the importance of research grants, grant writing, budgeting, legal aspects of grants etc., 83% of the survey population is circulating the fund calls to the institutions. 87% are not having a research grant management tool in their institution, but 70% are aware of the importance of grants in the university ranking, 73% of the population doesn't have a research policy or strategic planning for the promotion of the research fund related activities. The important note here for the funding agencies is that while going for open access publication most of the time researchers had to avoid the acknowledgement part so that they can avail the article processing charge (APC) fee waiver given by the publisher. This can be avoided by providing budget provisions while sanctioning the research grant to the PI. Implementation of provision This will be a great initiative from the funding agencies if they make provisions to handle APC charges while

budgeting. While quantifying the research output impact we can easily track all funding data from the acknowledgement as data is the brain of intellectual implementation to societal excellence.

12. Conclusion

As quoted by Albert Szent-Gyorgyi – "Research is to see what everybody else has seen, and to think what nobody else has thought."

Research being the prime source of human development has played a crucial role throughout human evolution. Up to the present, research- either scientific or non-scientific, is the mean of proving theories across the globe. Had the early civilization not been curious about the sky, then the current generations would be unaware of the presence of various galaxies and celestial bodies. Many years of research has led to the civilized society we belong to today that is equipped with knowledge and tools to move forward.

Funding distribution in the state of Karnataka is quantified and plotted based on the Subject area. The allocation to institutions by different Indian funding agencies during the year April 2005 to March 2010 and from April 2010 to March 2017 is collected and plotted using Tableau software. From the data, we can observe that in terms of funding and the impact of funding as research in India, the Department of Science and Technology (DST) have funded the highest grant amount and thus being the prominent funding agency in India and the outcome credited to DST itself. Followed by the DST Department of Biotechnology (DBT), CSIR, DSIR, ICMR, UGC etc with very good output and impact. Keeping the high quality and quantity metrics we have tried to create a ranking for funding agancies taking the data from Scopus database and analysisng it using SciVal analytical tool. Top funding agencies like CSIR, DBT, DSIR, DST and UGC ranked 1st in quantity and quality both. The ranking is satisfying the funding amount they have given for the last ten years to the Indian Institutions.

The recommendations after the research analysis goes with:

- Evaluate the result of Funding and SDG relation for future research grant allocation
- Considering budgeting for Article processing chanrges for promoting Open Acess publishing
- Making mandate to acknowledge funding details life long while conduction relted research
- Funding distribution should be equally to other instititons also apart from premier institutions
- Need of grants office should make mandatory to all the Institutions who are applying for grant.

CHAPTER- VI

13. Findings/Summary and Recommendations

United Nation's vision 2030, with its 17 sustainable development goals, lays out an ambitious blueprint for our planet's long-term viability. It constitutes a significant shift in policy toward research, giving the scientific fraternity a socially and politically determined mandate to contribute to the attainment of the SDGs and that research will be among the key important action plan for vision 2030, the efforts were made in this study to explore the impact of this research on the quality education and funding in India. Funding distribution in the state of Karnataka is quantified and plotted based on the Subject area. The allocation to institutions by different Indian funding agencies during the year April 2005 to March 2010 and from April 2010 to March 2017 is collected and plotted using Tableau software. From the data, we can observe that in terms of funding and the impact of funding as research in India, the Department of Science and Technology (DST) have funded the highest grant amount and thus being the prominent funding agency in India and the outcome credited to DST itself. Followed by the DST, DBT, CSIR, DSIR, UGC etc with very good output and impact. Keeping the high quality and quantity metrics we have tried to create a ranking for funding agancies taking the data from Scopus database and analysisng it using SciVal analytical tool. Top funding agencies like DST, DBT, CSIR, DSIR, and UGC ranked 1st in quantity and quality both. The ranking is satisfying the funding amount they have given for the last ten years to the Indian Institutions.

The recommendations after the research analysis goes with:

- Evaluate the result of Funding and SDG relation for future research grant allocation
- Considering budgeting for Article processing chanrges for promoting Open Acess publishing
- Making mandate to acknowledge funding details life long while conduction relted research

- Funding distribution should be equally to other instititons also apart from premier institutions
- Need of grants office should make mandatory to all the Institutions who are applying for grant.

14. Research Summary

United Nation's vision 2030, with its 17 sustainable development goals, lays out an ambitious blueprint for our planet's long-term viability. It constitutes a significant shift in policy toward research, giving the scientific fraternity a socially and politically determined mandate to contribute to the attainment of the SDGs and that research will be among the key important action plan for vision 2030, the efforts were made in this study to explore the impact of this research on the quality education and funding in India. Funding distribution in the state of Karnataka is quantified and plotted based on the Subject area. The allocation to institutions by different Indian funding agencies during the year April 2005 to March 2010 and from April 2010 to March 2017 is collected and plotted using Tableau software. From the data, we can observe that in terms of funding and the impact of funding as research in India, the Department of Science and Technology (DST) have funded the highest grant amount and thus being the prominent funding agency in India and the outcome credited to DST itself. Followed by the DST Department of Biotechnology (DBT), CSIR, DSIR, ICMR, UGC etc with very good output and impact. Research outcome as an impact of funded research has been calculated, analysed and visualized. It will give an idea of which funding agency is funding for the promotion of 16 SDGs and it can be a guide when allocating funding in future research areas.

Keeping the high quality and quantity metrics we have tried to create a ranking for funding agencies taking the data from the Scopus database and analysing it using the SciVal analytical tool. Top funding agencies like CSIR, DBT, DSIR, DST and UGC ranked 1st in quantity and quality both. The ranking is satisfying the funding amount they have given for the last ten years to the Indian Institutions.

Among the survey population, 50% are doing the awareness classes on the importance of research grants, grant writing, budgeting, legal aspects of grants etc., 83% of the survey population is circulating the fund calls to the institutions. 87% are not having a research grant

management tool in their institution, but 70% are aware of the importance of grants in the university ranking, 73% of the population doesn't have a research policy or strategic planning for the promotion of the research fund related activities. The important note here for the funding agencies is that while going for open access publication most of the time researchers had to avoid the acknowledgement part so that they can avail the article processing charge (APC) fee waiver given by the publisher. This can be avoided by providing budget provisions while sanctioning the research grant to the PI. Implementation of provision This will be a great initiative from the funding agencies if they make provisions to handle APC charges while budgeting. While quantifying the research output impact we can easily track all funding data from the acknowledgement as data is the brain of intellectual implementation to societal excellence.

The recommendations after the research analysis go with:

- Evaluate the result of Funding and SDG relation for future research grant allocation
- Considering budgeting for Article processing charges for promoting Open Acess publishing
- Making mandate to acknowledge funding details life long while conduction related research
- Funding distribution should be equal to other institutions also apart from premier institutions
- Need of grants office should make mandatory to all the Institutions who are applying for the grant.

15. End project deliverables

The deliverables of the projects are

1. Quantification of the Funding allocated to the Instuitutions in Karnataka state.
2. Quantification of the research output in terms of funding agencies.

3. Evaluation of the publications from various instuitons interms of quantity and quality parameters
4. Evaluation of the Impact of Funding outcome in terms of research output distributed in 16 SDGs
5. Tried to give ranking to the funding agencies on the basis of quantity, quality metrics
6. One research paper published and one communicated for publication (underreview) three manuscripts are readt to communicate.

16. How the outcome of this project will be beneficial to various stakeholders

- The outcome of the project is giving a highlight to the funding agency in terms of publications distributed on the 16 UN SDGs areas of high priority.
- The importance of funding on universal goals that meet the urgent environmental, political and economic challenges facing our world either as poverty, societal hunger, preventing deadly diseases, and expanding primary education to all children, energy consumption, environmental chlleges etc.
- The study tried to quantify the publications and funding allocations and it being an insight to the Institutions, Reaserchers and funders on the importamce of funding acknowkedgment.

17. References

1. Lakhotia, S. C. (2018). Research Fund Crunch, Real or Created, Is Hitting India's Academia on The Wrong Side. Proceedings of the Indian National Science Academy, 98(0).
2. Jayaraman, K. S., & Priyadarshini, S. (2018, September 6). Indian scientists concerned over funding crisis. Retrieved October 20, 2018, from https://www.natureasia.com/en/nindia/article/10.1038/nindia.2018.116
3. Science and technology: key element of India's growth, Ghazanfar Ali Khan, Arab News,20 Feb.2017.
4. India Rankings 2016, National Institutional ranking Framework, Dept. Of Higher educn., HRD, Govt. Of India, (2016)
5. https://ec.europa.eu/research/openscience/pdf/os_skills_wgreport_final.pdf Sethi, M. Higher Education In India: Vision 2030. Fund. Center for Global Development Policy Paper, (31).

6. Dukkipati, U. (2010). Higher Education in India: sustaining long-term growth. South Asia Monitor, 141(01).
7. Abbott, A. (2016). Europe's premier funding agency measures its impact. Nature News, 535(7613), 477
8. Reinhardt, A. (2012). Evaluation in research and research funding organisations: European practices: A report. Strasbourg: European Science Foundation.
9. Hartwig, L. (2006). Funding Systems and Their Effects on Higher Education Systems. Bavarian State Institute for Higher Education Research and Planning, Germany.
10. Van Raan, A. F. (2014). Advances in bibliometric analysis: research performance assessment and science mapping. Bibliometrics. Use and abuse in the review of research performance, 17-28.
11. Reinhardt, A. (2012). Evaluation in research and research funding organisations: European practices: A report. Strasbourg: European Science Foundation.
12. Reddy, K. S., Xie, E., & Tang, Q. (2016). Higher education, high-impact research, and world university rankings: A case of India and comparison with China. Pacific Science Review B: Humanities and Social Sciences, 2(1), 1-21.
13. Joseph, M., & Robinson, A. (2014). Policy: Free Indian science. Nature News, 508(7494), 36.
14. Desiraju, G. R. (2012). Policy: Bold strategies for Indian science. Nature, 484(7393), 159.
15. Jayaraman, K. S. (2012). India prepares to boost science. Nature News.
16. Mukhopadhyay, D. (2014). Post-independence science policy and science funding in India. Current Science, 1983-1987.
17. Yeravdekar, V. R., & Tiwari, G. (2014). Global Rankings of Higher Education Institutions and India's Effective Non-presence: Why Have World-class Universities Eluded the Indian Higher Education System? And, How Worthwhile is the Indian Government's Captivation to Launch World-Class Universities? Procedia-Social and Behavioral Sciences, 157, 63-83.
18. DNA WEB TEAM | Wed, 28 Oct 2015-11: 31am, DNA webdesk
19. Elsevier. (n.d.). SciVal Metric: Views Count. SciVal Metric: Views Count - SciVal Support Center. https://service.elsevier.com/app/answers/detail/a_id/28187/supporthub/scival/p/10961/28187/.
20. Elsevier. (n.d.). *SciVal Metric: Field-Weighted Views Impact*. SciVal Metric: Field-Weighted Views Impact - SciVal Support Center. https://service.elsevier.com/app/answers/detail/a_id/28190/p/10961/supporthub/scival/related/1/session/L2F2LzEvdGltZS8xNjIyNTI3MDkyL2dlbi8xNjIyNTI3MDkyL3NpZC9mVSU3RXJnZHhnRmhrcHNUX1lpVzhPYjZ4UnQxejJSdFJJbVhrVENnZzBwclVYc05Fdzg0TzA0Qll2VE4zdnRqQW0lN0V0S1Y3cGR6SVNuVU90MEU1MERUTWFubGZfQVB2NyU3RUVUbCU3RXlkMHNFS2pEUTA4WU80NXB0STZoUSUyMSUyMQ%3D%3D/.
21. Manoj Jadhav, P. J. (2013, December 30). What's ailing India's research funding agencies? Nature India, pp. 1-2.

22. No money, no research. (2014, October 30). Nature America, pp. 1-1.
23. Private funding for science. (2016, June 29). Nature Methods, p. 1.
24. Elizabeth Hatfield, E. D. (2009). Budgeting, Funding, and Managing Clinical Research.
    a. Methods in molecular biology (Clifton, N.J.), 473, 1-13.
25. Abdolrasoul Jowkar, F. D. (2011). The effect of funding on academic research impact: A case study of Iranian publications. Aslib Proceedings, 63, 593-602.
26. Carter Bloch, M. P. (2014). Developing a methodology to assess the impact of research grant. Evaluation and Program Planning, Elsevier, 43, 105-117.
27. Möller, T. (2019). The Impact of Research Funding Agencies on the Research Performance of five European Countries - A Funding Acknowledgements Analysis. 17th International Conference on Scientometrics & Informetrics (ISSI). Rome.
28. Alice M. Tan, S. X. (2012). Funds promote scientific output. Current Science, 104(4), 542-543.
29. Li Tang, G. H. (2016). Funding acknowledgment analysis: Queries and caveats. Assist, 68(3), 790-794.
30. *India's National Education Policy 2020 aligned to the 2030 Agenda for SDGs*. India CSR Network. (2020, July 30). https://indiacsr.in/indias-national-education-policy-2020-aligned-to-the-2030-agenda-for-sdgs/.
31. Dr Shantesh Kumar Singh & Zeba Rayee. (2020, August 3). SDGs and India's New National Education Policy 2020. Delhi Post. https://delhipostnews.com/sdgs-and-indias-new-national-education-policy-2020/.
32. United Nations Development Programme. (2010). The real wealth of nations: pathways to human development. Palgrave Macmillan.
33. Malik, K. (2014). Human development report 2014: Sustaining human progress: Reducing vulnerabilities and building resilience. United Nations Development Programme, New York.
34. India's National Education Policy 2020 aligned to the 2030 Agenda for SDGs. India CSR Network. (2020, July 30). https://indiacsr.in/indias-national-education-policy-2020-aligned-to-the-2030-agenda-for-sdgs/.
35. Dr Shantesh Kumar Singh & Zeba Rayee. (2020, August 3). SDGs and India's New National Education Policy 2020. Delhi Post. https://delhipostnews.com/sdgs-and-indias-new-national-education-policy-2020/.
36. Gupta, M. D. (2014). State of World Population 2014: The Power of 1.8 billion: Adolescents, Youth and the Transformation of the Future. UNFPA.

37. United Nations. (n.d.). Goal 1: End poverty in all its forms everywhere – United Nations Sustainable Development. United Nations. https://www.un.org/sustainabledevelopment/poverty/.
38. World Bank. (2006). World development report 2007: Development and the next generation. The World Bank.
39. A/RES/71/313: Work of the Statistical Commission ... (n.d.). http://ggim.un.org/documents/A_RES_71_313.pdf.
40. Lane, A. (2017). Open education and the sustainable development goals: Making change happen. Journal of Learning for Development, 4(3), 275-286.
41. United Nations. (n.d.). United Nations, main body, main organs, General Assembly. United Nations. https://www.un.org/en/ga/71/resolutions.shtml.
42. United Nations. (n.d.). United Nations, main body, main organs, General Assembly. United Nations. https://www.un.org/en/ga/71/resolutions.shtml.
43. Sustainable Development Goals: United Nations Development Programme. Sustainable Development Goals | United Nations Development Programme. (n.d.). https://www.undp.org/sustainable-development-goals#affordable-and-clean-energy.
44. Targets for Goal #8: Decent work and economic growth. The 2030 development agenda: Targets for Goal #8: Decent work and economic growth. (2015, September 16). http://ciaris.ilo.org/global/topics/sdg-2030/goal-8/WCMS_403787/lang--en/index.htm.
45. Goal 9: Industry, Innovation and Infrastructure. The Global Goals. (n.d.). https://www.globalgoals.org/9-industry-innovation-and-infrastructure.
46. United Nations. (n.d.). *Climate Change Programs in India | SDG 13 – UN India*. United Nations. https://in.one.un.org/page/sustainable-development-goals/combat-climate-change-sdg-13/.
47. Ali, N., Hill, C., Kennedy, A., & IJsselmuiden, C. (2006). What factors influence national health research agendas in low- and middle-income countries. Record Paper, 5.
48. Schneider, F., & Rist, S. (2014). Envisioning sustainable water futures in a transdisciplinary learning process: combining normative, explorative, and participatory scenario approaches. Sustainability science, 9(4), 463-48

Model Research Summary

Influence of Government Policies and Funding on the Research Output of Government And Private Institutions in India: A Bibliometric and Scientometric Study. 2018-2020, by Sheeba Pakkan, Manipal Academy of Higher education, Manipal. 2021

This work provides a mixed method design -Sequential Explanatory Design (Quan – Qual) of the impact of research publications as an outcome of government research funding as reflected in the publication output reported in Scopus databases and reported by the institutions of Kartanaka state. Funding distribution in the state of Karnataka is quantified and plotted based on the Subject area. The allocation to institutions by different Indian funding agencies during the year April 2005 to March 2010 and from April 2010 to March 2017 is collected and plotted using Tableau software. United Nation's vision 2030, with its 17 sustainable development goals, lays out an ambitious blueprint for our planet's long-term viability. It constitutes a significant shift in policy toward research, giving the scientific fraternity a socially and politically determined mandate to contribute to the attainment of the SDGs and that research will be among the key important action plan for vision 2030, the efforts were made in this study to explore the impact of this research on the quality education and funding in India. This study explores the funding acknowledgments in publications and tried to match the subject area with UN 16 SDGs. It explains various societal impotant topics and the funding already allotted to these ares by the Indian funding agencies.

The analysis uses data from SCOPUS and metrics from SciVal. From the data, we can observe that in terms of funding and the impact of funding as research in India, the Department of Science and Technology (DST) have funded the highest grant amount and thus being the prominent funding agency in India and the outcome credited to DST itself. Followed by the DST,DBT, CSIR, DSIR, UGC etc with very good output and impact. Keeping the high quality and quantity metrics we have tried to create a ranking for funding agancies taking the data from Scopus database and analysisng it using SciVal analytical tool. Top funding agencies like DST, DBT, CSIR, DSIR, and UGC ranked 1st in quantity and quality both. The ranking is satisfying the funding amount they have given for the last ten years to the Indian Institutions.

Annexure I

I am here by submitting the completion report of the project titled: "**Influence of Government Policies and Funding on the Research Output of Government and Private Institutions in India: A Bibliometric and Scientometric Study**."

The objectives of the project are:

1. To quantify the growth of a scientific publication in terms of government funds and policies.
2. To evaluate the productivity and quality of research of an individual, organization and the state of Karnataka in terms of the needs, capacities and funding policies relevant to India.
3. Development of models (metrics) for measuring outputs of S & T investments.
4. Development of suitable indicators, including not only publications, citations, and patents, but also other performance-markers- for example, institute/scientist location, age, per capita funding by Government etc.- for R & D assessment. This is highly significant for developing countries where young scientists trained/returning from abroad find placements in relatively new institutions and are thus handicapped by lack of funding, collaboration possibilities etc.
5. Development of an approach to gauge the value added to R & D efforts by government funding of public and private universities/national labs in the State of Karnataka.
6. A method for assessment of direct and indirect benefits of R & D on research output by public and private universities/national labs in the State of Karnataka.

The study outcome to the society is:

- The study tried to quantify the publications and funding allocations and it being an insight to the Institutions, Researchers and funders on the importance of funding acknowledgment.
- The outcome of the project gives highlights to the funding agency in terms of publications distributed on the 16 UN SDGs areas of high priority.
- The importance of funding on universal goals that meet the urgent environmental, political and economic challenges facing our world either as poverty, societal hunger, preventing deadly diseases, and expanding primary education to all children, energy consumption, environmental challenges etc.

Annexure II

Outcome-based Survey on Funded Research Grant (For Administrators)

Part-A

General Information

1. Name:**……**

2. Gender: Male ☐ Female ☐ Other ☐

3. Role in the University: (Administrator)
   - Research ☐
   - Finance ☐
   - Director ☐
   - Deputy Director ☐
   - Librarian ☐

   Others, please specify ……

4. Experience:
   - 1-5 ☐
   - 5-10 ☐
   - 10-20 ☐
   - 20 and above ☐
   - Others ☐

Part-B

5. Please write the Name of the funding agencies you are aware of (Kindly mention as many as you know (Indian & Foreign), for example (DST, AICTE, BIRIC, CSIR, DBT, WHO, SPIE, SPARC, UKIERI etc.)

   ……
   ……
   ……

6. Do you conduct an awareness programme about information on different research funding agency and fund calls?

   Yes ☐
   No ☐

6a. If yes, how often?

   ……

7. Do you have a grant office? [Grant office: To take care, to disseminate and facilitate the researcher in all grant related work]

   Yes ☐
   No ☐

7a. If yes, please specify

   ……
   ……
   ……

8. Do you intimate your researchers about different fund calls?

   Yes ☐

No ☐

8a. If yes, please specify the media.

Through Email ☐

Website display ☐

Others please specify …….

9. What are the technical supports you provide to a grant applicant? (You can select more than one answer)

Technical grant writing ☐

Legal related issues [For ex. MOU] ☐

Language corrections ☐

Budget ☐

Bank details ☐

Organizational details ☐

Managing collaborators ☐

Technical support ☐

Library support ☐

Software support ☐

Others please specify ……

10. Do your institution support in providing matching grant (For equipment, chemicals, consumables, stationaries etc.) if necessary?

Yes ☐

No ☐

11. Do you think the time to submit the project to the funding agency after the fund call announced is sufficient?

Yes ☐

No ☐

11 a. If No, what do you think the minimum required time should be?

……

12. Do you face any problem in applying for a research grant?

Yes ☐

No ☐

13. After the grant has been sanctioned, are you getting all the instalments regularly?

Yes ☐

No ☐

13 a. If yes, kindly specify the problems faced. (You can select more than one answer)

Sanctioned fund not received during the research period ☐

Delay in the response for quarries to the funding agencies ☐

Others, please specify …….

14. Does your institution support researchers financially (travel, accommodation for presenting the project proposal before funding agency)?

Yes ☐

No ☐

15. What are the technical support your institution providing to the grant recipients? (You can select more than one answer)

Managing the financial part ☐

Providing workspace to manage grant ☐

Providing utilisation certificate ☐

Procuring desired/ required instrument ☐

Others, please specify ……..

16. Do your institutions usually contract the funding agencies for knowing the details?

Yes ☐

No ☐

17. Would you release research funds in the smooth working of the project if the amount sanctioned got delayed from the funding agencies?

Yes ☐

No ☐

18. Do your institutions have a management system to capture the applied/sanctioned and received research grants?

Yes ☐

No ☐

19. Do you have a system to capture the PhD produced out of any research grants?

Yes ☐

No ☐

20. What are the benefits your institution achieved out of the different sanctioned research grants? (You can select more than one answer)

Infrastructure ☐

Societal Impact ☐

IP registered ☐

Increase in quantity of publication ☐

Increase in quality of publication ☐

Benefited in providing manpower development ☐

Others please specify …….

21. In your opinion, whether receiving research grant improve the University in world/ local University ranking?

Highly agree ☐
Agree ☐
Neutral ☐
Disagree ☐
Highly disagree ☐

22. How do you feel the assessment of a grant should be (Apart from main objective achievements)?

Publication number ☐
Quality of publication (Quartile, SJR, SNIP) ☐
Citations of the articles ☐
Ph. D produced (assisted during the project ☐
A Subject area in which publication is done ☐

Others please specify ……

23. How do you feel that the evaluation of the researcher should be for sanctioning the grant?

The theme of the project ☐
Area of interest of the applicant ☐
Publication in the area ☐
Quality of publication (Quartile, SJR, SNIP) ☐
Quality of the applicant(FWCI) ☐
Collaborative nature of the applicant(International/National/Institutional) ☐
Ph. D produced ☐
Publication during PhD ☐

Others, please specify ……

24. Do you feel it is necessary to award the researcher for getting a successful research project?

Yes ☐

No ☐

24a. If yes, do you have a policy to implement this?

please specify ……

25. Do you have a policy to actively encourage faculty member to apply for funding projects?

Yes ☐

No ☐

26. Suggestions if any to improve the grant process:

Annexure III

Funding Agency	Scholarly Output	International Collaboration	National Collaboration	Institutional Collaboration	Single Authorship	International Collaboration Impact	National Collaboration Impact	Institutional Collaboration Impact	Single Authorship Impact	Academic-Corporate Collaboration	Academic-Corporate Collaboration Impact	Citation Count	Cited Publications	Number of Citing Countries	Publications in Q1 Journal Quartile by CiteScore	Publications in Q2 Journal Quartile by CiteScore	Publications in Q3 Journal Quartile by CiteScore	Publications in Q4 Journal Quartile by CiteScore	Views Count	Classification
CSIR	33670	5990	12060	15182	423	24.2	17.5	17.3	11.6	215	36.8	623870	31901	202	20836	7747	3031	1053	1004536	1
DBT	12985	2844	4328	5656	149	26.4	18.1	17	14.4	88	62.9	251588	12380	197	8776	2663	930	293	416191	1
DSIR	4459	834	1345	2233	46	33.6	27.6	23.3	14.7	27	27.1	117822	4338	172	3124	926	275	82	164040	1
DST	58407	13159	17738	26294	1195	22.3	14.9	15.1	9.2	520	27	967202	53544	220	33496	13099	5887	2721	1700357	1
UGC	10961	2106	3803	4981	67	22	15.4	15.8	8.2	43	40.2	184305	10391	192	6728	2637	968	333	303221	1
AICTE	1804	236	623	902	42	27.8	19.4	19.2	7.8	11	6.3	36227	1614	143	738	525	270	108	56171	2

Board of Research in Nuclear Sciences	2591	387	1219	967	17	18.2	12.3	13.8	12.4	16	10.9	35667	2390	141	1407	693	271	106	67801	2
MHRD	1214	256	303	633	22	64.4	14.5	11.2	6.3	11	132.4	28101	1102	145	747	225	85	62	37853	2
Ministry of Earth Sciences	2192	590	921	652	28	19.9	12.5	13.8	4.7	34	17.6	32375	2022	173	1257	492	189	95	46415	2
Ministry of Electronics and Information technology	2489	364	518	1588	19	12.4	8	5.8	12.5	37	6.7	18126	1942	134	878	411	335	83	38798	2
ICAR	379	67	192	114	5	30.4	10.7	10.2	15.6	1	108	5341	345	125	179	99	51	34	8920	3
Indo-French CPAR	979	626	182	141	28	18.1	18.3	12.1	9.6	18	15.1	16664	913	139	656	200	52	20	22631	3
Indo-US Science and Technology Forum	564	351	70	135	8	31.3	16.8	32.5	5.9	13	31.9	16601	511	125	366	87	20	15	19474	3
ISRO	1450	208	638	565	39	12.9	9.5	7.5	3.5	8	13.3	13118	1222	150	638	422	136	53	24074	3
Ministry of Coal, Government of India	1000	214	275	472	38	15	9.3	9.5	4.9	6	17	10465	870	146	445	225	144	61	21013	3
Ministry of New and Renewable Energy	1042	156	322	550	14	24.4	22.8	20.2	6.4	8	7.4	22358	949	135	652	155	96	31	40030	3

National Board for Higher Mathematics	702	181	184	264	70	14	5.6	9.3	9.7	1	11	6676	563	98	230	196	136	78	9163	3
Pandit Deendayal Petroleum University	1064	193	423	389	59	16.1	9.6	9.1	3.7	13	17.2	10952	847	124	292	259	164	114	26759	3
The Wellcome Trust DBT India Alliance- 20 April 2021	592	251	116	206	17	49.4	10.1	10.5	8.6	11	343.6	15877	548	180	386	130	49	17	23533	3
Indian National Centre for Ocean Information Services	202	53	91	56	2	12.5	9.9	7.4	2	2	7	1984	183	96	105	41	13	17	3192	4
Institute of Bioinformatics	109	91	18	0	0	21.8	6.8	0	0	12	32.6	2105	104	84	54	44	7	1	2988	4
Ministry of Communication and Information Technology	94	12	29	52	1	18.5	20.9	13	3	1	6	1509	85	74	59	14	8	0	2153	4

NSTMISDivision
DepartmentofScience&Technology
MinistryofScience&Technology
TechnologyBhawan,NewMehrauliRoad,NewDelhi-110016
Phone:91-011-26567373

Website:www.nstmis-dst.org/

About NSTMIS:

The National Science and Technology Management Information System (NSTMIS), adivision of the Department of Science and Technology (DST) has been entrusted with the task of building the information base continuously on resources devoted to scientific and technological activities for policy planning in the country.

Citation:

The report may be cited as DST (2016): Report on Influence of government policies and funding on the research output of government and private institutions in India: A Bibliometric and scientometric study; Sheeba Pakkan, Manipal Academy of Higher Education. Manipal, India

Disclaimer:

Every care has been taken to provide the authenticated information. However, the onus of authenticity of data rests with the PI of the project.