CHAPTER- 6

DATA ANALYSIS AND INTERPRETATIONS

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Chapter- 6

DATA ANALYSIS AND INTERPRETATIONS

6.0 INTRODUCTION

Data Analysis and interpretation are essential for a scientific study and for ensuring that we have all relevant data for making contemplated comparisons and analysis. The term analysis refers to the computation of certain measures along with searching for patterns of relationship that exist among data groups. The analysis of data in a general way involves a number of closely related operations, which are performed with the purpose of summarizing the collected data and organizing these in such a manner that they answer the research questions. In the process of analysis, relationships or differences supporting or conflicting with original or new hypotheses should be subjected to statistical tests of significance to determine with what validity data can be said to indicate any conclusions.

Analysis is the product of insight into the total situation, paying upon the assembled facts and giving them a general significance. Its validity depends more upon common sense, experience, background knowledge, and intelligent honesty of the interpreter than upon conformity to any set rules that might be formulated.

The topic of the present study is ***"Information Use Pattern by Scientists Working at Selected CSIR Laboratories Northeast and Eastern India: A Study"*** which covers 350 scientists and research scholars of seven CSIR laboratories of North East and Eastern India. It was very difficult to survey all the science and technology staff of the laboratories within a very short time. For getting a clear image of users of KRC, of all the seven laboratories the scholar personally visited all the science and technology departments and met some Scientists including Senior Principal Scientist, Principal Scientist, Chief Scientist, Scientist, Outstanding Scientist, Scientists, Women Scientist and the Research Scholars that are engaged in different R & D projects including Research Associates (RA), Senior Research Fellow (SRF), Junior Research

Fellow (JRF) and Project Assistant (PA). Analysis shows that the information about the prevailing conditions of the library systems of the CSIR Laboratories under study in regard to information use pattern of the scientists. The study also analyses the publication trend of the scientists.

6.1 DATA ANALYSIS AND INTERPRETATIONS

In the present study, the collected through two type's questionnaires and the results have been analyzed and interpreted based on the data collected from the Librarian/library in-charge and the scientists of the laboratories/ institutes. Researcher has also collected and also exported data related to the publications trend of each individual laboratory from the SCOPUS database. For systematic analysis and interpretation of these data the researcher have categorized the analysis of responses into three parts:

- **Part A:** Analysis of the Responses Received from the Librarian/ Librarian In-Charge.
- **Part B:** Analysis of the Responses Received from the Scientists.
- **Part C:** Bibliometric Analysis of the Research Output of the Scientists.

Chapter- 6: Part- A

Analysis of the Responses Received from the Librarian/ Librarian in- Charge

6.1.1 Introduction

This part consists of the data analysis and interpretation of the data collected from the Librarians/ Librarian In -Charges of the seven selected CSIR laboratories of North East and Eastern India. The data collected from this target group considered as the primary information. Total numbers of seven (7) questionnaires were distributed to the 7 CSIR laboratories and the researcher has received back all the seven (7) questionnaires from the Librarian/ Librarian In- charge. The response rate of the first questionnaire is 100%. This part consists of seven sections which are as follows:

- Section A: General Information
- Section B: Library Collections and Budget
- Section C: Library Building
- Section D: Processing of Library Materials
- Section E: Reader's Service
- Section F: Software and Hardware Requirement for the KRC's
- Section G: ICT Infrastructure of the KRC's

6.1.1.1 Section A: General Information

This section comprises the general information like Name of the Laboratories, number of scientists, name of the library, year of establishment, number of scientists, number of library staff, name of the Librarian/ Librarian in- Charge, web address and e-mail address of the KRC's.

6.1.1.1.1 Information about the CSIR Laboratories/ KRC's

The **Table- 6.1** provides information like name of the laboratory, number of scientists, name of the library, year of establishment, number of scientists and number of library staff.

Table- 6.1: Information about the CSIR Laboratories/KRC

Sl. No.	Name of the Laboratory	No of Scientists	Name of the Library	Year of Establishment	No. of Library Staff
1.	Central Glass and Ceramic Research Institute (CGCRI), Kolkata	Not mention in the Questionnaire	Knowledge Resource Centre (KRC)	1950	7
2.	Indian Institute of Chemical Biology (IICB), Kolkata	61	Knowledge Resource Centre (KRC)	1935	7
3.	Central Institute of Mining and Fuel Research (CMERI), Durgapur	121	Knowledge Resource Centre (KRC)	1958	4
4.	Central Mechanical Engineering Research Institute (CIMFR), Dhanbad	Not mention in the Questionnaire	Knowledge Resource Centre (KRC)	1954	7
5.	North East Institute of Science and Technology (NEIST), Jorhat	97	Knowledge Resource Centre (KRC)	1961	5
6.	National Metallurgical Laboratory (NML), Jamshedpur	138	Knowledge Resource Centre (KRC)	1950	14
7.	Institute of Minerals and Materials Technology (IMMT), Bhubaneswar	92	Knowledge Resource Centre (KRC)	1964	2

Source: Computed from the Surveyed Data

The **Table- 6.1** indicates that the CSIR- CGCRI was established in the year 1950; its library was well known as Knowledge Resource Centre (KRC) and total numbers of 7 staff are working at KRC. CSIR- IICB was established in the year 1935. It was the first established laboratory among all the seven laboratories under study and it consists of 61 experienced and expert scientists. The KRC of IICB is named as Knowledge Resource Centre which consists of 7 professional and non- professional staff. The CSIR- CMERI was established in the year 1958 which comprises 121 scientists and the library was known as Knowledge Resource Centre which consists of 4 staff. The CSIR- CIMFR established in the year 1954 and the library and information division was known as Knowledge Resource Centre which comprises 7 numbers of professional and non- professional library staff. The CSIR- NEIST was established in 1961 which have 97 expert and experienced scientists working for the fulfillment of the institutions goal and the Knowledge Resource Centre comprising 5 professional and non- professional staff. The CSIR- NML was established in the year 1950 which have 138 scientists. The Information Management and Dissemination Centre (IMDC) of NML are renamed as Knowledge Resource Centre which consists of 14 staff. The last laboratory listed in the above table is CSIR- IMMT which was established in the year 1964 comprises 92 scientists. The Library and Documentation Division of IMMT is also called Knowledge Resource Center (KRC) like other CSIR laboratories which have only two staff working for the library resource management.

6.1.1.1.2 Name of the Librarian/ Librarian in- charge, Web Address and E-mail of the Library

The **Table 6.2** listed the name of the Librarian/ Librarian In- charge, Web address and E-mail of the Library. From table below it has been found that most of the KRC's have Librarian. Only two laboratories have Librarian In- charge/ Head namely NML, Jamshedpur and CMERI, Durgapur respectively. The laboratories have appointed one of the Principal Scientist/ Chief Scientist as the Librarian In- charge/ Head of the KRC's. Except CMERI, all the laboratories KRC's have their own web address. The Libraries of CGCRI, IICB, CMERI, NEIST and NML have their E-mail address, but the libraries of CIMFR and IMMT do not have any E-mail address.

Table- 6.2: Laboratory Wise Distribution of Name of the Librarian/ Librarian in- charge, Web Address and E-mail of the KRC

Sl. No.	Name of the Laboratory	Name of the Librarian/ Library In-charge	Web Address of the KRC	E-Mail of the KRC
1.	Central Glass and Ceramic Research Institute (CGCRI), Kolkata	Ms. Chandana Patra Librarian	www.cgcri.csircentral.net	library@cgcri.res.in
2.	Indian Institute of Chemical Biology (IICB), Kolkata	Dr. N. C. Ghosh Librarian	www.iicb.res.in	librarian@iicb.res.in
3.	Central Institute of Mining and Fuel Research (CMERI), Durgapur	Dr. Tapas Gangopadhyay Head, KRC	No	lib@cmeri.res.in
4.	Central Mechanical Engineering Research Institute (CIMFR), Dhanbad	Dr. B. R. Panduranga Librarian	www.cimfrlibrary.org	No
5.	North East Institute of Science and Technology (NEIST), Jorhat	Dr. P.K. Barooah Librarian	www.neist.res.in	neistlibrary@rrljorhat.res.in
6.	National Metallurgical Laboratory (NML), Jamshedpur	Dr. Arvind Sinha Librarian In- charge	www.krc.nmlindia.org	imdc@nmlindia.org
7.	Institute of Minerals and Materials Technology (IMMT), Bhubaneswar	Dr. B. K. Dalai Librarian	www.immt.res.in	No

Source: Computed from the Surveyed Data

6.1.1.2 Section B: Library Collections and Budget

This section consists of laboratory wise library collections, laboratory wise collection development policy and library budget and year wise allocation of library budget in the KRC's of all the seven laboratories.

6.1.1.2.1 Laboratory Wise Collections of the KRC's

The **Table- 6.3** shows the total number of collection in the KRC's in terms of books, current journals, back volumes, theses, reference tools, microfilm/ microfiche, CD-ROM and other resources.

The **Table 6.3** gives details of the total number of library collections in the laboratories. CGCRI have total number of 49,056 books including bound volumes of periodicals. The IICB, Kolkata have 14,063 numbers of books, 32,714 numbers of back volumes, 190 numbers of current journals, Theses 242 numbers and 743 numbers of CD ROM. CMERI having 28,342 numbers of books, 18,457 numbers of back volumes, 27 numbers of current journals, 2664 numbers of CD ROM and 20,286 numbers of standards. CIMFR, Dhanbad have 13,000 books, 12,000 back volumes, 71 current journals, 50 theses, 99 CD-ROM and 500 other documents. NEIST, Jorhat have 18,568 books, 23,158 back volumes, 103 current journals 167 theses, 86 reference tools and ISI 3135. The NML, Jamshedpur has 50,000 books, 35000 back volumes, 80000 current journals, 200 theses, 5000 reference tools, 500 CD-ROM, 10000 newspaper clippings, 10000 R& D Reports, 5000 in- house publications and 5000 patents/ standards. The IMMT, Bhubaneswar has the collection of 14,023 books, 17,628 back volumes, 90 current journals and 4 microfilm/microfiche.

Table 6.3: Laboratory Wise Library Collections

Sl. No.	Name of the Laboratory	Total No. of Collection in the Library							
		Books	**Back Volumes**	**Current Journals**	**Theses**	**Reference Tools**	**Microfilm/Microfiche**	**CD-ROM**	**Any Other**
1.	CGCRI, Kolkata	49056 Including bound volumes of periodicals	-	-	-	-	-	-	-
2.	IICB, Kolkata	14063	32714	190	242	-	-	743	
3.	CMERI, Durgapur	28342	18457	27	-	-	-	2664	20286 (Standards)
4.	CIMFR, Dhanbad	13000	12000	71	50	-	-	900	500
5.	NEIST, Jorhat	18568	23158	103	167	86	-	-	3135 (ISI)
6.	NML, Jamshedpur	50000	35000	80,000	200	5000	-	500	10,000 Newspaper clipping, 10,000 R&D Report, 5,000 in-house publication & 5,000 patent/ standards
7.	IMMT, Bhubaneswar	14023	17628	90	-	-	4	-	

6.1.1.2.2 Collection Development Policy and Library Budget

The **Table- 6.4** below shows the laboratory wise collection development policy, separate budget and selection policy of the KRC's.

Tables- 6.4: Laboratory Wise Collection Development Policy and Library Budget

Sl. No.	Name of the Laboratory	Collection Development Policy		Separate Budget		Selection Policy	
		Yes	No	Yes	No	Yes	No
1.	CGCRI, Kolkata	Y	-	Y	-	Y	-
2.	IICB, Kolkata	Y	-	Y	-	Y	-
3.	CMERI, Durgapur	Y	-	Y	-	Y	-
4.	CIMFR, Dhanbad	-	N	Y	-	Y	-
5.	NEIST, Jorhat	Y	-	Y	-	Y	-
6.	NML, Jamshedpur	Y	-	Y	-	Y	-
7.	IMMT, Bhubaneswar	Y	-	Y	-	Y	-
	Total	**6**	**1**	**7**	**0**	**7**	**0**
	Percentage	85.71%	14.29%	100%	0%	100%	0%

Source: Computed from the Surveyed Data

The survey result as shown in the **Table- 6.4** indicates that the KRC's of the laboratories namely CGCRI, IICB, CMERI, NEIST, NML and IMMT have their own collection development policy, separate library budget and selection policy. CIMFR-KRC, Dhanbad has separate budget and selection policy and it does not have collection development policy. The survey elucidates that out of seven laboratories 6 (85.71%) laboratories have collection development policy and 1 (14.29%) laboratory have no such policy. All the seven KRC's have their separate budget and selection policy which shows 100% responses. The graphical representation of the Table- 6.4 is represented by **Figure-6.1**.

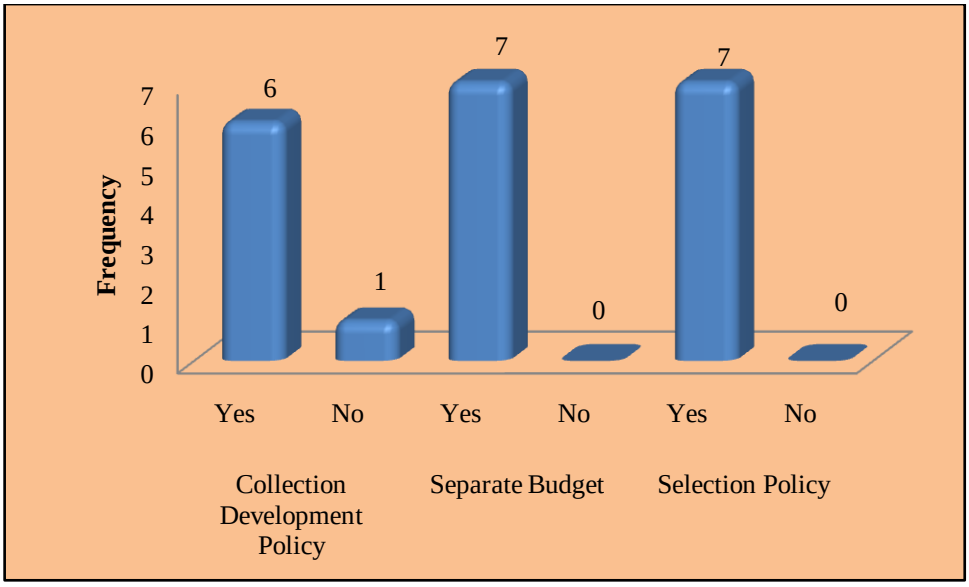


Figure- 6.1: Laboratory Wise Collection Development Policy and Library Budget

6.1.1.2.3 Year Wise Allocation of Library Budget

The **Table- 6.5** indicates allocation of Library budget for the financial year 2009-10 to 2013-14.

Tables -6.5: Year Wise Allocation of Library Budget

Sl. No.	Name of the Laboratory	Budget Allocated (Year wise)				
		2009-10	2010-11	2011-12	2012-13	2013-14
1	CGCRI, Kolkata	90.0 Lakhs	91.13 Lakhs	94.41 Lakhs	94.75 (Lakhs)	98.05 (Lakhs)
2	IICB, Kolkata	1 crore 35 lakh	1 crore 25 lakh	1 crore 30 lakh	1 crore	76 lakh
3	CMERI, Durgapur	25.0 Lakhs	47.5 lakhs	55.0 Lakhs	55.0 Lakhs	50.0 Lakhs
4	CIMFR, Dhanbad	40 Lakhs	30 Lakhs	50 Lakhs	30 Lakhs	70 Lakhs
5	NEIST, Jorhat	108 Lakhs	120 Lakhs	130 Lakhs	130 Lakhs	129.87 Lakhs
6	NML, Jamshedpur	86 Lakhs	90 Lakhs	90 Lakhs	100 Lakhs	110 Lakhs
7	IMMT, Bhubaneswar	55 Lakhs	73 Lakhs	66 Lakhs	50 Lakhs	1 Crores

Source: Computed from the Surveyed Data

The **Table-6.5** reflects the library budget of each laboratory from the session 2009-2010 to 2013-2014 for five years. The amount of library budget was highest 1 crore

35 lakhs, 1 crore 25 lakhs, 1 crore 30 lakhs in IICB, Kolkata for the sessions 2009-2010, 2010-2011, 2011-2012 and 2012-2013 respectively. For the session 2013-2014, the library budget was highest that is 1 crores in IMMT, Bhubaneswar as compared to other six laboratories.

6.1.1.3 Section C: Library Building

This section comprises laboratory wise information about the library building.

6.1.1.3.1 Laboratory Wise Information about the Library Building

The **Table- 6.6** gives a brief idea about the library building, availability of adequate space for providing services, adequate number of library seats and provision of research cubical/ research carrels.

Table- 6.6: Facilities in the Library Building

Sl. No.	Name of the Laboratory	Adequate space to provide Library services		Adequate no of seats to meet the requirement of Sci./Res. Scholars		Provide Research cubical/ Research Carrels	
		Yes	No	Yes	No	Yes	No
1.	CGCRI, Kolkata	Y	-	-	N	Y	-
2.	IICB, Kolkata	Y	-	Y	-	-	N
3.	CMERI, Durgapur	Y	-	Y	-	-	N
4.	CIMFR, Dhanbad	Y	-	Y	-	Y	-
5.	NEIST, Jorhat	Y	-	Y	-	-	N
6.	NML, Jamshedpur	Y	-	Y	-	Y	-
7.	IMMT, Bhubaneswar	Y	-	Y	-	Y	-
	Total	**7**	**0**	**6**	**1**	**4**	**3**
	Percentage	**100%**	**0%**	**85.71%**	**14.29%**	**57.14%**	**42.86%**

Source: Computed from the Surveyed Data

The **Table- 6.6** shows that all the seven KRC's have adequate space to provide library services. Except CGCRI all the six KRC's have adequate seats to meet the

requirement of the Scientists and Research Scholars. KRC's of CGCRI, CIMFR, NML and IMMT have provided Research Cubical/ Research Carrels to the users and rest of the three laboratories namely IICB, CMERI and NEIST have no such Research Cubical/ Research Carrels. The survey result as shown in the Table- 6.6 indicates that out of seven KRC's 7 (100%) KRC's have adequate space to provide library services, 6 (85.71%) KRC's have adequate number of seats and 1 (14.29%) do not have adequate seats to meet the requirements of scientists/ research scholars. The Results also indicates that 4 (57.14%) KRC's have research cubical/ research carrels and 3 (42.86%) does not provide such facilities to their users. The graphical representation of the Table- 6.6 is given in the **Figure- 6.2**.

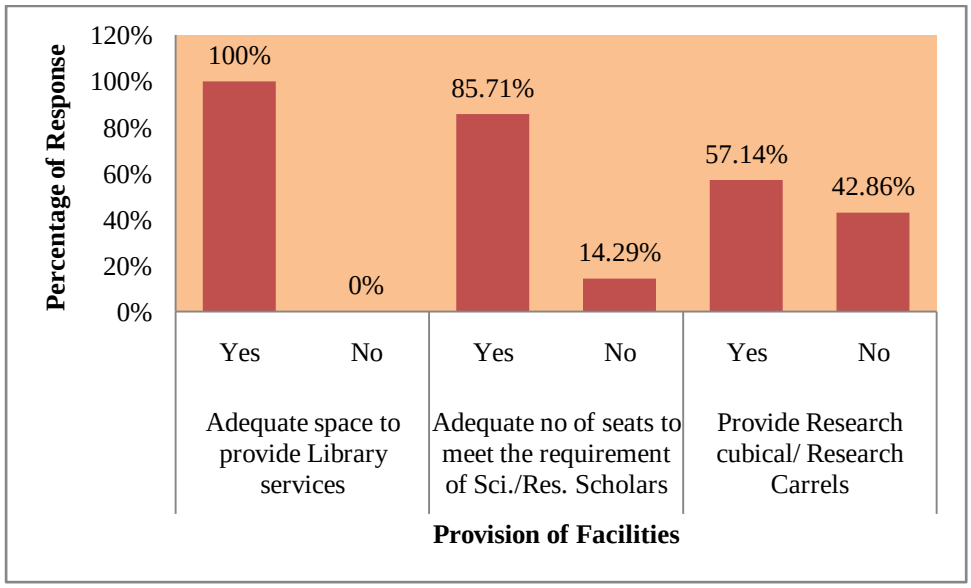


Figure- 6.2: Facilities in the Library Building

6.1.1.4 Section D: Processing of Library Materials

The following **Table- 6.7** discusses about the technical processing of the reading materials of the KRC's.

Table 6.7: Processing of Library Materials

Sl. No	Name of the Laboratory	Time taken to present the Book				Classification Scheme				Physical form of catalogue follow		Catalogue code use			
		One Week	Two Week	One Month	More than	DDC	CC	UDC	Other	Card	Ledger	CCC	AACR	AACR-2	Other
1.	CGCRI, Kolkata	✓	-	-	-	-	-	✓	-	✓	-	-	-	✓	-
2.	IICB, Kolkata	-	-	✓	-	-	-	✓	-	✓	-	-	-	✓	-
3.	CMERI, Durgapur	✓	-	-	-	-	-	✓	-	✓	-	-	-	✓	-
4.	CIMFR, Dhanbad	✓	-	-	-	-	-	✓	-	✓	-	✓	-	-	-
5.	NEIST, Jorhat	✓	-	-	-	-	-	-	-	✓	-	-	-	✓	-
6.	NML, Jamshedpur	-	✓	-	-	-	-	✓	-	✓	-	-	-	✓	-
7.	IMMT, Bhubaneswar	-	✓	-	-	-	-	✓	-	✓	-	-	-	✓	-

Source: Computed from the Surveyed Data

The **Table- 6.7** shows that KRC's of CGCRI, CMERI, CIMFR and NEIST have taken one week to present the books for issuing. The KRC's of NML and IMMT have taken two weeks and IICB takes one month to present the books. All the six KRC's have using Universal Decimal Classification scheme for classifying books. NEIST is the only laboratory which is using Dewey Decimal Classification (DDC) scheme. All the KRC's follow physical form of catalogue card. Regarding catalogue code CIMFR-KRC is using classified Catalogue Code (CCC) and the rest of the KRC's are using AACR-2.

Table- 6.7 (a): Classification Scheme Preferred by the KRC's

Sl. No.	Classification Scheme	Number of Responses	Percentage %
1.	Dewey Decimal Classification	1	14.29
2.	Colon Classification	0	0.00
3.	Universal Decimal Classification	6	85.71
4.	Other	0	0.00
	Total	**7**	**100.00**

Source: Computed from the Surveyed Data

The **Table- 6.7 (a)** shows that out of seven (7) KRC's, 1 (14.29%) KRC have using Dewey Decimal Classification (DDC), use of Colon Classification (CC) and other schemes is 0% and the 6 (85.71%) KRC's are using Universal Decimal Classification (UDC) scheme. So, from the result it is clear that most of the KRC's prefer UDC for classification of reading materials.

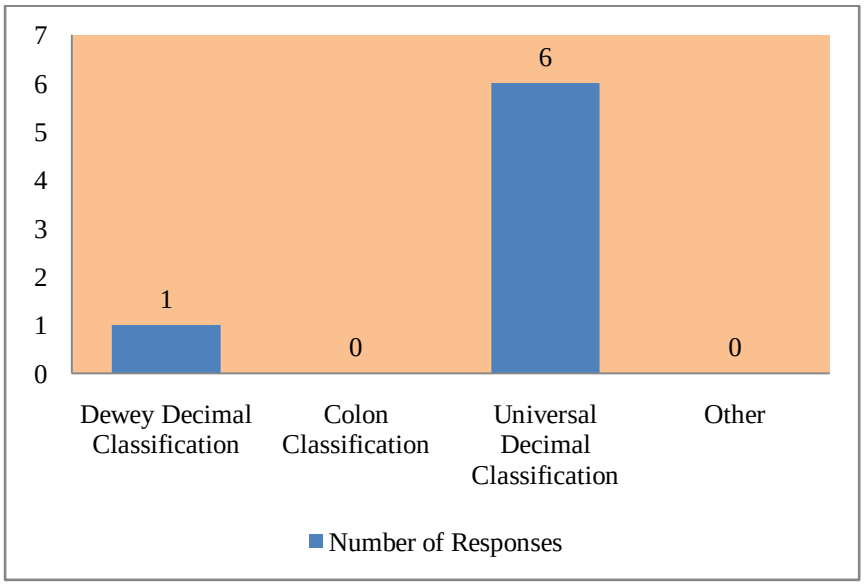


Figure- 6.3 (a): Classification Scheme Preferred by the KRC's

Table- 6.7 (b): Catalogue Code Use by the KRC's

Sl. No.	Catalogue Code Use	Number of Responses	Percentage %
1.	Classified Catalogue Code (CCC)	1	14.29
2.	AACR	0	0.00
3.	AACR- 2	6	85.71
4.	Other	0	0.00
	Total	**7**	**100.00**

Source: Computed from the Surveyed Data

From the **Table- 6.7 (b)** it was found that 1 (14.29%) KRC's are using Classified Catalogue Code (CCC) and 6 (85.71%) KRC's have using AACR- 2 for cataloguing purpose. Use of AACR and other catalogue code is 0% in the table. The **Figure- 6.3 (b)** was the graphical representation of the Table- 6.7 (b).

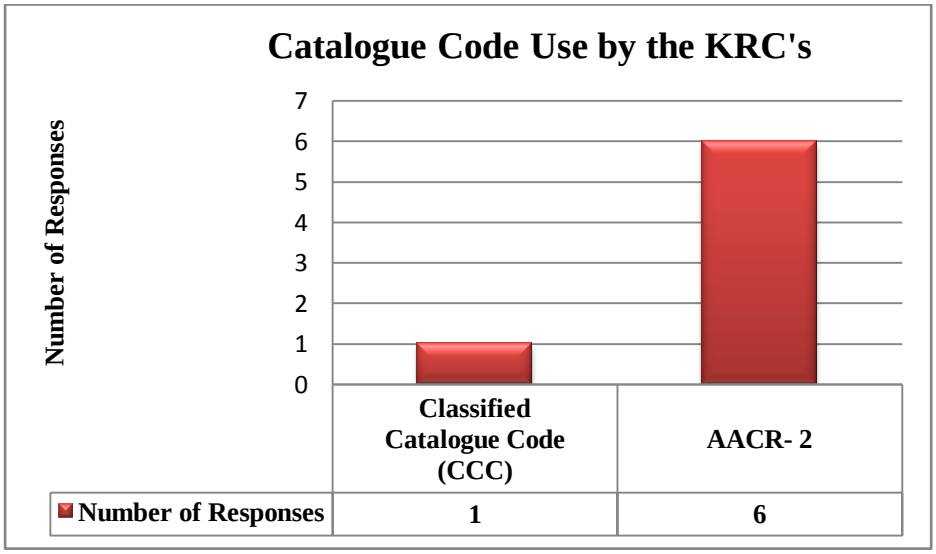


Figure- 6.3 (b): Catalogue Code Use by the KRC's

6.1.1.5 Section E: Readers Services

This part of the analysis discusses about the working hours of the KRC's, Library opening in holidays and vacation or not, charging System of the KRC's, methods using for charging of materials, provision of documentation service, active reference service and bibliographic/ current content service and the method using for disseminating of services.

6.1.1.5.1 Working Days of the KRC's

The **Table- 6.8** provides the information about the working days of the KRC's.

Table- 6.8: Working Days of the KRC's

Sl. No.	Name of the Laboratory	Week Days	Sundays
1.	CGCRI, Kolkata	✓	-
2.	IICB, Kolkata	✓	-
3.	CMERI, Durgapur	✓	-
4.	CIMFR, Dhanbad	✓	-
5.	NEIST, Jorhat	✓	-
6.	NML, Jamshedpur	✓	-
7.	IMMT, Bhubaneswar	✓	**40 hours open**

Source: Computed from the Surveyed Data

From the **Table- 6.8** it has been found that all the KRC' were kept open in the working days and IMMT open 40 hours in a week. All the KRC's were closed in Sunday.

6.1.1.5.2 Provision of Opening KRC's during Holidays and Vacations

The **Table- 6.9** provides information about opening of the KRC's during holidays and vacations.

Table- 6.9: Opening of the KRC's during Holidays and Vacations (N= 7)

Sl. No.	Name of the Laboratory	Yes	No
1.	CGCRI, Kolkata	-	✓
2.	IICB, Kolkata	-	✓
3.	CMERI, Durgapur	-	✓
4.	CIMFR, Dhanbad	✓	-
5.	NEIST, Jorhat	-	✓
6.	NML, Jamshedpur	-	✓
7.	IMMT, Bhubaneswar	-	✓
	Total	**1**	**6**
	Percentage (%)	**14.29**	**85.71**

Source: Computed from the surveyed Data

The survey result as shown in the **Table- 6.9** indicates that out of seven (7) KRC's 6 (85.71%) KRC's were kept close during holidays and vacations. The rest of the 1 (14.29%) KRC was open during holidays and vacations. From the study it was found that the KRC of CIMFR, Dhanbad was open during holidays and vacation and other six KRC's were closed in holidays and vacations. The **Figure- 6.4** is the graphical representation of the Table- 6.9.

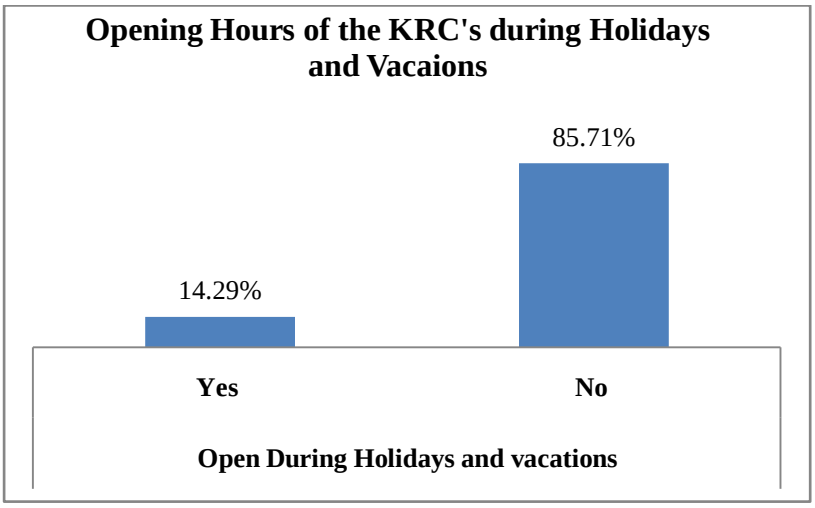


Figure- 6.4: Opening of the KRC's during Holidays and Vacations

6.1.1.5.3 Charging System of the KRC's

The **Table- 6.10** indicates about the charging system used in the KRC's.

Table- 6.10: Charging System of the KRC's

Sl. No.	Name of the Laboratory	Browne	Newark	Two card system of Ranganathan	Any Other
1.	CGCRI, Kolkata	-	-	-	RFID Technology
2.	IICB, Kolkata	-	-	-	-
3.	CMERI, Durgapur	-	-	-	Based on Libsys s/w
4.	CIMFR, Dhanbad	-	-	-	-
5.	NEIST, Jorhat	-	-	-	-
6.	NML, Jamshedpur	-	-	-	-
7.	IMMT, Bhubaneswar	-	-	✓	-

Source: Computed from Surveyed Data

The **Table- 6.10** indicates that the charging system of the KRC of IMMT was based on Ranganathan's two cards system, CGCRI using RFID technology for charging, CMERI- KRC's charging system based on LIBSYS s/w and other four laboratories did not give any comment in the questionnaire.

6.1.1.5.4 Methods Used for Issuing of Documents

The **Table 6.11** indicates about the issue systems preferred by the KRC's.

Table- 6.11: Methods Using for Charging of Materials (N= 7)

Sl. No.	Name of the Laboratory	Electronic Method	Traditional Method
1.	CGCRI, Kolkata	✓	-
2.	IICB, Kolkata	✓	-
3.	CMERI, Durgapur	✓	-
4.	CIMFR, Dhanbad	✓	-
5.	NEIST, Jorhat	✓	✓
6.	NML, Jamshedpur	✓	✓
7.	IMMT, Bhubaneswar	-	-
	Total	**6**	**2**
	Percentage	**85.71%**	**28.57%**

Source: Computed from the Surveyed Data

The **Table- 6.11** shows that except IMMT- KRC, all the KRC's were using electronic method to issue documents. The KRC's of NEIST and NML were also using traditional methods for issuing. From the survey result it was reflected that the 6 (85.71%) KRC's were using only electronic method for charging materials and 2 (28.57%) KRC's were using both electronic and traditional methods for charging of library reading materials. Here, the research scholar has consider N= 7. The **Figure- 6.5** is the graphical representation of the Table- 6.11.

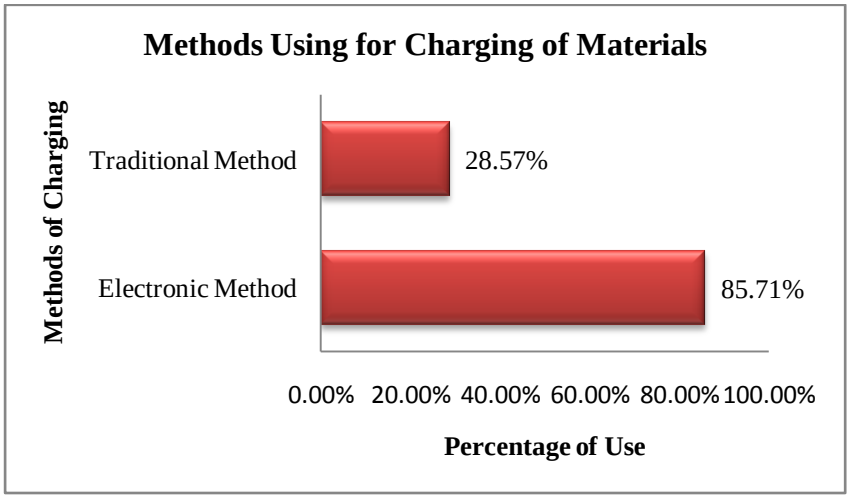


Figure- 6.5: Methods Using for Charging of Materials

6.1.1.5.5 Provision of Library Services

The **Table- 6.12** shows the provision of services like active reference service, documentation service and bibliographic/ current content service provided by the KRC's.

Table- 6.12: Provision of Documentation Service, Active Reference Service and Bibliographic/ Current Content Service (N= 7)

Sl. No.	Name of the Laboratory	Documentation Service		Active Reference service		Bibliographic/ Current Content Service	
		Yes	**No**	**Yes**	**No**	**Yes**	**No**
1.	CGCRI, Kolkata	✓	-	✓	-	✓	-
2.	IICB, Kolkata	✓	-	✓	-	✓	-
3.	CMERI, Durgapur	-	✓	-	✓	✓	-
4.	CIMFR, Dhanbad	✓	-	✓	-	-	✓
5.	NEIST, Jorhat	-	✓	✓	-	-	✓
6.	NML, Jamshedpur	✓	-	✓	-	✓	-
7.	IMMT, Bhubaneswar	✓	-	✓	-	✓	-
	Total	**5**	**2**	**6**	**1**	**5**	**2**
	Percentage (%)	**71.43**	**28.57**	**85.71**	**14.29**	**71.43**	**28.57**

Source: Computed from the Surveyed Data

The **Table- 6.12** shows that the KRC's of CGCRI, IICB, CIMFR, NML and IMMT providing documentation service to the users**.** CMERI does not provide active reference service to the readers but other six KRC's have providing active reference service to the readers. The KRC's of the CGCRI, IICB, CMERI, NML and IMMT provide bibliographic and current content services to the users. The survey result shows that out of seven KRC's 5 (71.73%) have provided both documentation service and bibliographic and current content service, and 6 (85.71%) were providing active reference service. The **Figure- 6.6** is the graphical representation of the Table- 6.12.

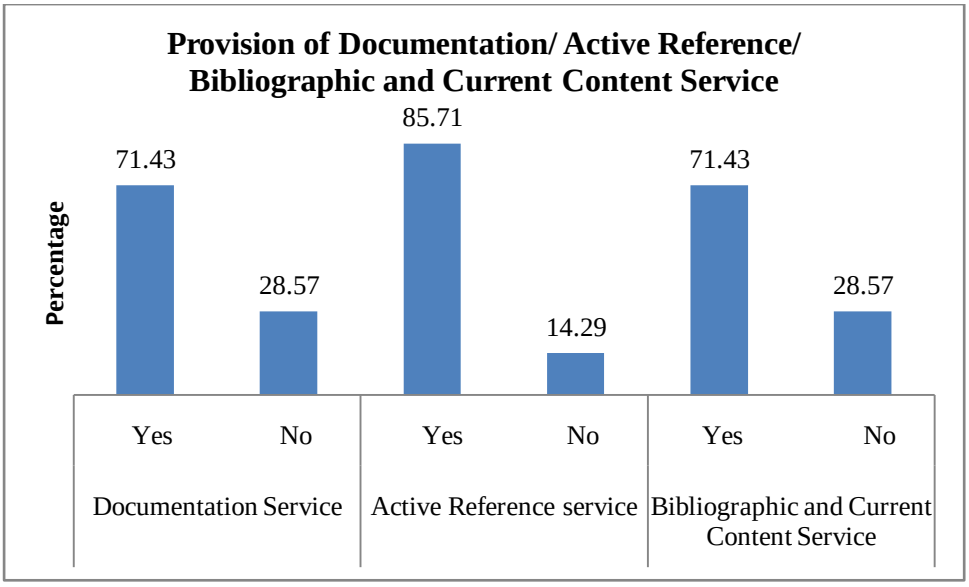


Figure- 6.6: Provision of Documentation Service, Active Reference Service and Bibliographic/ Current Content Service

6.1.1.5.6 Medium Used for Disseminating Services

The **Table- 6.13** indicates the medium used for disseminating services. The table shows that KRC's of CGCRI, CIMFR and NML were disseminating services both through documents and electronic form. The KRC of IICB was disseminating services through electronic form. NML has also using the social media for disseminating services.

The **Table- 6.13** shows that 3 (42.86%) KRC's were disseminating services through document, 4 (57.14%) disseminating services through electronic form and 1 (14.29%) KRC disseminating services through other media like Social media. The **Figure- 6.7** below is the graphical representation of the Table- 6.13.

Table- 6.13: Medium used for Disseminating of Services (N= 7)

Sl. No.	Name of the Laboratory	Through document	Through electronic form	Through any other media
1.	CGCRI, Kolkata	✓	✓	-
2.	IICB, Kolkata	-	✓	-
3.	CMERI, Durgapur	-	-	-
4.	CIMFR, Dhanbad	✓	✓	-
5.	NEIST, Jorhat	-	-	-
6.	NML, Jamshedpur	✓	✓	**Social Media**
7.	IMMT, Bhubaneswar	-	-	-
	Total	**3**	**4**	**1**
	Percentage (%)	**42.86**	**57.14**	**14.29**

Source: Computed from the surveyed data

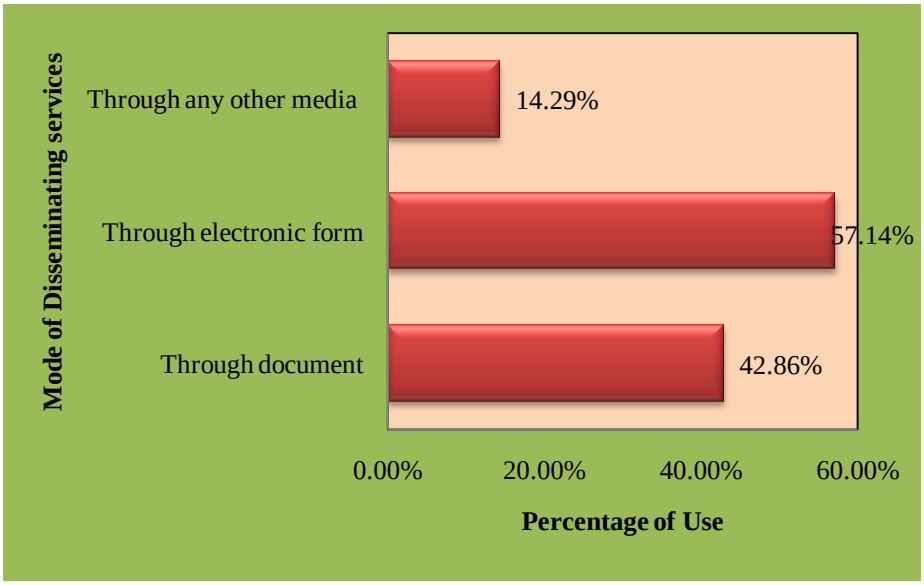


Figure- 6.7: Medium Used for Disseminating of Services

6.1.1.6 Section F: Status of Library Automation

This section of the analysis provides information about the status of the library automation in the KRC's.

6.1.1.6.1 Software using for Library Automation

The **Table- 6.14** shows the library automation software's that have been used by the KRC's. The research scholar has been prepared multiple choice questions to know the name of the library automation software and the options were Libsys, CDS/ISIS/WINISIS, SLIM++, SOUL 2.0, Koha and others.

From the result, it has been indicated that KRC's of CMERI, IICB, CGCRI and CIMFR were using Libsys software for the library automation process. NEIST was using CDS/ISIS, SLIM++ and Koha software for automation of the KRC. NML was using both Koha and Aurum 3.0 (in-house S/W). Only IMMT, Bhubaneswar was using Bibliosys software for library automation.

Table- 6.14: Library Automation software used in the KRC's (N= 7)

Sl. No.	Name of the Laboratory	Libsys	CDS/ISIS/ WINISIS	SLIM ++	SOUL 2.0	Koha	Other
1.	CGCRI, Kolkata	✓	-	-	-	-	-
2.	IICB, Kolkata	✓	-	-	-	-	-
3.	CMERI, Durgapur	✓	-	-	-	-	-
4.	CIMFR, Dhanbad	✓	-	-	-	✓	-
5.	NEIST, Jorhat	-	✓	✓	-	✓	-
6.	NML, Jamshedpur	-	-	-	-	✓	Aurum 3.0 (in-house S/W)
7.	IMMT, Bhubaneswar	-	-	-	-	-	BIBLIO Sys
	Total	**4**	**1**	**1**	**0**	**3**	**2**
	Percentage (%)	**57.14**	**14.29**	**14.29**	**0.00**	**42.86**	**28.57**

Source: Computed from the Surveyed Data

The survey result as shown in the **Table- 6.14** elucidates that 4 (57.14%) KRC's were using Libsys software for library automation, 3 (42.86%) KRC's were using Koha, 1 (14.29%) KRC was using CDS/ISIS/WINISIS and SLIM++ and 2 (28.57%) KRC's were using other software's like Aurum 3.0 and Bibliosys for automating their library

operations. The result shows that no KRC have using SOUL 2.0 for library automation purpose. The **Figure- 6.8** shows the result of the Table- 6.14.

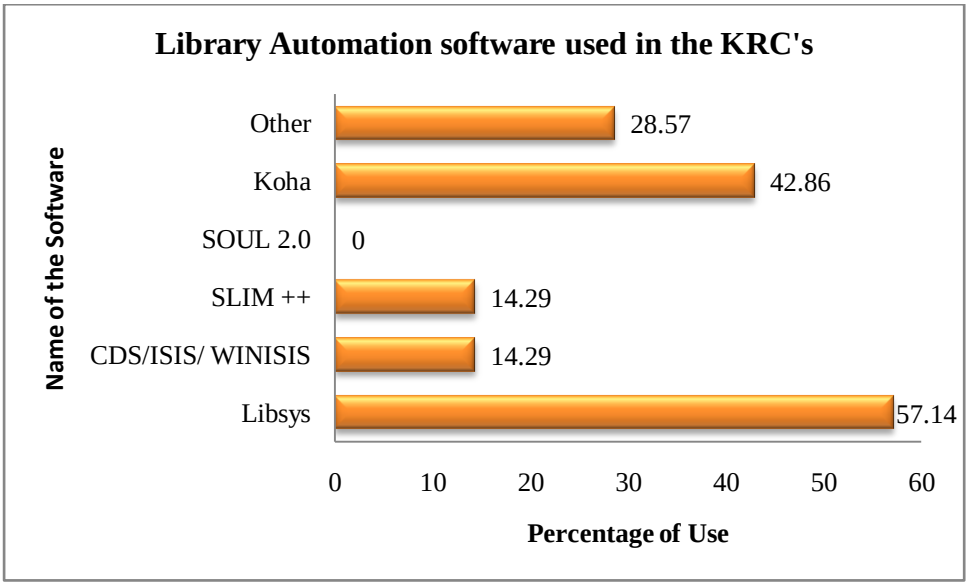


Figure- 6.8: Library Automation software used in the KRC's

6.1.1.6.2 Areas of Library Automation

The **Table 6.15** indicates the different areas of the KRC's that has been automated. From the Table- 6.15 it was found that acquisition, circulation, cataloguing and serial control section of KRC, CGCRI have been automated. In case of IICB, acquisition, circulation, cataloguing, serial control, back volume and text book section of KRC have been automated. IN CMERI, cataloguing, circulation, serial control and back volume sections are automated. In CIMFR, acquisition, circulation, cataloguing, back volume and text book section of KRC have been automated. In NEIST, Jorhat, acquisition, cataloguing and back volume section have been automated. In NML, circulation, cataloguing, serial control, back volume and text book section of KRC have been automated. In IMMT only Cataloguing section is automated.

Table- 6.15: Areas of Automation in the KRC's (N= 7)

Name of the Laboratory	Acquisition	Cataloguing	Circulation	Serial Control	Back volume	Text Book	Other
CGCRI, Kolkata	✓	✓	✓	✓	-	-	-
IICB, Kolkata	✓	✓	✓	✓	✓	✓	-
CMERI, Durgapur	-	✓	✓	✓	✓	-	-
CIMFR, Dhanbad	✓	✓	✓	-	✓	✓	-
NEIST, Jorhat	-	✓	✓	-	✓		-
NML, Jamshedpur	-	✓	✓	✓	✓	✓	-
IMMT, Bhubaneswar	-	✓	-	-	-	-	-
Total	**3**	**7**	**6**	**4**	**5**	**3**	**0**
Percentage (%)	**42.86**	**100.00**	**85.71**	**57.14**	**71.43**	**42.86**	**0.00**

Source: Computed from the Surveyed Data

The **Table- 6.15** shows that 3 (42.86%) KRC's have been automated their acquisition section, 7 (100%) KRC's automated the cataloguing section, 6 (85.71%) KRC's have automated circulation section, 4 (57.14%) have been automated serial control, 5 (71.43%) automated back volume section, 3 (42.86%) KRC's have automated text book section. **Figure- 6.9** is the graphical representation of the Table- 6.15.

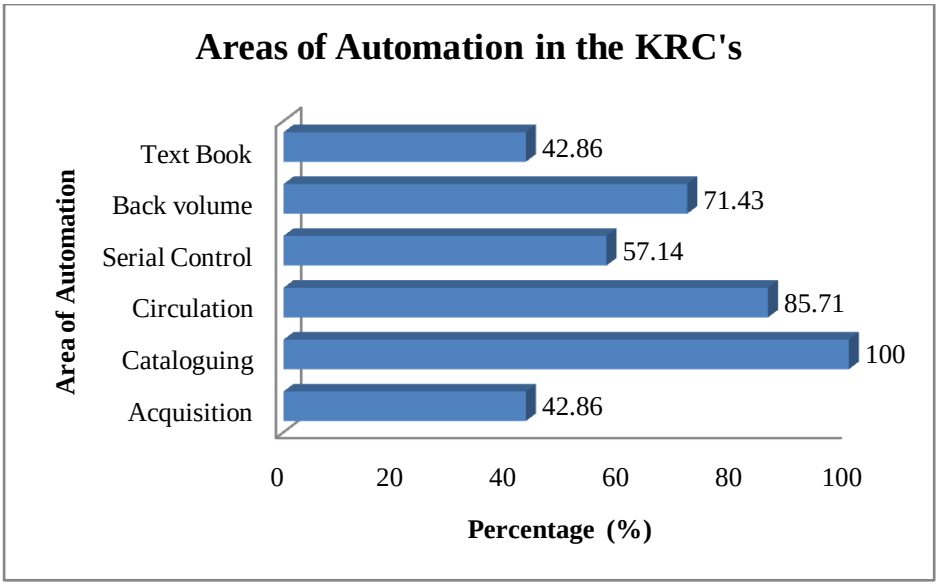


Figure- 6.9: Areas of Automation in the KRC's

6.1.1.7 Section G: ICT Infrastructure of the KRC's

The application of technology in library activities is not a new concept and the modern libraries have adopting latest technology to manage the different form of information and its communication. The newly emerged technology that is Information and Communication Technology (ICT) makes the tremendous impact on library's services, user and staff. The CSIR-KRC's of Northeast and Eastern India have adopted ICT infrastructure for the development and modernization of the library practices. This section mainly discusses the networking system of the KRC's, equipments and cables used for networking, areas of networking, Internet Service Provider (ISP) used in the KRC's, Library Consortium, number of e-resources subscribed by the consortium, amount spent for subscribing e- resources, type of Network Services (NS) provided by the KRC, areas covered under Electronic Data Interchange (EDI) services, automated library catalogue service, provision of automated circulation service, types of electronic library services provided by the KRC's, provision of online information access, provision of internet facilities, type of communication network services in the KRC's, provision of personal e-mail facilities, provision of e- learning/ education services, e-publishing services, user support services, initiation of digitization process, infrastructure facilities in the KRC's, Institutional Repository (IR) and the application of RFID technology in the KRC's.

6.1.1.7.1 Infrastructure Facilities of the KRC's

The **Table- 6.16** have indicates the infrastructure facility available in the KRC's.

Table- 6.16: Infrastructure Facilities Available in the KRC's

Sl. No.	Name of the Laboratory	No. of Computers	No. of Scanners	No. of Barcode scanners	No. of Printers	No of Photocopiers	No. of Fax Machines	No. of Telephones	No. of TV's	No. of VCR's	No. of Projectors
1.	CGCRI, Kolkata	15	01	-	05	01	-	03	-	-	-
2.	IICB, Kolkata	40	03	-	06	01	-	05	-	-	-
3.	CMERI, Durgapur	09	02	01	04	02	-	04	01	01	-
4.	CIMFR, Dhanbad	10	01	02	03	01	-	02	-	-	01
5.	NEIST, Jorhat	06	02	-	06	02	-	01	-	-	01
6.	NML, Jamshedpur	28	04	02	06	02	01	10	-	-	-
7.	IMMT, Bhubaneswar	15	02	01	05	02	-	02	-	-	-

Source: Computed from the Surveyed data

From the **Table- 6.16** it was observed that the CGCRI- KRC had 15 computers, 1 scanner, 5 printers 1 photocopier, 3 telephones; IICB- KRC has 40 computers, 3 scanners, 6 printers, 1 photocopier, 5 telephones and CMERI- KRC has 9 computers, 2 scanners, 1 barcode scanner, 4 printers, 2 photocopiers, 4 telephones, 1 TV, 1 VCR. CIMFR- KRC has 10 computers, 1 scanner, 2 barcode scanner, 3 printers, 1 photocopier, 2 telephones, and 1 projector. The NEIST- KRC has 6 computers, 2 scanners, 6 printers, 2 photocopiers, 1 telephone and 1 projector. The NML- KRC has 28 computers, 4 scanners, 2 barcode scanners, 1 fax machine and 10 telephones. The IMMT- KRC has 15 computers, 2 scanners, 1 barcode scanner, 5 printers, 2 photocopiers and 2 telephones.

6.1.1.7.2 Provision of Institute Websites

The **Table 6.17** shows the availability of the websites of all the selected CSIR laboratories/ institutes.

Table- 6.17: Availability of Institute Website

Sl. No.	Name of the Laboratory	Yes	No
1.	CGCRI, Kolkata	✓	-
2.	IICB, Kolkata	✓	-
3.	CMERI, Durgapur	✓	-
4.	CIMFR, Dhanbad	✓	-
5.	NEIST, Jorhat	✓	-
6.	NML, Jamshedpur	✓	-
7.	IMMT, Bhubaneswar	✓	-
	Total	**7**	**0**
	Percentage (%)	**100.00**	**0.00**

From the Table 6.17 it was found that all the seven (100%) CSIR laboratories have their own websites.

6.1.1.7.3 Type of Network connectivity of the KRC's

The implementation of resource sharing in library is largely depends on library networking. It gives an easy and the implementation of resource sharing in library is largely depends on library networking. It gives an easy and wider access to information as members have an expanded information base and service. The influence of electronic network on the delivery of information is the biggest technological advantage to the library. To know the type of network connection to the KRC's the researcher has asked one question to the librarian and the options of the question are whether it is independent network and the part of campus network.

Table- 6.18: Type of Network of the KRC's

Sl. No.	Name of the Laboratory	Independent Network	Part of campus Network
1.	Central Glass and Ceramic Research Institute (CGCRI), Kolkata	-	✓
2.	Indian Institute of Chemical Biology (IICB), Kolkata	-	✓
3.	Central Institute of Mining and Fuel Research (CMERI), Durgapur	-	✓
4.	Central Mechanical Engineering Research Institute (CIMFR), Dhanbad	-	✓
5.	North East Institute of Science and Technology (NEIST), Jorhat	-	✓
6.	National Metallurgical Laboratory (NML), Jamshedpur	-	✓
7.	Institute of Minerals and Materials Technology (IMMT), Bhubaneswar	✓	-
	Total	**1**	**6**
	Percentage (%)	**14.29**	**85.71**

Source: Computed from the Surveyed Data

The **Table - 6.18** shows that IMMT- KRC has its independence LAN connection and the network connection of the other six KRC's were the part of their campus network. The result shows that only 1 (14.29%) KRC has independent network and 6 (85.71%) KRC's were the part of campus network.

6.1.1.7.4 Equipment and Cables for LAN Connectivity

There were many equipments and cables that have been used for Local Area Network (LAN) connectivity which were Cabling, Hub, Router, Bridge and Switches. The KRC's of selected CSIR laboratories have using following equipments and cables.

Table- 6.19: The Equipments and Cables Used for LAN Connection in the KRC

Name of the Laboratory	Cabling			Hub			Router		Bridge	Switches	
	CAT5	Enhanced CAT5	Fiber Optic cable	Manageable	Unmanageable	Motorola	Cisco	Any Other	32 Bit/16Bit, PCI Cable	10/100 MBPS	Any other
CGCRI, Kolkata	-	✓	✓	✓	-	-	✓	-	-	✓	-
IICB, Kolkata	-	-	✓	-	-	-	✓	-	-	✓	-
CMERI, Durgapur	-	-	✓	-	-	-		-	-	✓	-
CIMFR, Dhanbad	✓	-			✓	-	✓	-	PCI	✓	-
NEIST, Jorhat	-	-	✓	✓	-	-	-	-	-	✓	-
NML, Jamshedpur	-	-	✓		-	✓	-	-	-	✓	-
IMMT, Bhubaneswar	-	-	✓	✓	-	-	-	-	-	✓	-

Source: Computed from the Surveyed Data

The **Table- 6.19** shows CGCRI has using Enhanced CAT5 and Fiber optic cables, Manageable hub, Cisco Router and 10/100 MBPS switches for network connectivity. IICB was using Fiber optic cables, Cisco router and 10/100 MBPS switches. CMERI uses fiber optic cable and 10/100 MBPS switches. CIMFR was using CAT5 cabling, unmanageable hub, Cisco router, PCI Bridge and 10/100 MBPS switches. NEIST was using fiber optic cable, manageable hub and 10/100 MBPS switch. NML was using fiber optic cable, Motorola router, 10/100 MBPS switches and KRC, IMMT was using fiber optic cables, manageable hub and 10/100 MBPS switches.

6.1.1.7.5 Areas Covered Under Campus LAN

The campus LAN of the seven laboratories has covered the following areas mentioned in the **Table- 6.20**.

Table- 6.20: Areas Covering Under the Campus LAN

Sl. No.	Name of the Laboratory	To all Departments	To Central Library	To All Labs/Centers/Units	To the entire campus including hostels	To the individual rooms of all scientists	To all scientists and officers residences	Any Other
1	CGCRI, Kolkata	-	-	✓	-	-	-	-
2	IICB, Kolkata	✓	-	-	-	-	-	-
3	CMERI, Durgapur	✓	-		-	-	-	-
4	CIMFR, Dhanbad	-	-	✓	-	-	-	-
5	NEIST, Jorhat	✓	-	-	-	-	-	-
6	NML, Jamshedpur	-	-	✓	-	-	-	-
7	IMMT, Bhubaneswar	-	-	-	-	-	✓	-

Source: Computed from the Surveyed Data

From the **Table- 6.20**, it was found that the campus LAN of CGCRI, CIMFR and NML were covering to all Labs/centers/units. The campus LAN of the IICB, CMERI and NEIST covered all the departments. The campus LAN of IMMT was spread to all scientists and officers residences.

6.1.1.7.6 Connection of Computer Network and Library Network to Internet

The **Table- 6.21** shows whether the campus network and library network of the KRC's were connected to Internet or not.

Table - 6.21: Provision of Connection of Computer Network and Library Network to Internet (N=7)

Sl. No.	Name of the Laboratory	Yes	No
1.	Central Glass and Ceramic Research Institute (CGCRI), Kolkata	✓	-
2.	Indian Institute of Chemical Biology (IICB), Kolkata	✓	-
3.	Central Institute of Mining and Fuel Research (CMERI), Durgapur	✓	-
4.	Central Mechanical Engineering Research Institute (CIMFR), Dhanbad	✓	-
5.	North East Institute of Science and Technology (NEIST), Jorhat	✓	-
6.	National Metallurgical Laboratory (NML), Jamshedpur	✓	-
7.	Institute of Minerals and Materials Technology (IMMT), Bhubaneswar	✓	-
	Total	**7**	**0**
	Percentage	**100%**	**0%**

Source: Computed from the Surveyed Data

From the **Table -6.21** it was found that Campus network and library network of all the seven (100%) laboratories were connected to internet.

6.1.1.7.7 Internet Service Provider (ISP)

The KRC's of selected laboratories were connected to Internet by the Internet Service Provider mentioned in the **Table- 6.22**.

Table- 6.22: The Internet Service Provider (ISP) used in the KRC's

Sl. No.	Name of the Laboratory	ERNET	BSNL	NICNET	Other
1	CGCRI, Kolkata	-	-	✓	TATA Communication
2	IICB, Kolkata	-	-	✓	-
3	CMERI, Durgapur	-	✓	-	-
4	CIMFR, Dhanbad	-	✓	-	-
5	NEIST, Jorhat	-	-	-	NKN & Sify
6	NML, Jamshedpur	-	✓	✓	-
7	IMMT, Bhubaneswar	-	-	-	STPI

Source: Computed from the Surveyed Data

The campus network and library network of the CGCRI, IICB and NML were connected to Internet by the Internet Service Provider- NICNET. The KRC of the CGCRI was also connected through Tata Communication and NML was also connected through BSNL. CMERI and CIMFR were connected through BSNL services. The library network of the IMMT was connected through STPI (Software Technology Park of India) and NEIST was using NKN (National Knowledge Network)/Sify services.

6.*1.1.7.8 Type of Internet Connection and Bandwidth of Library Network*

The type of Internet connection used by KRC's and the bandwidth of the library network were mentioned in the **Table- 6.23**.

Table- 6.23: Type of Internet Connection for the KRC, Departments and Residences

Sl. No.	Name of the Laboratory	Library						Bandwidth of library network				
		Dial-up	Leased	Radio link	Cable network	V-sat	Other	<=1.0 Mbps	<=1.0 to <=2.0 Mbps	<=2.0 to <=4.0 Mbps	<=4.0 to <=6.0 Mbps	<=6.0 Mbps & above
1.	CGCRI, Kolkata	-	✓	-	-	-	-	-	-	-	-	✓
2.	IICB, Kolkata	-	✓	-	-	-	-	-	-	-	-	✓
3.	CMERI, Durgapur	-	✓	-	-	-	-	-	-	-	-	✓
4.	CIMFR, Dhanbad	-	✓	-	-	-	-	-	-	-	-	✓
5.	NEIST, Jorhat	-	-	✓	-	-	-	-	-	-	-	✓
6.	NML, Jamshedpur	-	✓	-	✓	-	-	-	-	✓	-	-
7.	IMMT, Bhubaneswar	✓	-	-	✓	-	-	-	-	-	✓	-

Source: Computed from the Surveyed Data

From the **Table- 6.23** it was found that the type of internet connection was being used in the KRC (Library), departments and residences of CGCRI, IICB, CMERI and CIMFR were Leased line connectivity with <=6.0 Mbps. & above. NEIST was using Radio link connectivity with <=6.0 Mbps bandwidth. The KRC-NML was using both Leased line and Cable network connectivity with <=2.0 to <=4.0 Mbps bandwidth of library network. The KRC of IMMT was using both Dial-up and Cable network connectivity with <=4.0 to <=6.0 Mbps bandwidth of library network.

6.1.1.7.9 Membership of Library Network/ Consortium

The **Table- 6.24** indicates about the membership of the KRC's to any Library Network/ Consortium.

Table- 6.24: Membership of Library Networks/Consortium

Sl. No.	Name of the Laboratory	Library Networks					Consortium		
		DELNET	CALIBNET	MALIBNET	Other	INDEST	National Knowledge Resource Consortium (CSIR)	UGC-Infonet Digital Library Consortium (INFLIBNET)	Other
1	CGCRI, Kolkata	-	-	-	-	-	✓	-	-
2	IICB, Kolkata	-	-	-	-	-	✓	-	-
3	CMERI, Durgapur	-	-	-	-	-	✓	-	-
4	CIMFR, Dhanbad	-	-	-	-	-	✓	-	-
5	NEIST, Jorhat	-	-	-	-	-	✓	-	DelcoN
6	NML, Jamshedpur	-	-	-	-	-	✓	-	-
7	IMMT, Bhubaneswar	-	-	-	-	-	✓	-	-

Source: Computed from the Surveyed Data

The **Table- 6.24** reflects that all the laboratories were the part of Library consortium but were not the member of any library network in India. All the seven laboratories namely CGCRI, IICB, NML, CIMFR, CMERI, IMMT and NEIST were the part of National Knowledge Resource Consortium (NKRC). The KRC of NEIST was also the member of DelcoN.

6.1.1.7.10 Laboratory Wise Subscription of Electronic Resources through the Consortium

Electronic Resources encompasses a wide range of its sources, which includes E-journals, E- books, E- Reports, E- Databases, etc. E- Resources are those electronic products that delivers a collection of data, be in text referring full text basis, e- journals, image collection, bibliographic form, other multimedia products and numerical,

graphical or time based as a commercially available that has been published with an aim to being marketed. The KRC's of all the seven laboratories have subscribed number of E- resources both full-text and bibliographic databases through the consortium. The CSIR's National Knowledge Resource Consortium (NKRC) has negotiated with publishers and arranged for paying of access amount for subscribing from central fund of CSIR Head Quarter to make e-journal available throughout all the CSIR laboratories. The following **Table- 6.25** and **Table- 6.26** show the full text and bibliographic databases subscribed by the KRC's.

(a) Full-Text Databases

A full text database is an online database that contains the complete text of books, dissertations, journals, magazines, newspapers or other kinds of textual documents. It is opposed both to a bibliographic database (only covering bibliographical information and possibly abstracts and thus being a partial text database) and to a non-bibliographic database (such as, for example, a directory or a numeric database). Full text databases became common about 1990 when computer storage technology made them economic and technologically possible. All the seven CSIR- KRC's have subscribes Full text databases through the National Knowledge Resource Consortium (NKRC). The Table-6.25 gives information about the full text databases that have been subscribed by the KRC's.

The Table- **6.25** shows that CGCRI has subscribed Full- text databases like IEEE Online, Springer link, Nature, RSC and ACS. IICB, Kolkata has subscribed all the resources available through NKRC. CMERI, Durgapur has mainly subscribed IEEE Online, Springer Link, Standards (CD/Intranet) and RSC.

Table- 6.25: E-Resources (Full-Text) Subscribed by the Consortium

Name of the Laboratory	Science Direct	ACM Digital Library	IEEE Online	Springer link	Proquest	ASME	ASCE	Nature	Standards (CD/intranet)	RSC	ACS	Other
CGCRI, Kolkata	-	-	✓	✓	-	-	-	✓	-	✓	✓	-
IICB, Kolkata	NKRC		-	-	-	-	-	-	-	-	-	-
CMERI, Durgapur	-	-	✓	✓	-	-	-	-	✓	✓	-	-
CIMFR, Dhanbad	✓	-	✓	✓	-	✓	✓	✓	-	✓	✓	-
NEIST, Jorhat	✓	-	✓	✓	-	-	-	✓	-	✓	✓	-
NML, Jamshedpur	✓	-	✓	✓	-	✓	-	✓	✓	✓	✓	Sage, Wiley, Emerald,Delphin
IMMT, Bhubaneswar	✓	-	-	✓	-	✓	-	✓	-	✓	✓	-

Source: Computed from the Surveyed Data

The KRC- CIMFR subscribed E- resources like Science Direct, IEEE Online, Springer Link, ASME, ASCE, Nature, RSC and ACS. NEIST, Jorhat was subscribing Science Direct, IEEE Online, Springer Link, Nature, RSC and ACS. The KRC of the NML, Jamshedpur has subscribed Science Direct, IEEE Online, Springer Link, ASME, Nature, Standards (CD/ Intranet), RSC, ACS and other resources like Sage, Wiley, Emerald and Delphin. The IMMT, Bhubaneswar has subscribing e- resources named as Science Direct, Springer Link, ASME, Nature, RSC and ACS through the consortium.

(b) Bibliographic Databases

Databases are the collection of records pertaining to a specific field of study. An increasing number of bibliographic databases with abstracts of chapters in books, journal articles and conference proceedings are now available on various media. The KRC subscribes bibliographic databases to satisfy the information need of the

Scientists. The bibliographic databases subscribed by the KRC's are given in the **Table- 6.26**.

Table- 6.26: E-Resources (Bibliographic Databases) Subscribed by the Consortium (N= 7)

Name of the Laboratory	Engineering village2 (*Compendex & INSPEC*)	SciFinder	Web of Sciences	SCOPUS	Other
CGCRI, Kolkata	-	-	✓	-	-
IICB, Kolkata	-	✓	✓	-	-
CMERI, Durgapur	-	-	-	-	-
CIMFR, Dhanbad	-	-	✓	-	-
NEIST, Jorhat	-	-	✓	✓	-
NML, Jamshedpur	-	-	✓	-	-
IMMT, Bhubaneswar	-	-	✓	✓	-
Total	**0**	**0**	**6**	**2**	**0**
Percentage (%)	**0.00**	**0.00**	**85.71**	**28.57**	**0.00**

Source: Computed from the Surveyed Data

The **Table- 6.26** show CGCRI, IICB, CIMFR, NEIST, NML and IMMT were subscribing bibliographic database Web of Science. NEIST and IMMT were also subscribing SCOPUS database and IICB is subscribing SciFinder along with Web of Science. The survey results shows that 6 (85.71%) KRC's were subscribing bibliographic database Web of Science and 2 (28.57%) KRC's were subscribing SCOPUS database.

6.1.1.7.11 Number of E- Resources Subscribed by the KRC's

The **Table- 6.27** shows the total number of E-journals, E- books and other resources that has been subscribed by the KRC's.

Table- 6.27: Number of E- Journals, E- Books and Other Resources by the KRC's

Sl. No.	Name of the Laboratory	E-Journals	E-Books	Other
1	CGCRI, Kolkata	400	-	Patents & Standards
2	IICB, Kolkata	2500	-	-
3	CMERI, Durgapur	3	-	2
4	CIMFR, Dhanbad	10	-	-
5	NEIST, Jorhat	2600	86	-
6	NML, Jamshedpur	425	-	-
7	IMMT, Bhubaneswar	4500	500	-

Source: Computed from the Surveyed Data

The total number of e-books and e-journals subscribed by the KRC's were CGCRI subscribing 400 e-journals; IICB 2500 e-journals; CMERI 3 e-journals; CIMFR subscribing e-journals from 10 publishers; NEIST subscribing 86 e-books and 2600 e-journals and NML subscribing e-books through e-consortium and 425 e-journals. IMMT has subscription of 500 e-books and 4500 e-journals.

6.1.1.7.12 Budget for the Subscription of Electronic Resource

The **Table- 6.28** indicates the amount spent by the KRC's for subscription of the Electronic resources from the sessions 2009-10 to 2013-2014.

Table- 6.28: Amount Spent by the KRC's for Subscription of Electronic Resources

Sl. No.	Name of the Laboratory	2009-10	2010-11	2011-12	2012-13	2013-14
1.	CGCRI, Kolkata	-	21.34 Lakh	27.88 Lakh	19.65 Lakh	61.40 Lakh
2.	IICB, Kolkata	-	-	-	-	-
3.	CMERI, Durgapur	-	-	-	-	4143664.00
4.	CIMFR, Dhanbad	-	-	-	-	20.00 Lakh
5.	NEIST, Jorhat	70.00 Lakh	75.00 Lakh	75.00 Lakh	90.00 Lakh	100.00 Lakh
6.	NML, Jamshedpur	6.35 Lakh	2.00 Lakh	5.00 Lakh	23.00 Lakh	21.94 Lakh
7.	IMMT, Bhubaneswar	-	-	-	-	80 Lakh

Source: Computed from the Surveyed Data

From the **Table- 6.28** it was reflected that during the session 2013-2014, NEIST has spent 100.00 Lakhs for subscribing electronic resources which was the highest amount from 2009 to 2014. IICB did not comment regarding amount spent for e-resources subscription. CGCRI do not provide the data for the session 2009 to 2010. CMERI, CIMFR and IMMT also have not mention the amount spent for e-resource subscription for the sessions 2009-10 to 2012-2013.

6.1.1.7.13 Type of Network Services (NS)

The **Table- 6.29** shows the different types of Network Services provided by the KRC's.

Table- 6.29: Type of the Network Services (NS) Provided by the KRC's

Services	CGCRI		IICB		CMERI		CIMFR		NEIST		NML		IMMT	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Electronic Data Interchange (EDI)	-	✓	✓	-	-	✓	-	✓	-	-	✓	-	-	-
Automated Cataloguing	✓	-	✓	-	✓	-	✓	-	-	-	✓	-	✓	-
Automated Circulation	✓	-	✓	-	✓	-	✓	-	-	-	✓	-	-	-
Virtual Reference	-	✓	-	-	-	✓		✓	-	-	✓	-	-	-
E-CAS	-	✓	✓	-	-	✓		✓	-	-	✓	-	-	-
Online Database	✓	-	✓	-	-	✓	✓	-	-	-	✓	-	-	-
CD-ROM/DVD	-	✓	✓	-	-	✓	✓	-	-	-	✓	-	-	-
Electronic Thesis & Dissertations (ETD)	-	✓	✓	-	-	✓	-	-	-	-	✓	-	-	-
Multimedia Database (Audio & Video etc.)	-	✓	-	-	-	✓	-	-	-	-	✓	-	-	-
Standards	✓	-	-	-	✓	-	✓	-	-	-	✓	-	-	-
Internet facilities	✓	-	✓	-	✓	-	✓	-	✓	-	✓	-	-	-
E-mail	✓	-	✓	-	✓		✓	-	✓	-	✓	-	✓	-
Video & Teleconferencing	-	✓	✓	-	-	✓	-	-	✓	-	✓	-	-	-
Facsimile Transmission (Fax)	-	✓	-	-	-	✓	-	-	-	-	✓	-	-	-
Videotext or Teletext	-	✓	-	-	-	✓	-	-	-	-	✓	-	-	-
E-learning	-	✓	-	-	-	✓	-	-	-	-	✓	-	-	-
E-publishing	-	✓	-	-	-	✓	-	-	-	-	✓	-	-	-
Web-based document delivery	✓	-	✓	-	✓	-	✓	-	✓	-	✓	-	✓	-
Support	-	✓	-	-	-	✓	-	-	-	-	✓	-	-	-
Any Other	-	-	-	-	-	-	-	-	-	-	IR	-	-	-

Source: Computed from the Surveyed Data

The KRC of CGCRI provides Network Services (NS) like Automated cataloguing, Automated circulation, Online database, Standards, Internet facilities, E-mails and Web based Document Delivery Services. IICB is providing Electronic Data Interchange (ETD), automated cataloguing, automated circulation, E-CAS, Online database, CD-ROM/DVD, Electronic Thesis & Dissertations (ETD), Internet facilities, E-mail, Video & teleconferencing and web based document delivery services. CMERI was providing Automated Cataloguing, automated circulation, standards, internet facilities, e-mail and web based document delivery. CIMFR was providing automated cataloguing, automated circulation, online database, CD ROM/DVD, standards, internet facilities, e-mail and web based document delivery services. The KRC NEIST has provided internet facilities, e-mail, video & teleconferencing and web based document delivery services to its users. The KRC- NML was providing all the services mention in the **Table- 6.29** and besides these they were also providing Institutional Repository (IR) for their users. The IMMT has provided automated cataloguing, e-mail and document delivery services to its users.

6.1.1.7.14 Automated Library Catalogue Service

The KRC's have provided automated library catalogue service to its users.

Tables- 6.30: Automated Library Catalogue Service (N= 7)

Sl. No.	Name of the Laboratory	OPAC	Web OPAC	Both	Other
1.	CGCRI, Kolkata	✓	-	-	-
2.	IICB, Kolkata	-	✓	-	-
3.	CMERI, Durgapur	-	-	✓	-
4.	CIMFR, Dhanbad	-	-	✓	-
5.	NEIST, Jorhat	-	✓	-	-
6.	NML, Jamshedpur	-	-	✓	-
7.	IMMT, Bhubaneswar	-	-	-	✓
	Total	**1**	**2**	**3**	**1**
	Percentage (%)	**14.29**	**28.57**	**42.86**	**14.29**

Source: Computed from the Surveyed Data

The **Table- 6.30** shows that all the seven KRC's have provided automated library catalogue service to its users. The KRC- CGCRI has provided OPAC service to its users. The IICB and NEIST have provided Web OPAC to its users. The KRC- IMMT has provided other service which was not mention in the questionnaire. The KRC of CMERI and CIMFR were providing both OPAC and Web OPAC services to its users. The result shows 1 (14.29%) KRC's has provided OPAC service, 2 (28.57%) have provided Web OPAC, 3 (42.86%) KRC's have provided both OPAC and Web OPAC service and 1 (14.29%) has provided other online automated service. The **Figure- 6.10** is the graphical representation of the Table- 6.30.

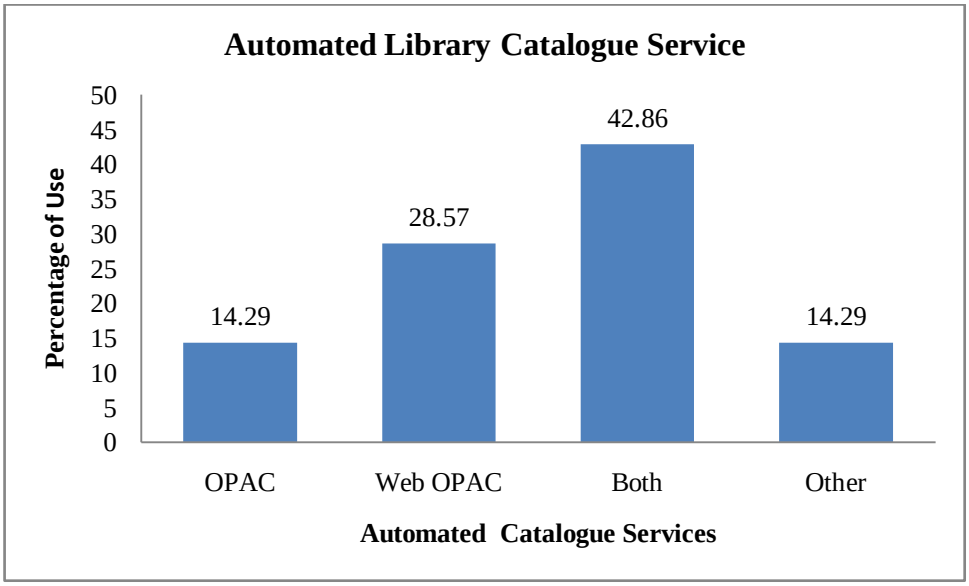


Figure- 6.10:Automated Library Catalogue Service

6.1.1.7.15 Automated Circulation Service

The **Table- 6.31** mainly shows the provision of automated circulation services namely Check- in, Check- out, Renewal, Reservation, Inter- Library Loan and other services in the KRC's.

Table- 6.31: Provision of Automated Circulation Service

Name of the Laboratory	Check-in		Check-out		Renewal		Reservation		Inter-library loan		Other
	Tick Marks	Daily Transactions	Tick Marks	Daily Transactions	Tick Marks	Daily Transactions	Tick Marks	Daily Transactions	Tick Marks	Daily Transactions	
CGCRI, Kolkata	✓	5	✓	4	✓	4	✓	1	-	-	-
IICB, Kolkata	✓	480	✓	460	-	-	-	-	-	-	-
CMERI, Durgapur	✓	15	✓	10	✓	5	✓	5	✓	6	-
CIMFR, Dhanbad	✓	-	✓	-	✓	-	✓	-	✓	-	-
NEIST, Jorhat	✓	-	✓	-	-	-	-	-	-	-	-
NML, Jamshedpur	✓	-	✓	-	✓	-	-	-	-	-	-
IMMT, Bhubaneswar	✓	-	✓	-	-	-	-	-	-	-	-

Source: Computed from the Surveyed Data

The **Table- 6.31** shows that all the seven KRC's have provided automated circulation services. The KRC of CGCRI was providing check-in, check-out, renewal, reservation services. The daily transaction was check-in 5 transactions, check-out 4 transaction, renewal 4 transactions, and reservation 1 transaction. IICB was providing check-in 480 daily transactions, check-out 460 transactions daily. CMERI was providing check-in: 15 transactions check-out: 10 transactions, renewal: 5 transactions, reservation: 5 transactions daily and inter library loan: 6 transactions daily. CIMFR has provided check-in, check-out, renewal, reservation and inter library loan service to its users but they do not mention the number of daily transaction in the questionnaire. NEIST and IMMT have only check-in and check-out service. The KRC- NML was providing check-in, check-out and renewal service to its users. The last four laboratories have not mention the number of transactions per day.

6.1.1.7.16 Electronic Library Services

The **Table- 6.32** indicates the Electronic services provided by the KRC's.

Table- 6.32: Electronic Library Services (N=7))

Name of the Laboratory	Current contents	New Arrivals	E-SID	Newspaper Clipping	Alert	Other
CGCRI, Kolkata	✓	✓	-	✓	-	-
IICB, Kolkata	✓	✓	-	✓	✓	-
CMERI, Durgapur	-	✓	-	-	-	-
CIMFR, Dhanbad	-	✓	-	-	-	-
NEIST, Jorhat	-	✓	-	-	-	-
NML, Jamshedpur	✓	✓	✓	✓	✓	EDI
IMMT, Bhubaneswar	✓	✓	✓	-	-	-
Total	**4**	**7**	**2**	**3**	**2**	**1**
Percentage (%)	**57.14**	**100.00**	**28.57**	**42.86**	**28.57**	**14.29**

Source: Computed from the Surveyed Data

The KRC CGCRI provides current content, new arrivals and newspaper clipping services. IICB was providing current content, new arrivals, newspaper clipping and alert services. The KRC of CMERI, CIMFR and NEIST were providing only new arrival service to its users. The KRC of NML were providing all the services mention in the table along with alert for renewed of book issue service. The KRC IMMT provides current content, new arrivals and E-SID services to its users. The KRC- NML has provided Electronic Data Interchange (EDI) services for ordering of library materials and budgeting. The result shows that the 4 (57.14%), 7 (100%), 3 (42.86%), and 1 (14.29%) KRC's have provided current content, new arrivals, newspaper clippings and EDI services and 2 (28.57%) KRC's have provided E- SID and also alert service to its users respectively. The **Figure- 6.11** is the graphical representation of the **Table- 6.32**.

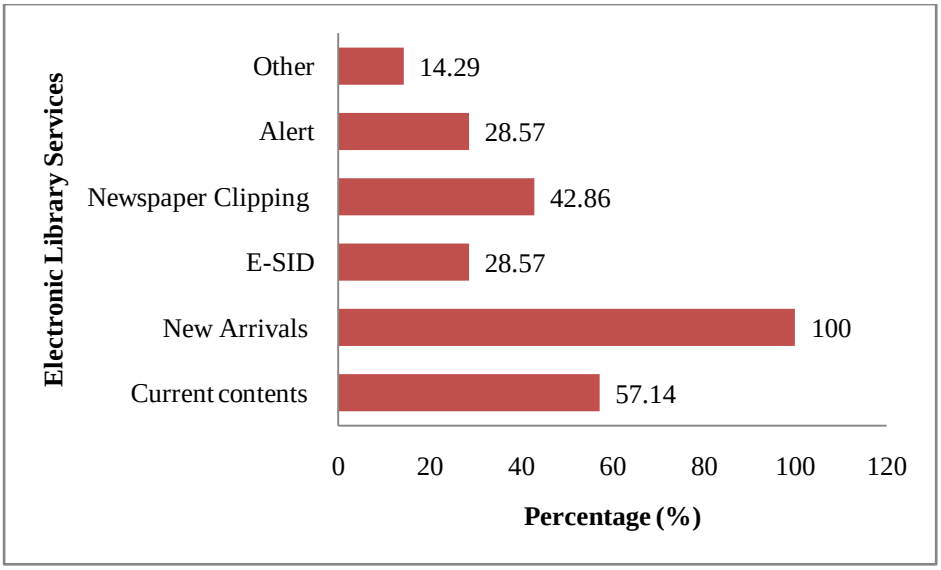


Figure- 6.11: Electronic Library Services

6.1.1.7.17 Provision of Online Information Access

The KRC's have the provision of access to Online Information which is mention in the **Table- 6.33**.

Table- 6.33: Provision of Online Information Access (N= 7)

Name of the Laboratory	E-books	E-journals	Abstracting database	Open access journals (free)	Other
CGCRI, Kolkata	-	✓	-	-	-
IICB, Kolkata	-	✓	✓	✓	-
CMERI, Durgapur	-	✓	-	✓	-
CIMFR, Dhanbad	✓	✓	-	-	-
NEIST, Jorhat	✓	✓	✓	✓	-
NML, Jamshedpur	✓	✓	✓	✓	In-house R&D publication
IMMT, Bhubaneswar	✓	✓	-	✓	-
Total	**4**	**7**	**3**	**5**	**1**
Percentage (%)	**57.14**	**14.29**	**42.86**	**71.43**	**14.29**

Source: Computed from the Surveyed Data

From the **Table- 6.33** it has been observed that all the KRC does have provide online information access. CGCRI was made provision for access only E-journals.

IICB was providing access to e-journals, abstracting database and open access journals. CMERI was providing access to e-journals and open access journals. CIMFR was providing access to e-books and e-journals. The KRC NEIST was providing online access to e-books, e-journals, abstracting database and open access journals. NML was provide this service to access e-books, e-journals, abstracting database, open access journals and in-house R & D publications. The overall frequencies of online information access were mentioned in the **Table- 6.33**. The result shows 4 (57.14%), 7 (100%), 3 (42.86%), 5 (71.43%) and 1 (14.29%) KRC's were accessing E-books, E- journals, abstracting database, Free open access journals and other sources like in- house R & D publications respectively. The graphical representation of the Table- 6.33 is shown in the **Figure- 6.12**.

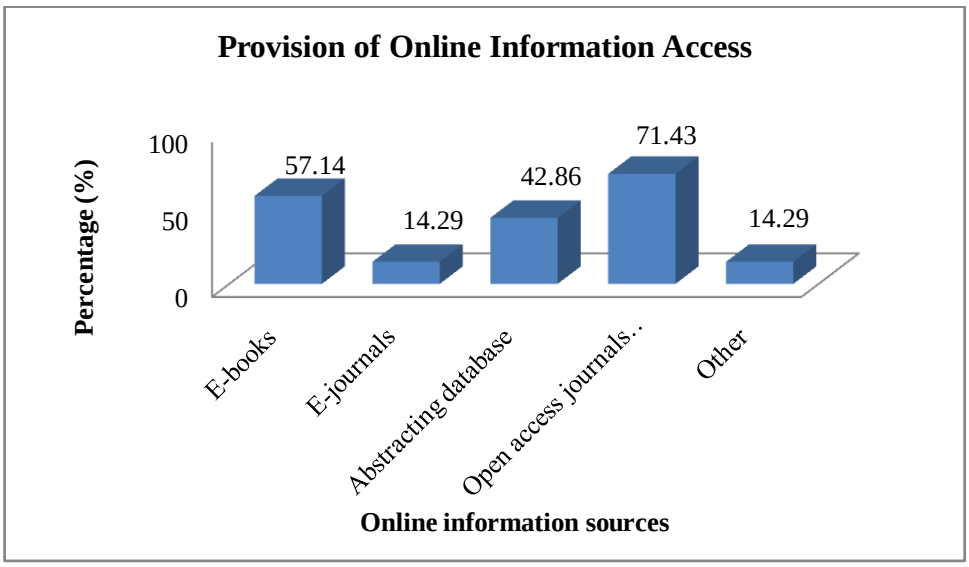


Figure- 6.12: Provision of Online Information Access

6.1.1.7.18 Infrastructure Available for Internet Services

Internet can be defined as the global community of information resources. It is a network of networks providing access to the remote databases (full text or bibliographic) housed elsewhere. The Internet has established as the storehouse of all world's resources in the electronic form ready for accessing. To update the library collection the Internet is the best source. Internet be coined the libraries of future as, 'library without walls' which basically means Virtual Library. The KRC's have

provided Internet facilities to its users and the following **Table- 6.34** gives information related to infrastructure available for Internet services.

All the seven KRC's providing Internet facilities. The Table- 6.34 shows that the KRC of CGCRI had 15 numbers of PCs connected to internet, Intel i5 core PC and per day 10 numbers of users acceding internet in the KRC. The KRC of IICB has 40 numbers of PCs connected to internet, HP computer and per day 35 numbers of users acceding internet in the KRC. The KRC of CMERI has 02 numbers of PCs connected to internet, P-IV PC and per day 8 numbers of users acceding internet in the KRC. The KRC of CIMFR has 10 numbers of PCs connected to internet and per day 10 numbers of users acceding internet in the KRC.

Table- 6.34: Infrastructure Available for Internet Services

Sl. No.	Name of the Laboratory	No. of PCs connected	Type PCs used	No. of users accessing per day
1.	CGCRI, Kolkata	15	Intel i5 core	10
2.	IICB, Kolkata	40	HP	35
3.	CMERI, Durgapur	02	P-IV	8
4.	CIMFR, Dhanbad	10	I5	10
5.	NEIST, Jorhat	6	-	20
6.	NML, Jamshedpur	20	Dual core	45
7.	IMMT, Bhubaneswar	15	10	25

Source: Computed from the Surveyed Data

The KRC of NEIST had 6 numbers of PCs connected to internet; NML has 15 PC, Dual core processor, 45 numbers of users accessing the internet per day and IMMT has 15 numbers of PCs connected to internet, and per day 25 numbers of users acceding internet in the KRC.

6.1.1.7.19 Type of Communication Network Services

The **Table- 6.35** indicates the type of communication network services provided by the KRC's.

Table- 6.35: Type of Communication Network Services in the KRC

Name of the Laboratory	E-mail	Telephone	Facsimile (fax)	Voice mail	Voice text	Teltext	Other
CGCRI, Kolkata	✓	✓	-	-	-	-	-
IICB, Kolkata	✓	✓	-	-	-	-	-
CMERI, Durgapur	✓	-	-	-	-	-	-
CIMFR, Dhanbad	✓	✓	-	-	-	-	-
NEIST, Jorhat	✓	-	-	-	-	-	-
NML, Jamshedpur	✓	✓	✓	-	-	-	-
IMMT, Bhubaneswar	✓	✓	-	-	-	-	-

Source: Computed from the Surveyed Data

The **Table- 6.35** shows KRC's CGCRI, IICB, CIMFR, IMMT were providing communication network services like E-mail and Telephone service. The KRC of NML was providing E-mail, Telephone, Fax service. CMERI and NEIST were providing only E-mail service in their KRC.

6.1.1.7.20 Provision of Personal E-mail Facilities

The KRC's have been provided personal e- mail facilities to the scientists, research scholars and the technical staffs of the laboratories. The **Table- 6.36** shows the laboratory wise provision of personal e- mail service to all categories of users.

Table- 6.36: Provision of Personal E-mail Facilities

Sl. No.	Name of the Laboratory	Personal E- mail Facilities			
		Scientists	Research scholars	Technical Staff	Other
1	CGCRI, Kolkata	✓	✓	✓	-
2	IICB, Kolkata	✓	✓	✓	-
3	CMERI, Durgapur	✓	-	✓	-
4	CIMFR, Dhanbad	✓	✓	✓	-
5	NEIST, Jorhat	✓	✓	✓	-
6	NML, Jamshedpur	✓	✓	✓	-
7	IMMT, Bhubaneswar	✓	✓	✓	-

Source: Computed from the Surveyed Data

All the KRC (100%) have provided personal e-mail facilities to the scientists, research scholars and technical staffs. The KRC of CMERI was providing personal e-mail services only to the scientists and technical staffs.

6.1.1.7.21 Provision of E- Learning/ Education Services

The Table- 6.37 elucidates about the availability of E- learning and E- education services in the KRC's.

Table- 6.37: Provision of E-Learning/Education Services

Name of the Laboratory	Desktop (stand-alone)	CD/DVD	Audio & Video cassettes	Intranet	Internet	Other
CGCRI, Kolkata	-	-	-	-	-	-
IICB, Kolkata	-	-	-	-	-	-
CMERI, Durgapur	✓	✓	✓	-	-	-
CIMFR, Dhanbad	✓	✓	✓	✓	✓	-
NEIST, Jorhat	-	-	-	✓	✓	-
NML, Jamshedpur	-	-	-	✓	✓	E-publishing
IMMT, Bhubaneswar	-	-	-	-	✓	-

Source: Computed from the Surveyed Data

Among all the seven KRC's, CMERI provides e-learning/education services through Desktop (Stand-alone), CD/DVD, Audio & Video cassettes; CIMFR provide these services through Desktop, CD/DVD, Audio/Video cassettes, Intranet, internet; NEIST and NML provides through Intranet and internet and IMMT provide these services through Internet. NML, Jamshedpur has also provided E- publishing services.

6.1.1.7.22 Provision of Support Services in the KRC's

The KRC's have the support services like user orientation/ education, user training, staff training and other support services to the users and staff of the institutes. The following Table 6.38 shows the different type of support services provided by each laboratory.

Table- 6.38: Provision of Any Support Services in the KRC's (N= 7)

Sl. No.	Name of the Laboratory	User Orientation/ Education	User Training	Staff Training	Other
1	CGCRI, Kolkata	✓	✓	-	-
2	IICB, Kolkata	✓	✓	✓	-
3	CMERI, Durgapur	-	✓	-	-
4	CIMFR, Dhanbad	✓	✓	✓	-
5	NEIST, Jorhat	-	✓	-	-
6	NML, Jamshedpur	✓	✓	✓	MLISc Internship, Professional training
7	IMMT, Bhubaneswar	-	-	-	-
	Total	**4**	**6**	**3**	**1**
	Percentage (%)	**57.14**	**85.71**	**42.86**	**14.29**

Source: Computed from the Surveyed Data

The KRC, CGCRI provides the user orientation/education and user training services. The KRC's of IICB, CIMFR and NML were providing user orientation/education, user training and staff training services. The KRC- NML has also provided MLISc Internship and Professional training programmes. The KRC's of NEIST and CMERI have provided only user training programmes. The result shows 4 (57.14%) KRC's have provided user orientation/ education, 6 (85.71%) have provided User training, 3 (42.86%) KRC's have the provision of staff training and 1 (14.29%) KRC's have provided other professional training/ internship.

6.1.1.7.23 Digitization Process in the KRC's

Digitization, now day, has becomes one of the key activities in libraries. Digitization can be defined as the digital conversion of library and other archival materials. Digitization is also a technique for data transmission at a very high speed. It is the conversation of fixed analog media- books, journals, photos and paintings, into electronic form through scanning, sampling or even re-keying. Digitization provides solution to traditional library. Problems such as conservation, preservation, storage space, remote access to information collections, acquisition of original digital works created by other publishers, agencies, access external digital materials and resources. The existing resources of the library can be converted into digital media by scanning the materials. It is

not a simple task for any library particularly developing country like India, to digitize (Full text) the whole collection in a single phase. Huge fund and time will be required for such project. Many of the KRC's of the CSIR laboratories have started digitization process, but it was in initial stage. The laboratories which have started digitization process are mention in the **Table- 6.39**.

Table-6.39: Initiation of Digitization Process (N= 7)

Sl. No.	Name of the Laboratory	Yes	No
1.	CGCRI, Kolkata	-	✓
2.	IICB, Kolkata	-	✓
3.	CMERI, Durgapur	-	✓
4.	CIMFR, Dhanbad	✓	-
5.	NEIST, Jorhat	-	✓
6.	NML, Jamshedpur	✓	-
7.	IMMT, Bhubaneswar	✓	-
	Total	**3**	**4**
	Percentage (%)	**42.86**	**57.14**

Source: Computed from the Surveyed Data

The KRC of CIMFR, NML and IMMT have initiated digitization process. The other four laboratories have not yet started digitization process. The Table- 6.39 and Figure- 6.13 shows that out of seven 3 (42.86%) KRC's have started digitization process and rest of the 4 (57.14%) have not yet started digitization process.

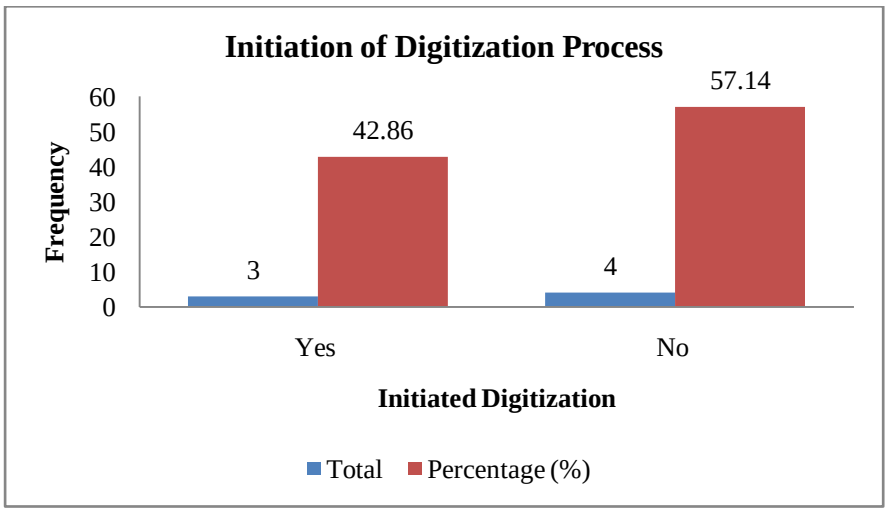


Figure- 6.13: Initiation of Digitization Process

6.1.1.7.24 Type of Digitized Documents

The Digitization processes have been started by the KRC's of CIMFR, NML and IMMT. The type of documents that have been digitized by the three laboratories is shown in the **Table- 6.40**.

In KRC- CIMFR, theses and dissertations were being digitized while NML and IMMT, books, journals and theses and dissertations were digitized. In NML, digitization of Annual report, R & D reports have been started. The PDF format has been used for the digitization of documents

Table- 6.40: Type of Digitized Documents

Sl. No.	Name of the Laboratory	Books (rare, out of print, public domain)	Journals	Thesis & Dissertations	Other
1	CGCRI, Kolkata	-	-	-	-
2	IICB, Kolkata	-	-	-	-
3	CMERI, Durgapur	-	-	-	-
4	CIMFR, Dhanbad	-	-	✓	-
5	NEIST, Jorhat	-	-	-	-
6	NML, Jamshedpur	✓	✓	✓	Annual Report, R&D Reports
7	IMMT, Bhubaneswar	✓	✓	✓	-

Source: Computed from the Surveyed Data

6.1.1.7.25 Provision of Institutional Repository

The **Table- 6.41** shows laboratories that have their Institutional Repositories.

Table- 6.41: Provision of Institutional Repository (N= 7)

Sl. No.	Name of the Laboratory	Yes	No
1.	CGCRI, Kolkata	✓	-
2.	IICB, Kolkata	✓	-
3.	CMERI, Durgapur	-	✓
4.	CIMFR, Dhanbad	✓	-
5.	NEIST, Jorhat	-	✓
6.	NML, Jamshedpur	✓	-
7.	IMMT, Bhubaneswar	✓	-
	Total	**5 (71.43%)**	**2(28.57%)**

Source: Computed from the Surveyed Data

The KRC of CMERI and NEIST have no institutional repository. Other five laboratories have their own institutional repository. The **Table- 6.41** shows total 5 (71.43%) KRC's have their institutional repository and 2 (28.57%) KRC's have no institutional repository.

6.1.1.7.26 Software Used for Building Institutional Repository

The software's like Dspace, OpenDOAR and E-print have been used for building institutional repository which are mention in the **Table- 6.42**.

Table- 6.42: Software Used for Building Institutional Repository (N= 7)

Sl. No.	Name of the Laboratory	DSpace	OpenDOAR	E-print	Other
1.	CGCRI, Kolkata	-	-	✓	-
2.	IICB, Kolkata	-	-	✓	-
3.	CMERI, Durgapur	-	-	-	-
4.	CIMFR, Dhanbad	✓	-	✓	-
5.	NEIST, Jorhat	-	-	-	-
6.	NML, Jamshedpur	-	-	✓	
7.	IMMT, Bhubaneswar	-	-	✓	-
	Total	**1 (14.29%)**	**0**	**5 (71.43%)**	**0**

Source: Computed from the Surveyed Data

The CGCRI, IICB, NML and IMMT are using E-print software for building Institutional Repository. The KRC- CIMFR is using both Dspace and E-print software for institutional repository. The KRC of NEIST is not using any software for building institutional repository. The CMERI, Durgapur has no institutional repository. The total number of 5 (71.43%) KRC's are using E- print software and 1 (14.29%) is using Dspace software.

6.1.1.7.27 Availability of RFID Technology in the KRC's

The Radio Frequency Identification (RFID) is the technology that uses radio waves to automatically identify individual items. The objective of any RFID system is to carry data in suitable transponders, generally known as tags and to retrieve data, by machine readable means, at a suitable time and place and to satisfy particular application needs. By using RFID in the libraries can saves library staff's time by automatizing their tasks. The table 6.43 shows about the availability of RFID technology in the KRC's.

Table- 6.43: Availability of RFID Technology (N= 7)

Sl. No.	Name of the Laboratory	Yes	No
1	CGCRI, Kolkata	✓	-
2	IICB, Kolkata	-	✓
3	CMERI, Durgapur	-	✓
4	CIMFR, Dhanbad	-	✓
5	NEIST, Jorhat	-	✓
6	NML, Jamshedpur	-	✓
7	IMMT, Bhubaneswar	-	✓
	Total	**1 (14.29%)**	**6 (85.71%)**

Source: Computed from the Surveyed Data

From the **Table- 6.43** it has been observed that CGCRI, Kolkata has adopted RFID technology in the KRC. The other six laboratories namely IICB, CMERI, CIMFR, NEIST, NML and IMMT have not introduced RFID technology in their KRC's. The overall analysis reflects that 1 (14.29%) KRC has uses RFID technology and rest of the 6 (85.71%) have not using RFID technology.

Chapter- 6: Part- B

Analysis of the Responses Received from the Scientists

6.1.2 Introduction

This part of the analysis consists of twenty five questions both close and open ended. The data that have been analyzed in this part were collected from the scientists and research scholars during the survey. The analysis of the data has been reflected in the following Tables.

6.1.2.1 Responses Received from the Respondent

The research scholar has been distributed questionnaires to the scientists and research scholars of the selected seven (7) CSIR laboratories of Northeast and Eastern India. The responses received and not received from the respondent are shown in the **Table- 6.44** and **Figure- 6.14** below.

Table 6.44: Laboratory Wise Responses Received from the Respondent (N= 288)

Sl. No.	Questionnaire	Number of Responses	Percentage
1.	Received	**288**	**82.29%**
2.	Not Received	**62**	**17.71%**
	Total Distributed	**350**	**100**

Source: Computed from the surveyed Data

The **Table- 6.44** shows that total numbers of 350 questionnaires were distributed among the scientists and out of 350 questionnaires the researcher has received 288 questionnaires and rest of 62 questionnaires were not received back. The response rate was 82.29% which reflects that majority of the population have responded the questionnaires. Here the number of respondent was N=288. The **Figure- 6.14** is also shows the numbers of responses received by the researcher.

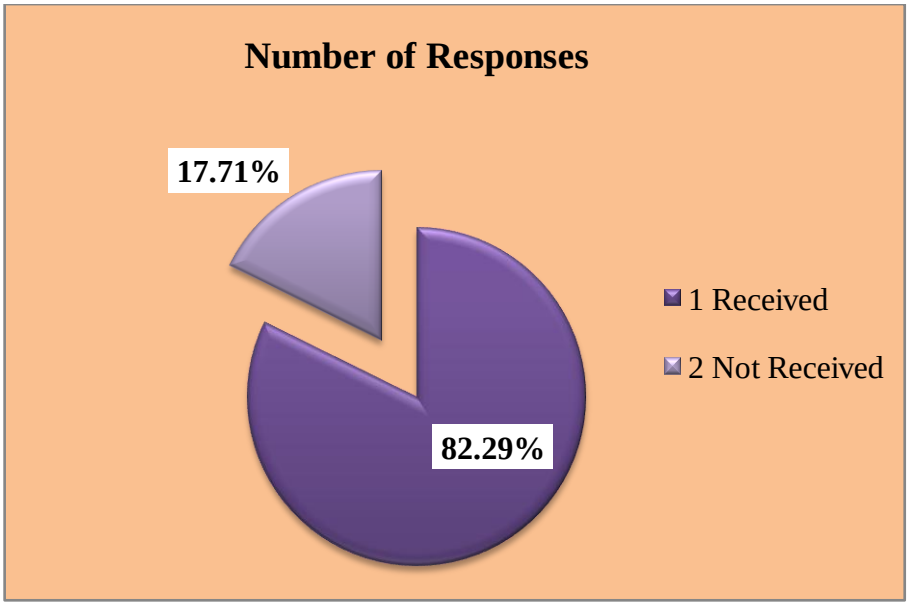


Figure -6.14: Responses Received from the Respondent

6.1.2.2 Laboratory wise Distribution of Questionnaires and Responses Received

This part includes the analysis of the responses received from the laboratories under study. The following **Table- 6.45** and **Figure- 6.15** are shows the laboratory wise distribution of questionnaires and responses received:

Table- 6.45: Laboratory Wise Distribution and Responses Received (N= 288)

Sl. No.	Name of the Laboratories/ Institutes	Questionnaire Distributed	Responses Received	Percentage %
1.	IMMT, Bhubaneswar	50	41	82%
2.	IICB, Kolkata	50	39	78%
3.	CGCRI, Kolkata	50	47	94%
4.	CIMFR, Dhanbad	50	38	76%
5.	CMERI, Durgapur	50	40	80%
6.	NML, Jamshedpur	50	37	74%
7.	NEIST, Jorhat	50	46	92%
	Total	**350**	**288**	**82.29%**

Source: Computed from the Surveyed Data

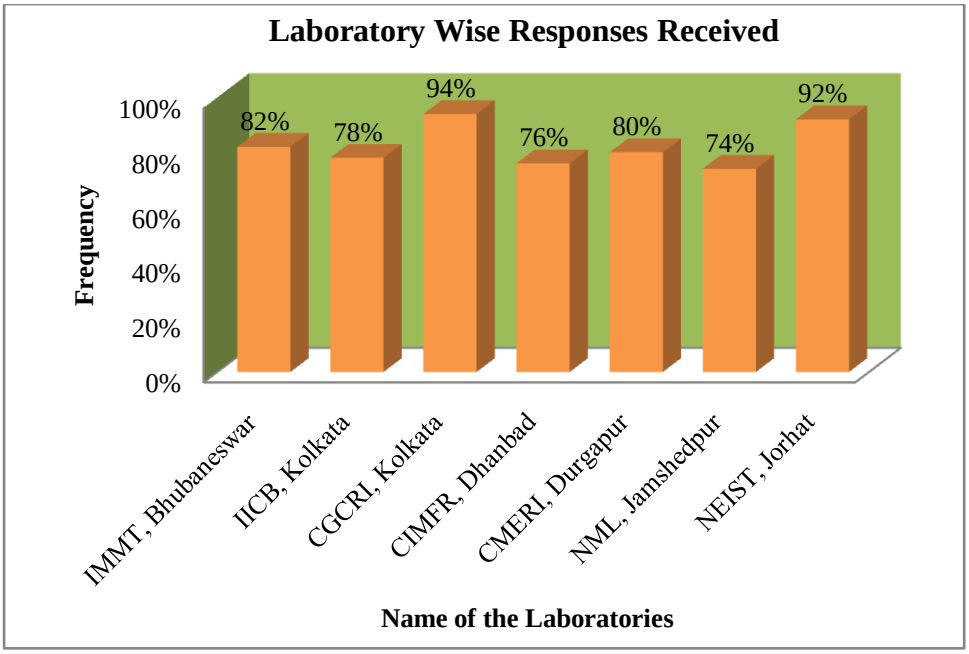


Figure- 6.15: Laboratory Wise Responses Received

The **Table- 6.45** reflects the number of responses received from the laboratories under study. Total numbers of 350 questionnaires were distributed among the scientists of the 7 CSIR laboratories and total numbers of 50 questionnaires were distributed in each laboratory. The researcher has received total 288 filled in questionnaire. From the study it is observed that researcher has received 94% response from the scientists of CGCRI, Kolkata, 92% responses received from the NEIST, Jorhat, 82% from IMMT, Bhubaneswar, 80% from CMERI, Durgapur, 78% from IICB, Kolkata, 76% responses received from CIMFR, Dhanbad and 74% responses received from the scientists of the NML, Jamshedpur. The **Figure- 6.15** is the graphical representation of the **Table- 6.45**.

6.1.2.3 Analysis by Library Visit

The **Table- 6.46** shows the number and percentage of library (KRC) visit by the scientists of the laboratories.

Table- 6.46: Library (KRC) Visit

Sl. No.	Library Visit	Number of Responses	Percentage (%)
1.	Yes	**275**	**95.49 %**
2.	No	**13**	**4.51%**
	Total	**288**	**100**

Source: Computed from the Surveyed Data

Analysis of visit to the library under study has been shown in Table- 6.46 which reveals that the 275 (95.49%) users have visited the KRC. The study also reveals that only 13 (4.51%) number of the respondents have not visited the Library. The following **Figure- 6.16** shows the graphical representation of the data computed in the **Table- 6.46**.

Therefore, from the above study it was found that the majority of the respondent visited the KRC for developing their knowledge.

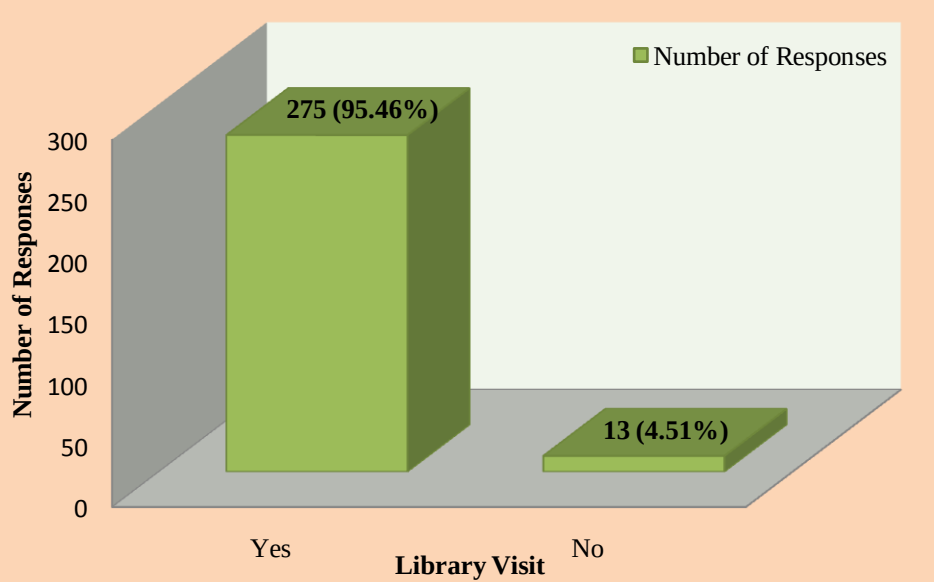


Figure- 6.16: Library Visit

6.1.2.3.1 Frequency of Library Visit and Time Devoted to the Library

The **Table- 6.47** and **Table- 6.48** show the frequency of Library visit and time devoted to the library by the scientists of the selected laboratories.

Table- 6.47: Frequency of Library visit

Sl. No.	Library Visit	Frequency	Percentage (%)
1.	Daily	45	15.63
2.	Fortnightly	75	26.04
3.	Once in a month	52	18.06
4.	Sometimes	114	39.58
5.	Not at all	2	0.69
	Total	**288**	**100.00**

Source: Computed from the surveyed Data

The **Table- 6.47** shows that 45 (15.63%) respondents have daily visited the library, 75 (26.04%) visited fortnightly, 52 (18.06%) once in a month, and 114 (39.58%) sometimes visited the library and only 2 (0.69%) of the respondents not at all visited the library. The **Figure- 6.17** is the graphical representation of the same.

From the result as shown in the **Table- 6.47** it can be concluded that most of the Scientists and other scientific personals are found to visiting in KRC regularly. Some of the users are interested only to use library occasionally during leisure time. This situation has arises due to their limited time, lack of sufficient current literature. Frequency of KRC used by users was high due to location of current and back volume of periodicals centrally and provision of up to date information through INTERNET.

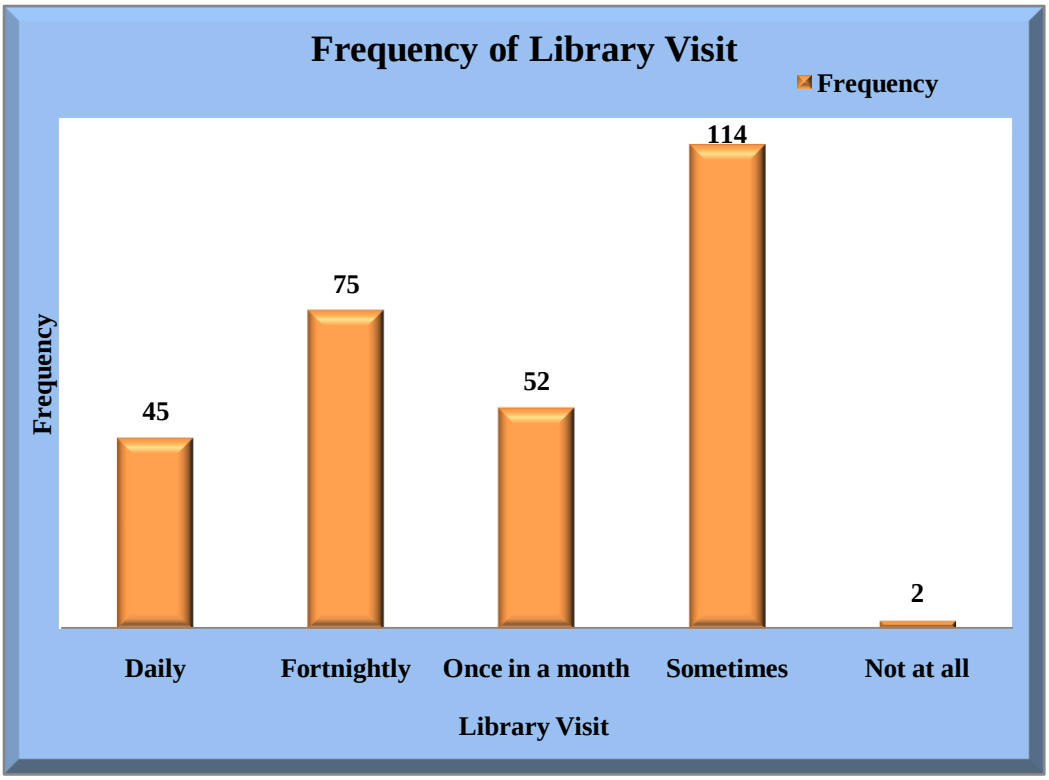


Figure- 6.17: Frequency of Library visit

Table- 6.48: Time Devoted to the Library (KRC) (N= 288)

Sl. No.	Time Devoted to the Library	Frequency	Percentage (%)
1.	Less than one hour	151	52.43
2.	1-5 hours	126	43.75
3.	6-10 hours	11	3.82
4.	11-15 hours	0	0.00
5.	Over 15 hours	0	0.00
	Total	**288**	**100**

Source: Computed from the Surveyed Data

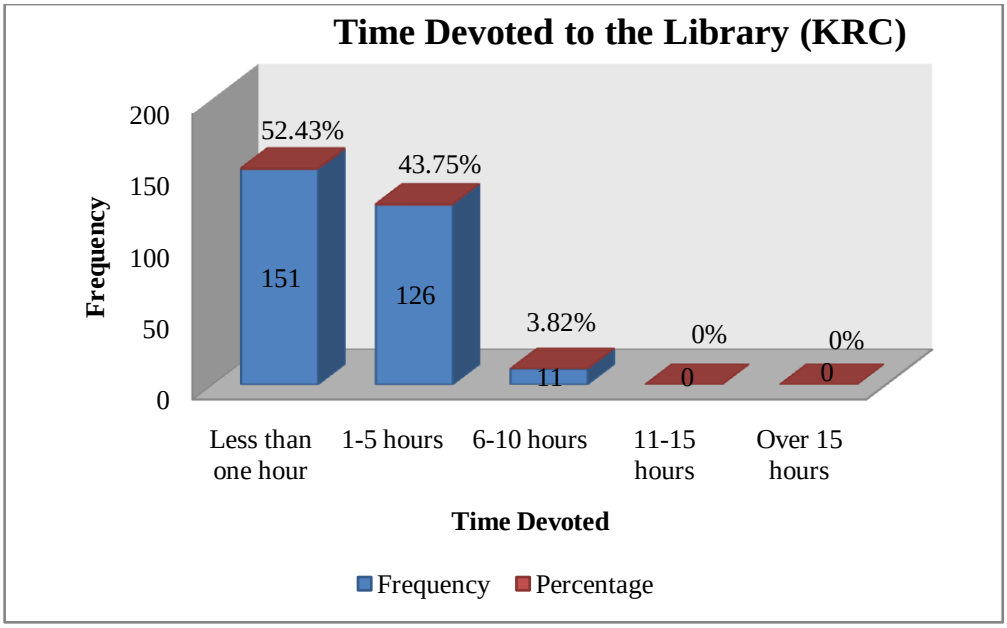


Figure- 6.18: Time Devoted to the Library (KRC)

While making an analysis of time devoted to the library under study placed above in **Tables- 6.48** the research scholar has consult with the library professionals and users of the KRC. The maximum numbers of 151 (52.43%) respondents have devoted their time for less than one hour daily to the library, 126 (43.75%) devoted their time for 1- 5 hours, 11 (3.82%) respondents devoted their for 6- 10 hours daily to the library. From the study it has been observed that scientists never get time to use the library for 11- 15 hours and over 15 hours daily. The **Figure 6.18** shows the graphical output of the **Table- 6.48**.

6.1.2.3.2 Purpose of Library (KRC) Visit

The **Table- 6.49** below shows the different types of purposes for visiting the KRC by the respondents.

Table- 6.49: Purpose of Visiting the KRC (N= 288)

Sl. No.	Rank	Purpose of KRC Visit	Frequency	Percentage (%)
1.	I	To borrow books	210	72.92
2.	II	For supporting research investigation	145	50.35
3.	III	To update knowledge	129	44.79
4.	IV	For reading purpose only	89	30.90
5.	V	Writing an article/paper	82	28.42
6.	VI	Starting a project	63	21.88
7.	VII	For guiding researchers	42	14.58
8.	VIII	For workshop/ Seminar presentation	28	9.72
9.	IX	To browse Internet	25	8.68
10.	X	Patent design	21	7.29
11.	XI	Writing a book	19	6.60
12.	XII	Others	9	3.13

Source: Computed from the Surveyed Data

The purpose of information need or use is another aspect of library visit by the users. Analysis of the **Table- 6.49** shows the purpose of library visit by the users. Users were generally visit the library to access information for writing an article/paper, writing a book, to update knowledge, starting a project, to browse internet, etc. The analysis of the table reflects that scientists come to the KRC for seeking information mainly to update their knowledge. The highest number of 210 (72.92%) scientists used to visit the KRC 'to borrow books' which is in rank one, 145 (50.35%) of respondents have visited the KRC 'for supporting research investigation' ranked as two, 129 (44.79%) scientists were using the KRC 'to update knowledge' as rank three, 89

(30.90%) users came to the KRC 'for reading purpose' which was in rank four, 82 (28.42%) respondent were visited for 'writing an article/ paper' ranked as five, 63 (21.88%) scientists visited the library for 'starting a project' ranked as six. The rest of the 42 (14.58 %), 28 (9.72%), 25 (8.68%), 21 (7.29%), 19 (6.60%) and 9 (3.13%) scientists were using the KRC for the purpose of guiding researchers, workshop/ seminar presentation, patent design, to browse internet, writing a book and others which are ranked as seven, eight, nine, ten, eleven and twelve respectively. The **Figure- 6.19** represents the graphical analysis of the above data.

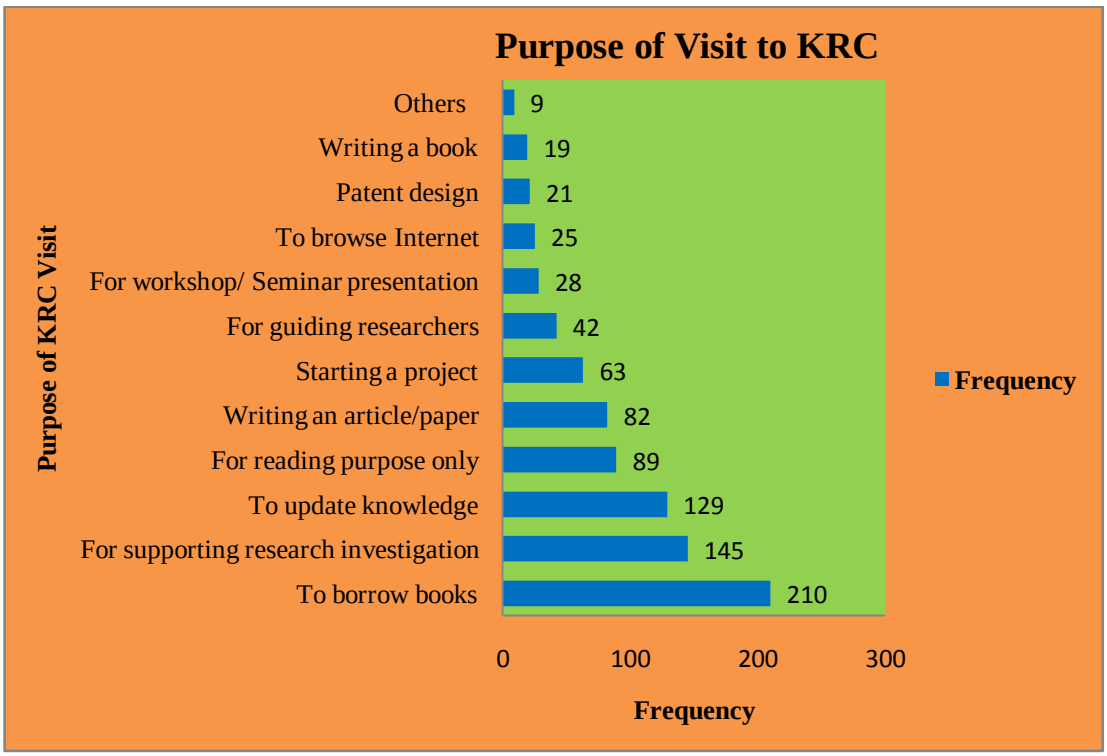


Figure- 6.19: Purpose of Visiting the KRC

Therefore, the majority of the respondent were visited KRC for the purpose to borrow books and very less respondents were visit KRC for other purposes.

6.1.2.4 Information Need of the Scientists

The **Table- 6.50** gives idea about the type of information need of the users. The research scholar has been asked one questions to the respondents related to type of their information need. There were two options given by the research scholar namely Current information and Retrospective information. The option chosen by the respondents has been reflected in the Table- 6.50.

Table- 6.50: Type of Information Need (N= 288)

Sl. No.	Type of Information	Number of Responses	Percentage (%)
1.	Current	**221**	**76.74**
2.	Retrospective	**67**	**23.26**
	Total	**288**	**100**

Source: Computed from the Surveyed Data

From the **Table- 6.50** it has been observed that highest number of 221 (76.74%) respondents preferred Current information while rest of the 67 (23.26%) respondents needs information of Retrospective type. The **Figure- 6.20** is the graphical representation of the Table- 6.50.

Hence, it has been found that majority of the respondents prefer Current information for their research purpose.

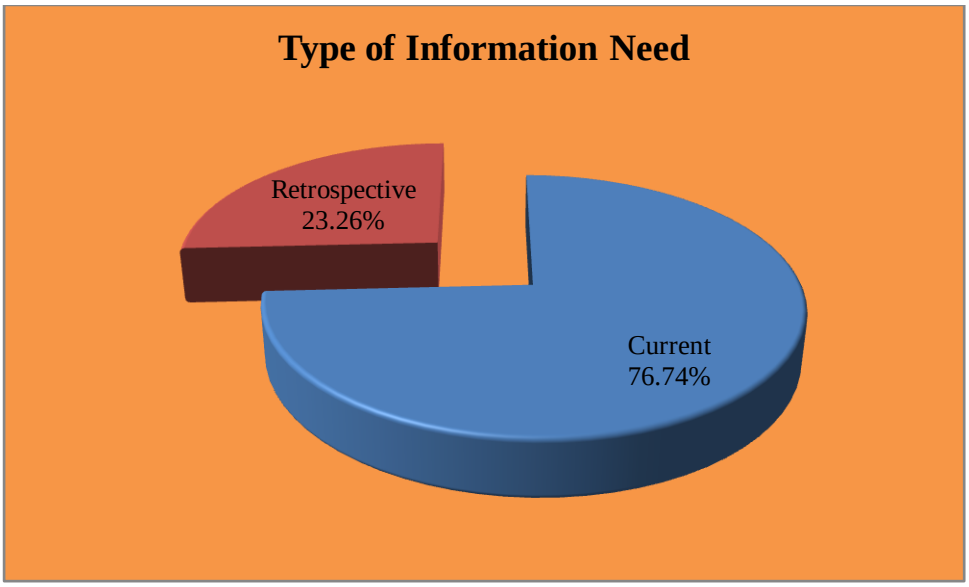


Figure- 6.20: Type of Information Need

6.1.2.5 Provision of Departmental Library

The researcher has been asked question to the respondent related to the availability of the Departmental Library in their respective departments. The respondents have given the answer which is reflected in the **Table- 6.51** and **Figure- 6.8** below:

Table- 6.51: Provision of Departmental Library (N= 288)

Sl. No.	Provision of Departmental Library	Number of Responses	Percentage (%)
1.	Yes	55	19.10
2.	No	233	80.90
	Total	**288**	**100**

Source: Computed from the Surveyed Data

The **Table- 6.51** above and **Figure- 6.21** below shows the highest number of 233 (80.90%) respondent were answered that they have no departmental library while 55 (19.10%) respondents were answered that they have separate departmental library.

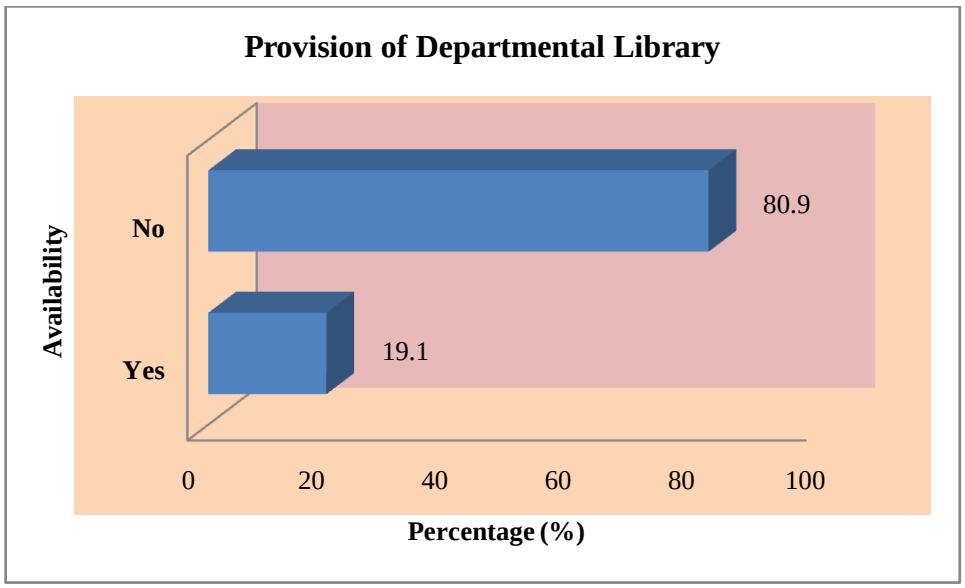


Figure- 6.21: Provision of Departmental Library

Therefore from the above analysis it has been observed that majority of the CSIR laboratories have no separate Departmental library in each department. Very few laboratories have separate Departmental library.

6.1.2.5.1 Accessing the Library from the Department

The respondents were asked the question related to the accessing the library from the department. The respondents have given the answer which is indicated in the **Table- 6.52**.

Table- 6.52: Accessing the Library from the Department (N=288)

Sl. No.	Access Library from Department	Number of Responses	Percentage (%)
1.	Yes	**106**	**36.81**
2.	No	**182**	**63.19**
	Total	**288**	**100**

Source: Computed from the Surveyed Data

The **Table- 6.52** shows that almost 182 (63.19%) number of respondents did not access the library from the department and the rest of the 106 (36.81%) respondents were access the library from their department. The **Figure- 6.22** below illustrates the analysis of the Table- 6.52.

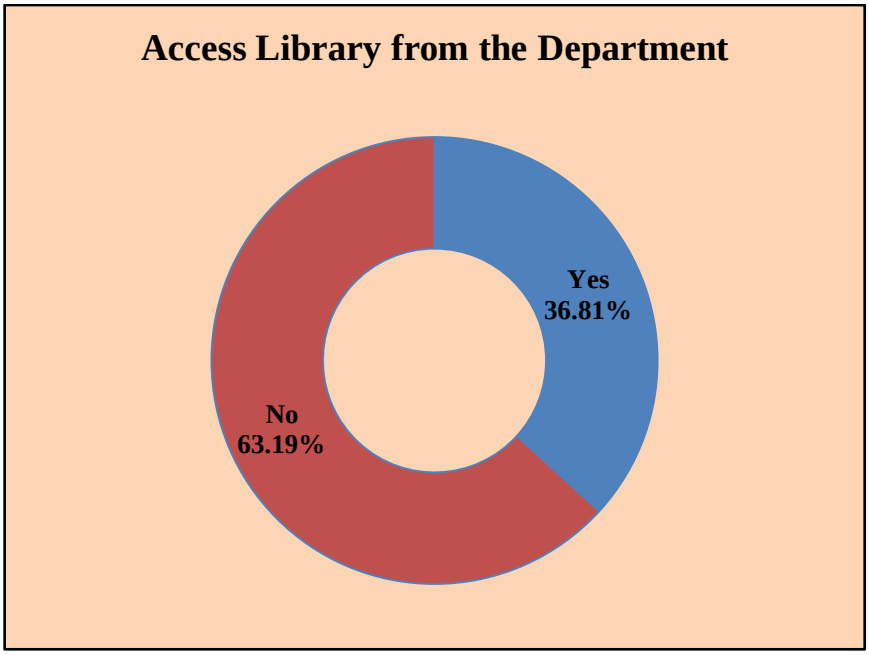


Figure- 6.22: Access the Library from the Department

Hence from the study it reveals that majority of the respondents did not access the library from the department. They generally prefer to visit the library for accessing their required information in the library (KRC). Some of the respondents have preferred to access the library from the department. The reasons behind accessing the library from the department are the time factor; their institutes have Wi-Fi campus, the scientists mostly search the E-resources, Institutional Repository, etc which can access from campus LAN, those respondents are largely dependent on the electronic sources instead of printed resources.

6.1.2.6 Type of Document Search

The **Table- 6.53** indicated the type of documents that have search by the scientists of the laboratories under study. The documents were mainly text books, reference books, patents, reviews, index, bibliographies, research project, trade literature, encyclopedia, periodicals, conference/ seminar proceedings, standards, newsletters, abstracts, micrographics, theses/ dissertations, hand books, newspaper clippings and others. The table- 6.53 below reflects type of document search and the frequency of searching:

Table- 6.53: Type of Documents Search (N= 288)

Sl. No.	Rank	Type of Documents search	Frequency	Percentage (%)
1.	I	Text book	202	70.14
2.	III	Reference Books	149	51.74
3.	VII	Patents	83	28.82
4.	V	Reviews	122	42.36
5.	XVI	Index	24	8.33
6.	XIV	Bibliographies	39	13.54
7.	IV	Research Project	143	49.65
8.	XVII	Tread Literature	21	7.29
9.	IX	Encyclopedia	79	27.43
10.	II	Periodicals	165	57.29
11.	VIII	Conference/Seminar Proceedings	82	28.47
12.	XIII	Standards	40	13.89
13.	XII	News Letters	48	16.67
14.	X	Abstracts	72	25.0
15.	XVIII	Micrographics	9	3.13
16.	VI	Theses/ Dissertations	84	29.17
17.	XI	Hand Books	61	21.18
18.	XV	News paper clipping	28	9.72
19.	XIX	Other	0	0

Source: Computed from the Surveyed Data

Providing different types of information sources in the questionnaire, the users were asked for multiple choice of their required document as extensively and

sufficiently. The **Table- 6.53** represents the types of document search by the users of KRC's of all the seven laboratories. From the table it was revealed that the 202 (70.14%) respondents have extensively use text books which was in rank one, 165 (57.29%) respondent were uses periodicals which ranked as two, 149 (51.74%) number of respondents were using reference books ranked as three, 49.65% research projects, 42.36% using reviews, 29.17% uses theses/ dissertations, 28.82% uses patents, 28.47% uses conference/ seminar proceedings, 27.43% uses encyclopaedias, 25% uses abstracts, 21.18% uses hand books, 16.67% uses newsletters, 13.89% uses standards, 13.54 % using bibliographies, 9.72 % uses newspaper clippings, 8.33% were using index, 7.29% uses trade literature, 3.13% uses micrographics, and others uses 0% which were falls under rank four, five, six, seven, eight, nine, ten, eleven, twelve, thirteen, fourteen, fifteen, sixteen, seventeen, eighteen and nineteen respectively. The **Figure- 6.23** is the graphical representation of the Table- 6.53.

The study reveals that majority of the scientists used to search the text books as compared to the other documents. The second number in the list is Periodicals and not a single respondent were search other documents in the KRC.

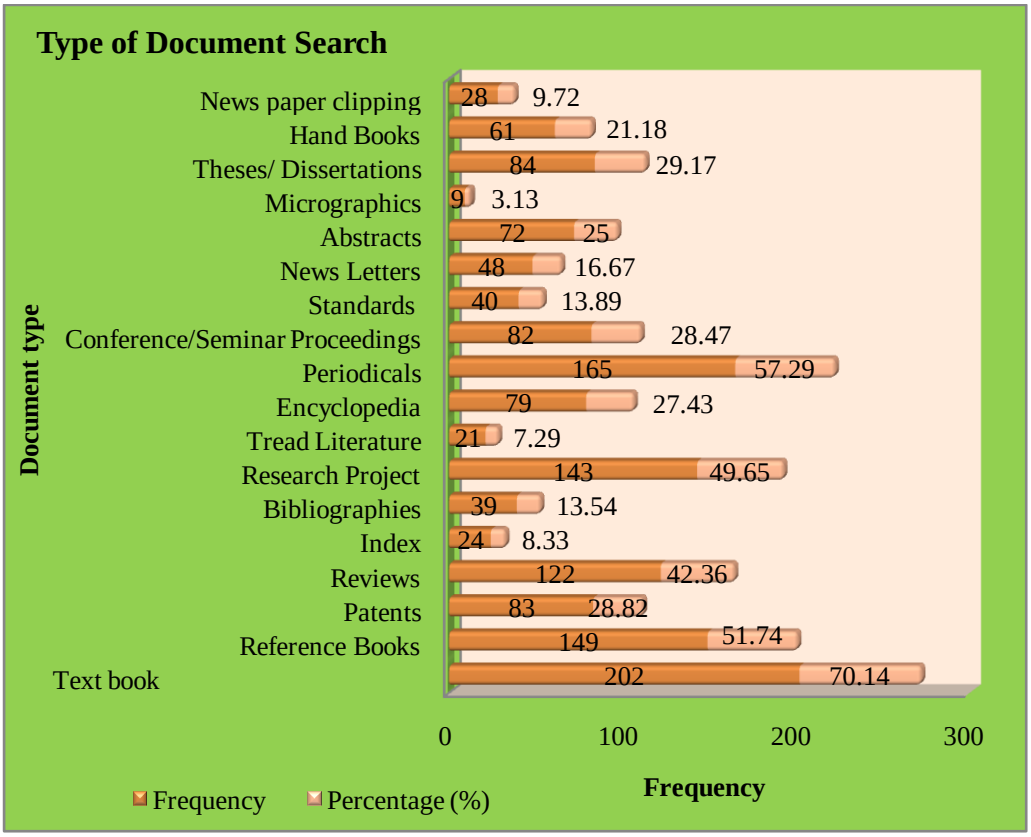


Figure- 6.23: Type of Documents Searc

6.1.2.7 Accessing Internet by the Respondents

The **Table- 6.54** below indicates whether the respondents were accessing the Internet or not.

Table- 6.54: Accessing Internet by the Respondents (N= 288)

Sl. No.	Access Internet	Number of Responses	Percentage (%)
1.	Yes	**286**	**99.31**
2.	No	**2**	**0.69**
	Total	**288**	**100**

Source: Computed from the Surveyed Data

Searching Internet is a viable platform for taking up research activities. The scholar explored the library users through questionnaire to know the access of internet by the user communities and this has been placed in the Table- 6.54, where it could be revealed that, total number of 286 (99.31%) of the respondents were accessing internet and 2 (0.69%) respondents were not searching the Internet. The figure- 6.11 shows the graphical representation of the above data analysis.

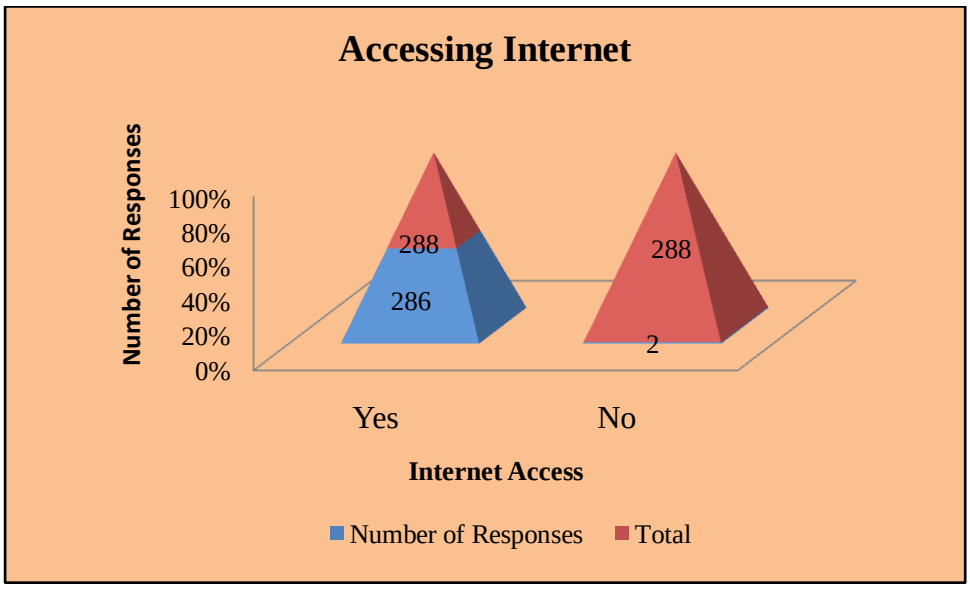


Figure- 6.24: Accessing Internet by the Respondents

Therefore, majority of the respondents have access the internet. The main reason for using Internet is that the scientists significantly depend on communication with the fellow scientists and also search frequently current information in their concerned field to keep up to date their knowledge. This helps scientists in their further study, starting a new project, inventions and innovations. Internet is the only way for keeps up to date information and because of that the science and technology people more frequently access Internet. The rest of the small group of respondents has not willing to access internet may be due to the age factor.

6.1.2.7.1 Reason for Accessing Internet

The **Table- 6.55** indicates the reasons for accessing Internet by the respondents. The research scholar has constructed a multiple choice question including eight options to know the reasons behind the access to Internet. The respondents have allowed choosing more than one options. The result of the query has been reflected in the following table.

Table - 6.55: Reason for Accessing Internet (N=288)

Sl. No.	Rank	Reason for Accessing Internet	Frequency	Percentage (%)
1.	I	E-book	202	70.14
2.	II	E- journals	149	51.74
3.	III	E- theses/ dissertations	143	49.65
4.	IV	E- report	122	42.36
5.	V	E- patent	83	28.82
6.	VI	E- database	39	13.54
7.	VII	E- proceeding	24	8.33
8.	VIII	Any Others	21	7.29

Source: Computed from the Surveyed Data

The **Table- 6.55** shows that the total numbers of 202 (70.14%) respondents were mainly search internet for accessing E-books which was ranked as one and 149 (51.74%) respondents used to assess E-journals which constitute rank two. Total numbers of 143 (49.65%) respondents were searching internet for accessing E- these/

dissertations which ranked as three, 122 (42.36%) respondents used to access E-reports which was ranked as five. The total numbers of 83 (28.82%) respondents were searching E- patent, 39 (13.54%) searching E- database, 24 (8.33%) searching E-proceeding and 21 (7.29%) searching other resources in the internet which were ranked as six, seven, and eight position. The **Figure- 6.25** is the graphical representation of the same above.

Internet is the global information infrastructure, which enables the scientists to access the information through the medium like text, voice, and graphics in other words multimedia. The electronic sources of information are widely available on Internet, which includes e-journals, e-books, e-patent, e-reports, e-proceedings, e-databases, e-theses/dissertations. E-Resources are those electronic products that deliver a collection of data, be in text referring full-text basis, e-journals, image collection, and other multimedia products and numerical, graphical or time based as a commercially available till that has been published with an aim to being marketed. The study reveals that majority of the respondents were accessing internet for searching E- books.

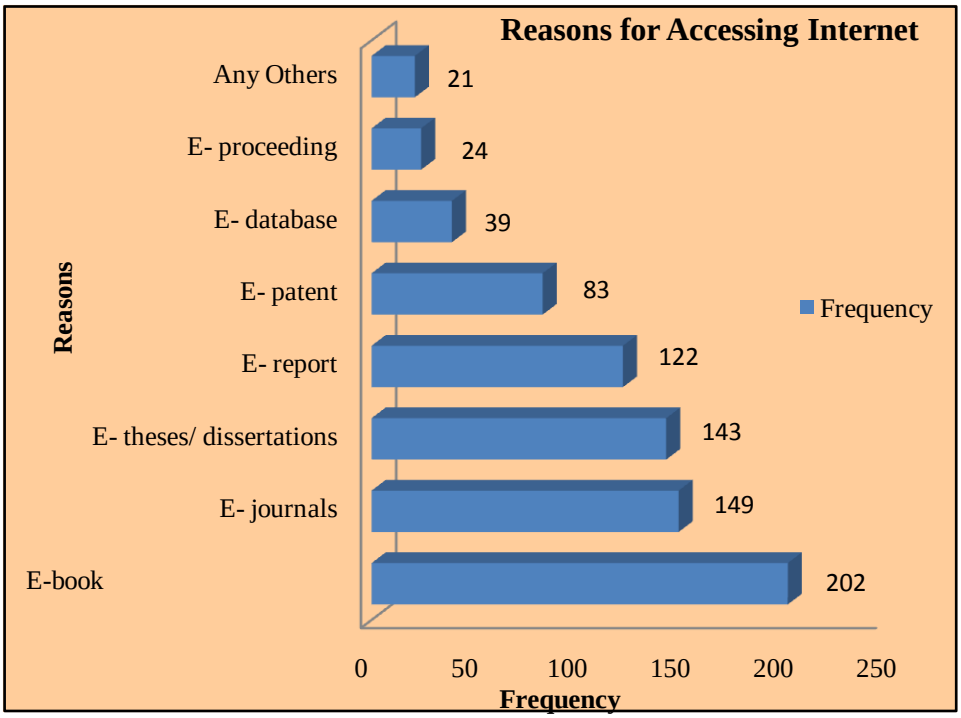


Figure- 6.25: Reason for Accessing Internet

6.1.2.7.2 Duration of Access Internet

The respondents were asked the question about the duration of hours they used to access the Internet and the answer of the question is resulted in the **Table- 6.56**.

Table- 6.56: Duration of Access the Internet (N=288)

Sl. No.	Rank	Duration	Frequency	Percentage (%)
1.	III	Less than 2 hour	51	17.71
2.	II	2-3 hours	80	27.78
3.	I	3-4 hours	85	29.51
4.	V	4-5 hours	34	11.81
5.	IV	Above 5 hours	38	13.19
		Total	**288**	**100**

Source: Computed from the Surveyed Data

The **Table- 6.56** shows highest frequency of 85 (29.51%) respondents were accessing internet for 3- 4 hours daily which is considered as the rank one. The 80 (27.78%) numbers of respondents were accessing internet for 2- 3 hours which is in rank two, 51 (17.71%) respondents used to access internet for less than 2 hours ranked as three, 38 (13.19%) respondents have accessed internet for above 5 hours ranked as four and the 34 (11.81%) respondents were accessing internet for 4- 5 hours regularly ranked as fifth. The **Figure- 6.26** below is the graphical representation of the Table- 6.56.

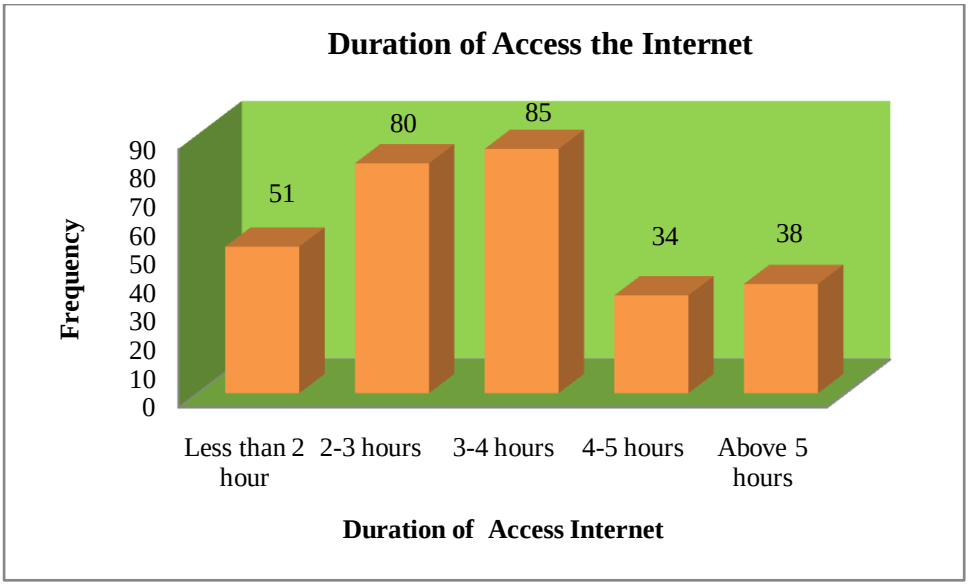


Figure- 6.26: Duration of Access the Internet

Therefore, majority of the respondents used to access internet for 3- 4 hours and very few respondents were used to access internet above 5 hours and 4-5 hours in a day.

6.1.2.8 Use of Search Engine to Access E- Resources

The respondents have preferred the search engines for accessing E- resources as mentioned in the Table- **6.57**.

Table- 6.57: Use of Search Engines to Access E-resources (N= 288)

Sl. No.	Rank	Name of the Search Engine	Frequency (N= 288)	Percentage (%)
1.	I	Google	228	79.17
2.	II	Yahoo	74	25.69
3.	III	AltaVista	7	2.43
4.	IV	Others	1	0.35

Source: Computed from the Surveyed Data

The respondents were asked to put tick mark in a multiple choice question to know about the use of search engines to access e-resources and the respondent answers are resulted in the above **Table- 6.57**. The number of frequency was N=288. The table shows that 228 (79.17%) of the respondents were searching Google for accessing E-resources which was Ranking one. The 74 (25.69%) respondents preferred Yahoo for accessing resources which ranked as two in the list, 7 (2.43%) respondents were using

AltaVista for searching resources which ranked as three. The other resource like Bing was used by only 1 (0.35%) numbers of respondents ranked last in the table. The **Figure- 6.27** is the graphical representation of the **Table- 6.57**.

Most of the respondents were preferred to search Google for its user friendly browsing and access facilities. The rest of the respondents were preferred Yahoo, Alta Vista and other source like Bing respectively for searching the e- resources.

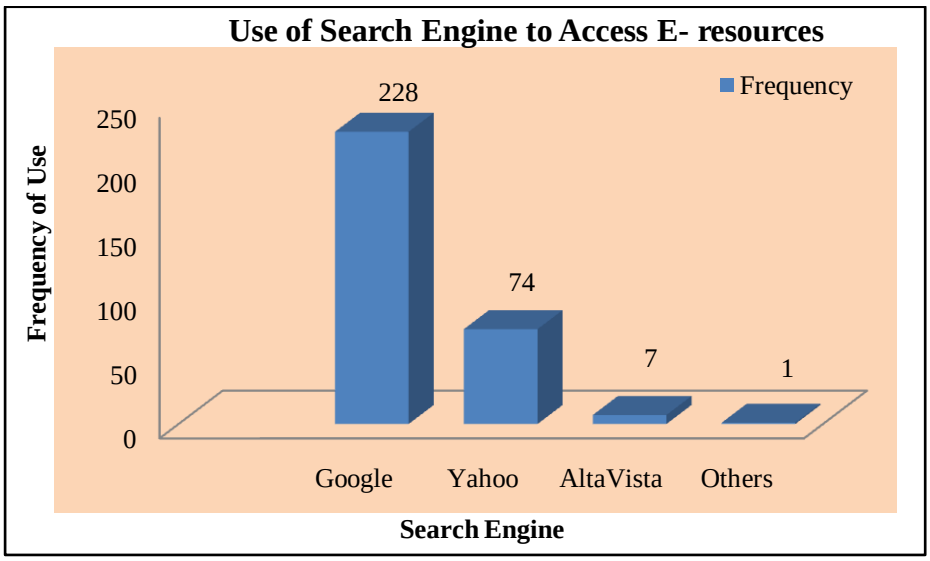


Figure- 6.27: Use of Search Engines to Access E-resources

6.1.2.9 Frequency of Using E- resources in the KRC's

The **Table- 6.58** shows the frequency of using different E-resources by the respondents.

Table- 6.58: Frequency of Using Electronic Resources in the KRC's (N= 288)

E-Resources	Frequency of Use with Percentage				
	Everyday	**2-3 times in a week**	**Once in week**	**Once in month**	**Never**
CD-ROM	7 (2.43)	11(3.82)	11(3.82)	19 (6.60)	31(10.76)
Internet	221 (76.73)	18 (6.25)	10 (3.47)	6 (2.08)	6 (2.08)
OPAC	14 (4.81)	14 (4.86)	13 (4.51)	23 (7.99)	21(7.29)
E-database	64 (22.22)	37 (12.85)	19 (6.60)	20 (6.94)	14 (4.86)
E-journals	129 (44.79)	49 (17.01)	21(7.29)	16 (5.56)	7 (2.43)
E-books	87 (33.21)	35 (12.15)	27 (9.38)	20 (6.94)	6 (2.08)
E-patent	54 (18.75)	31 (10.76)	23 (7.99)	25 (8.68)	13 (4.51)
E-proceeding	61(21.18)	30 (10.42)	13(4.51)	24 (8.33)	10 (3.47)
E-report	77 (26.74)	32 (11.11)	26 (9.03)	29 (10.07)	10 (3.47)
Others	0 (0.00)	2 (0.69)	1(0.35)	2 (0.69)	1(0.35)

Source: Computed from the Surveyed Data

The **Table- 6.58** shows that 221 (76.73%) of the respondents using the Internet every day which is the highest in rank among all the resources using every day. The highest number of 49 (17.01%) respondents prefers to use E-journals 2- 3 times in a week; highest number of 27 (9.38%) prefers to use E- books once in week; highest number 29 (10.07%) prefers to use E- reports once in a month and 31 (10.76%) of the users never use CD-ROM which shows the highest number. The study reveals that majority of respondents prefer to access internet resources every day and not a single respondents were use other resources.

6.1.2.10 Purpose of Using Electronic Resources

The **Table- 6.59** below shows the various types of purposes for using the electronic resources by the respondents.

Table- 6.59: Purpose of Use of Electronic Resources (N= 288)

Electronic Resources	Purpose of Using Electronic Resources (N=288) with Percentage (%)							
	Academic Purpose	Research purpose	To update knowledge	Patent design	Writing article/ paper	Writing books	Starting project	Other
E-books	185 (64.24)	204(70.83)	177 (61.46)	41(14.24)	162(56.25)	49(17.01)	104(36.111)	1(0.34)
E-journals	139(48.26)	220(76.39)	176(61.11)	46(15.98)	165(57.29)	27(9.38)	93(32.29)	0
e-proceedings	68(23.61)	116(40.28	100(34.72)	23(7.99)	76(26.39)	15(5.21)	40(13.89)	0
Online-databases	68(23.61)	128(44.44)	75(26.04)	22(7.64)	73(25.35)	17(5.90)	42(14.58)	0
E-theses/dissertation	68(23.61)	98(34.03)	74(25.69)	14(4.86)	56(19.44)	35(12.15)	27(9.38)	0
E-patent	60(20.83)	84(29.17)	60(20.83)	61(21.18)	45(15.63)	13(4.51)	28(9.72)	0
Standards	45(15.63)	62(21.52)	37(12.84)	16(5.56)	27(9.38)	8(2.78)	17(5.90)	0
Abstracting & Indexing Databases	53(18.40)	83(2882)	44(15.28)	12(4.17)	52(15.06)	12(4.17)	15(5.21)	0
Open sources	90(31.25)	114(39.58)	74(25.69)	30(10.42)	73(25.34)	29(10.07)	45(15.63)	0
Web sources	92(31.94)	101(35.07)	86(29.86)	30(10.42)	74(25.69)	23(7.98)	43(14.93)	0

Source: Computed from the Surveyed Data

The **Table- 6.59** reflects the Electronic Resources that has been used by the respondents for different purposes.

Table- 6.59 (a): Use of Electronic Resources for Academic Purpose (N= 288 for Each Resources)

Sl. No.	Rank	Electronic Resources	Frequency of Use for Academic Purpose	Percentage (%)
1.	I	E-books	185	64.23
2.	II	E-journals	139	47.22
3.	V	e-proceedings	68	23.61
4.	V	Online-databases	68	23.61
5.	V	E-theses/dissertation	68	23.61
6.	VI	E-patent	60	20.84
7.	IX	Standards	45	15.63
8.	VII	Full text databases	55	19.10
9.	VIII	Abstracting & Indexing databases	53	18.40
10.	IV	Open sources	90	31.25
11.	III	Web sources	92	31.94

Sources: Computed from the Surveyed data

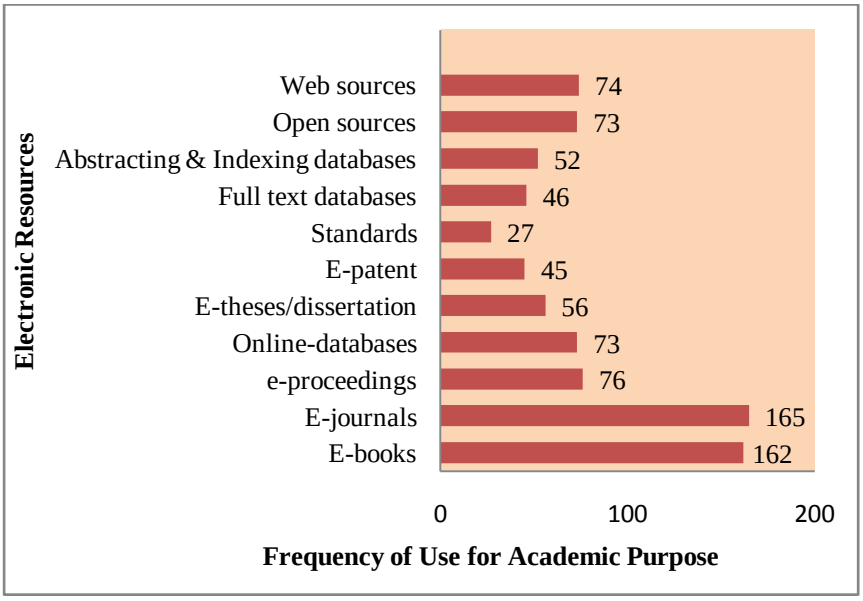


Figure- 6.28 (a) Use of Electronic Resources for Academic Purpose

Table- 6.59 (b): Use of Electronic Resources for Research Purpose (N= 288 for Each Resources)

Sl. No.	Rank	Electronic Resources	Frequency of Use for Research purpose	Percentage (%)
1.	II	E-books	204	70.83
2.	I	E-journals	220	76.39
3.	IV	e-proceedings	116	40.28
4.	III	Online-databases	128	44.44
5.	VII	E-theses/ dissertation	98	34.03
6.	IX	E-patent	84	29.17
7.	XI	Standards	62	21.53
8.	VIII	Full text databases	91	31.60
9.	X	Abstracting & Indexing databases	83	28.82
10.	V	Open sources	114	39.58
11.	VI	Web sources	101	35.07

Source: Computed from the Surveyed Data

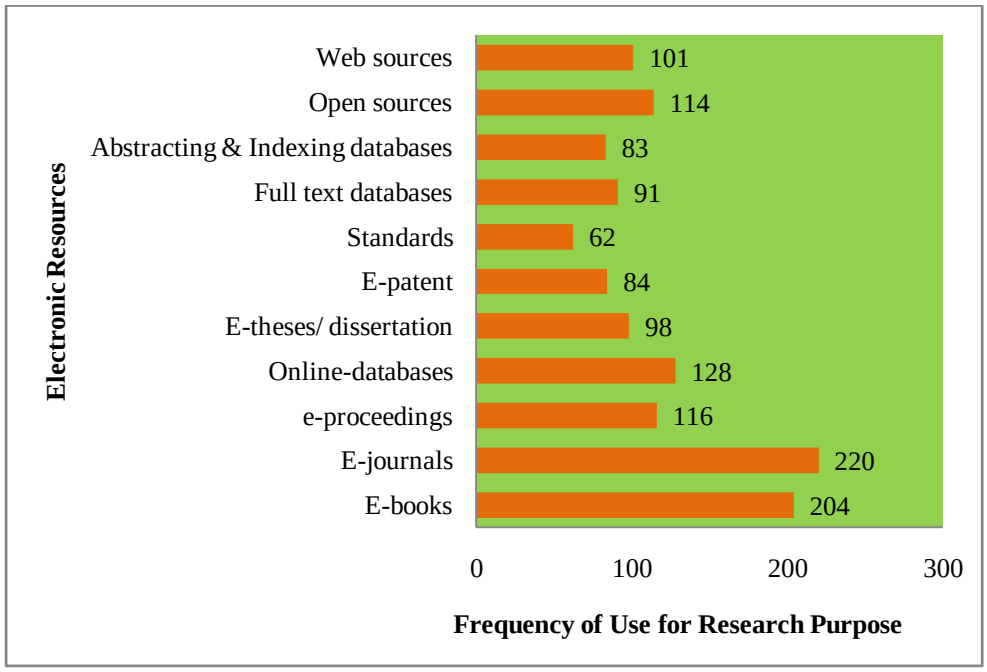


Figure- 6.28 (b): Use of Electronic Resources for Research Purpose

Table- 6.59 (c): Use of Electronic Resources to Update Knowledge (N= 288)

Sl. No.	Rank	Electronic Resources	Frequency of Use for to update knowledge	Percentage (%)
1.	I	E-books	177	61.46
2.	II	E-journals	176	61.11
3.	III	e-proceedings	100	34.72
4.	V	Online-databases	75	26.04
5.	VI	E-theses/dissertation	74	25.69
6.	VII	E-patent	60	20.83
7.	X	Standards	37	12.85
8.	VIII	Full text databases	52	18.06
9.	IX	Abstracting & Indexing databases	44	15.28
10.	VI	Open sources	74	25.69
11.	IV	Web sources	86	29.86

Source: Computed from the Surveyed Data

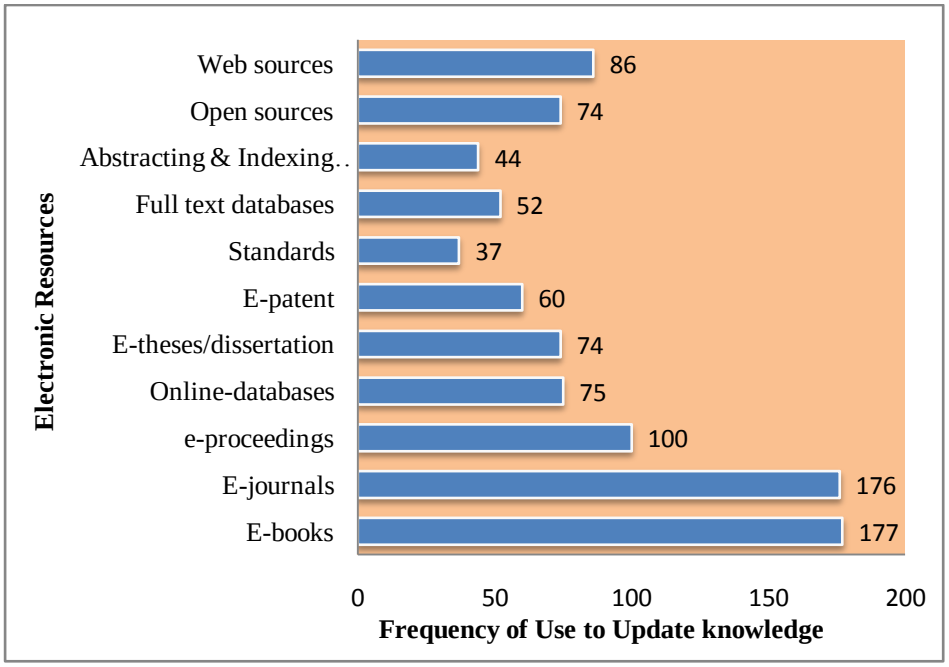


Figure- 6.28 (c): Use of Electronic Resources to Update Knowledge

Table- 6.59 (d): Use of Electronic Resources for Patent Design (N= 288)

Sl. No.	Rank	Electronic Resources	Frequency of Use for Patent design	Percentage (%)
1.	III	E-books	41	14.24
2.	II	E-journals	46	15.97
3.	V	e-proceedings	23	7.99
4.	VI	Online-databases	22	7.64
5.		E-theses/dissertation	14	4.86
6.	I	E-patent	61	21.18
7.	VIII	Standards	16	5.56
8.	VII	Full text databases	21	7.29
9.	IX	Abstracting & Indexing databases	12	4.17
10.	IV	Open sources	30	10.42
11.	IV	Web sources	30	10.42

Source: Computed from Surveyed Data

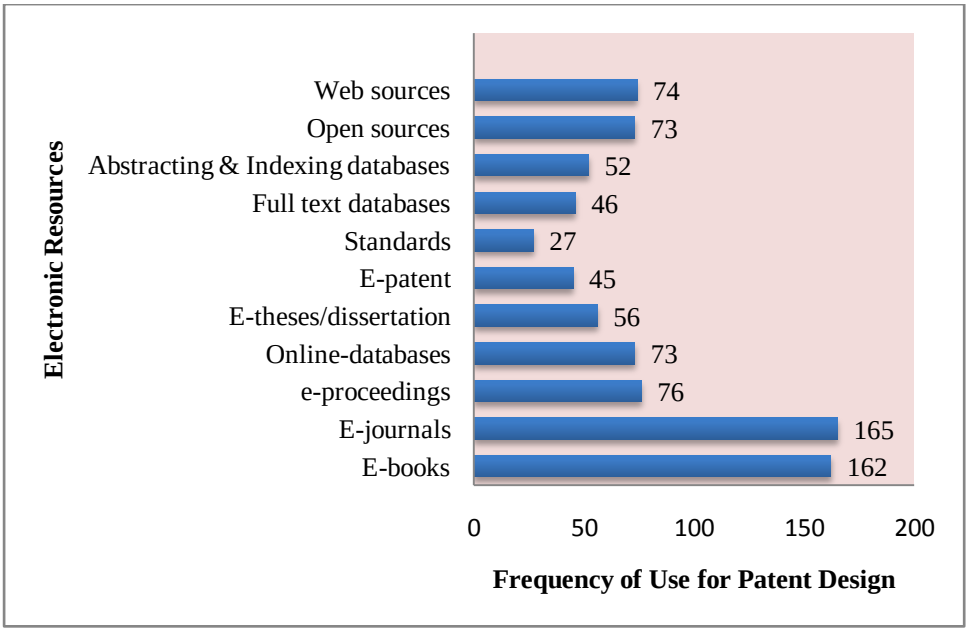


Figure- 6.28 (d): Use of Electronic Resources for Patent Design

Table- 6.59 (e): Use of Electronic Resources to Writing Article/ Paper (N= 288)

Sl. No.	Rank	Electronic Resources	Frequency of Use for Writing article/ paper	Percentage (%)
1.	II	E-books	162	56.25
2.	I	E-journals	165	57.29
3.	III	e-proceedings	76	26.40
4.	V	Online-databases	73	25.35
5.	VI	E-theses/dissertation	56	19.44
6.	IX	E-patent	45	15.63
7.	X	Standards	27	9.38
8.	VIII	Full text databases	46	15.97
9.	VII	Abstracting & Indexing databases	52	18.06
10.	V	Open sources	73	25.35
11.	IV	Web sources	74	25.69

Source: Computed from the Surveyed Data

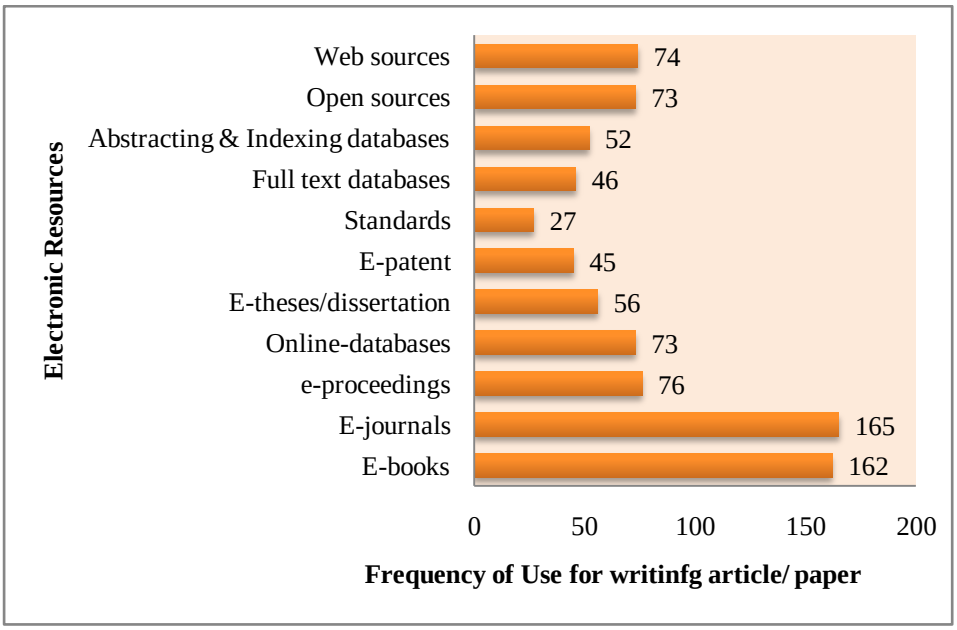


Figure- 6.28 (e): Use of Electronic Resources to Writing Article/ Paper

Table- 6.59 (f): Use of Electronic Resources to Writing Books (N= 288)

Sl. No.	Rank	Electronic Resources	Frequency of Use for Writing books	Percentage (%)
1.	I	E-books	49	17.01
2.	IV	E-journals	27	9.38
3.	III	e-proceedings	15	5.21
4.	VI	Online-databases	17	5.90
5.	II	E-theses/dissertation	35	12.15
6.	VIII	E-patent	13	4.51
7.	X	Standards	8	2.78
8.	VII	Full text databases	14	4.86
9.	IX	Abstracting & Indexing databases	12	4.17
10.	III	Open sources	29	10.07
11.	V	Web sources	23	7.99

Source: Computed from the Surveyed Data

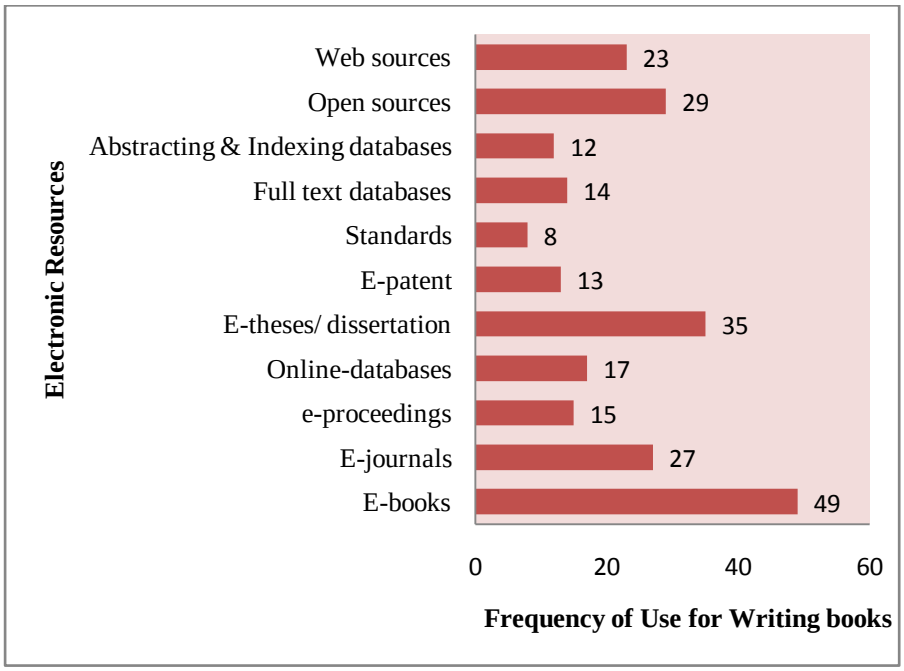


Figure- 6.28 (f): Use of Electronic Resources to Writing Books

Table- 6.59 (g): Use of Electronic Resources for Starting Project (N= 288)

Sl. No.	Rank	Electronic Resources	Frequency of Use for starting project	Percentage (%)
1.	I	E-books	104	36.11
2.	II	E-journals	93	32.29
3.	VI	e-proceedings	40	13.89
4.	V	Online-databases	42	14.58
5.	VIII	E-theses/dissertation	27	9.38
6.	VII	E-patent	28	9.72
7.	XI	Standards	17	5.90
8.	IX	Full text databases	19	6.60
9.	X	Abstracting & Indexing databases	15	5.21
10.	III	Open sources	45	15.63
11.	IV	Web sources	43	7.99

Source: Computed from the Surveyed Data

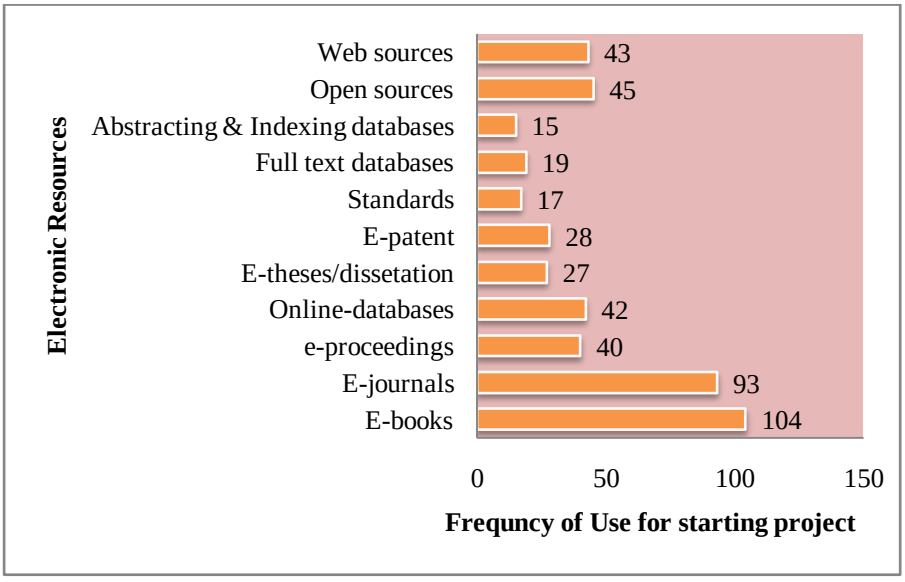


Figure- 6.28 (g): Use of Electronic Resources for Starting Project

The respondents were asked about their purpose of using of electronic resources**.** The answer given by the respondents are resulted in the Table- 6.59. The Table- 6.59 was again sub- divided into seven tables for analyzing purpose wise use of e- resources.

The Table- 6.59 (a), 6.59 (b), 6.59 (c), 6.59 (d), 6.59 (e), 6.59 (f) and 6.59 (g) reflects the use of e- resources for academic purpose, research purpose, to update knowledge, for patent design, writing article/ paper, writing books, and starting projects. The Table- 59 (a) shows that highest number of 185 (64.24%) respondents have uses electronic books for academic purpose followed by e- journals 139 (47.22%) and web sources 92 (31.94%) which were ranked as one, two and three. The Table- 59 (b) shows that out of 288 respondents 220 (76.39%), 204 (70.83%) and 128 (44.44%) are using e- journals, e- books and online- database for research purpose which ranked as one, two and three respectively. The Table- 6.59 (c) reveals that 177 (61.46%) respondent's uses e- book, 176 (61.11%) e- journal and 100 (34.72%) uses e- proceeding to update knowledge which ranked as one, two and three in the table respectively. The Table- 6.59 (d) reveals that 61 (21.18%) respondent's uses e- patent, 46 (15.97%) full- text database and 41 (14.24%) uses e- book for patent design which ranked as one, two and three in the table respectively. The Table- 6.59 (e) reveals that 165 (57.29%) respondent's uses e- journal, 162 (56.25%) e- book and 76 (26.39%) uses e- proceeding to writing article/ paper which ranked as one, two, and three in the table respectively. The Table- 6.59 (f) reveals that 49 (17.01%) respondent's uses e- book, 29 (10.07%) open sources and 27 (9.38%) uses e- journal to writing books which ranked as one, two and three respectively. The Table- 6.59 (g) reveals that 104 (36.11%) respondent's uses e- book, 93 (32.29%) e- journal and 45 (15.63%) uses open sources to starting project which ranked as one, two and three respectively. The other resources also used by the respondents for different purposes. The Figure- 6.28 (a), 6.28 (b), 6.28 (c), 6.28 (d), 6.28 (e), 6.28 (f) and 6.28 (g) are the graphical representation of the Table- 6.59 (a), 6.59 (b), 6.59 (c), 6.59 (d), 6.59 (e), 6.59 (f) and 6.59 (g) respectively

The survey results that maximum number of electronic resources namely e- journals, e- books, e- proceedings, online databases, open sources and web sources for different purposes.

6.1.2.11 Subscribing E- consortium by the KRC

The **Table- 6.60** shows the provision of subscribing E- consortium by the KRC.

Table - 6.60: Subscribing E- consortium by the KRC (N= 288)

Sl. No.	Subscribing E-consortium	Number of Responses	Percentage (%)
1.	Yes	285	98.96
2.	No	3	1.04
	Total	**288**	**100**

Source: Computed from the Surveyed Data

To know the awareness among the respondents about the availability of E-consortium in the KRC the research scholar have asked question to the respondent and answer given by the respondent was reflected in the **Table- 6.60**. It reveals that 285 (98.96%) respondents of the laboratories were agreed with the KRC subscribing e-journal consortium. The rest of the 3 (1.04%) respondents were not aware about the subscription of e- resources by the KRC. The **Figure- 6.29** was the graphical representation of the Table- 6.60.

The survey results show that maximum number of respondents were aware about the subscription of e- resources by the KRC.

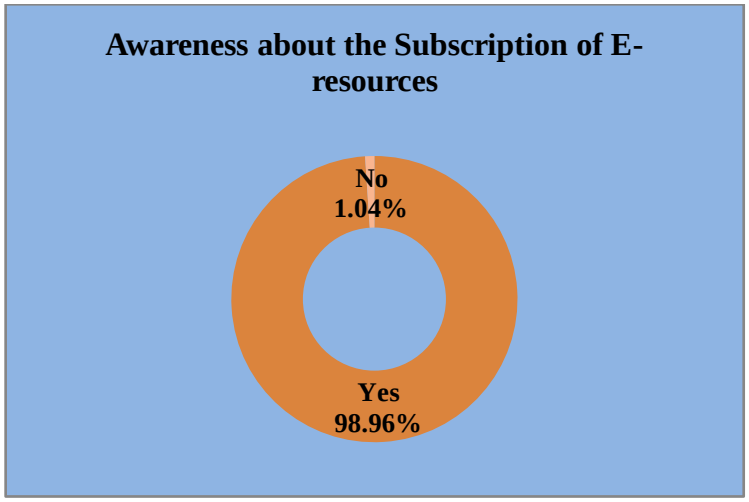


Figure- 6.29: Provision of Subscribing E- consortium by the KRC

6.1.2.12 Use of Consortium by the Respondents

The **Table- 6.61** shows the use of the consortium by the respondents.

Table- 6.61: Use of Consortium by the Respondent (N= 288)

Sl. No.	Using Consortium	Number of Responses	Percentage (%)
1.	Yes	282	97.92
2.	No	6	2.0
	Total	**288**	**100**

Source: Computed from the Surveyed Data

The research scholar has put one question to the respondents regarding the use of consortium. The answer given by the respondents were reflected in the Table- 6.61. The total numbers of 288 (97.92%) respondents were using consortium while 6 (2%) of the respondents were not using any consortium. The result shows that maximum number of respondents were using consortium. The **Figure- 6.30** shows the analysis of the Table- 6.61.

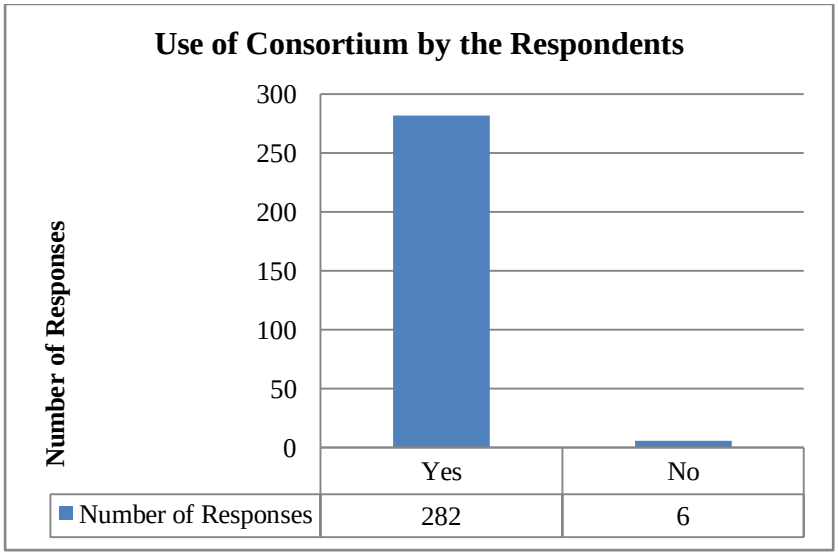


Figure- 6.30: Use of Consortium by the Respondents

6.1.2.12.1 Purpose of using Consortium

The **Table- 6.62** shows the purpose of using consortium by the users.

Table- 6.62: Purpose of using Consortium (N= 288)

Sl. No.	Rank	Using Consortium	Number of Responses	Percentage (%)
1.	I	To update knowledge	208	72.22
2.	II	Writing article /paper	174	60.42
3.	V	Writing a book	76	26.39
4.	III	Research purpose	168	58.33
5.	IV	Starting a project	103	35.76
6.	VI	Patent Design	56	19.44
7.	VII	Others	0	00.00

Source: Computed from the Surveyed Data

The **Table- 6.62** reveals that to update knowledge highest numbers of 208 (72.22%) respondents were using the consortium, writing article/ paper 174 (60.42%) respondents using the consortium and for research purpose 168 (58.33%) respondents using consortium which are ranked as one, two and three. For starting a project, writing a book and patent design 103 (35.76%), 76 (26.39%) and 56 (19.44%) respondents was using consortium which are ranked as four, five and six in the table. The **Figure- 6.31** is the graphical representation of the Table- 6.62.

Hence, maximum number of respondents were using consortium to update knowledge.

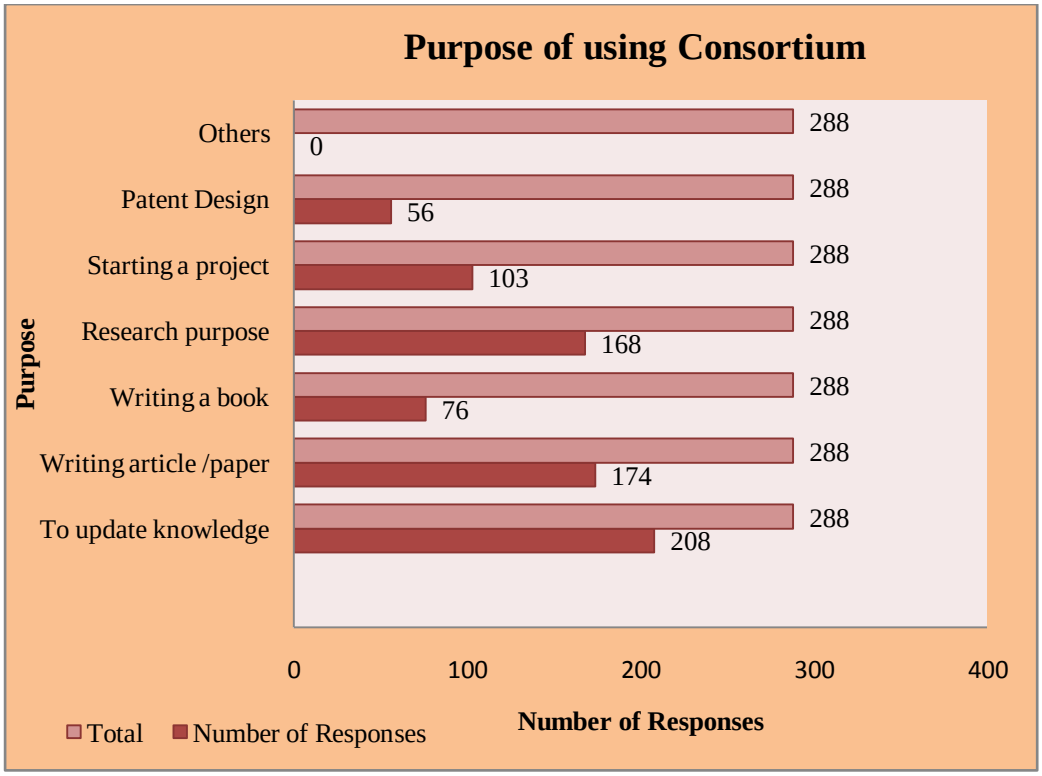


Figure- 6.31: Purpose of using Consortium

6.1.2.12.2 Publisher Wise Rank of the E- Resource Accessed by the Respondents

The **Table- 6.63** shows the rank given by the respondents to the E- Resouces accessed from the different publishers.

Table- 6.63: Publisher Wise Rank of the E- Resources Accessed by the Respondents

Rank	Elsevier-Science Direct	American Chemical Society	American Institute of Physics	APS	Derwent Innovation Index	Emerald	IEEE	IOP	Nature	OSA	RSC
1	142	20	0	0	0	1	10	0	29	0	7
2	39	27	8	0	0	2	13	5	24	4	14
3	25	19	8	1	0	5	17	10	19	1	19
4	23	15	7	3	0	4	16	9	19	1	14
5	15	6	10	1	0	4	6	8	20	2	23
6	6	6	1	5	1	1	16	9	17	0	13
7	3	5	3	5	2	6	7	10	6	1	10
8	5	4	4	4	0	7	7	8	9	7	8
9	2	3	4	3	1	5	7	6	2	3	13
10	3	2	3	4	0	9	4	5	5	1	10
11	0	2	0	1	0	1	5	0	1	1	0
12	0	0	0	2	1	1	0	1	0	1	0
13	0	0	0	1	2	2	0	1	1	1	0
14	0	0	0	0	1	0	0	4	0	0	3
15	0	1	0	1	0	3	0	0	0	2	0
16	0	0	0	3	0	0	1	2	0	0	0
17	0	2	0	0	0	1	1	0	0	2	0
18	0	0	0	0	1	1	0	0	0	0	0
19	0	0	0	0	5	1	0	0	0	2	0
20	0	1	0	2	0	0	3	0	1	4	0
21	0	0	0	2	3	1	0	2	0	1	0
22	0	0	1	0	1	2	3	0	0	0	0
23	0	0	2	0	1	2	0	0	0	0	2
24	0	0	0	0	0	0	0	1	0	0	0
	263	**113**	**51**	**38**	**19**	**59**	**116**	**81**	**153**	**34**	**136**

Rank	Cambridge University Press	ASCE	ASME	Questal	Spriger	Taylor & Francis	Web of Science	Wiley	Annual Reviews	ACM Digital library	SCOPUS database	Sage Journals online	Others
1	0	0	1	0	10	5	44	3	2	0	5	2	0
2	2	1	5	0	47	25	24	22	0	1	14	1	0
3	6	1	6	0	54	26	14	24	4	0	6	0	0
4	4	1	7	0	32	35	17	32	12	1	7	1	0
5	6	2	3	0	27	24	17	30	12	2	16	8	0
6	5	0	5	0	27	14	11	24	13	3	14	4	0
7	11	1	3	0	6	31	5	14	14	2	14	4	0
8	4	2	0	0	6	11	6	18	6	2	14	4	2
9	5	0	4	0	6	6	5	7	12	1	19	8	1
10	4	2	2	0	4	3	1	7	10	1	20	9	0
11	1	3	0	0	0	1	4	4	3	2	3	0	0
12	3	2	3	0	0	3	1	1	1	1	1	4	1
13	0	1	2	3	0	3	0	0	1	1	2	2	0
14	2	1	0	0	0	0	2	0	0	2	4	0	1
15	3	1	0	0	1	2	0	1	2	2	0	3	0
16	0	3	1	2	0	2	2	1	0	0	1	1	0
17	1	0	4	3	1	0	0	0	2	0	0	0	0
18	4	0	3	3	0	0	0	0	1	2	0	4	0
19	1	4	0	1	0	1	1	0	0	1	0	0	1
20	0	1	3	1	0	0	1	0	2	1	0	0	0
21	0	2	1	0	0	0	0	0	0	3	3	0	1
22	0	0	0	4	0	0	0	0	0	2	2	2	0
23	0	0	0	0	0	0	0	0	0	1	1	6	1
24	0	0	0	0	0	0	0	0	0	0	0	0	3
	62	**28**	**53**	**17**	**221**	**192**	**155**	**188**	**97**	**31**	**146**	**63**	**11**

The **Table- 6.63** reflected the ranks given by the respondents to the E- resources which have been published by different publishers. In Table- 6.63, Elsevier Science received the highest numbers of 142 votes for rank one by the scientist's of CSIR laboratories of Northeast and Eastern India.

6.1.2.13 Received Assistance from Library Personnel during Accessing E-resources

The **Table- 6.64** indicate about the assistance provided by the library personnel to the users during accessing E- resources.

Table- 6.64: Get Assistance from the Library Personnel during Accessing E-Resources

Sl. No.	Get Assistance from the Library Personnel	Number of Responses	Percentage (%)
1.	Yes	**237**	**82.29**
2.	No	**51**	**17.71**
	Total	**288**	**100**

Source: Computed from the Surveyed Data

The **Table- 6.64** elucidates that 237 (82.29%) respondents were agreed with getting assistance from the library personnel and 51 (17.71%) have not get any assistance from the library personnel. **Figure- 6.32** is the graphical representation of the same above.

The result shows that maximum number of respondents was get assistance from the library personnel.

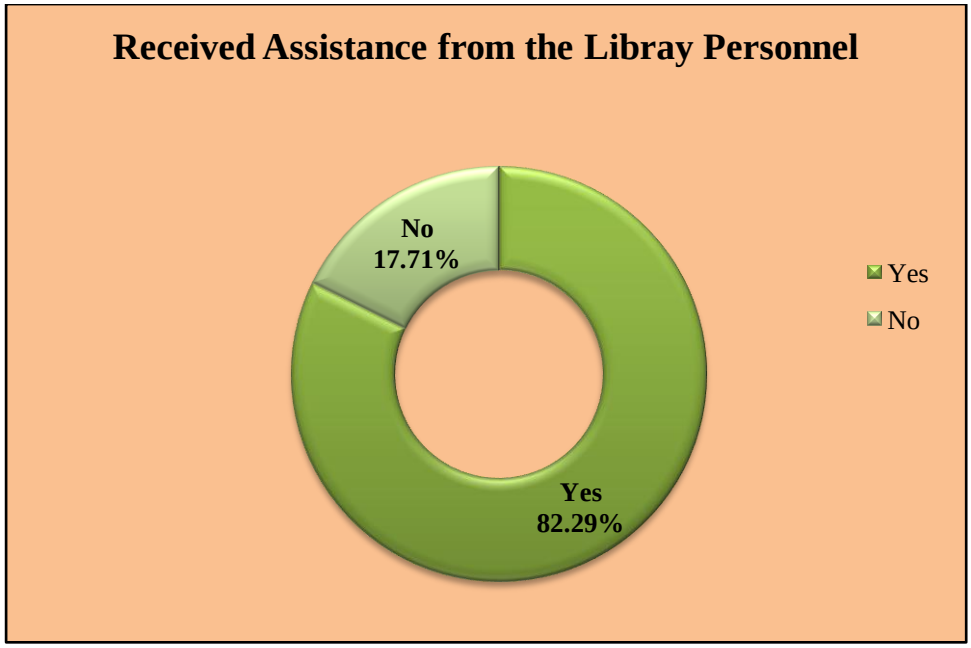


Figure- 6.32: Assistance from the Library Personnel during Accessing E-resources

6.1.2.14 Required Document/ Information Provided by the KRC

The **Table- 6.65** shows the KRC's providing required Document/ Information to the users or not.

Table- 6.65: Providing Required Document/ Information by the KRC

Sl. No.	Providing Document/ Information	Number of Responses	Percentage (%)
1.	Yes	**262**	**90.97**
2.	No	**26**	**9.03**
	Total	**288**	**100**

Source: Computed from the Surveyed Data

The **Table- 6.65** reveals that 262 (90.97%) of the respondents were agree that the KRC provided the required document/ information to them and rest of the 26 (9.03%) respondents were disagree. The **Figure- 6.33** is the graphical representation of the Table-6.65.

Therefore it has been proved that the KRC's have providing the required documents/ information to the users.

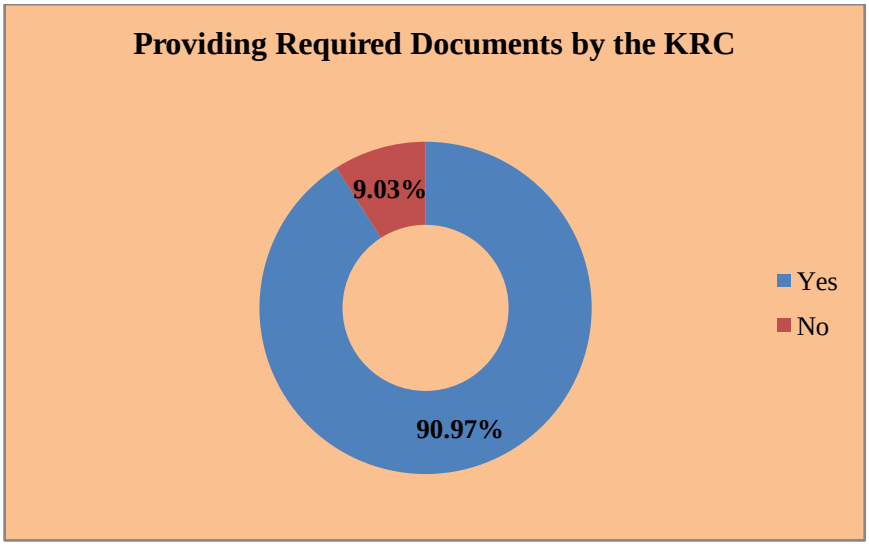


Figure- 6.33: Providing Required Document/ Information by the KRC

6.1.2.15 Satisfaction with Regard to the Library Services

The **Table- 6.66** indicates the number of respondents who are satisfied with the library services provided by the KRC's.

Table- 6.66: Satisfaction With Regard to the Library Services

Sl. No.	Satisfaction from Library services	Number of Responses	Percentage (%)
1.	Yes	**259**	**89.93**
2.	No	**29**	**10.07**
	Total	**288**	**100**

Source: Computed from the Surveyed Data

Satisfaction is one of the important criteria among the use of the library, which basically depend upon the materials that the library uses to possess and services rendered by the library. The analysis of the fact has been shown in the Table- 6.66, which clearly shows that 259 (89.93%) respondents were satisfied with their library activities and 29 (10.07%) were not satisfied. The graphical representation of the Table- 6.66 is shown in the **Figure- 6.34**.

Thus, it is clear that maximum number of respondents were satisfied with the library services.

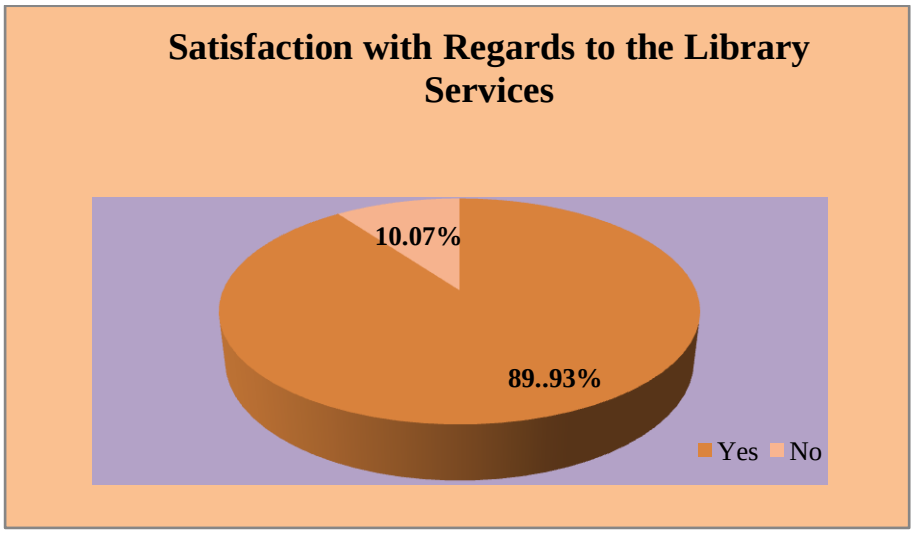


Figure- 6.34: Satisfaction With Regard to the Library Services

6.1.2.16 Rate of Effectiveness Regarding Availability of E- Resources

The rate of effectiveness regarding availability of E -resources is shown in the **Table- 6.67**.

Table- 6.67: Rate of Effectiveness of E- Resources (N= 288)

Sl. No.	Rate of Effectiveness	Frequency	Percentage (%)	Rank
1.	Highly Effective	188	65.28	I
2.	Moderately Effective	98	34.03	II
3.	Not Effective	2	00.69	III
	Total	**288**	**100.00**	

Source: Computed from the Surveyed Data

The survey result indicates that out of 288 respondents 188 (65.28%) respondents were answered that the E- resources available in the KRC are highly effective, 98 (34.03%) answered moderately effective and 2 (0.69%) answered that the e- resources are not effective. The **Figure- 6.35** is the graphical representation of the Table- 6.67.

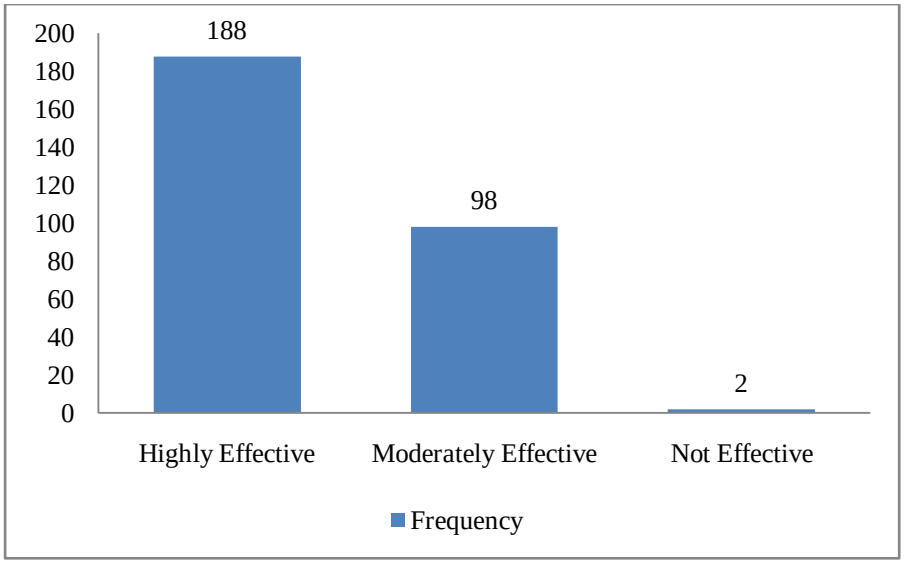


Figure- 6.35: Rate of Effectiveness of E- Resources

Thus, from the analysis it is clear that majority of the respondents agreed that the e- resources available in the KRC are highly effective.

6.1.2.16.1 Rate of Satisfaction

The rate of satisfaction is shown in the **Table- 6.68**.

Table- 6.68: Rate of Satisfaction

Sl. No.	Satisfaction Rate	Frequency	Percentage (%)
1.	Excellent	156	54.17
2.	Good	132	45.83
	Total	**288**	**100.00**

Source: Computed from the Surveyed Data

The research scholar has been asked question to the respondents regarding how they rate the satisfaction. The answer given by the respondent is reflected in the Table- 6.68. Out of 288 respondents 156 (54.17%) respondents were rate the satisfaction level as excellent and the rest of the 132 (45.83%) respondents were rate it as good. The **Figure- 6.36** is the graphical representation of the Table- 6.68.

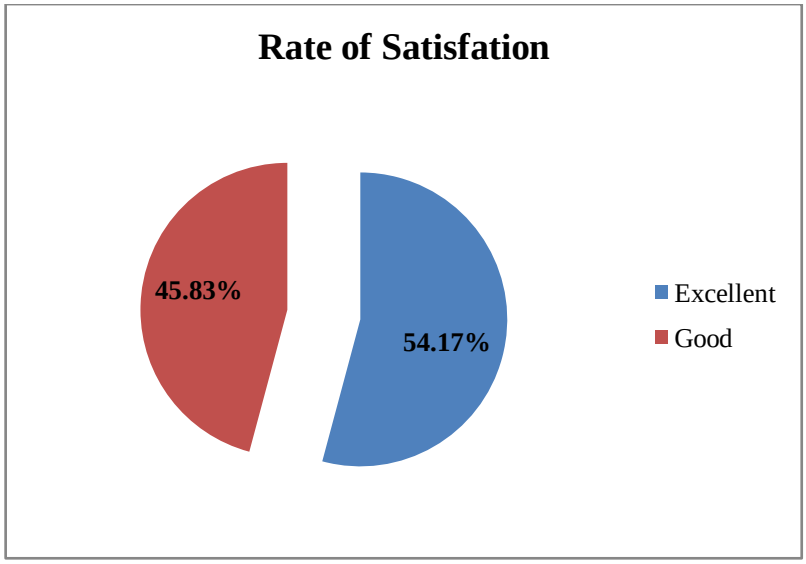


Figure- 6.36: Rate of Satisfaction

6.1.2.17 Difficulties Faced by the Respondents

The difficulties faced by the respondents while using resources of the KRC are mention in the **Table- 6.68**.

Table- 6.69: Difficulties Faced by the Respondents while using the resources of the KRC (N= 288)

Difficulties faced by the Respondents	Total	Percentage (%)
Lack of time	104	36.11
Lack of knowledge about the organizing tools such as library classification, cataloguing, indexes and abstracts available in the library	29	10.07
Lack of awareness about the services rendered by the library	33	11.46
Lack of user friendly staff in the library	54	18.75
Lack of sufficient e-resources	70	24.31
E-Resources access is difficult	36	12.5
Other	0	0.00

Source: Computed from the Surveyed Data

Difficulties faced by the respondents while use the resources of the library are resulted in the **Table- 6.69** which indicates that out of 288 respondents 104 (36.11%)

respondents have lack of time to use the KRC resources, 43 (14.93%) have replied that lack of relevant information in the KRC and 29 (10.07 %) respondents have lack of knowledge about the organizing tools such as library classification, cataloguing, indexes and abstract available in the KRC. The 33 (11.46%) respondents have lack of awareness about the services rendered by the KRC, 54 (18.75%) respondents have replied that the KRC have lack of sufficient e- resources and 36 (12.5%) replied that e-resource- resource access is difficult in KRC. The **Figure- 6.37** is the graphical representation of the same above.

The result of the survey reveals that maximum numbers of users have lack of time to use the library resources.

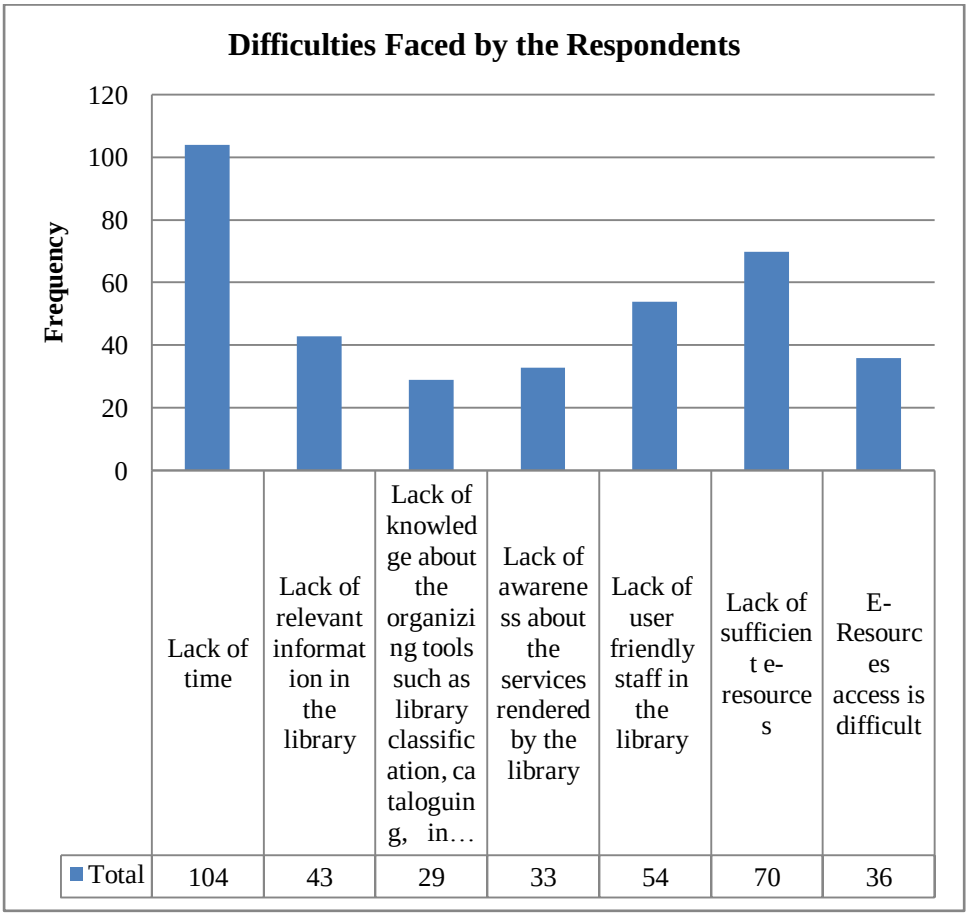


Figure- 6.37: Difficulties Faced by the Respondents while using the resources of the KRC

6.1.2.18 Suggestions for the Improvement of the Library Facilities

The suggestions given by the respondents regarding the improvement of the library facilities are discussed in the **Table- 6.70.**

Table- 6.70: Suggestions for the Improvement of the Library Facilities (N= 288)

Improvement of Library Services	Frequency of Responses	Percentage (%)	Rank
Increase the total number of text books	162	56.25	IV
Increase the total number of reference books	138	47.91	VI
Increase the current journals	198	68.75	II
Increase the Electronic sources such as Database	177	61.46	III
Subscription of more e-journals and e-books	205	71.18	I
Building digital library & institutional repository	145	50.35	V
Provision of Subject Gateways	78	27.08	IX
Speed in the delivery of e-resources	122	42.36	VII
Complete automation of the library	116	40.28	VIII

Source: Computed from the Surveyed Data

The **Table- 6.70** shows that the respondents of all the laboratories have suggesting for the improvement of the library facilities. Out of 288 respondents 205 (71.18%) have suggesting for subscription of more e- journals and e- books which ranked as one, 198 (68.75%) suggesting for increased the current journals, 177 (61.46%) responses for increase the electronic sources such as Database, 162 (56.25%) for increase the total number of books, 145 (50.35%) for building digital library and institutional repository, 138 (47.91%) for increased the total number of reference books, 122 (42.36%) respondents have agree with increasing speed in the delivery of e-resources, 116 (40.28%) suggesting for complete automation of the Library (KRC), and 78 (27.08%) respondents have suggested for make provision of subject gateways which are holds the rank two, three, four, five, six, seven, eight, nine respectively.

Therefore, majority of the respondents have been suggested for more e- journals and e- books for the KRC.

Chapter- 6: Part- C

Bibliometric Analysis of the Research Output of the Scientists

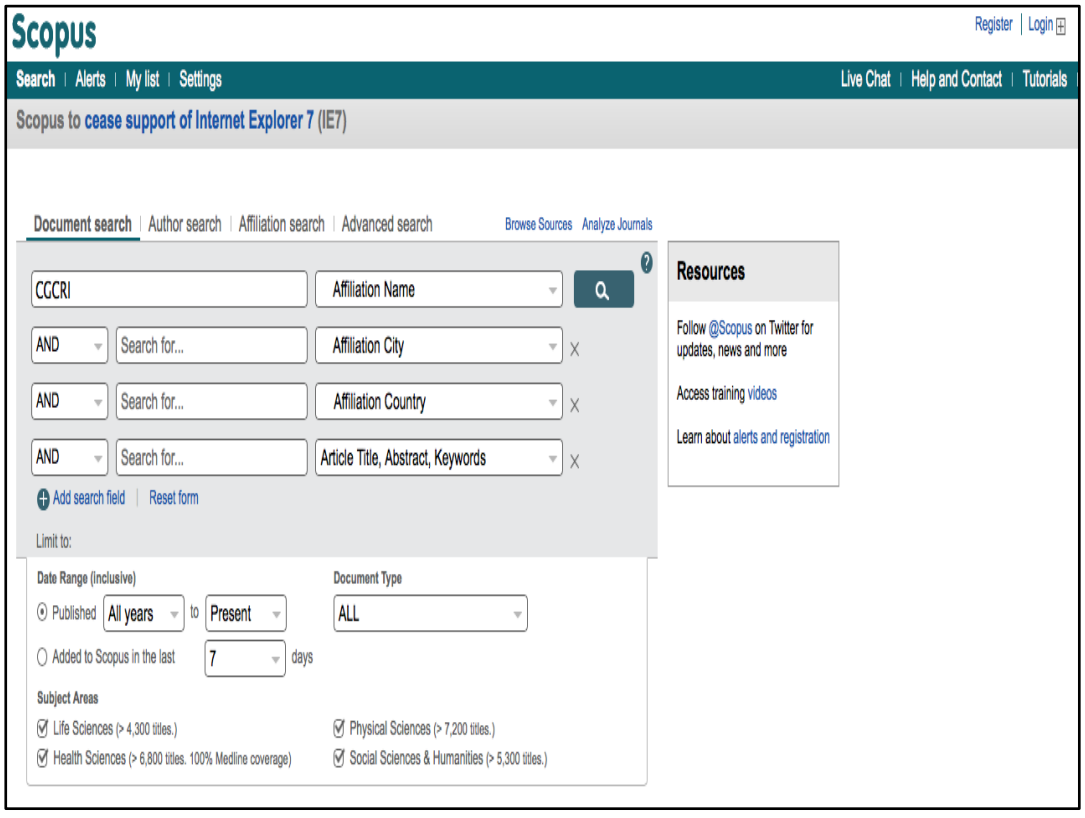
6.1.3 Introduction

Scientific organization's success/achievement is measured number of patents it filled/ commercialized, number of paper published, Impact factor (IF) earned and h-index. Progressing trend of achievement of a scientific is directly related to availability of latest information to its S&T workers. To create information and to promote use of information, it is necessary to know the needs of the users. Research and development institution are the place where knowledge is being generated as a result of research activities of scientists. Pritchard (1969) used the term "bibliometrics" to describe all "studies to quantify the process of written communication." Fairthorne (1969) defined it as "the quantitative treatment of the properties of recorded discourse and behaviour pertaining to it". Bibliometric is the quantitative evaluation of the institutions/organizations publication, journal articles, book publications, etc. In this part the scholar made an attempt to study the scientific productivity of the author with the help of bibliometric techniques.

6.1.3.1 SCOPUS Database and Publications of the CSIR laboratories of NE and Eastern India

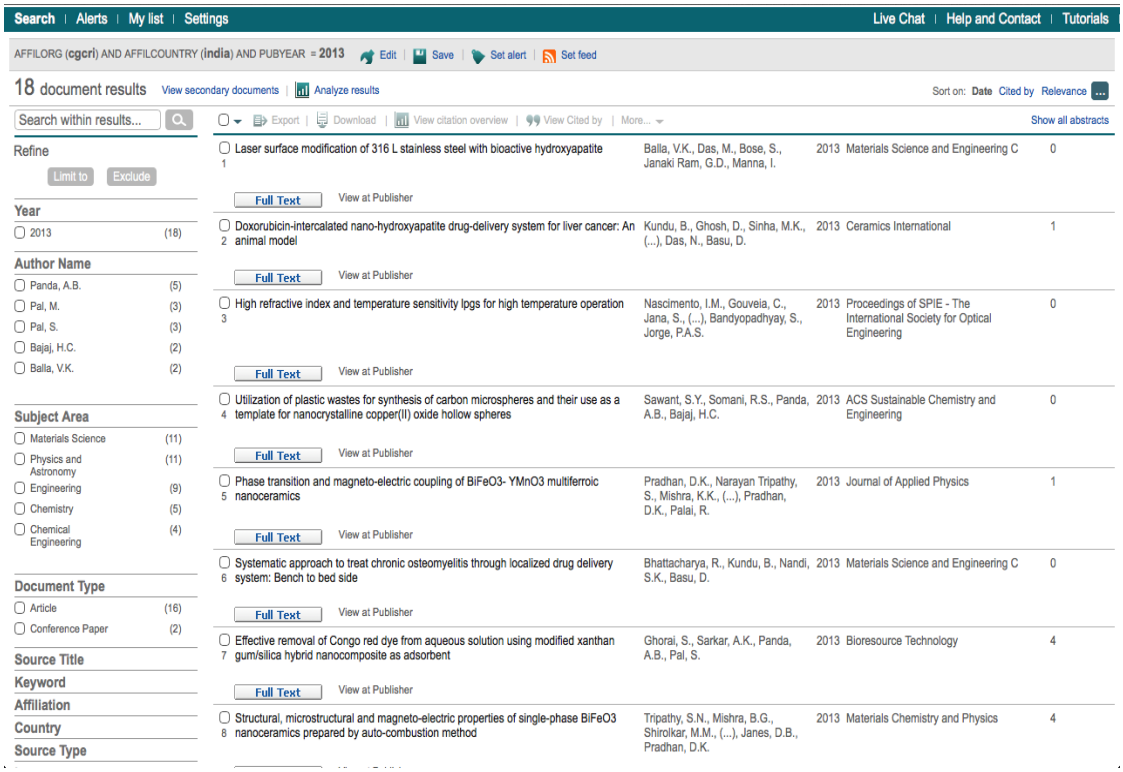
SCOPUS is the largest abstract and citation database of peer-reviewed literature and quality web sources with smart tools to track analyze and visualize research. Scopus has been chosen to provide the data source for the metric evaluation for the official rankings to ensure that greater clarity and transparency can be guaranteed. Scopus is designed and developed with over 500 users and librarians internationally. Its unique database contains abstracts and references from 15,000 peer-reviewed journals from more than

4,000 publisher's worldwide, ensuring broad interdisciplinary coverage. Scopus not only offers users citations information about the articles covered, but also integrates web and patent searches directly from its clean and simple interface. During the study the researcher has found that the North east institute of science and technology was subscribed SCOPUS database up to 23rd May 2016. From SCOPUS database one can find out the research publications along with citations for individual laboratories. During the visit to the laboratories and also INFLIBNET Center, Gandhinagar, the research scholar have exported the publication of the Scientists of seven laboratories namely NEIST, IIMT, IICB, CGCRI, CMERI, CIMFR and NML since 2007 to May, 2016 from SCOPUS database The following web pages show how to search documents in Scopus database. After document search (Photo- 6.1) one can find out the publications of the individual laboratories and can export the required data and save it in excel file, doc file, txt file etc. (Photo- 6.2).



Source: www.scopus.com (Accessed on 23-05-2016)

Photo- 6.1: Home Page of the Scopus Database.



Source: www.scopus.com (Accessed on 23-.05-2016)

Photo- 6.2: Searching and Export of Research publications for the individual laboratories

6.1.3.2 Analysis of the Publication Trends by the Scientists of North East Institute of Science and Technology (NEIST), Jorhat

The following are the analysis and findings of the research output of the NEIST scientists.

6.1.3.2.1. Year Wise Distribution of Publication of NEIST

The **Table- 6.71** shows the year wise distribution of publications by the NEIST scientists from 2007 to 2016.

Table- 6.71: Year wise Distribution of Publication of NEIST

Sl. No.	Year	No. of Publication (N=642)	Percentage %
1.	2007	13	2.02
2.	2008	45	7.00
3.	2009	63	9.81
4.	2010	53	8.25
5.	2011	74	11.52
6.	2012	69	10.74
7.	2013	80	12.46
8.	2014	98	15.26
9.	2015	114	17.76
10.	2016	33	5.14
	Total	**642**	**100 %**

Source: Exported from the SCOPUS Database (23-05- 2016)

The **Table- 6.71** shows the year wise distribution of the publication. In NEIST, Jorhat total of 642 papers has been published during 2007-2016 (Up to 26-05-2016). The highest 114 (17.75%) papers has been published in the year 2015 followed by 98 (15.26%) and 80 (12.46%) in the years 2014 and 2013.

From the analysis it was clear that the NEIST's publications increasing gradually. In the year 2010 and 2012, the trend of publications decreases as compared to the earlier years.

6.1.3.2.2 Subject Area Wise Distribution of NEIST

The **Table- 6.72** elucidates the subject area wise distribution of publications by the NEIST's Scientists.

Table- 6.72: Subject Area Wise Distribution of NEIST

Subject Areas	No. of Publications (N=642)	Percentage %	Rank
Chemistry	326	50.77	I
Chemical Engineering	183	28.5	II
Biochemistry, Genetics and Molecular Biology	167	26.01	III
Pharmacology, Toxicology and Pharmaceutics	92	14.33	IV
Materials Science	91	14.17	V
Agricultural and Biological Sciences	66	10.28	VI
Earth and Planetary Sciences	62	9.65	VII
Medicine	58	9.03	VIII
Environmental Science	54	8.41	IX
Engineering	46	7.16	X
Physics and Astronomy	42	6.54	XI
Energy	39	6.07	XII
Immunology and Microbiology	33	5.14	XIII
Multidisciplinary	17	2.64	XIV
Computer Science	12	1.86	XV
Health Professions	5	0.77	XVI
Nursing	3	0.46	XVII
3 subjects 2 publications each	2	0.31	XVIII
2 subjects 1 publications each	1	0.16	XIX

Source: Exported from the SCOPUS Database (23-05-2016)

The **Table- 6.72** analyzes the subject wise distribution of research publication by NEIST scientists. The highest 50.77% papers have been published in the field of Chemistry 28.5 percent in Chemical engineering and 26.01 percent in Biochemistry,

Genetics and Molecular Biology. The lowest 0.16% papers has been published in two subjects.

From the above analysis it is found that majority of the article/ papers published in the field of chemical sciences.

6.1.3.2.3 Source Wise Distribution of Publications of NEIST

The **Table- 6.73** shows the distribution of the publications according to their publication sources.

Table- 6.73: Source Wise Distribution of Publication of NEIST (N= 642 for each sources)

Source Title	No. of Publications (N=642)	Percentage %	Rank
Tetrahedron Letters	35	5.45	I
RSC Advances	29	4.51	II
Synlett	21	3.27	III
Steroids	16	2.49	IV
Current Science	14	2.18	V
Molecular Diversity	11	1.71	VI
Journal of Molecular Catalysis A Chemical	11	1.71	VI
Catalysis Communications	8	1.24	VII
Tetrahedron	8	1.24	VII
Applied Catalysis A General	7	1.09	VIII
9 sources 6 publications each	6	0.93	IX
12 sources 5 publications each	5	0.78	X
10 sources 4 publications each	4	0.62	XI
20 sources 3 publications each	3	0.46	XII
33 sources 2 publications each	2	0.31	XIII
55 sources 1 publication each	1	0.16	XIX

Source: Exported from the SCOPUS Database

The **Table- 6.73** shows the source title wise distribution of publications by the NEIST scientists. The study reveals that highest number of 35 that is 5.45% papers has been published in Tetrahedron Letters by the NEIST scientists. In RSC Advanced and

Synlett, the total numbers of 29 (4.51%) and 21(3.27%) papers have been contributed by NEIST scientists which are ranked as one and two respectively. The rest of productive sources namely Steroids, Current Science, Molecular Diversity, Journal of Molecular Catalysis A Chemical, Catalysis Communications, Tetrahedron and Applied Catalysis A General publishes total numbers of 21 (3.27%), 16 (2.49%), 14 (2.18%), 11(1.71%), 11 (1.71%), 8 (1.24%), 8 (1.24%) and 7 (1.09%) respectively. The nine numbers of sources have 6 publications each, 12 sources have 5 publications each, 10 sources have 4 publications, 20 sources have 3 publications, 33 sources 2 publications each and 55 sources have 1 publication each.

6.1.3.2.4 Document Type Wise Distribution of NEIST

The **Table- 6.74** indicates the document type wise distribution of publications of the NEIST scientists.

Table-6.74: Document Type Wise Distribution Publications of NEIST

Sl. No.	Document Type	No. of Publications (N=642)	Percentage %
1.	Article	581	90.49
2.	Book Chapter	19	2.96
3.	Conference Paper	15	2.33
4.	Article in Press	11	1.71
5.	Review	9	1.40
6.	Erratum	3	0.46
7.	Letter	2	0.31
8.	Editorial	1	0.16
9.	Short Survey	1	0.16
	Total	**642**	**100%**

Source: Exported from the SCOPUS Database

The **Table- 6.74** indicates that Article is the most productive Document type of publication contributing 581 (90.49%) publications to the total number of publications followed by Book chapter, Conference Paper, Article in Press, Review and Letter with 19 (2.96%), 15 (2.33%), 11 (1.71%), 9 (1.40%), 3 (0.46%) and 2 (0.31%) numbers of

publications respectively. Both Editorial and Short surveys have published the lowest numbers of 1 (0.16%) papers among all the document types.

6.1.3.2.4 Country Wise Distribution of Publications of NEIST

The **Table- 6.75** shows the country wise distribution of the publications of the NEIST Scientists

Table- 6.75: Country Wise Distribution of Publications of NEIST (N= 642 for each country)

Country	No. of Publications (N=642)	Percentage (%)	Rank
India	631	98.28	I
France	16	2.49	II
United States	13	2.02	III
China	9	1.40	IV
Russian Federation	8	1.24	V
United Kingdom	8	1.24	V
Australia	6	0.93	VI
Brazil	6	0.93	VI
3 countries 4 publications each	4	0.62	VII
3 countries 3 publications each	3	0.46	VIII
5 countries 2 publications each	2	0.31	IX
6 countries 1 publication each	1	0.16	X

Source: Exported from the SCOPUS Database

The **Table- 6.75** gives the country wise distribution of publications. The 631 (98.28%) numbers of paper has been published in India followed by France 16 (2.49%), United States 13 (2.02%), China 9 (1.40%), Russian Federation and United Kingdom both have 8 (1.24%) publications each and both Australia and Brazil have 6 (0.93%) numbers of publications contributed by the NEIST scientists. The list also reflects that 3 countries have 4 publications each, 3 countries have 3 publications each, 5 countries have 2 publications and 6 countries have only one publication each. The study reveals that India, France and United States were in rank one, two and three as per distribution of publications country wise.

6.1.3.2.5 Most Productive Authors of NEIST

The **Table- 6.76** mainly shows the highly productive authors from the CSIR-NEIST.

Table- 6.76 Most Productive Authors of NEIST (N= 642 for each authors)

Author Name	No. of Publications (N=642)	Percentage %	Rank
Dutta, D.K.	50	7.78	I
Das, M.R.	49	7.63	II
Prajapati, D.	39	6.07	III
Baruah, B.P.	37	5.76	IV
Boruah, R.C.	36	5.60	V
Rao, P.G.	34	5.29	VI
Bhuyan, P.J.	33	5.14	VII
Saikia, B.K.	32	4.98	VIII
Barua, N.C.	32	4.98	VIII
Saikia, R.	23	3.58	IX
Baruah, S.	23	3.58	IX
Borah, B.J.	22	3.42	X

Source: Exported from the SCOPUS Database

From the **Table- 6.76**, it has been identified that D.K. Dutta is the most productive author contributing 50 numbers (7.78%) of research publications during 2007-2016 which holds the rank one among all the authors. The other most productive authors are M.R. Das with 49 (7.63%), D. Prajapati 39 (6.07%), Baruah, B.P. with 37 (5.76%), Baruah, R.C. with 36 (5.60%), Rao, P.G. with 34 (5.29%), Bhuyan and P.J. with 33 (5.14%) numbers of publications ranked as two, three, four, five, six and seven number. The authors Saikia, B.K. and Barua, N.C.with total numbers of 32 (4.98%) publications jointly holding the rank eight and Saikia, R. and Baruah, S. with 23 (3.58%) papers jointly holds the rank nine. The author Borah, B.J.has published total numbers of 22 (3.42%) publications which ranked in the tenth position.

6.1.3.2.6 Distribution of Publications of NEIST by Affiliation

The **Table- 6.77** shows the distribution of publications of NEIST by affiliated institutions.

Table- 6.77: Distribution of Publications of NEIST by Affiliation

Affiliation	No. of Publication (N=642)	Percentage %	Rank
NEIST, Jorhat	298	46.41	I
CSIR	60	9.34	II
Medicinal Chemistry Division	24	3.73	III
Dibrugarh University	24	3.73	III
Gauhati University	23	3.58	IV
Tezpur University	16	2.49	V
Analytical Chemistry Division	15	2.33	VI
Synthetic Organic Chemistry Division	14	2.18	VII
CSIR-NEIST	13	2.02	VIII
National Institute for Interdisciplinary Science & Technology	12	1.86	IX
2 institutions 11 publications each	11	1.71	X
3 institutions 10 publications each	10	1.55	XI
2 institutions 9 publications each	9	1.40	XII
2 institutions 8 publications each	8	1.24	XIII
6 institutions 7 publications each	7	1.09	XIV
9 institutions 6 publications each	6	0.93	XV
6 institutions 5 publications each	5	0.77	XVI
7 institutions 4 publications each	4	0.62	XVII
11 institutions 3 publications each	3	0.46	XVIII
42 institutions 2 publications each	2	0.31	XIX
57 institutions 1 publication each	1	0.15	XX

Source: Exported from the SCOPUS Database (23-05-2016)

The **Table- 6.77** shows the distribution of publications by the authors of NEIST, Jorhat collaborating with affiliated institutions. From the table it is found that NEIST itself published 298 papers (46.41%) of total publications which ranked as one followed by Council of Scientific and Industrial Research with 60 (9.34%) and Medical Chemistry division and Dibrugarh University both with 24 (3.73%) publications collaborating with NEIST ranked as two and three respectively. The other institutions namely Gauhati University, Tezpur University, Analytical Chemistry Division, Synthetic Organic Chemistry Division, CSIR-North East Institute of Science and Technology and National Institute for Interdisciplinary Science and Technology have published 23(3.58%), 16 (2.49%), 15(2.33%), 14 (2.18%), 13 (2.02%) and12 (1.86%) papers collaborating with NEIST respectively. The lowest number of publications are found in case of 57 institutions publishes only 1 (0.15%) paper each which are ranked as twenty in the **Table- 6.77**.

6.1.3.2.7 Highly Cited Authors of NEIST, Jorhat

The top ten highly cited authors are listed with number of citations and rank in the **Table- 6.78**.

Table- 6.78: Top Ten Highly Cited Authors of NEIST

Author	Cited By	Rank
Pal D., Dasgupta S., Kundu R., Maitra S., Das G., Mukhopadhyay S., Ray S., Majumdar S.S., Bhattacharya S.	192	I
Das Sharma S., Hazarika P., Konwar D.	162	II
Das M.R., Sarma R.K., Saikia R., Kale V.S., Shelke M.V., Sengupta P.	154	III
Chaturvedi D., Goswami A., Pratim Saikia P., Barua N.C., Rao P.G.	101	IV
Chutia M., Deka Bhuyan P., Pathak M.G., Sarma T.C., Boruah P.	71	V
Sharma P., Das M.R.	69	VI
Kaminska I., Das M.R., Coffinier Y., Niedziolka-Jonsson J., Sobczak J., Woisel P., Lyskawa J., Opallo M., Boukherroub R., Szunerits S.	68	VII
Thakur D., Yadav A., Gogoi B.K., Bora T.C.	62	VIII
Baruah B., Bhuyan P.J.	56	IX
Hazarika L.K., Bhuyan M., Hazarika B.N.	56	X
Khan R., Dhayal M.	55	XI

The **Table- 6.78** indicates the top ten highly cited authors from the NEIST. The highly cited authors are Pal D., Dasgupta S., Kundu R., Maitra S., Das G., Mukhopadhyay S., Ray S., Majumdar S.S., Bhattacharya S. with citation 192 followed by Das Sharma S., Hazarika P., Konwar Dreceived 162 citations and Das M.R., Sarma R.K., Saikia R., Kale V.S., Shelke M.V., Sengupta P. with 154 citations have received one, two and three in the study. The other highly cited authors are Das M.R., Sarma R.K., Saikia R., Kale V.S., Shelke M.V., Sengupta P. with 154 citations; Chaturvedi D., Goswami A., Pratim Saikia P., Barua N.C., Rao P.G. with 101 citations; Chutia M., Deka Bhuyan P., Pathak M.G., Sarma T.C., Boruah P. with 71citations; Sharma P., Das M.R. with 69 citations; Kaminska I., Das M.R., Coffinier Y., Niedziolka-Jonsson J., Sobczak J., Woisel P., Lyskawa J., Opallo M., Boukherroub R., Szunerits S. with 68 citation; Thakur D., Yadav A., Gogoi B.K., Bora T.C. with 62; Baruah B., Bhuyan P.J. with 56 citations; Hazarika L.K., Bhuyan M., Hazarika B.N. with 56 citations and Khan R., Dhayal M. with 55 citations.

6.1.3.2.8 Degree of Collaboration of NEIST, Jorhat

The **Table- 6.79** shows the Degree of Collaboration of the Authors of NEIST, Jorhat from the year 2007 to 2016. The Degree of Collaboration has been calculated on the basis of K. Subramanyam's formula for Degree of Collaboration which is mention below:

$$DC = \frac{M\_n}{S\_n + M\_n} \text{ where}$$

DC= Degree of Collaboration

S_n= Single Author;

M_n= Multiple Authors

$$DC = \frac{624}{18 + + 624} = \frac{624}{642} = 0.98$$

Table- 6.79: Degree of Collaboration of NEIST Authors

Year	Authorship Pattern		(S_n + M_n)	Degree of Collaboration (DC)
	Single (S_n)	Multiple (M_n)		
2007	0	13	13	1.00
2008	4	41	45	0.91
2009	1	62	63	0.98
2010	2	51	53	0.96
2011	7	67	74	0.91
2012	2	67	69	0.97
2013	1	79	80	0.99
2014	1	97	98	0.99
2015	0	114	114	1.00
2016	0	33	33	1.00
Total	**18**	**624**	**642**	**0.97**

Source: Exported from the SCOPUS Database

The **Table- 6.79** indicates that average number of is 0.97 and the range for degree of collaboration started from 0.97 to 1.00. Maximum number of Degree of Collaboration occurred in 2007, 2015 and 2016 with 1.00 and lowest in 2008 and 2011 with 0.91.

6.1.3.3 Analysis of the Publication Trends by the Scientists of Central Glass and Ceramic Research Institute (CGCRI), Kolkata

6.1.3.3.1 Yearly Distribution of Publications of CGCRI, Kolkata

The **Table- 6.80** shows the yearly publications of the Scientists of CGCRI on the basis of the data collected from the SCOPUS Database.

Table- 6.80: Yearly Distribution of Publications of CGCRI

Year	No. of Publications	Percentage %
2007	85	5.72
2008	100	6.73
2009	145	9.77
2010	151	10.17
2011	158	10.64
2012	164	11.05
2013	181	12.19
2014	222	14.95
2015	175	11.79
2016	103	6.94
Total	**1484**	100%

Source: Exported from the SCOPUS Database

The **Table- 6.80** shows that total number of 1484 papers has been published from CGCRI since 2007 to 2016. The highest number of 222 (14.95%) papers was published in the year 2014 followed by 181 (12.19%) in the year 2013 and 175 (11.79%) paper published in the year 2015.

6.1.3.3.2 Distribution of Publications of CGCRI by Affiliation

The Table- **6.81** reflects the distribution of publications by affiliated institutions.

Table- 6.81: Distribution of Publications of CGCRI by Affiliation

Affiliation	No. of Publications (N=1484)	Percentage %	Rank
Central Glass and Ceramic Research Institute India	1129	76.07	I
Council of Scientific and Industrial Research India	324	21.83	II
Jadavpur University	125	8.42	III
University of Malaya	55	3.70	IV
Indian Institute of Technology, Kharagpur	50	3.36	V
University of Calcutta	46	3.09	VI
Sri Venkateswara University	41	2.76	VII
Indian Space Research Organization	34	2.29	VIII
Bhabha Atomic Research Centre	32	2.16	IX
Indian Institute of Science	30	2.02	X
Bengal Engineering and Science University	25	1.68	XI
Bangalore University	24	1.61	XII
M.S. Ramaiah Institute Of Technology	23	1.54	XIII
University of Southampton	22	1.48	XIV
2 institutions having 21 publications each	21	1.41	XV
National Institute of Technology, Durgapur	17	1.14	XVI
Indian Institute of Chemical Biology	16	1.08	XVII
2 institutions having 15 publications each	15	1.01	XVIII
National Aerospace Laboratories India	14	0.94	XIX
3 institutions having 13 publications	13	0.87	XX
Hokkaido University	12	0.80	XXI
2 institutions having 11 publications	11	0.74	XXII
Raja Ramanna Centre for Advanced Technology	10	0.67	XXIII
7 institutions having 9 publications each	09	0.60	XXIV
7 institutions having 8 publications each	08	0.53	XXV
8 institutions having 7 publications	7	0.47	XXVI
7 institutions having 6 publications	6	0.40	XXVII
15 institutions having 5 publications	5	0.34	XXVIII
20 institutions having 4 publications	4	0.27	XXIX
37 institutions having 3 publications	3	0.20	XXX

Source: Exported from the SCOPUS Database

From the **Table- 6.81** it was found that CGCRI individually published 1129 number of papers which is 76.07% of the total publications that holding rank one. CSIR

publishes 324 (21.83%) papers collaborating with CGCRI followed by Jadavpur University with 125 (8.42%) and University of Malaya with 55 (3.70%) publications which are ranked as two, three and four number. The collaborating institutions have less numbers of publication as compared to the above four institutions.

6.1.3.3.3 Subject Area of Research wise Distribution of publication of CGCRI

The **Table- 6.82** indicates the subject wise distribution of publications by the scientists of CGCRI, Kolkata.

Table- 6.82: Subject Area of Research Wise Distribution of CGCRI

Subject Area	No. of Publications (N=1484)	Percentage %	Rank
Materials Science	934	62.93	I
Physics and Astronomy	697	46.97	II
Engineering	510	34.37	III
Chemistry	354	23.85	IV
Chemical Engineering	208	14.02	V
Computer Science	60	4.04	VI
Energy	56	3.77	VII
Biochemistry, Genetics and Molecular Biology	45	3.03	VIII
Environmental Science	42	2.83	IX
Medicine	37	2.49	X
Mathematics	29	1.95	XI
Business, Management and Accounting	15	1.01	XII
Pharmacology, Toxicology and Pharmaceutics	14	0.94	XIII
Earth and Planetary Sciences	13	0.88	XIV
Multidisciplinary	11	0.74	XV
2 Subject Areas 6 publication each	6	0.40	XVI
2 Subject Areas 5 publication each	5	0.33	XVII
Veterinary	4	0.27	XVIII
2 Subject Areas 1 publication each	1	0.07	XIX

The **Table- 6.82** shows that in case of subject wise distribution of publications the subject Material science shows highest number of 934 (62.93 %) publications

followed by Physics and Astronomy 697 (46.97%) and engineering 510 (34.37%) publications which are ranked as one, two and three respectively.

6.1.3.3.4 Contribution by Document Type (CGCRI)

In this part the research scholar have studied the contribution of publications in different documents.

Table- 6.83: Contribution of CGCRI by Document Type (N= 1484)

Sl. No.	Document Type	No. of Publications (N=1484)	Percentage %
1.	Article	1231	82.95
2.	Conference Paper	184	12.39
3.	Review	24	1.61
4.	Article in Press	18	1.21
5.	Book Chapter	15	1.01
6.	Erratum	4	0.26
7.	Editorial	4	0.26
8.	Letter	2	0.13
9.	Book	2	0.13

Source: Exported from the SCOPUS Database (23-05-2016)

The **Table- 6.83** examined that Article is the most favored document type of publication contributing 1231 (82.95%) publications followed by Conference Paper and Review with 37(8.83%) and 10(2.39%) respectively. The lowest numbers of 2 (0.13%) papers have been published both in the Letter and Books.

6.1.3.3.5 Distribution of Publications of CGCRI Country wise

The **Table- 6.84** shows the country wise distribution of publications of the CGCRI.

Table- 6.84: Distribution of Publications of CGCRI Country Wise

Country	No. of Publications (N=1484)	Percentage %	Rank
India	1471	99.12	I
Malaysia	58	3.91	II
United Kingdom	46	3.09	III
United States	39	2.62	IV
2 Countries 24 Publications each	24	1.61	V
Australia	24	1.61	V
Italy	22	1.48	VI
Germany	22	1.48	VI
Japan	20	1.34	VII
Mexico	17	1.14	VIII
Russian Federation	16	1.07	IX
Poland	14	0.94	X
Ireland	9	0.60	XI
2 Countries 8 publications each	8	0.53	XII
2 Countries 6 Publications each	6	0.40	XIII
Portugal	5	0.33	XIV
3 Countries 4 publications each	4	0.26	XV
5 Countries 3 publications each	3	0.20	XVI
2 Countries 2 publications each	2	0.13	XVII
9 Countries 1 publications each	1	0.06	XVIII

Source: Exported from the SCOPUS Database (23-05-2016)

In the **Table- 6.84** it is seen that the highest number of 99.12% paper has been published in India by scientists of CGCRI. Malaysia is in second number with 3.91% and United Kingdom is in third number with 3.01% publications.

6.1.3.3.6 Most Productive Sources (CGCRI)

This part discusses about the most productive sources that publishes highest number of papers of the scientists of CGCRI.

Table- 6.85: Most Productive Sources (CGCRI)

Source Title	No. of Publications (N=1484)	Percentage %	Rank
Ceramics International	86	5.80	I
RSC Advances	37	2.49	II
Journal of Alloys and Compounds	33	2.22	III
2 sources 30 publications each	30	2.02	IV
Transactions of the Indian Ceramic Society	26	1.75	V
2 sources 23 publications each	23	1.54	VI
Journal of Non Crystalline Solids	22	1.48	VII
Materials Research Bulletin	20	1.34	VIII
3 sources 19 publications each	19	1.28	IX
Materials Letters	18	1.21	X
3 sources 16 publications each	16	1.07	XI
3 sources 14 publications each	14	0.94	XII
4 sources 13 publications each	13	0.87	XIII
3 sources 12 publications each	12	0.80	XIV
3 sources 11 publications each	11	0.74	XV
3 sources 10 publications each	10	0.67	XVI
7 sources 9 publications each	9	0.60	XVII
4 sources 8 publications each	8	0.53	XVIII
9 sources 7 publications each	7	0.47	XIX
9 sources 6 publications each	6	0.40	XX
9 sources 5 publications each	5	0.33	XXI
26 sources 4 publications each	4	0.26	XXII
25 sources 3 publications each	3	0.20	XXIII
24 sources 2 publications each	2	0.13	XXIV

Source: Exported from the SCOPUS Database (23-05-2016)

From the **Table- 6.85** it was found that the most productive sources of publication is Ceramic International with 5.80% of publication followed by RSC Advance 2.49% and Journals of Alloy and Compounds with 2.22% publications.

6.1.3.3.7 Most Productive Authors of CGCRI, Kolkata

The most productive authors of CGCRI have listed in the **Table- 6.86**.

Table- 6.86: Most Productive Authors of CGCRI

Author	No. of Publications (N=1484)	Percentage %	Rank
Bhadra, S.K.	133	8.96	I
Pal, M	127	8.55	II
Paul, M.C.	99	6.67	III
Karmakar, B.	95	6.40	IV
Basu, D.	80	5.39	V
Mukhopadhyay, A.K.	74	4.98	VI
Basu, R.N.	73	4.91	VII
De, G.	67	4.51	VIII
Chakradhar, R.P.S.	67	4.51	IX
Sen, R.	65	4.38	X
Dey, A.	58	3.90	XI

Source: Exported from the SCOPUS Database (23-05-2016)

The **Table- 6.86** shows the top ten most productive authors of CGCRI indexed in the SCOPUS database. Bhadra, S.K. was the most productive author during the period with 133 (8.96%) publications in his credit. The other highest productive authors are Pal, M. with 8.55% publications, Paul, M.C. with 6.67% and Karmakar, B. with 6.40% publications over the period and ranked as two, three and four number in the list.

6.1.3.3.8 Top Ten Citation Received Authors of CGCRI, Kolkata

The top ten citation received authors of CGCRI are listed in the **Table- 6.87**.

Table- 6.87: Top Ten Citations Received Authors of CGCRI

Author	Citied By	Rank
Majumder M., Gangopadhyay T.K., Chakraborty A.K., Dasgupta K., Bhattacharya D.K.	308	I
Das S., Mukhopadhyay A.K., Datta S., Basu D.	161	II
Mazumder R., Sujatha Devi P., Bhattacharya D., Choudhury P., Sen A., Raja M.	146	III
Bandyopadhyay S., Canning J., Stevenson M., Cook K.	133	IV
Nandi S.K., Roy S., Mukherjee P., Kundu B., De D.K., Basu D.	120	V
Reddy A.J., Kokila M.K., Nagabhushana H., Chakradhar R.P.S., Shivakumara C., Rao J.L., Nagabhushana B.M.	94	VI
Chen K.K., Alam S.-U., Price J.H.V., Hayes J.R., Lin D., Malinowski A., Codemard C., Ghosh D., Pal M., Bhadra S.K., Richardson D.J.	84	VII
Das N., Majumdar R., Sen A., Maiti H.S.	73	VIII
Mukherjee R., Bandyopadhyay D., Sharma A.	70	IX
Som T., Karmakar B.	69	X

Source: Exported from the SCOPUS Database (23-05-2016

The most cited authors of the CGCRI were Majumder M., Gangopadhyay T.K., Chakraborty A.K., Dasgupta K., Bhattacharya D.K. which received 308 citations, followed by Das S., Mukhopadhyay A.K., Datta S., Basu D. with 161 citations and Mazumder R., Sujatha Devi P., Bhattacharya D., Choudhury P., Sen A., Raja M. received 146 citations.

6.1.3.3.9 Degree of Collaboration of CGCRI's Authors

The Degree of Collaboration of the authors of CGCRI are calculated in the **Table- 6.88**

Table- 6.88: Degree of Collaboration of CGCRI's Authors

Year	Authorship Pattern		(S_n + M_n)	Degree of Collaboration (DC)
	Single (S_n)	Multiple (M_n)		
2007	2	83	85	0.98
2008	7	93	100	0.93
2009	2	143	145	0.99
2010	4	147	151	0.97
2011	3	155	158	0.98
2012	2	162	164	0.99
2013	1	180	181	0.99
2014	3	219	222	0.99
2015	3	172	175	0.98
2016	5	98	103	0.95
Total	**32**	**1452**	**1484**	**0.98**

Source: Exported from the SCOPUS Database (23-05-2016)

Here, highest degree of collaboration 0.99 has been show in the year 2009, 2010, 2012, 2013, and 2014 and lowest degree of collaboration 0.93 was shown in the year 2008.

6.1.3.4 Analysis of the Publication Trends by the Scientists of Central Institute of Mining and Fuel Research (CIMFR), Dhanbad

6.1.3.4.1 Yearly Distribution of Publication of CIMFR, Dhanbad

The **Table- 6.89** shows that the yearly publications of CIMFR scientists which are archived in the SCOPUS database.

Table- 6.89: Yearly Distribution of Publications of CIMFR

Sl. No.	Year	No. of Publications	Percentage %
1.	2007	10	2.09
2.	2008	46	9.62
3.	2009	49	10.25
4.	2010	45	9.41
5.	2011	51	10.66
6.	2012	58	12.13
7.	2013	65	13.59
8.	2014	57	11.92
9.	2015	64	13.38
10.	2016	33	6.90
	Total	**478**	**100**

Source: Exported from the SCOPUS Database (23-05-2016)

Table- 6.89 shows yearly distribution of publication from CIMFR, Dhanbad since 2007 to 2016. Total number of 478 papers has been published from CIMFR during the periods. The highest number of 65 (13.59%) papers has been published in the year 2013.

6.1.3.4.2 Subject Area wise Distribution of Publications of CIMFR

The **Table- 6.90** elucidates the subject area wise distribution of the publications of CIMFR scientists.

Table- 6.90: Subject Area wise Distribution of Publication of CIMFR

Subject Area	No. of Publications (N=478)	Percentage %	Rank
Earth and Planetary Sciences	240	50.28	I
Energy	147	30.75	II
Environmental Science	111	23.22	III
Chemical Engineering	70	14.64	IV
Engineering	68	14.22	V
Chemistry	47	9.83	VI
Agricultural and Biological Sciences	33	6.90	VII
Materials Science	26	5.43	VIII
Physics and Astronomy	19	3.97	IX
Multidisciplinary	17	3.55	X
Medicine	12	2.10	XI
Mathematics	9	1.88	XII
Pharmacology, Toxicology and Pharmaceutics	8	0.83	XV
Business, Management and Accounting	7	1.46	XIII
Social Sciences	6	1.25	XIV
Computer Science	4	0.83	XV
3 subjects 3 publications each	3	0.62	XVI
2 subjects 2 publications each	2	0.41	XVII
2 subjects 1 publications each	1	0.20	XVIII

Source: Exported from the SCOPUS Database (23-05-2016)

From the **Table- 6.90** it is seen that Earth and Planetary Sciences have the highest number of 240 (50.28%) publications from the total number of publications. The rest of the subject areas are Energy with 30.75% publications, Environmental science with 23.22% publications.

6.1.3.4.3 Most Productive Sources of publication of CIMFR

The most productive sources of publication of CIMFR scientists are listed in the **Table- 6.91**

Table- 6.91: Most productive Sources of Publications of CIMFR

Source Title	No. of Publications (N=478)	Percentage %	Rank
Journal of Mines Metals and Fuels	63	13.17	I
Indian Journal of Environmental Protection	20	4.18	II
International Journal of Rock Mechanics and Mining Sciences	14	2.92	III
International Journal of Coal Preparation and Utilization	14	2.92	III
Current Science	12	2.51	IV
Environmental Earth Sciences	12	2.51	IV
Fuel	11	2.30	V
International Journal of Coal Geology	11	2.30	V
Energy Sources Part A Recovery Utilization and Environmental Effects	10	2.09	VI
5 sources 6 publications each	6	1.25	VII
4 sources 5 publications each	5	1.04	VIII
12 sources 4 publications each	4	0.83	IX
10 sources 3 publications each	3	0.62	X
23 sources 2 publications each	2	0.41	XI
71 sources 1 publication each	1	0.20	XII

Source: Exported from the SCOPUS Database (23-05-2016)

From the table it has been analyzed that in the Journal of Mines Metals and Fuels the scientists of CIMFR have published highest number of 13.17% papers followed by Indian Journal of Environmental protection 4.18% and Indian Journal of Rock Mechanics and Mining Sciences 2.92% of publications.

6.1.3.4.4 Contribution of CIMFR Scientists by Document Type

The **Table- 6.92** shows the contribution of scientists of the CIMFR by document type.

Table- 6.92: Contribution of CIMFR by Document Type Wise

Sl. No.	Document Type	No. of Publications (N=478)	Percentage %
1.	Article	386	80.75
2.	Conference Paper	60	12.55
3.	Review	15	3.13
4.	Article in Press	6	1.25
5.	Letter	6	1.25
6.	Book Chapter	4	0.83
7.	Book	1	0.20

Source: Exported from the SCOPUS Database (23-05-2016)

The **Table 6.92** shows that 386 (80.75%) documents of CIMFR has been published as article in journal followed by 60 (12.55%) published as conference paper, 15 (3.13%) as review, article in press 6 (1.25%), Letter 6 (1.25%), Book chapter 4 (0.83%) and 1 (0.20%) book has been published by the CIMFR scientists.

6.1.3.4.5 Country Wise Distribution of Publications of CIMFR

The **Table- 6.93** shows the CIMFR scientists have published papers in different countries. The Table- 6.93 shows the country wise distribution of publications by CIMFR scientists.

Table- 6.93: Distribution of publications of CIMFR Country Wise

Country/Territory	No. of Publications (N=478)	Percentage %	Rank
India	474	99.16	I
United Kingdom	6	1.25	II
Australia	5	1.04	III
Japan	5	1.04	III
Nigeria	5	1.04	III
Canada	4	0.83	IV
Germany	4	0.83	IV
Sweden	3	0.62	V
United States	3	0.62	V
Italy	2	0.41	VI
Spain	2	0.41	VI
11 countries 1 publication each	1	0.20	VII

Source: Exported from the SCOPUS Database (23-05-2016)

From the **Table 6.93** it was seen that 474 (99.16%) papers of CIMFR has been published in India which was ranked as one, in United Kingdom 6 (1.25%), in Australia 5 (1.04%), Japan 5 (1.04%), Nigeria 5 (1.04%), Canada 4 (0.83%), Germany 4 (0.83%), Sweden 3 (0.62%), United States 3 (0.62%), Italy 2 (0.41%), Spain 2 (0.41%) and 11 countries 1 publication each having 0.20% publications.

6.1.3.4.6 Most Productive Authors of CIMFR

The **Table- 6.94** identified the most productive author of CIMFR, Dhanbad.

Table- 6.94: Most Productive Authors of CIMFR

Authors Name	No. of Publications (N=478)	Percentage %	Rank
Sinha, A.	43	8.99	I
Ram, L.C.	42	8.78	II
Masto, R.E.	36	7.53	III
Maity, S.	23	4.81	IV
George, J.	22	4.60	V
Srivastava, S.K.	20	4.18	VI
Singh, A.K.	18	3.76	VII
Tewary, B.K.	17	3.55	VIII
Roy, M.P.	16	3.34	IX
Sawmliana, C.	15	3.13	X
Selvi, V.A.	15	3.13	X
Singh, A.K.	15	3.13	X
Mandal, S.K.	15	3.13	X
Chowdhury, B.	15	3.13	X

Source: Exported from the SCOPUS Database (23-05-2016)

The **Table- 6.94** reveals that the most productive author of CIMFR is Sinha, A. with 43 (8.99%) publications out of 478 publications ranked as one. The rest of the productive authors were Ram, L.C. with 42 (8.78%) publications, Masto, R.E. with 36 (7.53%) publications, etc. which were ranked as two and three respectively.

6.1.3.4.7 Distribution of Publications of CIMFR by Affiliation

The **Table- 6.95** shows the distribution of publications of CIMFR by affiliated institutions.

Table- 6.95: Distribution of Publications of CIMFR by Affiliation

Affiliation	No. of Publications (N=478)	Percentage %	Rank
Central Institute of Mining and Fuel Research India	442	92.46	I
Indian School of Mines University	93	19.45	II
Council of Scientific and Industrial Research India	19	3.97	III
Jadavpur University	14	2.92	IV
Bhabha Atomic Research Centre	11	2.30	V
Banaras Hindu University	10	2.09	VI
Indian Institute of Technology, Kharagpur	8	1.67	VII
Birla Institute of Technology, Mesra	7	1.46	VIII
3 institutions 6 publications each	6	1.25	IX
3 institutions 5 publications each	5	1.04	X
6 institutions 4 publications each	4	0.83	XI
13 institutions 3 publications each	3	0.62	XII
28 institutions 2 publications each	2	0.41	XIII
98 institutions 1 publication each	1	0.20	XIV

Source: Exported from the SCOPUS Database (23-05-2016)

From the **Table- 6.95** it has been observed that CIMFR individually published 442 numbers of papers which was 442 (92.46%) of the total publications which holds the rank one. India School of Mines University have been published 93 (19.45%) papers collaborating with CIMFR which was ranked as two followed by CSIR with 19 (3.97%), Jadavpur University with 14 (2.92%) papers and with Bhabha Atomic Research Center the CIMFR have publishes 11 (2.30%) publications which were ranked as three, four and five in the list.

6.1.3.4.8 Top Ten Citation Received Authors of CIMFR from 2007-2016

The **Table- 6.96** identified the top ten highly cited authors from CIMFR, Dhanbad from 2007- 2016

Table- 6.96: Top Ten Citation Received Authors of CIMFR from 2007-2016

Authors	Cited By	Rank
James O.O., Maity S., Usman L.A., Ajanaku K.O. , Ajani O.O., Siyanbola T.O., Sahu S., Chaubey R.	96	I
Chaubey R., Sahu S., James O.O., Maity S.	91	II
Ram L.C., Masto R.E.	60	III
Sahu S.G., Sarkar P., Chakraborty N., Adak A.K.	58	IV
Sinha S., Masto R.E., Ram L.C., Selvi V.A., Srivastava N.K., Tripathi R.C., George J.	54	V
Singh A.K., Mondal G.C., Kumar S., Singh T.B., Tewary B.K., Sinha A.	51	VI
James O.O., Mesubi A.M., Ako T.C., Maity S.	43	VII
Prusty B.K.	37	VIII
Ram L.C., Masto R.E.	35	IX
Singh S., Ram L.C., Masto R.E., Verma S.K.	35	IX
Singh P.K., Roy M.P.	28	X

Source: Exported from the SCOPUS Database (23-05-2016)

From the **Table- 6.96** it has been found that James O.O., Maity S., Usman L.A., Ajanaku K.O., Ajani O.O., was the most cited author of CIMFR with 96 citations. The other highly cited authors are Chaubey R., Sahu S., James O.O., Maity S. with 91 citations holding the rank two and Ram L.C., Masto R.E.with 60 citations holdings the rank three.

6.1.3.4.9 Degree of Collaboration of CIMFR Authors

The **Table- 6.97** shows the degree of collaboration of the authors of CIMFR.

Table- 6.97: Degree of Collaboration Authors of CIMFR

Year	Authorship Pattern		(S_n + M_n)	Degree of Collaboration (DC)
	Single (S_n)	Multiple (M_n)		
2007	0	10	10	1.00
2008	3	43	46	0.93
2009	7	42	49	0.86
2010	3	42	45	0.93
2011	3	48	51	0.94
2012	2	56	58	0.97
2013	6	59	65	0.91
2014	2	55	57	0.96
2015	2	62	64	0.97
2016	1	32	33	0.97
Total	**29**	**449**	**478**	**0.94**

Source: Exported from the SCOPUS Database (23-05-2016)

The **Table- 6.97** indicates that average number of degree of collaboration is 0.94 and the range for degree of collaboration started from 0.86 to 1.00. Maximum number of Degree of Collaboration occurred in 2007 with 1.00 and lowest in 2009 with 0.86.

6.1.3.5 Analysis of the Publication Trends by the Scientists of Central Mechanical Engineering Research Institute, Durgapur (CMERI)

The following are the analysis and findings of the research output of the CMERI scientists.

6.1.3.5.1 Yearly Distribution of Publications of CMERI, Durgapur

The **Table- 6.98** shows the year wise distribution of publications by the CMERI scientists from 2007 to 2016.

Table- 6.98: Yearly Distribution of Publications of CMERI

Sl. No.	Year	No. of Publications (N=682)	Percentage %
1.	2007	19	2.79
2.	2008	17	2.49
3.	2009	38	5.57
4.	2010	63	9.24
5.	2011	83	12.17
6.	2012	92	13.50
7.	2013	99	14.51
8.	2014	115	16.86
9.	2015	108	15.84
10.	2016	48	7.03
	Total	**682**	**100 %**

Source: Exported from the SCOPUS Database (23-05-2016)

The **Table- 6.98** shows the year wise distribution of the publication. In CMERI, Durgapur total of 682 papers has been published during 2007-2016 (Up to 23-05-2016). The highest number of 115(16.86%) papers has been published in the year 2014 followed by 108 (15.84%) in 2015 and 99 (14.51%) in 2013.

From the analysis it was clear that the CMERI's publications increasing gradually. In the year 2010 and 2012, the trend of publications decreases as compared to the earlier years and in 2015 also the number of publications decreases than the year 2014.

6.1.3.5.2 Subject Area Wise Distribution of Publications of CMERI

The **Table- 6.99** shows the subject wise distribution of publications of CMERI's Scientists.

Table- 6.99: Subject Area Wise Distribution of Publications of CMERI

Subject Areas	No. of Publications (N=682)	Percentage %	Rank
Engineering	317	46.48	I
Materials Science	195	28.59	II
Physics and Astronomy	174	25.51	III
Computer Science	158	23.16	IV
Chemistry	143	20.96	V
Chemical Engineering	103	15.10	VI
Energy	63	9.23	VII
Mathematics	52	7.62	VIII
Biochemistry, Genetics and Molecular Biology	23	3.37	IX
Environmental Science	21	3.07	X
Medicine	17	2.49	XI
Multidisciplinary	12	1.75	XII
2 subjects 8 publications each	8	1.17	XIII
Earth and Planetary Sciences	6	0.87	XIV
Business, Management and Accounting	4	0.58	XV
3 subjects 3 publications each	3	0.43	XVI
4 subjects 1 publications each	1	0.14	XVII

Source: Exported from the SCOPUS Database (23-05-2016)

From the **Table- 6.99,** it reveals that Engineering has the highest number of 317 (46.48%) publications from the total number of publications. The rest of the subject areas are Material Science with 195 (28.59%) publications, Physics and Astronomy with 174 (25.51%) publications which holds the rank one, two and three in the list.

6.1.3.5.3 Most Productive Source of Publication Wise Distribution (CMERI)

The most productive sources where the scientists of CMERI have been published highest number of papers are listed in the **Table- 6.100**.

Table- 6.100: Most Productive Source Wise Distribution of Publication (CMERI)

Source Title	No. of Publications (N=682)	Percentage %	Rank
Numerical Heat Transfer Part A Applications	20	2.93	I
RSC Advances	16	2.34	II
Dalton Transactions	16	2.34	II
International Journal of Heat and Mass Transfer	11	1.61	III
Journal of Failure Analysis and Prevention	10	1.46	IV
3 sources 9 publications each	9	1.31	V
2 sources 8 publications each	8	1.17	VI
4 sources 6 publications each	6	0.87	VII
9 sources 5 publications each	5	0.73	VIII
9 sources 4 publications each	4	0.58	IX
18 sources 3 publications each	3	0.43	X
60 sources 2 publications each	2	0.29	XI
23 sources 1 publication each	1	0.14	XII

Source: Exported from the SCOPUS Database (23-05-2016)

From the **Table- 6.100** it was seen that the highest number of 20 (2.93%) papers has been published in Numerical Heat Transfer Part A Applications which was in rank one. The rest of the sources are RSC Advances and Dalton Transactions with 16 (2.34%) publications were jointly holding the rank two and International Journal of Heat and Mass Transfer with 11 (1.61%) holding the rank three in the list.

6.1.3.5.4 Document Type Wise Distribution of Publications of CMERI

The **Table- 6.101** shows the document type wise distribution of publication that has been contributed by CMERI's Scientists.

Table- 6.101: Document Type Wise Distribution of Publication of CMERI

Sl. No.	Document Type	No. Of Publications (N=682)	Percentage %
1	Article	490	72.14
2	Conference Paper	155	22.72
3	Review	21	3.07
4	Article in Press	8	1.17
5	Book Chapter	6	0.87
6	Erratum	2	0.14

Source: Exported from the SCOPUS Database (23-05-2016)

From the **Table- 6.101** it has been reflected that out of 682 publications 490 (72.14%) publications of CMERI were published as Article, 155 (22.72%) as Conference papers, 21 (3.07%) as Review, 8 (1.17%) as Article in Press, 6 (0.87%) in Book Chapter and 1 (0.14%) published as Erratum.

6.1.3.5.5 Country Wise Distribution of Publications of CMERI

The **Table- 6.102** discusses about the publications of CMERI's scientists in different countries with rank.

Table- 6.102: Country Wise Distribution of Publications of CMERI

Country/Territory	No. of Publications (N=682)	Percentage %	Rank
India	676	99.12	I
South Korea	34	4.98	II
Germany	25	3.65	III
United States	21	3.07	IV
United Kingdom	9	1.31	V
Japan	8	1.17	VI
France	6	0.87	VII
Finland	4	0.58	VIII
3 country 3 publications each	3	0.43	IX
6 country 2 publications each	2	0.29	X
8 country 1 publication each	1	0.14	XI

Source: Exported from the SCOPUS Database (23-05-2016)

The scientists of CMERI has been published highest number of 676 (99.12%) papers in India followed by 34 (4.98%) papers in South Korea, 25 (3.65%) papers in South Korea, 21 (3.07%) papers in United States which were holding the rank one, two, three and four in the list.

6*.1.3.5.6 Most Productive Author of CMERI*

The most productive authors of CMERI have been identified and mentioned in the **Table- 6.103.**

Table- 6.103: Most Productive Authors (Top 10 numbers) of CMERI

Author Name	No. of Publications (N=682)	Percentage %	Rank
Chatterjee, D.	55	8.06	I
Chatterjee, D.	49	7.18	II
Kuila, T.	37	5.42	III
Mondal, B.	36	5.27	IV
Majumder, S.	35	5.13	V
Roy, H.	34	4.98	VI
Shome, S.N.	26	3.18	VII
Chatterjee, P.K.	25	3.66	VIII
Lee, J.H.	24	3.51	IX
Ray, R.	23	3.37	IX
Pal, M.	23	3.37	IX

Source: Exported from the SCOPUS Database (23-05-2016)

From the Table- 6.103 it has been found that since 2007 to 2016 the most productive authors of CMERI was Chatterjee, D. with 55 (8.06%) publications holding rank one. The other authors are Chatterjee, D. with 49 (7.18%) publications and Kuila, T. with 37 (5.42%) publications which were ranked as two and three respectively.

6.1.3.5.7 Distribution of Publications of CMERI by Affiliation

The **Table- 6.104** shows the affiliation wise distribution of publications of CMERI's scientists.

Table- 6.104: Distribution of Publications of CMERI by Affiliation

Affiliation	No. of Publications (N=682)	Percentage %	Rank
Central Mechanical Engineering Research Institute India	659	96.62	I
National Institute of Technology, Durgapur	137	20.08	II
Indian Institute of Technology, Kharagpur	53	7.77	III
Jadavpur University	41	6.01	IV
Indian Institute of Technology, Kanpur	37	5.42	V
Chonbuk National University	27	3.95	VI
Bengal Engineering and Science University	19	2.78	VII
Friedrich-Alexander-University Erlangen-Nurberg	14	2.05	VIII
Indian Association for the Cultivation of Science	13	1.09	IX
Council of Scientific and Industrial Research India	12	1.75	X
3 institutions 11 publications each	11	1.61	XI
3 institutions 10 publications each	10	1.46	XII
Korea Institute of Science and Technology	9	1.31	XIII
2 institutions 8 publications each	8	1.17	XIV
Bengal College of Engineering and Technology	7	1.02	XV
Meijo University	6	0.87	XVI
5 institutions 5 publications each	5	0.73	XVII
8 institutions 4 publications each	4	0.58	XVIII
10 institutions 3 publications each	3	0.43	XIX
33 institutions 2 publications each	2	0.29	XX
83 institutions 1 publications each	1	0.14	XXI

Source: Exported from the SCOPUS Database (23-05-2016)

From the **Table- 6.104** it was found that CMERI individually published 659 numbers of papers which is 96.62% of the total publications 682 which was ranked as one. National Institute of Technology, Durgapur publishes 137 (20.08%) papers collaborating with CMERI followed by IIT, Kharagpur with 53 (7.77%), Jadavpur

University with 41 (6.01%) and IIT, Kanpur with 37 (5.42%) publications which were ranked as two, three, four and five.

6.1.3.5.8 Top Ten Highly Cited Authors of CMERI

The Top ten authors of CMERI who received maximum number of citation are mentioned in the **Table- 6.105**.

Table- 6.105: Top Ten Highly Cited Authors of CMERI

Author	Cited By	Rank
Singh S.	207	I
Gopalsamy B.M., Mondal B., Ghosh S.	74	II
Das S., Saha S., Das S., Gupta A.	63	III
Choudhury B., Saha B.B., Chatterjee P.K., Sarkar J.P.	55	IV
Chatterjee D.	53	V
Singh S., Singhal R., Malhotra B.D.	53	V
Karmakar M.K., Datta A.B.	49	VI
Jiang T., Kuila T., Kim N.H., Ku B.-C., Lee J.H.	46	VII
Nagahanumaiah, Subburaj K., Ravi B.	41	VIII
Nandi A.K., Paulo Davim J.	39	IX
Chatterjee D., Mondal B.	38	X

Source: Exported from the SCOPUS Database (23-05-2016)

The highly cited authors of CMERI were Singh, S. with 207 citation, Gopalsamy B.M., Mondal B., Ghosh S. with 74 citations, Das S., Saha S., Das S., Gupta A. with 63 citations, Choudhury B., Saha B.B., Chatterjee P.K., Sarkar J.P. with 55 citations, etc. who were holds the rank one, two, three and four among all the authors from CMERI.

6.1.3.5.9 Degree of Collaboration of CMERI

The **Table- 6.106** shows the degree of collaboration of CMERI's scientist's from 2007 to 23rd May, 2016.

Table- 6.106: Degree of Collaboration Authors of CMERI

Year	Authorship Pattern		(S_n + M_n)	Degree of Collaboration (DC)
	Single (S_n)	Multiple (M_n)		
2007	3	16	19	0.82
2008	1	16	17	0.94
2009	3	35	38	0.92
2010	4	59	63	0.94
2011	7	76	83	0.92
2012	5	87	92	0.95
2013	5	94	99	0.95
2014	4	111	115	0.97
2015	1	107	108	0.99
2016	0	48	48	1.00
Total	**33**	**649**	**682**	**0.95**

Source: Exported from the SCOPUS Database (23-05-2016)

The **Table- 6.106** indicates that average number of was 0.95 and the range for degree of collaboration started from 0.82 to 1.00. Maximum number of Degree of Collaboration occurred in 2016 with 1.00 and lowest in 2008 and 2007 with 0.82.

6.1.3.6 Analysis of the Publication Trends by the Scientists of Indian Institute of Chemical Biology (IICB), Kolkata

The following were the analysis and findings of the research output of the IICB's scientists.

6.1.3.6.1. Year Wise Distribution of Publication of IICB

The **Table- 6.107** shows the year wise distribution of publications by the IICB scientists from 2007 to 23rd May, 2016

Table- 6.107: Year Wise Distribution of Publications of IICB

Sl. No.	Year	No. of Publications (N=1769)	Percentage %
1.	2007	142	8.03
2.	2008	153	8.65
3.	2009	142	8.03
4.	2010	156	8.82
5.	2011	178	10.06
6.	2012	214	12.09
7.	2013	222	12.55
8.	2014	255	14.42
9.	2015	217	12.27
10.	2016	90	5.08
Total		**1769**	**100**

Source: Exported from the SCOPUS Database (23-05-2016)

The **Table- 6.107** shows the year wise distribution of the publication of IICB's scientists. In IICB, Kolkata total number of 1769 papers has been published during 2007-2016 (Up to 23-05-2016). Out of 1769 papers the highest 255 (14.42%) papers has been published in the year 2014 followed by 222 (12.55%) and 217 (12.09%) in the years 2013 and 2012 respectively.

6.1.3.6.2 Subject Wise Distribution of Publications of IICB

The **Table- 6.108** shows the subject wise distribution of publications of the scientists of IICB.

Table- 6.108: Distribution of Publications of IICB by Subject Type

Subject Areas	No. of Publications (N=1769)	Percentage %	Rank
Biochemistry, Genetics and Molecular Biology	933	52.74	I
Medicine	630	36.61	II
Chemistry	441	24.92	III
Pharmacology, Toxicology and Pharmaceutics	332	18.76	IV
Immunology and Microbiology	186	10.51	V
Agricultural and Biological Sciences	146	8.25	VI
Chemical Engineering	145	8.19	VII
Materials Science	113	6.38	VIII
Physics and Astronomy	105	5.93	IX
Neuroscience	68	3.84	X
Environmental Science	66	3.73	XI
Mathematics	37	2.09	XII
Engineering	35	1.97	XIII
Multidisciplinary	30	1.69	XIV
Computer Science	24	1.35	XV
2 subjects 12 publications each	12	0.67	XVI
2 subjects 10 publications each	10	0.56	XVII
Health Professions	7	0.39	XVIII
Dentistry	6	0.33	XIX
Psychology	3	0.16	XX
Nursing	2	0.11	XXI
Economics, Econometrics and Finance	1	0.05	XXII

Source: Exported from the SCOPUS Database (23-05-2016)

From the **Table- 6.108** it has been found that Biochemistry, Genetics and Molecular Biology have the highest number of 933 (52.74%) publications from the total number of publications which holding the rank one. The rest of the subject areas were Medicine with 630 (36.61%) publications and Chemistry with 441 (24.92%) publications which were holding rank two and three.

6.1.3.6.3 Most Productive Source of Publication of IICB

The **Table- 6.109** shows the most productive source of Publication in which IICB's scientists have largely contributed their papers.

Table- 6.109: Most productive Source Wise Distribution of Publications (IICB)

Source Title	No. of Publications (N=1769)	Percentage %	Rank
Plos One	64	3.61	I
Tetrahedron Letters	44	2.48	II
RSC Advances	44	2.48	II
Journal of Biological Chemistry	29	1.63	III
Biochemical Et Biophysical Acta General Subjects	21	1.18	IV
3 sources 17 publications each	17	0.96	V
Journal of Organic Chemistry	16	0.90	VI
4 sources 15 publications each	15	0.84	VII
3 sources 14 publications each	14	0.79	VIII
Human Genetics	13	0.73	IX
5 sources 12 publications each	12	0.67	X
4 sources 11 publications each	11	0.62	XI
4 sources 10 publications each	10	0.56	XII
3 sources 9 publications each	9	0.50	XIII
11 sources 8 publications each	8	0.45	XIV
14 sources 7 publications each	7	0.39	XV
13 sources 6 publications each	6	0.33	XVI
21 sources 5 publications each	5	0.28	XVII
25 sources 4 publications each	4	0.22	XVIII
43 sources 3 publications each	3	0.16	XIX

Source: Exported from the SCOPUS Database (23-05-2016)

The result shown in the **Table- 6.109** reveals that the 64 (3.61%) papers from IICB are published in Plos ranked as one, 44 (2.48%) papers has been published in Tetrahedron Letters and RSC Advance with rank two, 29 (1.63%) papers has been published in Journal of Biological Chemistry holds the rank three and 21 (1.18%) published in Biochimica Et Biophysica Acta General Subjects which was ranked four in the list.

6.1.3.6.4 Distribution of Publications of IICB by Document Type

The **Table- 6.110** reveals the document type wise distribution of publications of IICB's scientists.

Table- 6.110: Distribution Publication of IICB by Document Type

Document Type	No. of Publications (N=1769)	Percentage %	Rank
Article	1562	88.29	I
Review	99	5.59	II
Conference Paper	38	2.14	III
Article in Press	20	1.13	IV
Letter	14	0.79	V
Book Chapter	12	0.67	VI
Erratum	10	0.56	VII
Editorial	6	0.33	VIII
Note	4	0.22	IX
Short Survey	3	0.16	X
Book	1	0.05	XI

Source: Exported from the SCOPUS Database (23-05-2016)

The **Table- 6.110** shows that the scientists of the IICB published their documents as article which was the 1562 (88.29%) from the total publication and it was in rank one. Review was received the rank two with 99 (5.59%), Conference paper was in rank three with 38 (2.14%), Article in press was in rank four with 20 (1.13%) from the total publications.

6.1.3.6.5 Country Wise Distribution of Publications of IICB

The **Table- 6.111** shows the country wise distribution of publications of IICB's scientists.

Table- 6.111: Country Wise Distribution of Publications of IICB

Country/Territory	No. of Publications (N=1769)	Percentage %	Rank
India	1731	97.85	I
United States	188	10.62	II
United Kingdom	45	2.54	III
Germany	39	2.20	IV
Italy	25	1.41	V
Canada	16	0.90	VI
South Korea	13	0.73	VII
Japan	13	0.73	VIII
Belgium	12	0.67	VIII
Sweden	10	0.56	IX
2 country 9 publications each	9	0.50	X
2 country 8 publications each	8	0.45	XI
2 countries 7 publications each	7	0.39	XII
2 countries 6 publications each	6	0.33	XIII
3 countries 5 publications each	5	0.28	XIV
5 countries 4 publications each	4	0.22	XV
2 countries 3 publications each	3	0.16	XVI
6 countries 2 publications each	2	0.11	XVII
25 countries 1 publication each	1	0.05	XVIII

Source: Exported from the SCOPUS Database (23-05-2016)

The survey results shows that majority of the documents of IICB has been published in India with 1731 (97.85%) publications holding rank one followed by United States 188 (10.62%) and United Kingdom 45 (2.54%) which were in rank two and three.

6.1.3.6.6 Most Renowned Authors of IICB (Top ten)

The top ten most renowned authors of IICB was listed in the **Table- 6.112**

Table- 6.112: Most Renowned Authors of IICB (Top ten)

Author Name	No. of Publications (N=1769)	Percentage %	Rank
Kumar, G.S.	88	4.97	I
Chaudhuri, K.	70	3.95	II
Mondal, N.B.	65	3.67	III
Suresh Kumar, G.	61	3.44	IV
Roychoudhury, S.	61	3.44	IV
Ray, K.	57	3.22	V
Giri, A.K.	48	2.71	VI
Hazra, A.	47	2.65	VII
Banerjee, S.	47	2.65	VII
Roy, S.	46	2.60	VIII
Swarnakar, S.	44	2.48	IX
Dana, S.K.	43	2.43	X
Jaisankar, P.	43	2.43	X
Ali, N.	43	2.43	X

Source: Exported from the SCOPUS Database (23-05-2016)

The most renowned author of IICB, Kolkata was Kumar, G.S with 88 (4.97%) publications, Chaudhuri, K. with 70 (3.95%) publications, Mondal, N.B. with 65 (3.67%) publications and Suresh Kumar G. and Roychoudhury, S. with 61 (3.44%) publications receiving the rank one, two, three and four.

6.1.3.6.7 Distribution of Publications of IICB by Affiliation

The **Table- 6.113** shows the affiliation wise distribution of publications of IICB.

Table- 6.113: Distribution of Publications of IICB by Affiliation

Affiliation	No. of Publications (N=1769)	Percentage %	Rank
Indian Institute of Chemical Biology	1747	98.75	I
Jadavpur University	148	8.37	II
University of Calcutta	138	7.80	III
Indian Association for the Cultivation of Science	57	3.22	IV
Chittaranjan National Cancer Institute	52	2.94	V
Bose Institute	38	2.15	VI
Medical College and Hospital Kolkata	37	2.09	VII
Institute of Post Graduate Medical Education and Research Kolkatta	34	1.92	VIII
University of Kalyani	30	1.70	IX
National Institute of Pharmaceutical Education and Research India	27	1.53	X
Presidency University	24	1.36	XI
Institute of Genomics and Integrative Biology India	23	1.30	XII
Saha Institute of Nuclear Physics	20	1.13	XIII
Indian Statistical Institute, Kolkata	19	1.07	XIV
2 institutions 18 publications each	18	1.02	XV
Central Drug Research Institute India	17	0.96	XVI
2 institutions 16 publications each	16	0.90	XVII
2 institutions 15 publications each	15	0.85	XVIII
4 institutions 14 publications each	14	0.79	XIX
3 institutions 13 publications each	13	0.73	XX
Banaras Hindu University Institute of Medical Sciences	12	0.68	XXI
4 institutions 11 publications each	11	0.62	
2 institutions 10 publications each	10	0.57	23
5 institutions 9 publications each	9	0.51	24
5 institutions 8 publications each	8	0.45	25
5 institutions 7 publications each	7	0.40	26
8 institutions 6 publications each	6	0.34	27
24 institutions 5 publications each	5	0.28	28
28 institutions 4 publications each	4	0.23	29

From the **Table- 6.113** it was found that IICB individually published 1747 numbers of papers which was 98.75% of the total publications. Jadavpur University

publishes 148 (8.37%) papers collaborating with IICB followed by University of Calcutta with 138 (7.80%) of publications.

6.1.3.6.8 Top Ten Highly Cited Authors of IICB

The top ten highest citation received authors of IICB are shown in the Table- **6.114**.

Table- 6.114: Top Ten Highly Cited Authors of IICB

Authors	Cited By	Rank
Brahmachari S.K., Majumder P.P., Mukerji M., Habib S., Dash D., Ray K., Bahl S., Singh L.,	182	I
Maiti M., Kumar G.S.	127	II
De R., Kundu P., Swarnakar S., Ramamurthy T., Chowdhury A., Nair G.B., Mukhopadhyay A.K.	119	III
Paul S., Bag S.K., Das S., Harvill E.T., Dutta C.	108	IV
Islam M.M., Chowdhury S.R., Kumar G.S.	91	V
Bhadra K., Maiti M., Kumar G.S.	88	VI
Islam Md.M., Sinha R., Kumar G.S.	88	VI
Mandal C., Dutta A., Mallick A., Chandra S., Misra L., Sangwan R.S., Mandal C.	87	VII
Klug S.J., Ressing M., Koenig J., Abba M.C., Agorastos T., Brenna S.M., Ciotti M., Das B.R.,	86	VIII
Bhadra K., Kumar G.S.	84	IX
Ganguly D., Haak S., Sisirak V., Reizis B.	82	X
Maity P., Hansda D., Bandyopadhyay U., Mishra D.K.	82	X

Source: Exported from the SCOPUS Database (23-05-2016)

From the **Table- 6.114**, it was found that the most cited authors of the IICB, Kolkata were Brahmachari S.K., Majumder P.P., Mukerji M., Habib S., Dash D., Ray K., Bahl S., Singh L. with 182 citations. Maiti, M. Kumar, G.S. received 127 citations with rank two and De R., Kundu P., Swarnakar S., Ramamurthy T., Chowdhury A., Nair G.B., Mukhopadhyay A.K. received 119 citations with rank three.

6.1.3.6.9 Degree of Collaboration of IICB's Authors

The degrees of collaboration of authors of IICB are given in the **Table- 6.115.**

Table- 6.115: Degree of Collaboration Authors of IICB

Year	Authorship Pattern		(S_n + M_n)	Degree of Collaboration (DC)
	Single (S_n)	Multiple (M_n)		
2007	1	141	142	0.99
2008	2	151	153	0.99
2009	0	142	142	1.00
2010	2	154	156	0.99
2011	0	178	178	1.00
2012	1	213	214	0.99
2013	1	221	222	0.99
2014	2	253	255	0.99
2015	3	214	217	0.98
2016	0	90	90	1.00
Total	**12**	**1757**	**1769**	**0.99**

Source: Exported from the SCOPUS Database (23-05-2016)

The **Table- 6.115** indicates that average number of degree of collaboration is 0.99 and the range for degree of collaboration started from 0.98 to 1.00. Maximum number of Degree of Collaboration occurred in 2009, 2011 and 2016 with 1.00 and lowest in 2015 with 0.98.

6.1.3.7 Analysis of the Publication Trends by the Scientists of Institute of Minerals and Materials Technology (IMMT), Bhubaneswar

6.1.3.7.1 Yearly Distribution of Publications of IMMT

The **Table- 6.116** indicates the year wise distribution of the publications of IMMT, Bhubaneswar.

Table- 6.116: Yearly Distribution of Publications of IMMT

Sl. No.	Year	No. of Publications	Percentage %
1.	2007	16	1.43
2.	2008	59	5.27
3.	2009	106	9.46
4.	2010	108	9.64
5.	2011	131	11.70
6.	2012	163	14.55
7.	2013	158	14.11
8.	2014	180	16.07
9.	2015	138	12.32
10.	2016	61	5.45
	Total	**1120**	**100%**

Source: Exported from the SCOPUS Database (23-05-2016)

The **Table- 6.116** shows yearly distribution of publications of IMMT, Bhubaneswar Since 2007 to 23rd May, 2016. Total number of 1120 paper has been published during this period. The study reveals that in the year 2014 highest number of 180 (16.07%) paper has been published from IMMT which holds the rank one followed by 163 (14.55%) papers published in 2012, 158 (14.11%) in 2013, 138 (12.32%) in 2015 and 131 (11.70%) papers has been published in 2011 which were ranked as two, three, four and five respectively.

6.1.3.7.2 Subject Area Wise Distribution of Publications of IMMT

The **Table- 6.117** discusses about the subject area wise distribution of publications of the scientists working at IMMT, Bhubaneswar.

Table- 6.117: Subject Area Wise Distribution of Publication of IMMT

Subject Area	No. of Publications (N=1120)	Percentage %	Rank
Materials Science	412	37.59	I
Engineering	331	29.55	II
Chemistry	326	29.11	III
Chemical Engineering	289	25.80	IV
Physics and Astronomy	233	20.80	V
Earth and Planetary Sciences	166	14.82	VI
Environmental Science	159	14.20	VII
Energy	97	8.66	VIII
Biochemistry, Genetics and Molecular Biology	66	5.89	IX
Agricultural and Biological Sciences	55	4.91	X
Medicine	39	3.48	XI
Computer Science	25	2.23	XII
Immunology and Microbiology	18	1.61	XIII
Mathematics	17	1.52	XIV
2 subjects 12 publications each	12	1.07	XV
Social Sciences	10	0.90	XVI
Health Professions	5	0.45	XVII
Multidisciplinary	4	0.36	XVIII
Arts and Humanities	3	0.27	XIX
5 subjects 1 publication each	1	0.089	XX

Source: Exported from the SCOPUS Database (23-05-2016)

The study indicated that the maximum number of 412 (37.59%) papers has been published in the area of Material Science, followed by Engineering 331 (29.55%), Chemistry 326 (29.11%), Chemical engineering 289 (25.80%), and Physics and Astronomy 233 (20.80%) publications which were ranked as one, two, three, four and five in the list.

6.1.3.7.3 Source Type Wise Distribution of Publications of IMMT

The **Table- 6.118** indicates the source wise distribution of publications of IMMT.

Table- 6.118: Source Type Wise Distribution of Publications of IMMT

Source Title	No. of Publications (N=1120)	Percentage %	Rank
Hydrometallurgy	28	2.5	I
RSC Advances	21	1.88	II
Transactions of the Indian Institute of Metals	20	1.79	III
Powder Technology	18	1.61	IV
Journal of Hazardous Materials	17	1.52	V
3 sources 15 publications each	15	1.34	VI
Industrial and Engineering Chemistry Research	14	1.25	VII
2 sources 13 publications each	13	1.16	VIII
International Journal of Mineral Processing	12	1.07	IX
2 sources 11 publications each	11	0.98	X
Journal of the Geological Society of India	10	0.89	XI
3 sources 9 publications each	9	0.80	XII
11 sources 8 publications each	8	0.71	XIII
10 sources 7 publications each	7	0.62	XIV
14 sources 6 publications each	6	0.54	XV
16 sources 5 publications each	5	0.45	XVI
15 sources 4 publications each	4	0.36	XVII
29 sources 3 publications each	3	0.27	XVIII
41 sources 2 publications each	2	0.18	XIX

Source: Exported from the SCOPUS Database (23-05-2016)

From the **Table- 6.118** reveals that the highest number of 28 (2.5%) papers have been published in Hydrometallurgy, in RSC Advances 21 (1.88%) and Transactions of the Indian Institute of Metals 20 (1.79%) of the total publication which were ranked as one, two and three in the list.

The rest of the papers has been published in Powder Technology 18 (1.61%), Journal of Hazardous Materials 17 (1.52%), 3 sources 15 publications each 1.34%,

Industrial and Engineering Chemistry Research 14 (1.25%), 2 sources 13 publications each having 1.16%, International Journal of Mineral Processing 12 (1.07%), 2 sources 11 publications each having 0.98%, Journal of the Geological Society of India 10 (0.89%), 3 sources 9 publications each having 0.80%, 11 sources 8 publications each having 0.71%, 10 sources 7 publications each having 0.62%, 14 sources 6 publications each having 0.54%, 16 sources 5 publications each having 0.45%, 15 sources 4 publications each having 0.36%, 29 sources 3 publications each having 0.27% a and 41 sources 2 publications each having 0.1%. So, from the above analysis it has been found that highest number of papers was published in Hydrometallurgy.

6.1.3.7.4 Document Type Wise Distribution of Publications of IMMT

The document type wise distribution of publications of IIMT's scientists is shown in the **Table- 6.119**.

Table- 6.119: Document Type Wise Distribution of Publications of IMMT

Sl. No.	Document Type	No. of Publications	Percentage %
1.	Article	962	85.90
2.	Conference Paper	98	8.75
3.	Article in Press	25	2.23
4.	Review	17	1.52
5.	Book Chapter	11	0.98
6.	Erratum	4	0.36
7.	Book	1	0.089
8.	Editorial	1	0.089
9.	Letter	1	0.089
	Total	**1120**	**100%**

Source: Exported from the SCOPUS Database (23-05-2016)

The **Table- 6.119** shows that the total number of 962 (85.90%) document has been published in journal as articles. The rest of the document published in Conference paper 98 (8.75%), Article in press 25 (2.23%), review 17 (1.52%), Book chapter 11 (0.98%), Erratum 4 (0.36%) and book, editorial and letter 1 (0.089%).

6.1.3.7.5 Country Wise Distribution of Publications of IIMT

The **Table- 6.120** identified the countries where scientists of the IMMT have published maximum number of papers.

Table- 6.120: Country Wise Distribution of Publications of IMMT

Country	No. of Publications (N=1120)	Percentage %	Rank
India	1103	98.48	I
South Korea	32	2.86	II
Australia	29	2.59	III
United States	24	2.14	IV
South Africa	23	2.05	V
Germany	18	1.61	VI
Japan	11	0.98	VII
Nigeria	10	0.89	VIII
United Kingdom	10	0.89	VIII
Taiwan	8	0.71	IX
Canada	7	0.62	X
Sweden	6	0.54	XI
2 countries 5 publications each	5	0.45	XII
Brazil	4	0.36	XIII
4 countries 3 publications each	3	0.27	XIV
5 countries 2 publications each	2	0.18	XV
15 countries 1 publication each	1	0.089	XVI

Source: Exported from the SCOPUS Database (23-05-2016)

The **Table- 6.120** shows that highest number of 1103 (98.48%) documents have been published in India followed by 32 (2.86%) in South Korea, 29 (2.59%) in Australia and 24 (2.14%) papers have been published from United States which were ranked as one, two, three and four in the list. The rest of the countries are South Africa with 23 (2.05%) publications, Germany with 18 (1.61%) publications, Japan 11 (0.98%), Nigeria and United Kingdom have 10 (0.89%) publications each, Taiwan with 8 (0.71%), Canada 7 (0.62%) and Sweden with 6 (0.54%) publications ranking as six, seven, eight, nine, ten and eleven in the list.

6.1.3.7.6 Most Productive Authors of IMMT

The **Table- 6.121** shows the most productive authors of IMMT from 2007 to 23rd May, 2016 as archived in the SCOPUS database.

Table- 6.121: Most Productive Authors of IMMT

Author Name	No. of Publications (N=1120)	Percentage %	Rank
Mishra, B.K.	129	11.52	I
Parida, K.M.	140	12.5	II
Mishra, B.K.	63	5.63	III
Anand, S.	53	4.73	IV
Sukla, L.B.	49	4.38	V
Singh, S.K.	48	4.29	VI
Mohapatra, M.	46	4.11	VII
Pradhan, N.	42	3.75	VIII
Mishra, D.K.	39	3.48	IX
Mohapatra, B.K.	39	3.48	IX
Das, B.	37	3.30	X

Source: Exported from the SCOPUS Database (23-05-2016)

The **Table- 6.121** reveals that the most productive author was Parida, K.M. with 129 (12.5%) publications, follwed by Mishra, B.K. 140 (11.52%), Mishra, B.K. 63 (5.63%) and Anand, S. with 53 (4.73%) publications ranking as one, two, three and four. The other productive authors were Sukla, L.B. with 49 (4.38%) publications,

Singh, S.K. with 48 (4.29%), Mohapatra, M. with 46 (4.11%), Pradhan, N. 42 (3.75%), Mishra, D.K. 39 (3.48%), Mohapatra, B.K. with 39 (3.48%) publications and Das, B. with 37(3.30%) publications.

6.1.3.7.7 Distribution of Publications of IMMT by Affiliation

The **Table- 6.122** shows the Affiliated Institute wise publications of IMMT's scientists.

Table- 6.122: Distribution of Publications of IMMT by Affiliation

Affiliation	No. of Publications (N=1120)	Percentage %	Rank
Institute of Minerals and Materials Technology India	1056	94.29	I
Indian Institute of Technology Bhubaneswar	49	4.38	II
Council of Scientific and Industrial Research India	42	3.75	III
Siksha O Anusandhan University	37	3.30	IV
Utkal University	31	2.77	V
Institute of Physics Bhubaneswar	28	2.5	VI
National Institute of Technology Rourkela	27	2.41	VII
Kalinga Institute of Industrial Technology, Bhubaneswar	26	2.32	VIII
Indian Institute of Technology, Kharagpur	24	2.14	IX
Korea Institute of Geoscience and Mineral Resources	23	2.05	X
2 institutions 21 publications each	21	1.88	XI
2 institutions 19 publications each	19	1.69	XII
2 institutions 13 publications each	13	1.16	XIII
Indian Institute of Chemical Technology	12	1.07	XIV
North Orissa University	10	0.89	XV
2 institution 9 publications each	9	0.80	XVI
9 institutions 8 publications each	8	0.71	XVII
7 institutions 7 publications each	7	0.62	XVIII
9 institutions 6 publications each	6	0.54	XIX
9 institutions 5 publications each	5	0.45	XX
20 institutions 4 publications each	4	0.36	XXI
34 institutions 3 publications each	3	0.27	XXII
52 institutions 32 publications each	2	0.18	XXIII

Source: Exported from the SCOPUS Database (23-05-2016)

From the **Table- 6.122** it was found that IMMT individually published 1056 numbers of papers which was 94.29% of the total publications and ranking as one in the list. IIT, Bhubaneswar publishes 49 (4.39%) papers collaborating with IICB ranking as two followed by CSIR with 42 (3.75%) of publications and it was ranking as three.

The other high rank affiliated institutions in terms of publication are Siksha O Anusandhan University 37 (3.30%) publications, Utkal University 31 (2.77%), Institute of Physics Bhubaneswar 28 (2.5%), National Institute of Technology Rourkela 27 (2.41%), Kalinga Institute of Industrial Technology, Bhubaneswar 26 (2.32%), Indian Institute of Technology, Kharagpur 24 (2.14%) and Korea Institute of Geoscience and Mineral Resources with 23 (2.05%) publications.

6.1.3.7.8 Top Ten Highly Cited authors of IMMT

The top ten highly cited authors of IMMT are listed in the **Table- 6.123**.

Table- 6.123: Top Ten Highly Cited Authors of IMMT

Authors	Cited by	Rank
Mohapatra M., Anand S., Mishra B.K., Giles D.E., Singh P.	232	I
Sundaray S.K., Nayak B.B., Lin S., Bhatta D.	146	II
Parida K.M., Sahu N.	144	III
Pradhan N., Nathsarma K.C., Srinivasa Rao K., Sukla L.B., Mishra B.K.	135	IV
Giles D.E., Mohapatra M., Issa T.B., Anand S., Singh P.	99	V
Baral S.S., Das N., Ramulu T.S., Sahoo S.K., Das S.N., Chaudhury G.R.	97	VI
Naik B., Parida K.M., Gopinath C.S.	90	VII
Parida K.M., Reddy K.H., Martha S., Das D.P., Biswal N.	88	VIII
Parida K.M., Sahu N., Biswal N.R., Naik B., Pradhan A.C.	84	IX
Pradhan G.K., Parida K.M.	83	X

Source: Exported from the SCOPUS Database (23-05-2016)

The **Table- 6.123** identified the most cited authors of IMMT were Mohapatra M., Anand S., Mishra B.K., Giles D.E., Singh P. with 232 citations ranking as one,

followed by Sundaray S.K., Nayak B.B., Lin S., Bhatta D. with 146 citation ranking as two, Parida K.M., Sahu N. with 144 citations, Pradhan N., Nathsarma K.C., Srinivasa Rao K., Sukla L.B., Mishra B.K. with 135 citations, Giles D.E., Mohapatra M., Issa T.B., Anand S., Singh P. 99 citations, Baral S.S., Das N., Ramulu T.S., Sahoo S.K., Das S.N., Chaudhury G.R. 97 citations, Naik B., Parida K.M., Gopinath C.S. 90 citations, Parida K.M., Reddy K.H., Martha S., Das D.P., Biswal N. with 88 citations, Parida K.M., Sahu N., Biswal N.R., Naik B., Pradhan A.C. 84 citations and Pradhan G.K., Parida K.M. with 83 citations.

6.1.3.7.9 Degree of Collaboration of the authors of IMMT

The **Table- 6.124** elucidated the degree of collaboration of the authors of IMMT.

Table- 6.124: Degree of Collaboration (IMMT)

Year	Authorship Pattern		(S_n + M_n)	Degree of Collaboration (DC)
	Single (S_n)	Multiple (M_n)		
2007	1	15	16	0.93
2008	4	55	59	0.93
2009	4	102	106	0.96
2010	2	106	108	0.98
2011	1	130	131	0.99
2012	2	161	163	0.99
2013	4	154	158	0.97
2014	3	177	180	0.98
2015	4	134	138	0.97
2016	1	60	61	0.98
Total	**26**	**1094**	**1120**	**0.98**

Source: Exported from the SCOPUS Database (23-05-2016)

The **Table- 6.124** indicates that average number of is 0.98 and the range for degree of collaboration started from 0.93 to 0.99. Maximum number of Degree of

Collaboration occurred in 2011 and 2012 with 0.99 and lowest in 2007 and 2008 with 0.91.

6.1.3.8. Analysis of the Publication Trends by the Scientists of National Metallurgical Laboratory (NML), Jamshedpur

6.1.3.8.1 Yearly Distribution of Publications of NML

The **Table- 6.125** shows the year wise publications of the scientists of the NML, Jamshedpur from 2007 to 23rd May, 2016.

Table- 6.125: Yearly Distribution of Publications of NML

Sl. No.	Year	No. of Publications	Percentage %
1.	2007	123	11.09
2.	2008	107	9.65
3.	2009	107	9.65
4.	2010	122	11.00
5.	2011	104	9.38
6.	2012	122	11.00
7.	2013	146	13.17
8.	2014	137	12.35
9.	2015	96	8.66
10.	2016	45	4.06
Total		**1109**	**100%**

Source: Exported from the SCOPUS Database (23-05-2016)

The **Table- 6.125** shows yearly distribution of publication from NML, Jamshedpur since 2007 to 23rd May, 2016. Total number of 1109 papers has been published from NML during the period. The highest number of 146 (13.17%) papers has been published in the year 2013 followed by 137 (12.35%) in 2014, 123 (11.09%) in 2007, 122 (11%) in 2010 and 2012, 107 (9.65%) in 2008, and 2009, 104 (9.38%) in 2011, 96 (8.66%) in 2015 and 45 (4.06%) publications in 2016.

6.1.3.8.2 Subject Wise Distribution of Publications of NML

The **Table- 6.126** discusses about the subject area wise distribution of publications of NML.

Table- 6.126: Subject Area Wise Distribution of Publications of NML

Subject Area	No. of Publications (N=1109)	Percentage %	Rank
Materials Science	715	64.47	I
Engineering	537	48.42	II
Physics and Astronomy	351	31.65	III
Chemistry	158	14.25	IV
Chemical Engineering	130	11.72	V
Earth and Planetary Sciences	108	9.74	VI
Environmental Science	57	5.14	VII
Energy	40	3.61	VIII
Computer Science	31	2.80	IX
Biochemistry, Genetics and Molecular Biology	29	2.61	X
Mathematics	22	1.98	XI
Pharmacology, Toxicology and Pharmaceutics	16	1.44	XII
Medicine	15	1.35	XIII
Business, Management and Accounting	12	1.08	XIV
Social Sciences	6	0.54	XV
Multidisciplinary	4	0.36	XVI
Economics, Econometrics and Finance	3	0.27	XVII
3 subjects 2 publications each	2	0.18	XVIII
Decision Sciences	1	0.09	XIX

Source: Exported from the SCOPUS Database (23-05-2016)

From the table it has been found that 715 (64.47%) documents of NML has been published in Material science which was ranked as one, followed by 715 (48.42%) paper published in Engineering, 351 (31.65%) papers has been published in Physics and Astronomy, Chemistry 158 (14.25%), Chemical Engineering 130 (11.72%), Earth and Planetary Sciences 108 (9.74%), Environmental Science 57 (5.14%), Energy 40 (3.61%), Computer Science 31 (2.80%), Biochemistry, Genetics and Molecular Biology with 29 (2.61%) publications which were ranked as two, three, four, five, six, seven, eight, nine and ten in the list.

The other subjects like Mathematics have 22 (1.98%),Pharmacology,Toxicology and Pharmaceutics 16 (1.44%), Medicine 15 (1.35%), Business, Management and Accounting 12 (1.08%), Social Sciences 6 (0.54%), Multidisciplinary 4 (0.36%), Economics, Econometrics and Finance 3 (0.27%), 3 subjects 2 publications each having 0.18% and Decision Sciences have 1 (0.09%) publication.

6.1.3.8.3 Source Wise Distribution of Publications of NML

The **Table- 6.127** shows the source wise distribution of publications of the NML's scientists.

Table- 6.127: Source Wise Distribution of Publications of NML

Source Title	No. of Publications (N=1109)	Percentage %	Rank
Materials Science and Engineering	91	8.21	I
Hydrometallurgy	39	3.52	II
A Physical Metallurgy and Materials Science Metallurgical and Materials Transactions	39	3.52	II
Transactions of the Indian Institute of Metals	30	2.71	III
Journal of Magnetism and Magnetic Materials	21	1.89	IV
3 sources 17 publications each	17	1.53	V
Journal of Hazardous Materials	15	1.35	VI
4 sources 14 publications each	14	1.26	VII
3 sources 13 publications each	13	1.17	VIII
5 sources 12 publications each	12	1.08	IX
3 sources 11 publications each	11	0.99	X
2 sources 10 publications each	10	0.90	XI
6 sources 9 publications each	9	0.81	XII
4 sources 8 publications each	8	0.72	XIII
4 sources 7 publications each	7	0.63	XIV
5 sources 6 publications each	6	0.54	XV
9 sources 5 publications each	5	0.45	XVI
11 sources 4 publications each	4	0.36	XVII
29 sources 3 publications each	3	0.27	XVIII
35 sources 2 publications each	2	0.18	XIX
20 sources 1 publication each	1	0.09	XX

Source: Exported from the SCOPUS Database (23-05-2016)

From the table is found that in the journal Materials Science and Engineering A 91 (8.21%) paper has been published which was ranked as one. In Hydrometallurgy and Metallurgical and Materials Transactions A Physical Metallurgy and Materials Science 39 (3.52%) paper has been published which was ranked as two. The other sources like Transactions of the Indian Institute of Metals have 30 (2.71%) publications ranked as three and Journal of Magnetism and Magnetic Materials with 21 (1.89%) publications has securing the rank four.

So, from the above study it has been indicated that the maximum number of publications of NML were published in the journal Material Science and Engineering.

6.1.3.8.4 Document Type Wise Distribution of Publications of NML

The **Table- 6.128** indicated about the document type wise distribution of the publications of NML's scientists.

Table- 6.128: Document Type Wise Distribution of Publications of NML

Sl. No.	Document Type	No. of Publications	Percentage %
1.	Article	871	78.54
2.	Conference Paper	177	15.96
3.	Review	25	2.25
4.	Article in Press	19	1.71
5.	Book Chapter	8	0.72
6.	Erratum	5	0.45
7.	Editorial	2	0.18
8.	Book	1	0.09
9.	Note	1	0.09
	Total	**1109**	

Source: Exported from the SCOPUS Database (23-05-2016)

From the **Table- 6.128** it was found that maximum number of 871 (78.54%) documents has been published as journal article from NML, Jamshedpur followed by 177 (5.96%) published as Conference paper, 25 (2.25%) published as review, 19 (1.71%) as Article in press, 8 (0.72%) was published in book chapters, 5 (0.45%) as erratum, 2 (0.18%) as editorial, 1 (0.09%) published as book and note.

6.1.3.8.5 Country Wise Distribution of Publications of NML

Table- 6.129: Country Wise Distribution of Publications of NML

Country	No. of Publications (N=1109)	Percentage %	Rank
India	1094	98.65	I
United States	*67*	6.04	II
South Korea	62	5.59	III
Germany	56	5.04	IV
United Kingdom	19	1.71	V
Russian Federation	14	1.26	VI
Finland	8	0.72	VII
2 countries 7 publications each	7	0.63	VIII
2 countries 6 publications each	6	0.54	IX
4 countries 5 publications each	5	0.45	X
3 countries 4 publications each	4	0.36	XI
2 countries 3 publications each	3	0.27	XII
6 countries 2 publications each	2	0.18	XIII
16 countries 1 publication each	1	0.09	XIV

Source: Exported from the SCOPUS Database (23-05-2016)

The Table- **6.129** shows that the scientists of NML has publishes highest number of 1094 (98.65%) documents in India followed by United States 64 (6.04%), South Korea 62 (5.59%), Germany 56 (5.04%) of publications, United Kingdom 19 (1.71%), Russian Federation 14 (1.26%), Finland 8 (0.72%), 2 countries 7 publications each with 0.63%, 2 countries 6 publications each with 0.54%, 4 countries 5 publications each with 0.45%, 3 countries 4 publications each with 0.36%, 2 countries 3 publications

each with 0.27%, 6 countries 2 publications each with 0.18% and 16 countries 1 publication each 0.09% which were ranked as one, two, three, four, five, six, seven, eight, nine, eleven, twelve, thirteen and fourteen in the table.

6.1.3.8.6 Most Productive Authors of NML

The most productive authors of NML are identified in the **Table- 6.130**.

Table- 6.130: Most Productive Authors of NML

Author Name	No. of Publications (N=1109)	Percentage %	Rank
Tarafder, S.	75	6.76	I
Pandey, B.D.	67	6.04	II
Sivaprasad, S.	65	5.86	III
Mitra, A.	61	5.50	IV
Panda, A.K.	60	5.41	V
Ghosh, M.	58	5.23	VI
Mishra, S.K.	40	3.61	VII
Das, G.	39	3.52	VIII
Ghosh, R.N.	37	3.34	IX
Jha, M.K.	37	3.34	IX
Das, S.K.	37	3.34	IX
Roy, R.K.	36	3.25	X

Source: Exported from the SCOPUS Database (23-05-2016)

The most renowned authors from NML were Tarafder, S. with 75 (6.76%) publications, Pandey, B.D. with 67 (6.04%), Sivaprasad, S. with 64 (5.86%), Mitra, A. with 61 (5.50%) publications, Panda, A.K. with 60 (5.41%) publications, Ghosh, M. with 58 (5.23%), Mishra, S.K. 40 (3.61%), Das, G. 39 (3.52%), Ghosh, R.N. 37 (3.34%), Jha, M.K. 37(3.34%), Das, S.K. 37(3.34%) and Roy, R.K. with 36 (3.25%) publications have secured the rank one, two, three, four, five, six, seven, eight, nine and ten in the table. Hence the most productive authors from NML, Jamshedpur was Tarafder, S.

6.1.3.8.7 Distribution of Publications of NML by Affiliation

The **Table- 6.131** reveals the distribution of publications of NML's scientists by affiliated institutions.

Table- 6.131: Distribution of Publications of NML by Affiliation

Affiliation	No. of Publications (N=1109)	Percentage %	Rank
National Metallurgical Laboratory India	1041	99.55	I
Indian Institute of Technology, Kharagpur	82	7.39	II
Council of Scientific and Industrial Research India	72	6.49	III
Jadavpur University	72	6.49	III
Korea Institute of Geoscience and Mineral Resources	53	4.78	IV
Tata Iron & Steel Company Limited	32	2.89	V
Bengal Engineering and Science University	30	2.71	VI
Banaras Hindu University	28	2.52	VII
Indian Institute of Technology, Kanpur	28	2.52	VII
Bhabha Atomic Research Centre	24	2.16	VIII
2 institutions 18 publications each	18	1.62	IX
Defence Metallurgical Research Lab India	14	1.26	X
2 institutions 13 publications each	13	1.17	XI
3 institutions 12 publications each	12	1.08	XII
3 institutions 11 publications each	11	0.99	XIII
4 institutions 10 publications each	10	0.90	XIV
6 institutions 9 publications each	9	0.81	XV
4 institutions 8 publications each	8	0.72	XVI
5 institutions 7 publications each	7	0.63	XVII
6 institutions 6 publications each	6	0.54	XVIII
9 institutions 5 publications each	5	0.45	XIX
20 institutions 4 publications each	4	0.36	XX
29 institutions 3 publications each	3	0.27	XXI

From the Table- 6.131 it was found that NML individually published 1041 numbers of papers which is 99.55% of the total publications and rank in one position followed by IIT, Kharagpur publishes 82 (7.39%) papers collaborating with IICB, CSIR and Jadavpur University with 72 (6.49%) publications were ranked as two and three.

6.1.3.8.8 Top Ten Highly Cited Authors from NML

The top ten highly cited authors from NML are shown in the **Table- 6.132**.

Table- 6.132: Top Ten Highly Cited Authors of NML

Authors	Cited by	Rank
Mohanty A., Garg N., Jin R.	151	I
Balaz P., Achimovicova M., Balaz M., Billik P., Cherkezova-Zheleva Z., Criado J.M., Delogu F., Dutkova E., Gaffet E., Gotor F.J., Kumar R., Mitov I., Rojac T., Senna M., Streletskii A., Wieczorek-Ciurowa K.	144	II
Singh R., Dahotre N.B.	106	III
Kumar S., Kumar R., Mehrotra S.P.	90	IV
Dhal B., Thatoi H.N., Das N.N., Pandey B.D.	85	V
Kumar R., Kumar S., Mehrotra S.P.	80	VI
Tran N., Mir A., Mallik D., Sinha A., Nayar S., Webster T.J.	78	VII
Kumar S., Kumar R., Bandopadhyay A., Alex T.C., Ravi Kumar B., Das S.K., Mehrotra S.P.	75	VIII
Chakravarty S., Mohanty A., Sudha T.N., Upadhyay A.K., Konar J., Sircar J.K., Madhukar A., Gupta K.K.	74	IX
Lee J.-C., Pandey B.D.	73	X

Source: Exported from the SCOPUS Database (23-05-2016)

The highly cited authors of NML were Mohanty A., Garg N., Jin R. with 151 citations. Balaz P., Achimovicova M., Balaz M., Billik P., Cherkezova-Zheleva Z., Criado J.M., Delogu F., Dutkova E., Gaffet E., Gotor F.J., Kumar R., Mitov I., Rojac T., Senna M., Streletskii A., Wieczorek-Ciurowa K. have received 144 citations and Singh R., Dahotre N.B. has received 106 number of citations have secured the rank one, two and three.

The other highly cited authors were Kumar S., Kumar R., Mehrotra S.P. with 90 citations, Dhal B., Thatoi H.N., Das N.N., Pandey B.D. with 85 citations, Kumar R.,

Kumar S., Mehrotra S.P. with 80, Tran N., Mir A., Mallik D., Sinha A., Nayar S., Webster T.J. with 78 citations, Kumar S., Kumar R., Bandopadhyay A., Alex T.C., Ravi Kumar B., Das S.K., Mehrotra S.P. with 75 citations, Chakravarty S., Mohanty A., Sudha T.N., Upadhyay A.K., Konar J., Sircar J.K., Madhukar A., Gupta K.K. with 74 citations and Lee J.-C., Pandey B.D. with 73 citations securing the rank four, five, six, seven, eight, nine and ten.

6.1.3.8.9 Degree of Collaboration of the NML's Authors

The **Table- 6.133** elucidated the degree of collaboration of the authors of NML, Jamshedpur.

Table- 6.133: Degree of Collaboration of NML

Year	Authorship Pattern		(S_n + M_n)	Degree of Collaboration (DC)
	Single (S_n)	Multiple (M_n)		
2007	0	123	123	1.00
2008	4	103	107	0.96
2009	2	105	107	0.98
2010	2	120	122	0.98
2011	8	96	104	0.92
2012	5	117	122	0.96
2013	5	141	146	0.97
2014	6	131	137	0.96
2015	6	90	96	0.94
2016	1	44	45	0.97
Total	**39**	**1070**	**1109**	**0.96**

Source: Exported from the SCOPUS Database (23-05-2016)

The **Table- 6.133** Indicates that average number of degree of collaboration was 0.96 and the range for degree of collaboration started from 0.92 to 1.00. Maximum number of Degree of Collaboration occurred in 2007with 1.00 and lowest in 2011 with 0.92.

6.1.3.9 Overall Analysis of the Trend of Publications of CSIR Laboratories of Northeast and Eastern India:

In this section, the research scholar has merged the some of the surveyed data of all the seven laboratories to find out the overall publication trend of the scientists.

6.1.3.9.1 Year Wise Distribution of Publications of CSIR Laboratories of Northeast and Eastern India

Table- 6.134: Yearly Distribution of Publications of CSIR Laboratories of Northeast and Eastern India

Year	Number of Publications	Percentage (%)
2007	408	5.6
2008	527	7.24
2009	650	8.92
2010	698	9.58
2011	779	10.69
2012	882	12.11
2013	951	13.06
2014	1064	14.61
2015	912	12.52
2016	413	5.67
Total	**7284**	**100.00**

Source: Exported from the SCOPUS Database (23-05-2016)

The **Table- 6.134** reveals the yearly publications of the selected CSIR laboratories under study. From the table it has been found that altogether the selected seven CSIR laboratories of Northeast and Eastern India have 7,284 publications from 2007 to 23rd May, 2016. Out of 7,284 publications 1064 (14.61%) papers have been published in 2014 followed by 951 (13.06%) in 2013, 912 (12.52%) in 2015, 882 (12.11%), 779 (10.69%) in 2011, 698 (9.58%) in 2010, 650 (8.92%) in 2009, 527 (7.24%) in 2008, 413 (5.67%) in 2016 and 408 (5.6%) papers have been published in 2007.

Hence, from the table it has been observed that maximum numbers of papers of selected laboratories of CSIR were published in the year 2014.

6.1.3.9.2 Document Type Wise Distribution of Publications of CSIR Laboratories of Northeast and Eastern India

The **Table- 6.135** shows the document type wise distribution of publications of Northeast and Eastern India.

Table- 6.135: Document Type Wise Distribution of Publications

Document Type	Number of Publications	Percentage (%)	Rank
Article	6083	83.51	I
Book Chapter	78	1.07	IV
Conference Paper	727	9.98	II
Article in Press	107	1.47	IV
Review	210	2.88	III
Erratum	28	0.38	V
Letter	28	0.38	V
Editorial	16	0.22	VI
Book	7	0.09	VII
Total	**7284**	**100.00**	

Source: Exported from the SCOPUS Database (23-05-2016)

From the **Table- 6.135** it has been observed that the scientists of CSIR laboratories of North East and Eastern India were largely published their documents in Article Form with 6083 (83.51%) publications followed by 727 (9.98%) in Conference paper, 210 (2.88%) in Review, 78 (1.07%) in Book chapter, 28 (0.38%) in Erratum and Letter, 16 (0.22%) in Editorial and 1 (0.09%) documents were published as a book ranking as one, two, three, four, five, six and seven.

6.1.3.9.3 Degree of Collaboration of the Authors

The Degree of Collaboration of the authors of CSIR laboratories of Northeast and Eastern India are shown in the **Table- 6.136**.

Table- 6.136: Degree of Collaboration

Year	Single Author S_n	Multiple Authors M_n	S_n+ M_n	Degree of Collaboration (DC)
2007	7	401	408	0.98
2008	25	502	527	0.95
2009	19	631	650	0.97
2010	19	679	698	0.97
2011	29	750	779	0.96
2012	19	863	882	0.98
2013	23	928	951	0.96
2014	21	1043	1064	0.98
2015	19	893	912	0.98
2016	8	405	413	0.98
Total	**189**	**7095**	**7284**	**0.97**

Source: Exported from the SCOPUS Database (23-05-2016)

The **Table- 6.136** Indicates that average number of degree of collaboration was 0.97 and the range for degree of collaboration of the CSIR laboratories of North East and Eastern India started from 0.95 to 0.98. Maximum number of Degree of Collaboration occurred in 2007with 0.98 and lowest in 2011 with 0.95.

6.1.3.9.4 Most Productive Authors of CSIR Laboratories of Northeast and Eastern India

The most productive authors among the CSIR Laboratories of Northeast and Eastern India are given in the **Table- 6.137**.

Table- 6.137: Most Productive Authors of CSIR Laboratories of Northeast and Eastern India

Sl. No.	Author Name	No. of Publications (N=7284)	Percentage (%)	Rank
1.	Parida, K.M.	140	1.92	I
2.	Bhadra, S.K.	133	1.83	II
3.	Mishra, B.K.	129	1.77	III
4.	Pal, M	127	1.74	IV
5.	Paul, M.C.	99	1.36	V
6.	Karmakar, B.	95	1.30	VI
7.	Kumar, G.S.	88	1.21	VII
8.	Basu, D.	80	1.10	VIII
9.	Tarafder, S.	75	1.03	IX
10.	Mukhopadhyay, A.K.	74	1.02	X

Source: Exported from the SCOPUS Database (23-05-2016)

The **Table- 6.137** shows that amongst the authors from CSIR Laboratories of Northeast and Eastern India Parida, K.M. was the most productive author with 140 (1.92%) publications secured the rank one. The other productive authors were Bhadra, S.K. with 133 (1.83%), Mishra, B.K. with 129 (1.77%), Pal, M with 127 (1.74%), Paul, M.C. with 99 (1.36%), Karmakar, B. with 95 (1.30%), Kumar, G.S. with 88 (1.21%), Basu, D. with 80 (1.10%), Tarafder, S. with 75 (1.03%) and Mukhopadhyay, A.K. with 74 (1.02%) publications have secured two, three, four, five, six, seven, eight, nine and ten in the list.

6.1.3.1.5 Laboratory Wise Citation Used by the Authors

The **Table- 6.138** have discusses about the Laboratory wise number of references from journals have been consulted by the authors of CSIR Laboratories of Northeast and Eastern India.

Table- 6.138: Laboratory Wise Citation Used by the Authors

Sl. No.	Name of the Laboratory	Number of Citation Used (N=92814)	Percentage (%)
1	NEIST	9630	10.38
2	CGCRI	17808	19.19
3	CIMFR	7170	7.73
4	CMERI	10230	11.02
5	IICB	21228	22.87
6	IMMT	13440	14.48
7	NML	13308	14.34
	Total	**92814**	**100%**

Source: Collected from the SCOPUS Database (23-05-2016)

From the **Table- 6.128** it has been observed that 21228 (22.87%) journal citations have been used by the scientists of IICB, 17808 (19.19%) citations used by the scientists of CGCRI, IMMT used 13440 (14.48%) citations, NML used 13308 (14.34%) citations, CMERI used 10230 (11.02%) citations, NEIST used 9630 (10.38%) citations and the authors of CIMFR have used 7170 (7.73%) citations from the total of 92, 814 citations.

6.2 CONCLUSION

The present chapter was the analysis and interpretations of the data that has been collected during survey. This chapter has been divided into three parts which was analysis of responses received from the Librarian/ Librarian In- charge, analysis of the responses received from the scientists and Bibliometric analysis of the research output of the scientists. All the analysis and interpretation mentioned in this chapter has give a clear picture about the facilities, activities of the KRC's, information use pattern by the scientists and publication trends of the scientists of selected CSIR Laboratories of Northeast and Eastern India. The important findings, suggestions and recommendations have been given in the next chapter **(Chapter- 7)**.