



IJEAST

INTERNATIONAL JOURNAL
OF ENGINEERING APPLIED SCIENCE
AND TECHNOLOGY



VOLUME : 6 ISSUE : 3 Print / Issue Publication Date: 16-Sep-2021



ISSN : 2455-2143



DOI : 10.33564/IJEAST.2021.v06i03.041

Indexed In



WWW.IJEAST.COM

editor@ijeast.com



IDENTIFICATION OF COMPONENTS FOR THE EVALUATION OF FUNDED RESEARCH PROJECT: A SYSTEMATIC LITERATURE REVIEW

Kruthi Chikkaballapur Balaji, Poorvika Gopal

Researchers, Department of Industrial Engineering and Management, JSS campus, JSS Academy of Technical Education, Uttarahalli-Kengeri Road, Bangalore - 560060, Affiliated to Visvesvaraya Technological University, Belagavi, Karnataka,

Rashmi Srinivasaiah

Assistant Professor Department of Industrial Engineering and Management, JSS campus, JSS Academy of Technical Education, Uttarahalli-Kengeri Road, Bangalore - 560060, Karnataka, India.

Devappa Renuka Swamy

Professor Department of Industrial Engineering and Management, JSS campus, JSS Academy of Technical Education, Uttarahalli-Kengeri Road, Bangalore - 560060, Karnataka, India.

Abstract

Objective: The purpose of this paper is to identify different components that can help to determine the effect of study findings and to identify different methodologies as well. To clarify the extent of the study on the impact assessment of funded initiatives in various countries, a systematic literature review is carried out.

Methodology: It is important to consider the effects of scientific findings to achieve value for the resources spent in science and technology. A systematic literature review (SLR) is carried out to gain a detailed understanding of the different literature available in the area of assessment of the search results of the projects funded. A total of 72 papers are collected from Google scholars to perform the SRL, which are screened according to the requirements for inclusion and exclusion.

Further 20 papers, primarily focusing on two study fields, namely the academic and health care industries, are accepted. The 20 papers chosen are mapped accordingly based on the market, country of origin, variables, and approaches used by different authors.

Conclusion: To determine the most significant variables commonly used by numerous writers in their studies, a systematic literature review is undertaken. The methodologies used by writers in their studies are also identified in this study. This

paper can also be used by other researchers to describe in their studies the components and methodologies commonly used.

Originality/Value: The current research assists policymakers in making decisions on which components to examine when assessing funded initiatives that improve the effects, quality, and productivity in the higher educational sectors, and there has been relatively limited research in this field.

Keywords: Impact Assessment, Funded-Projects, Systematic review, Higher educational institutions.

I. INTRODUCTION

Individuals, groups of individuals, and institutions are sometimes granted funds to perform a study, research, or project. The funds don't have to be reimbursed, but the institutions go through a competitive application process to receive the funds. One of the main factors driving economic growth is technological advancement. Hence, a fair share of the economy is devoted to technological advancements. The initiatives are supported not only by government agencies but also by private institutions, businesses, trusts and foundations, direct endowments, and specific fundraising initiatives and non-profit organizations. For example, The National Institutes of



Health (NIH) and the National Science Foundation (NSF) in the United States, for example, spend over \$30 billion on basic and applied science research. (Jacob and Lefgren, 2007)¹. Between 2014 and 2020, the European Union spent approximately €80 billion in science, predominantly through Horizon 2020, its flagship research program. This EU funding typically comes in the form of grants, which are used to partially support a wide variety of research projects. Similarly, the New Zealand government under the Creative Communities Scheme (CCS) supports more than 1800 projects every year.

Developing countries such as India have a strong emphasis on improving science and technology and advanced research, which is very important for the country's economic growth and development. Given this fact, the Government of India established the Department of Science and Technology (DST) in 1971 intending to promote science and technology activities across India. The Department has a wide variety of operations, ranging from the promotion of high-end basic research and development of state-of-the-art technology, on the one hand, to meet the technical needs of the ordinary citizen through the development of relevant skills and technologies, on the other.

The Oxford Dictionary delineates impact as a 'marked effect or influence.' However, the Research Excellence Framework (REF), 'Assessment framework and guidance on submissions' (REF2014 2011b)² severely limits the interpretation of 'impact' to include an influence on, change in, or advantage to the economic system, community, cultural norms, policymaking or service providers, wellness, the ecosystem, or quality of life outside of academia.

Focusing on academic impacts, funded projects seem to positively influence certain tangible and intangible outcomes. As a result, this paper aims to define the components that will assist in the assessment of funded research's academic impact. Funding organizations can use the results to guide the allocation of funds where they are needed.

Need for the present study and analysis

Developing countries devote a significant portion of their economies to project funding. As a consequence, it is critical to evaluate the impact of these funded initiatives. To evaluate, a questionnaire has to be designed by considering appropriate indicators. A suitable combination of indicators can be found by conducting a systematic literature review.

II. OBJECTIVE

A Systematic Literature Review (SLR) identifies, evaluates, and conducts increased evidence to understand specified questions. The purpose of this study is to perform a comprehensive literature review to identify the components for evaluating funded research projects. Hence SLR is adopted to fulfill the aim of this study.

III. METHODOLOGY

This section gives a brief picture of the methodology adopted to conduct the research. Along with a Systematic Literature Review, Pareto analysis suggests the vital few components used by several authors. The components can be sorted and arranged using "Pareto analysis" in the order of criticality (Karuppusami and Gandhinathan, 2006)³. This approach can be applied to identify the components to evaluate funded research projects. The aim of using Pareto Analysis is to look at the components used by different authors and see how much they appear. This, in turn, provides details on where effort should be prioritized.

A Systematic Literature Review (SLR) recognizes, qualifies, and conducts high-frequency evidence to understand stated questions (Dewey A. & Drahota A. 2016)⁴. For a systematic assessment, a well-defined procedure or approach should be used where the criteria are stated even before a review is conducted. It is a thorough, direct search across numerous archives and research articles that many other scholars can replicate and expand. It entails creating a search algorithm with a particular emphasis or that adequately answers a given query. The analysis describes the set of content searched, criticized and written, within known timelines. The review must include all search terms, search methods (such as site names, platforms, search dates), and constraints. Systematic literature reviews emerged in healthcare and are associated with evidence-based practice. According to Grant and Booth, (2009)⁵ "The growth of evidence-based practice has resulted in a growing diversity of review styles". They juxtapose 14 study approaches, detailing the strengths and drawbacks of each review. The objective of this SLR is to evaluate and analyze research outcomes in different educational institutions. The study has been carried out in the following steps: literature review, inclusion, and exclusion criteria development, analysis & conclusion.

Research Question:



This research focuses on the following questions:

Question 1: How many Indian authors have focused their research on the Evaluation of Impacts of Funded Projects?

Question 2: Does funded research publications have a greater effect on citation impacts than unfunded research publications?

Question 3: What main academic and research factors help evaluate the impact of funded projects and research?

Question 4: What are the different research methodologies and statistical analysis used by various authors in their studies to evaluate the impact of funded research projects?

Question 5: What are the various academic outcomes in different academic institutions which have been funded for their projects and research?

Inclusion and Exclusion criteria development:

Judgments may be made on the impact of the inclusion and exclusion criteria on the external validity of the findings. Determining such choices requires a thorough knowledge of the study area as well as a comprehension of how each criterion may affect the experiment's accuracy (Patino and Ferreira, 2018)⁶. Inclusion criteria are everything that a thesis needs to offer in order to be included in a review's examination. The exclusion criteria are the characteristics that would render a study ineligible for inclusion in a review. Dates, how the research was planned, population, outcomes, and so on are examples of these criteria. This inclusion and exclusion criteria development takes place in two stages firstly, domain criteria secondly, the language criteria. The first inclusion criteria include published documents, papers, or articles which have not been published in journals yet are excluded. The domain is the next criteria that identify the area of focus of the research. In this case, the papers falling under 'Research outcomes of funded projects are included. However,

funded studies on funded projects by NGOs and non-funded projects are excluded. The final criteria are the language of the manuscript, any language other than English is excluded from the study.

Table 1: Inclusion and Exclusion Criteria

Criteria	Inclusion	Exclusion
Document Type	Published documents	Ongoing, Unpublished, or upcoming documents.
Domain	Research outcomes of funded projects in different institutions	Funded projects by NGOs, Non-funded projects.
Language	English	Other than English

Databases and search strategies

A total of "72" published papers were selected and downloaded from the internet. Out of "72" papers, the number of papers finally accepted for the study is 20. Certain search terms and search strings are fed to google scholars to find the papers. After reviewing the paper suggested by google scholar results, the references of that paper are also looked into for further more papers. For example, a study named "Evaluation of the Impact of NBCF funded research" by Donovan et al., (2014)⁷ mentions certain other APA citations of studies in its references, which helped in finding more studies related to impact evaluation of funded projects. "Evaluation of NHMRC funded research completed in 1992, 1997 and 2003" by Kingwell et al., (2006)⁸ is one of the papers taken from the reference section of the study conducted by Donovan et al., (2014)⁷. The search terms and their combinations used to search for relevant papers on google scholar are as follows:

Search Terms:

The terms and keywords used to find research papers: Impact evaluation, Research Outcomes, Academic Institutions, Health care sector, Funded projects, DST - FIST programs.

Search Strings:

Search strings used to find research papers on google scholar are:

"Impact evaluation" And "Funded projects"

"Funded projects" And "Health Care Sector"

"Funded projects" And "Academic institutions"

"Impact evaluation" And "DST - FIST programs"

"Research outcomes" And "Funded projects"

"Research outcomes" And "Academic Institutions"

Document selection



The papers download is segregated into academic and health care sectors. However, papers focusing on social impacts are excluded from the study. 52 papers focusing on academic outputs were initially obtained, whereas, 20 papers on health care sectors. 15 out of the 36 screened academic papers are accepted and 3 out of 20 screened health care papers. Reasons for the other 54 papers not being screened and not accepted could be due to

- (i) lack of accessibility of specific data such as variables, methods, or statistical analysis used by the authors
- (ii) a substantial emphasis on social impacts
- (iii) NGO funding.

Table 2: Document Selection

Sectors	Initial	Screened	Accepted
Academic	52	36	15
Health Care	20	20	05
Total	72	30	20

IV. LITERATURE REVIEW

There is a growing demand in many Western countries for new forms of audit, review, and performance reports that disclose and visualize the results of the funded projects in public sector organizations (Pollitt and Bouckaert, 2000)⁹. Hence, several recent studies are being centered on evaluating the effects of funds and grants for health, research, and development programs. While there has been a great deal of research in the healthcare sector to continuously enhance the quality of medicines and therapies, few researchers have taken into account the effect of funds for various research and academic projects for academic institutions.

A tabular overview of the numerous recent research papers concerning the impact assessment of funded projects and most frequently used indicators are given in table number 3.

Table 3: Literature Review Table

Sl no	Author	Objective	Indicators	Methodology	Outcome
1.	Kinkel and Henke (2006) ¹⁰	To compare the effects on academic success, educational preparation, and career growth of funded undergraduate research	educational planning, Academic performance, and Career development	Comparative study	Undergraduate students actively participating in research activities observed optimistic results in their academics and were immediately employed than those students who lacked funding for their research.
2.	Goldfarb (2008) ¹¹	To analyze the impact of a sponsor and identify the shortcomings of the process for grant funding for academic research	Funding, Research outcomes (Publications and citations), Researcher fields	Three-stage least squares estimation technique	As a result of continued involvement with the funding agencies, research output exhibits declination due to a lack of utilitarian objectives on the works and projects.
3	Carol et al., (2015) ¹²	Present the findings of evaluative research that has gathered and evaluated evidence of the potential of such funding to promote productive abilities and the effect it has had on recipients.	Project funding, Academic progress, Organization culture.	Quantitative and qualitative analysis	It is observed that funding leaves an optimistic impact on professional enhancement when induced with strengthened teaching and project management skills practice. The work environment also ultimately affects the incidence of innovation.
4	Gusic et al., (2010) ¹³	To examine the effect of projects on faculty	Products of project work, academic	Mixed Approach Method	Accomplishing the projects leads to the development of new skills and establishes



		development, within the Pennsylvania State University College of Medicine.	productivity, career development		a concentration on their careers. The highest number of academic products (publications, presentations, and grants) and the highest number of overall achievements associate with the faculty who made the most progress on their projects.
5	Gulbrandsen and Smeby (2005) ¹⁴	To explore the relationship between industrial funding and (a) academic outcomes (b) research collaboration	Profile of research collaboration, patents, and scientific publishing	Descriptive statistical and Regression analysis	The paper shows that university professors associate industry funding with applied research more than development work. Industrially funded professors publish more than their peers with no external funding. Industrial funding and collaboration are also closely associated with patent development.
6	Fan et al., (2019) ¹⁵	Exploring the effect of funding sources on the success of universities in innovation	Regulation implementation, innovation climate of the university, Management mechanism.	Structural equation modeling using partial least squares	Government funding has a higher effect on regulatory enforcement, and industrial funding has a higher impact on the development of management systems. The results have shown that only industrial funding has a beneficial impact on the climate of innovation at a university.
7	Dougherty and Reddy (2011) ¹⁶	To evaluate the impact of performance funding	Student Outcomes, Changes in Organizational Policies and Practices, status competition, Knowledge protection	Case Studies	Performance funding increased status competitions colleges, this, in turn, results in implementing better policies for the organization, enhancing student services and opportunities. However, the result does not show any evidence of an increase in the student retention rate.
8	Jacob and Lefgren (2011) ¹⁷	To examine the quality and value of scientific productivity of research productivity associated with grant funding	Citations, Publications, and Rank of graduate institution	Quasi-static analysis	We see that, before the grant submission, researchers who were granted a grant because they scored just below the cutoff had lower efficiency. The average increase of additional publications over the succeeding 5 years was found to be 7% more than the initial years before funding.
9	Zhao (2015) ¹⁸	To determine the impact of grant-funded research in the library and information science field	Citation counts, Research Articles, Funding agency	Bibliometric analysis	Grant-funded research had a much greater effect than other research, as assessed by citation counts, both overall and in each publication individually. The proportion of journalists citing grant-funded research in information-oriented publications was considerably greater than in library-focused ones.
10	Garg et al., (2005) ¹⁹	Assessing the impact of AICTE funding on R&D and educational development	Productivity, Human resource development,	Data Envelopment Analysis	About 40% of project investigators propagated information through conference papers. Data analysis shows



			Education, Linkages established.		that 72 PhDs were the product of 17% of the programs. In 26 percent of projects, 139 students pursued their PhDs. In 34% of projects, 334 students completed their ME degrees. Compared to research and technical efficiency, the study indicated that the impact was greater in terms of human resource capacity growth.
11	Jowkar et al., (2011) ²⁰	To compare the citation effect of Iranian-funded research papers with those of non-funded research.	Fields, Funded, Unfunded	Bibliometric method	Around 12.5 percent of Iranian publications were funded, and over the past four years, the number of publications funded has grown significantly. In nearly all of the subject areas, the citation effect of funded publications was substantially higher.
12	Anguelov and Ivanova (2018) ²¹	To clarify and evaluate the university's internal variables affecting the efficacy and efficiency of project financing.	Financial capacity; Team capacity; Image capacity; Administrative Capacity; Infrastructure capacity	Statistical data processing	Of all the factors, the project team's attributes, administrative capacity, and financial capacity have a major impact. Universities can use this assessment to decide whether the project proposal has all the potential benefits and consistency to secure funds for grants or not.
13	Bozeman and Gaughan (2007) ²²	To study the effect of research grant funding on the type and scope of academic research and technological collaborations with industry.	Demographic, Career, Grant's activity, disciplinary affiliation.	Multivariate analysis.	The research observation states that academics who have research grants, as well as contracts, collaborate most actively with industry than those without brands or contracts
14	Choi et al., (2009) ²³	For a better understanding of the impact of R&D funding.	Technology performance, Management performance, Business performance Manufacturing performance, Impacts	Quantification analysis Clustering analysis Contingency analysis.	It is observed that firms with a research department perform better than those without a research department. Policy imperatives were suggested for cluster 1 as it showed relatively lower impacts than the rest.
15	Frolich et al., (2010) ²⁴	To explore how higher education institutions and their policies and core activities are affected by funding mechanisms.	Type of funding, Basic grants, Budget, External research grants	Comparative analysis	The research at the machine level provides an example of a pattern across Europe. The paper shows that in all three nations, mixed funding models were being adopted (Denmark, Norway, and Portugal).
16	Clay et al., (2006) ²⁵	Evaluation of the results of the National Heart Foundation of Australia research investment (NHF)	Level of research funding, Visibility of NHF-funded research, Funding level, Leverage of research funding.	Bibliometric analysis.	The observation from the research was made like, - Public health research funding increased by 75 percent and 26 percent, especially for individuals and projects. -NHF funded research had high visibility



					than other funded researches in high impact journals - Citation rates (6.4) were higher than the country (6.1) and world benchmark (5.4) - Further leveraged the support of \$1.5 million.
17	Donovan et al., (2014) ⁷	To assess the effect of the National Breast Cancer Foundation's (NBCF's) research investment.	Research Type, Funding, Duration, Cost, Payback categories	Bibliometric analysis.	These were evaluated and concluded from the research, -Seventy surveys (46%) recorded career advancement, and 185 reported career progressions - Higher degrees, including 121 PhDs, have also been acquired or planned. -Hundred and one grant (66%) provided research system-wide capacity-building resources, and research teams leveraged an additional \$1.40 in support for each dollar invested. - Actual research had a higher effect on knowledge generation and regenerative medicine, while applied research had a larger influence on the other Payback categories.
18	Silvestre et al., (2016) ²⁶	To see whether there was a link between scholarly influence, as assessed by the h-index, and the receipt of National Institutes of Health (NIH) grant money among academic plastic surgeons.	Status, Academic rank, and Terminal degree(s).	correlation coefficient analysis.	A clear connection between academic influence and funding procurement was observed. As calculated by the h-index, faculty with higher funding had a greater scholarly effect, which indicates that this instrument could be helpful during the selection process for the NIH grant.
19	Hanney et al (2004) ²⁷	To outline the strategies to be used to analyze the outcomes of the study sponsored by the UK Arthritis Research Campaign.	Payback categories: Knowledge production, Capacity building, Research Targeting, Informing policy Absorption, Product development, Health benefits, and Broader economic benefits	Semi-structured interviews Literature review, and bibliometric analysis	The methods for presenting the findings of research funded by the Arthritis Research Campaign have been validated by a pilot analysis.
20	Boulding et al., (2020) ²⁸	To map the diversity of studies into public health and to recognize examples of impacts.	Payback Model	Quantitative analysis and Semi-structured analysis with Principal	89% of NIHR portfolio projects suggest a substantial overlap of fields that relate to the findings of public health studies. The other impact examples include establishing partnerships of trust with local bodies,



				Investigators	understanding unintentional collaborations and networks of non-academic dissemination.
--	--	--	--	---------------	--

After studying through many publications, it is well acknowledged that the objective purposes and conclusions of the above literature seem to assess the impacts of funded projects. Bibliometric analysis is the most common and productive method used by researchers to examine the impacts Gusic et al.,(2008)¹³, [Jacob](#) and [Lefgren](#) (2011)¹⁷, Zhao (2015)¹⁸, Jowkar et al., (2011)²⁰, Clay et al.,(2006)²⁵, Goldfarb (2008)¹¹. Bibliometrics is a quantitative method to quantify the outcomes of the research. They are suitable for repeated analysis and comparisons can be used to manage large amounts of data and can be very cost-effective (A Boaz et al., 2009)²⁹. The Payback Framework was initially developed to evaluate the impacts of health services research

Donovan et al., (2014)⁷, Clay et al., (2006)²⁵. However, literature related to academic outcomes supports a) citations b) increase in publications c) patents d) career development e) collaborations f) work environment g) organizational policies as components to be considered. Although a few Indian researchers are working on this topic, it is scarce to find Indian literature focused on the evaluation of academic outputs of funded projects. However, Indian research focuses more on the social effects of funded initiatives. It is essential for developing countries like India to evaluate the academic outputs as it invests a good percentage of its economy in the development of Science and Technology.

Table 4: Components and Frequencies

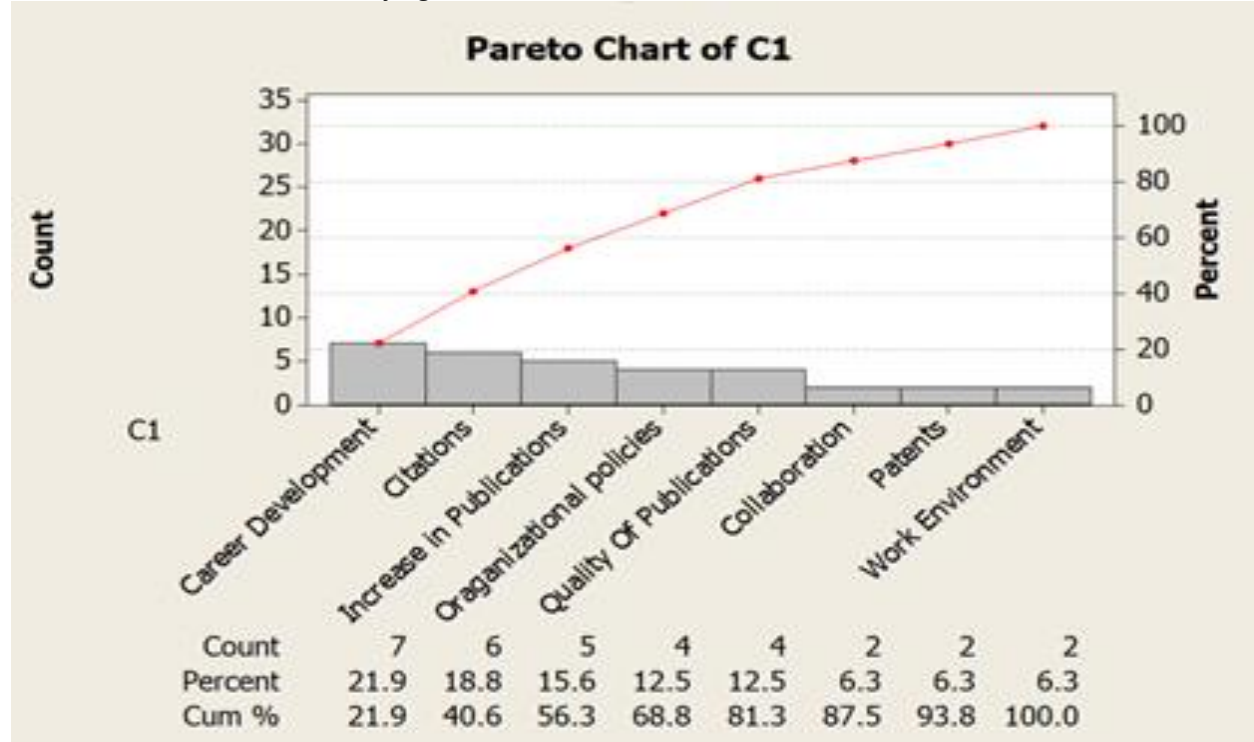
Indicators	Authors	Frequency
Citations	Gusic et al.,(2008) ¹³ , Jacob and Lefgren (2011) ¹⁷ , Zhao (2015) ¹⁸ , Jowkar et al., (2011) ²⁰ , Clay et al.,(2006) ²⁵ , Goldfarb (2008) ¹¹	6
Increase in Publications	Gusic et al.,(2008) ¹³ , Jowkar et al., (2011) ²⁰ , Jacob and Lefgren (2011) ¹⁷ , Goldfarb (2008) ¹⁸ , Gulbrandsen and Smeby (2005) ¹⁴	5
Patents	Gulbrandsen and Smeby (2005) ¹⁴ , Donovan et al., (2014) ⁷	2
Career Development	Garg et al., (2005) ¹⁹ , Donovan et al., (2014) ⁷ , Kinkel and Henke (2006), Carol et al., (2015) ¹² , Dougherty and Reddy (2011) ¹⁶ , Bozeman and Gaughan (2007) ²² , Silvestre et al., (2016) ²⁶	7
Collaboration	Gulbrandsen and Smeby (2005) ¹⁴ , Bozeman and Gaughan (2007) ²²	2
Work Environment	Fan et al., (2019) ¹⁵ , Carol et al., (2015) ¹²	2
Quality of publications	Goldfarb (2008) ¹¹ , Zhao (2015) ¹⁸ , Clay et al., (2006) ²⁵ , Silvestre et al., (2016) ²⁶	4
Organizational policies	Dougherty and Reddy (2011) ¹⁶ , Anguelov and Ivanova (2018) ²¹ , Choi et al., (2009) ²³ , Donovan et al., (2014) ⁷	4

Identification of Components

A graph with bars in ascending order of the frequencies is a Pareto diagram. The lengths of the bars represent frequency or cost (time or money) and

are ordered with the longest on the left and the shortest on the right. The graph thus visually indicates that the circumstances are more significant. This illustrates both the extent and the cumulative effect of defects. Pareto Charts are useful in identifying the defects to

prioritize to observe the greatest overall change. In this context, Pareto analysis is conducted to identify the factors which contribute the most to interpret the impact of funded research projects.



The above Pareto chart represents the indicators based on their frequencies. It infers that Career Development, Citations, and Increase in Publications are the most effective indicators of research outcomes. Organizational Policies and Quality of Publications have a moderate effect and about 80% of the effect on the outcomes of the academic research is caused by the above-mentioned five indicators. Indicators like Collaboration, Patents, and Work Environment are

least effective with comparatively very few frequencies. The results of this analysis help in determining which component to focus more on to get higher quality research outcomes from the academic departments.

Table 5 lists the articles that have been categorized by author and year, as well as by journals, countries, and the number of citations that each work has received.

Table 5: Paper Classification

Sl No	Author & year	Journal	Country	Citations
1	Kinkel and Henke (2006) ¹⁰	Natural Resources and Life Sciences Education	United States	63
2	Goldfarb (2008) ¹¹	Research Policy	United States	188



3	Carol et al., (2015) ¹²	Engineering Education	England	5
4	Gusic et al., (2008) ¹³	Academic Medicine	United States	52
5	Gulbrandsen and Smeby (2005) ¹⁴	Research Policy	Norway	897
6	Fan et al., (2019) ¹⁵	Technology Analysis & Strategic Development	Taiwan	4
7	Dougherty and Reddy (2011) ¹⁶	College Research Center	Columbia	188
8	Jacob and Lefgren (2011) ¹⁷	Journal of public economics	United States	345
9	Zhao (2010) ¹⁸	Scientometrics & AKJournals	Hungary	84
10	Garg et al., (2005) ¹⁹	Scientometrics & AKJournals	INDIA	23
11	Jowkar et al., (2011) ²⁰	Aslib Proceedings: New Information Perspectives	Iran	30
12	Anguelov and Ivanova (2018) ²¹	International Conference on High Technology for Sustainable Development, HiTech 2018 - Proceedings	Bulgaria	6
13	Bozeman and Gaughan (2007) ²²	Research Policy	United States	388
14	Choi et al., (2009) ²³	Research Policy	South Korea	22
15	Frolich et al., (2010) ²⁴	International Journal of Educational Management	Denmark, Norway & Portugal	105
16	Clay et al., (2006) ²⁵	Medical Journal of Australia	Australia	16
17	Donovan et al., (2014) ⁷	Medical Journal of Australia	Australia	32
18	Silvestre et al., (2016) ²⁶	Plastic and Reconstructive Surgery	United States	25
19	Hanney et al., (2004) ²⁷	Health Research Policy and Systems	United Kingdom	141
20	Boulding et al., (2020) ²⁸	BMC medical research methodology	United Kingdom	2

V. CONCLUSIONS AND DISCUSSION

While there are several different methods of performing a literature review, it has been proven that a systematic literature review offers a consistent and thorough summary of existing evidence on a particular

subject. SLR made it possible to classify the factors used by the authors to assess the effects of funded projects utilizing a systematic literature review. Factors such as citations, enhancement in the quality of publications, and patents are important measures of impact evaluation. Funds for infrastructure upgrades



will put a constructive view of the working environment to the fore. The work environment for the faculties, career growth of students, and faculties make up several other components reflecting academic outputs. Different methodologies used by various authors for different fields are also established, in addition to variables. To gain knowledge about the citation impacts, some authors perform bibliometric analysis, while authors focusing on the health care sectors use Herg's Pay-Back System Model to evaluate the impacts, especially in Australia's national health institutes. Although Indian authors work on studies related to impact assessment, they are more focused on the social impacts. The present study does not focus on social impacts or broader economic impacts hence, this study can be further expanded by including different fields.

VI. REFERENCES

1. Jacob, B., & Lefgren, L. (2007). The impact of research grant funding on scientific productivity.
2. Penfield, T., Baker, M. J., Scoble, R., & Wykes, M. C. (2014). Assessment, evaluations, and definitions of research impact: A review. *Research evaluation*, 23(1), 21-32.
3. Karuppusami, G., & Gandhinathan, R. (2006). Pareto analysis of critical success factors of total quality management: A literature review and analysis. *The TQM magazine*.
4. Dewey, A. & Drahota, A. (2016) Introduction to systematic reviews: online learning module *Cochrane Training* <https://training.cochrane.org/interactivelearning/module-1-introduction-conducting-systematic-reviews>
5. Grant, M. J., & Booth, A. (2009). A typology of reviews: an analysis of 14 review types and associated methodologies. *Health information & libraries journal*, 26(2), 91-108.
6. Patino, C. M., & Ferreira, J. C. (2018). Inclusion and exclusion criteria in research studies: definitions and why they matter. *Jornal Brasileiro de Pneumologia*, 44, 84-84.
7. Donovan, C., Butler, L., Butt, A. J., Jones, T. H., & Hanney, S. R. (2014). Evaluation of the impact of National Breast Cancer Foundation-funded research. *Medical Journal of Australia*, 200(4), 214-218.
8. Kingwell, B. A., Anderson, G. P., Morris, M. E., Duckett, S. J., Hoole, E. A., Rothwell-Short, J., ... & Wilson, A. J. (2006). Evaluation of NHMRC funded research completed in 1992, 1997 and 2003: gains in knowledge, health and wealth. *Medical journal of Australia*, 184(6), 282-286.
9. Pollitt, Christopher and Geert Bouckaert (2000), *Public Management Reform*, Oxford: Oxford University Press.
10. Kinkel, D. H., & Henke, S. E. (2006). Impact of undergraduate research on academic performance, educational planning, and career development. *Journal of Natural Resources and Life Sciences Education*, 35(1), 194-201.
11. Goldfarb, B. (2008). The effect of government contracting on academic research: Does the source of funding affect scientific output?. *Research Policy*, 37(1), 41-58.
12. Carol, A., Alison, S., & Harry, T. (2007). An evaluation of the impact of small-scale funding on the professional practices of engineering academics. *engineering education*, 2(1), 13-22.
13. Gusic, M. E., Milner, R. J., Tisdell, E. J., Taylor, E. W., Quillen, D. A., & Thorndyke, L. E. (2010). The essential value of projects in faculty development. *Academic Medicine*, 85(9), 1484-1491.
14. Gulbrandsen, M., & Smeby, J. C. (2005). Industry funding and university professors' research performance. *Research policy*, 34(6), 932-950.
15. Fan, H. L., Huang, M. H., & Chen, D. Z. (2019). Do funding sources matter?: The impact of university-industry collaboration funding sources on innovation performance of universities. *Technology Analysis & Strategic Management*, 31(11), 1368-1380.
16. Dougherty, K. J., & Reddy, V. T. (2011). The impacts of state performance funding systems on higher education institutions: Research literature review and policy recommendations.
17. Jacob, B. A., & Lefgren, L. (2011). The impact of research grant funding on scientific productivity. *Journal of public economics*, 95(9-10), 1168-1177.
18. Zhao, D. (2010). Characteristics and impact of grant-funded research: a case study of the



- library and information science field. *Scientometrics*, 84(2), 293-306.
19. Garg, K. C., Gupta, B. M., Jamal, T., Roy, S., & Kumar, S. (2005). Assessment of impact of AICTE funding on R&D and educational development. *Scientometrics*, 65(2), 151-160.
 20. Jamali, H. R., Jowkar, A., Didegah, F., & Gazni, A. (2011, November). The effect of funding on academic research impact: a case study of Iranian publications. In *Aslib Proceedings*. Emerald Group Publishing Limited.
 21. Anguelov, K., & Ivanova, M. (2018, June). Impact factors in implementation of EU-funded projects in Bulgarian Higher Education Institutions. In *2018 International Conference on High Technology for Sustainable Development (HiTech)* (pp. 1-5). IEEE.
 22. Bozeman, B., & Gaughan, M. (2007). Impacts of grants and contracts on academic researchers' interactions with industry. *Research policy*, 36(5), 694-707.
 23. Choi, J. Y., Lee, J. H., & Sohn, S. Y. (2009). Impact analysis for national R&D funding in science and technology using quantification method II. *Research Policy*, 38(10), 1534-1544.
 24. Frølich, N., Schmidt, E. K., & Rosa, M. J. (2010). Funding systems for higher education and their impacts on institutional strategies and academia. *International Journal of Educational Management*.
 25. Clay, M. A., Donovan, C., Butler, L., & Oldenburg, B. F. (2006). The returns from cardiovascular research: the impact of the National Heart Foundation of Australia's investment. *Medical journal of Australia*, 185(4), 209-212.
 26. Silvestre, J., Abbatematteo, J. M., Chang, B., Serletti, J. M., & Taylor, J. A. (2016). The impact of National Institutes of Health funding on scholarly productivity in academic plastic surgery. *Plastic and Reconstructive Surgery*, 137(2), 690-695.
 27. Hanney, S. R., Grant, J., Wooding, S., & Buxton, M. J. (2004). Proposed methods for reviewing the outcomes of health research: the impact of funding by the UK's' Arthritis Research Campaign'. *Health research policy and systems*, 2(1), 4.
 28. Boulding, H., Kamenetzky, A., Ghiga, I., Ioppolo, B., Herrera, F., Parks, S., ... & Hinrichs-Krapels, S. (2020). Mechanisms and pathways to impact in public health research: a preliminary analysis of research funded by the National Institute for Health Research (NIHR). *BMC medical research methodology*, 20(1), 1-20.
 29. Boaz, A., Fitzpatrick, S., & Shaw, B. (2009). Assessing the impact of research on policy: a literature review. *Science and Public Policy*, 36(4), 255-270.

IJEAST

INTERNATIONAL JOURNAL
OF ENGINEERING APPLIED SCIENCE
AND TECHNOLOGY

ABOUT IJEAST

International Journal of Engineering Applied Science and Technology (IJEAST) is a peer-reviewed, open access journal that publishes high-quality research papers in the field of Engineering, Applied Science and Technology.

IJEAST aims to provide a platform for researchers, academicians, and professionals to share their innovative ideas, research findings, and practical experiences with the global scientific community.

FOCUS AREAS

- Engineering
- Applied Science
- Technology
- Innovation & Development
- Interdisciplinary Studies



PEER REVIEWED

All submissions are rigorously peer reviewed to ensure quality.



OPEN ACCESS

Free and unrestricted access to research for all.



GLOBAL REACH

Connecting researchers and professionals worldwide.



TIMELY PUBLICATION

We ensure a swift and efficient publication process.



For more information, visit our website

www.ijeast.com



INTERNATIONAL JOURNAL
OF ENGINEERING APPLIED SCIENCE
AND TECHNOLOGY

✉ editor@ijeast.com

🌐 www.ijeast.com

📍 India



2455-2143