

E-Resources Usage and Return on Investment (ROI) Analysis of Selected Libraries of Odisha

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Abstract

In present study five selected leading scientific & research libraries of Odisha were covered. The details of their electronic resources and services provided by these libraries are briefly discussed. Publications of respective institutes were retrieved from SCOPUS databases and attempt was made to analyze ROI value in term of their research publications. ROI values ranges from 1.02% to 4.88% which signify the positive impact of e-resources on the research growth and activities of institutes. The paper also briefly discussed the measures to taken by the research libraries to enhance the usage of e-resources which will provide positive results/returns.

Keywords: Electronic resources, Return on Investment (ROI), Cost benefit analysis, Usage statistics.

1. Introduction

Electronic resources are considered as the major source of scientific & research information. Research libraries are spending huge amount of expenditures for electronic resources and online database services. Monopoly of publishers and increasing costs of these resources are major concern for a scientific and research libraries. It is imperative for research library to carefully measure and assess the usage of these online resources. Evaluating the impact of these resources in terms of the institute research output will boost library managers to justify the management and higher authority against this huge investment. The definition for Return on Investment (ROI) varies depending on the context and it is frequently expressed as income received as a percent of the amount invested in the asset. Adopting suitable methods to reaching library users and enhance the usage of acquired electronic resources will yield a positive impact on Intuitional research activities

2. Literature Review

Urquhart and Turner, (2016) in their study on critically review methods of impact assessment and an economic analysis is a comprehensive study. The study found that Terms for library assessment (outcome, output, impact, value and benefit) vary among different sectors. The study is helpful and gives insight into the ROI Analysis. Mani ... et al. (2019) study on e-resources usage revealed that 78.3% of are aware and used e-resources. The study found that the primary uses of e-resource by respondents are for research purpose (53%). The study also unfold that, "17.3% are using e-resources to improve professional competence, 39% of the

respondents felt that lack of training as a key constraint for the effective use of e-resources and 35% of the respondents are highly satisfied with the present e-collection of the library. Singh and Pandita (2019) in their study on ROI of IITs Libraries presented a study which “aims to assess the Returns on Investment (ROI) of the twenty leading libraries of the Institutes of Engineering and Technology in India in the form of institutional research output”. The results of the study revealed that “Institutes of Engineering and Technology in India concentrate more on procurement of electronic resources in their libraries, spending nearly three-fourth of their budget on the procurement of electronic documents mostly in the form of online journals and e-Books”. The study gives an insight into the importance of libraries and the part these sub-institutions’ play in the overall ranking of their institution.

3. Objective of the Study

1. To study the different types of electronic information resources used by scientists, faculty, research scholars and students.
2. To study the research output of scientists, faculty, research scholars and students in terms of usability of electronic information resources.
3. To study the economic value of library to the scientific and research institute.
4. To study the library value within the context of an intuitional research growth.
5. To suggest some possible measures to strengthen vis-a-vis enhance the usability of subscribed electronic resources.

4. Institute & their E-resources Collections

4.1 Central Institute of Fresh Water Aquaculture (CIFA), Bhubaneswar

Central Institute of Freshwater Aquaculture (CIFA) is a leading research institute on freshwater aquaculture in the country under the umbrella of the Indian Council of Agricultural Research (ICAR), New Delhi. Institute is actively engaged in basic and strategic research for the development of sustainable culture systems for freshwater finfish and shellfish, species and systems diversification in freshwater aquaculture. The CIFA library and documentation unit acts as a repository of literature and information and provides latest information in the field of freshwater aquaculture, fish genetics and biotechnology, fish Nutrition and Physiology, fisheries and related aspects. Library and documentation unit has the total collection of 6991 books, 2500 bound volumes of journals, and other reference materials. The library subscribed to 24 International current journals along with 44 Indian current Journals. The library has been recognized as the Food and Agriculture Organization (FAO) of the United Nations Depository Library and has a good collection of FAO publications related to fisheries and allied agricultural sciences. Library activities are fully automated with integrated library management software. The Consortium for e-Resources in Agriculture (CeRA), which enables the library to access around 2800 electronic journals for its users. Library extends the services to the institute staff as well as visitors from outside organizations.

4.2 Institute of Life Science (ILS), Bhubaneswar

Institute of Life Sciences (ILS) an autonomous institute of Department of Biotechnology, Govt. of India is undertaking cutting-edge research in the fields of vector-borne diseases such as malaria and filaria, viral infections, cancer biology, allergy and auto-immune disorders, genetic disorders, and agricultural productivity. The institute has necessary infrastructure,

including research facilities, genomics and proteomics platforms, flow cytometry, imaging facilities, animal house, green-house, plant tissue culture and zebra fish facilities and high performance computing facility etc. The Institute has currently about 100 Ph.D. students and a large number of post-doctoral fellows, fast track as well as women scientists. The research focuses at various themes such as infectious diseases, cancer biology, genetic & auto-immune diseases and plant & microbial biotechnology. The library has collection of books and journals in the frontier area of life sciences- infectious diseases, genetics, gene function and regulation and technology, developmental relevance to ILS research activities. Currently, the Library has collection about 2173 reference books including manuals and protocols. In addition to 917 online Journals from different publishers through DeLCON consortium, the library also subscribes to 7 print and 27 electronic journals.

4.3 Institute of Physics (IOP), Bhubaneswar

Institute of Physics, Bhubaneswar is an autonomous research institution within the Department of Atomic Energy (DAE), Government of India. Institute has a vibrant research programme in the fields of theoretical and experimental condensed matter physics, theoretical high energy physics and string theory, theoretical nuclear physics, ultra-relativistic heavy-ion collisions and cosmology, quantum information and experimental high energy nuclear physics. The Institute offers Ph.D. programme to young research scholars and provide opportunity to carryout research work on both fundamental and applied physics. The Library is furnished with modern infrastructure and furniture's on an area of 22,000 sq. ft. It has 13 research cubicles specially designed for senior scientist and research fellow. LibSys automation software is used for cataloguing, circulation, accounting and acquisition of books and journals. The users are also provided with the services of crystal software (for books) and PASS (for publications). The major services like, acquisition of books, journals and micro-documents, resource sharing among DAE units, publication assistance, reference and reprographic provided for the Institute members. The database of the books and journals are available on the web for the users. The library collection includes around 16,700 books in the related areas of physics, computer science, electronics, chemistry, mathematics.

4.4 National Institute of Science Education & Research (NISER), Bhubaneswar

The National Institute of Science Education and Research was founded in 2006 under the aegis of the Department of Atomic Energy with the goal of integrating scientific rigor into our country's broader pedagogical practices. The primary objective of the Institute is to train and develop future knowledge economies of human resources in the sciences. NISER provide graduate, Masters and PhD programmes in all basic science subjects. Interdisciplinary and cutting edge research programme are carried out at the institutes. NISER Library links people with information by providing academic and research community with diverse information resources and services. NISER Library develops and maintains wide range of information resources, including e-journal subscriptions, digital repositories and specialized collections crossing subjects. Library holds around 20,000 books in the fields of biology, chemistry, mathematics, physics, computer science, humanities and other interdisciplinary areas. Library also subscribes around 3850 e-journals in related disciplines along with scientific databases.

4.5 Regional Medical Research Centre (RMRC), Bhubaneswar

Regional Medical Research Centre (ICMR), Bhubaneswar is a prominent research centre of Indian Council of Medical Research established in 1981. Institute conducts basic as well as

applied research to understand and ultimately develop prevention strategy for diseases of regional importance like lymphatic filariasis, malaria, diarrheal disorders, tuberculosis, HIV/AIDS, emerging and reemerging bacterial/viral infections and allied disorders, hypertension, diabetes and health problems related to tribal populations. Library & Information Centre of RMRC has been back bone for the research activities of the institute. It is considered as one of the best bio-medical & health science research libraries in odisha with modern facilities and infrastructure. Koha an integrated library management system is used for the library housekeeping operations including OPAC modules. The library has set up digital repository to collect, preserve, and distributes digital material scholarly publications of the institute. The Library serves the research needs of the scientists, researchers, students, doctors and academicians of the state. Provide online literature search through, ICMR-EJC, ERMED consortia, JCCC@ICMR, EBSCO Database & Science Direct for scientists and researchers. Engaged in bibliometric/scientometric analysis and provide impact factor of scientific journals. It regularly publishes institute annual report, news bulletin, library news letter, IEC materials on specific diseases and special publications. Print collection includes 4000 books, 5000 bound Journals, 31 foreign journals, and 30 Indian journals. RMRC subscribed around 3500 title of electronic journals of its individual and mainly through membership of three major consortia ICMR E-journal Consortia (ICMR-EJC), J-Gate Custom Content (JCCC), ERMED consortia, etc. Library also subscribed to Science Direct, PROQUEST and EBSCO database.

5. Data Analysis and Interpretation

5.1 User base Analysis

Users are the most important component of the libraries. Below given table 1 contain the data related to the strength of faculty, staffs and students in the in the Institutes under the study.

Table 1: Users base of SRLIs

S. N.	Name of SRL	Scientist/ Faculty	Scientific/ Technical Staff	Administrative/ Supporting Staff	Student/ Research Scholar
1.	CIFA	71	37	30	14
2.	ILS	42	10	32	138
3.	IOP	27	38	49	85
4.	NISER	110	46	68	900
5.	RMRC	19	31	32	20

Scientist/Faculty, Scientific/Technical staff as well as Student/Research Scholar are found to be prominent users of the library. Users community of SRL's also covers Administrative/ Supporting Staff of the institute. The data collated in table 1 clearly indicates that there is highest number of human resources available at NISER, Bhubaneswar followed by CIFA, IOP, ILS and RMRC.

5.2 Annual Expenditures on E-Resources

Table 2 contains the data related to the annual expenditure on the e-resources of the Institutes under the study during the years 2010 to 2018.

Table 2: Institute wise Annual Expenditures on E-resources

Name of SRL	SRILs (Amount are in Indian Rupees (Lakh))									Total
	2010	2011	2012	2013	2014	2015	2016	2017	2018	
CIFA	22	25	18	7.59	18	21.88	9.11	8.3	4.94	134.82
ILS	20	22.3	29.1	31.2	36.2	38.7	41.3	43.2	50	312.00
IOP	24.3	26.5	27.1	30.4	35.2	40.1	32.8	31.9	38.4	286.70
NISER	37.6	38.2	41.6	44.7	47.9	51.3	54.2	59.3	65.29	440.09
RMRC	7.9	8.7	9.9	10.2	10.5	17.2	11.4	12.9	15	103.70

The table 2 depicted the amount of expenditure occurred by each libraries for subscribing the electronic resources. The amount of expenditures towards electronic resources has increased substantially year wise. It is observed that the average budget at NISER Bhubaneswar was highest 440.09 lakh during 2010-18. However other institutions were also allocated significant proportion of budget towards subscription of e-resources.

5.3 Collections of Scientific and Research Institute Libraries (SRILs)

Rich collections of the library are very much important in order to provide useful and relevant documents to clients. Below given table 3 contain the data related to the collection of the libraries under the study.

Table 3: Resource Collections of Scientific & Research Institute Libraries (SRILs)

Sl. No.	Name of SRL	Resource Collections of SRILs					
		Book	Journal	E-Journal	Database	E-Books	CD/DVD/Multimedia/ Others
1.	CIFA	6991	68	3000	2	250	200
2.	ILS	2173	8	1191	2	50	48
3.	IOP	16700	135	2500	4	6000	100
4.	NISER	20000	58	3865	9	10100	250
5.	RMRC	5046	61	3532	2	250	100

Above table 3 shows that each Scientific & Research Institute Libraries (SRILs) are holding significant number of collections and it is observed that most of the SRILs are having adequate quantity of electronic resources for their users in their respective area of research. E-journals are the most preferred electronic resources format subscribed by these research libraries. Electronic databases along with electronic books are the other prominent form in e-resources that are included in their core collections. It has been also observed that the highest (3865) numbers of e-journals are subscribed by NISER. As far e-books were concerned the highest (10100) number of e-books were subscribed by Institute of Physics.

5.4 ROI Analysis with respect to their Research Publications

Publications of each institute are retrieved from the SCOPUS database during the period of 2010-2018. Below given table 4 contains the related data.

Table 4: Growth of Research Publications

Name of SRL	Year Wise Growth of Publications									Total Publications
	2010	2011	2012	2013	2014	2015	2016	2017	2018	
CIFA	35	40	53	43	57	43	56	65	48	440
ILS	57	69	99	111	65	62	63	52	61	639
IOP	108	111	135	106	141	126	182	275	303	1487
NISER	27	30	55	155	354	305	330	361	438	2055
RMRC	29	32	29	32	51	51	42	42	46	354

The above table 4 describe the scholarly communication of research through publication of journal article, reports, and technical documents. Publications pattern study helps in analyzing the growth of institute's research activities and communicating the research findings among others scientific community. From this table it has been observed that the number of publications of each institute has increased substantially. It is also observed that highest number of publication is by NISER 2055 followed by Institute of Physics 1487 during the period 2010-18.

In order to measure the impact on research productivity the following ROI formula is used

$$\text{ROI (\%)} = \text{Total Benefits (TB)}/\text{Total Budget(B)}*100$$

5.5 ROI analysis of e-resources in terms of research output/publications

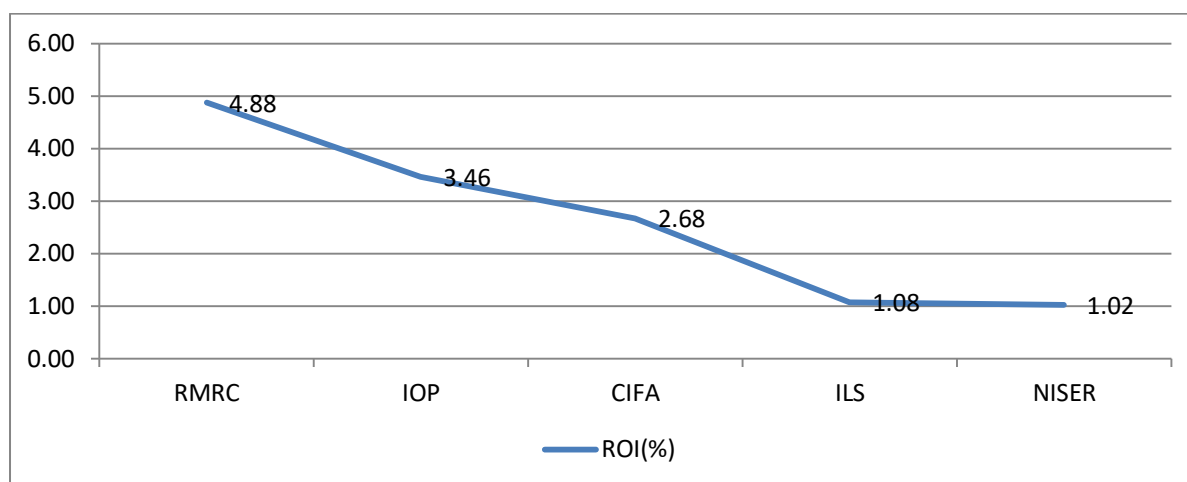
Below given table 4 contain the data related to the ROI analysis of e-resources in terms of research output/publications of the all Scientific and Research Institutions located in Bhubaneswar, Odisha.

Table 5: ROI analysis of e-resources in terms of research output/publications

Name of SRL	Total Budget (B)	Average Budget	Total Publication (TP)	Total Staff (TS)	Total Benefits (TB)	ROI (%)	Rank
					TB=TP/TS	ROI=TB/B*100	
RMRC	103.70	11.52	354	70	5.06	4.88	1
IOP	286.70	31.86	1487	150	9.91	3.46	2
CIFA	134.82	14.98	440	122	3.61	2.68	3
ILS	312.00	34.67	639	190	3.36	1.08	4
NISER	440.09	48.90	2055	458	4.49	1.02	5

Scientist/ Faculty member, Scientific/Technical staff, Research scholars were taken in to consideration of calculating ROI in term of research publications. However, supporting Administrative staff and students were not considered for ROI analysis because of their nature of work is not directly associate with in any significant research and publication activities. Table 5 & Fig. no. 1 depicted the study of details ROI analysis of e-resources in terms of research output/publications. It has been found that RMRC obtained maximum returns (4.88%) followed by Institute of Physics (3.46%).

Fig no. 1 ROI analysis of e-resources in terms of research output/publications



There is some study which suggested that any ROI greater than 1% is good and indicates that the value of benefits provided exceeds the cost to provide them. (Kelly, Hamasu & Jones, 2012). All SRILs are having ROI value of more than 1%. Hence, the results are encouraging and significant for these research libraries. Furthermore, it may draw an inference that the resultant data exclusively deals with ROI in relation to the budget spent on electronic resources and research publications. Thus it can be concluded that there is greater impact of e-resources on the research activities of various institution in relation to the money spent for subscribing e-resources by scientific & research libraries.

6. Measures to be taken to Enhance the Usage of e-resources & Increase the ROI Values

Though most of these libraries having ROI positive values, maximum usage of electronic resources will certainly increase the research activities and services of the parent institution as whole. The following measures should be taken by the research libraries to enhance its usage of electronic resources which will provide maximum returns/results and greater ROI value.

6.1 Use of Electronic Resource Management (ERM) system to assess the Impact

Electronic Resource Management (ERM) facilitates e-resource authorization, organisation and better management. Integrated ERM system provides platform for analyzing and monitoring e-resource usage. Implementation of such tool in research library would support better use of the electronic resources. This will also assist management in assessing and analyzing impact of these e-resources on the research activities of the organization.

6.2 Adopting communication tools to popularizing E-resources content

It is need to adopt new communication tools to reach out to users. Web-based electronic display board will not only educate the user about the e-resources library but will also increase the potential for attracting user to access library services. Having use of social platforms to share the information about availability of content will certainly impact the usage.

6.3 Extending e-resources access beyond Library

Extending the facility to access the content of information regardless of location and time. The move would give scientists, faculty, researchers and students the opportunity to make full use of the subscribed electronic collections for their research activities. Basically, it will yield maximum returns on the expenditure that libraries are doing to procure these resources.

6.4 Dynamic Library Portal to push e-resources Information

Integrated library portal and all information about e-resources definitely act as a key to the scientific information. Incorporating the content of e-resources through web OPAC will also expand the use of online services. Library portal with all the user centric features should be interactive and more functional.

6.5 Assessing the impact of e-resources on Research Grant and Publications and Awards

For the calculation of ROI it is important to evaluate research publications by the individual scientist and faculty. Awards and recognitions are a result of both individual and organizational work carried out. Analytical study of how the library contributes to the organization in obtaining such recognitions needs to be carried out.

6.6 Consortia of e-resources

Consortiums are found to be the main source to obtain collection of e-resources for these scientific libraries. To study minutely the effect of resources on their research activities, each participating institute is required to analyze the usage data. Flexibility should be provided to Member organizations to follow methods of pick and choose, pay by view, when selecting e-resources.

6.7 ICT Infrastructure and Adoption of New Technology

The use of electronic resources had been greatly impacted by ICT infrastructure of the library. To provide better user services, therefore, it is important for research libraries to improve their current ICT infrastructure. Dedicated Internet connectivity with modern computer facilities to be provided for the users for accessing e-journals and online resources.

6.8 Training for the Library Professional to Effective way of handling e-resources

Library professional should expose to training programme relate with effective way handling electronic resources. Sophisticated searching and information retrieval skill or techniques is must for the professionals to handle the e-resources smartly.

7. Conclusion

In present scenario it is highly essential for library and information professionals to keep track of usages of e-resources and assessment of the impact of e-resources on research activities at the institutes. Adopting best practices in the evaluation of e-resources & ROI analysis of research libraries will give meaning full inference to the authority.

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