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Utilisation of Scholarly Communication through DRDO E-journal Consortium during 2012-2017

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ABSTRACT

Timely, speedy dissemination of latest information is the benchmark of any information and documentation center, but utilisation of e-journals is an important factor for its significance and cost effectiveness. However, in R&D community especially for defence R&D, where scientists are involved in core technology areas, value of information is more important instead of its utilisation. The aim of the study is to find out the utilisation of e-journals with cost effectiveness under Consortium, which was established in the year 2009 for resource sharing among DRDO labs with least expenses. The data was analysed for the period 2011-2017 to know the current trends of utilisation under Consortium. Feedbacks and suggestions were collected from all DRDO users to evaluate the importance of information and its effectiveness. The study shows that productivity of DRDO scientists in publications were increased in high impact factor journal and majority of scientists preferred e-journals instead of print subscriptions.

Keywords: Consortium; E-journal consortium; Electronic resources; Library consortium; Consortium model; Cost effectiveness; DRDO consortium; Resource sharing

1. INTRODUCTION

Defence Research and Development Organisation (DRDO) is a premier R&D organisation working in various areas of military technology. It has 58 laboratories across India and more than 7000 Scientists are working in multi-disciplinary subject areas. Each DRDO laboratory has an independent and well established library and information center called Technical Information and Resource Center (TIRC) that is also backed up with strategic information support from Defence Scientific Information and Documentation Centre (DESIDOC), a constituent establishment of DRDO. A consortium is made for high quality, cost effective, sharing of resources and collaboration of shared goals. Looking at the developments in national and international scenario and the success of INDEST-AICTE and CSIR-DST consortia in meeting the multifarious information requirements of their users, it was felt that a similar effort by DRDO would be beneficial to the R&D community who need latest information on their desktops.

DESIDOC is a central agency of all DRDO libraries with the mandate to provide latest scientific information to DRDO labs as and when required, and also responsible to make policies and procedures for DRDO libraries. During annual Heads of TIRC meet in 2006, it was decided to setup E-journal Consortium for DRDO users. The DRDO HQrs constituted a committee on E-journal Services to DRDO labs along with Terms of References and to explore the feasibility to join existing consortia under the chairmanship of Prof. GP Agrawal, Coordinator of INDEST Consortium IIT Delhi. The Committee recommended to setup a separate consortium for DRDO labs keeping-in-view the R&D nature of DRDO and then in 2009 it was implemented with seven publishers (ACM, ACS, AIAA, AAAS_Science, IEEE, Jane's and Elsevier) and one service provider (JCCC Service).

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2. LITERATURE REVIEW

Moorthy[1], focused on initiatives taken by DESIDOC during implementation of DRDO Consortium, how consortium may benefits the member institutions and about the need of establishing National Federation of Library Consortia. Senthil, and Madhusudhan[2] analysed the data for the period from 2009-2016 in respect of coverage of labs and publishers, year wise expenditure, and subject wise distribution of journals among labs. They concluded that DRDO e-journal consortium is one of the important resource for the scientific community to carry out the research.

Arora and Trivedi[3] given detailed overview on UGC-INFONET consortium – associate membership, governing structure, and licensing terms and fair use. They focused that providing access to e-resources to faculties and researchers is not a purpose. The development of stronger research and academic culture should be triggered and optimal use of e-resources is one of the biggest concerns of the consortium.

Arora[5], *et al.* analysed the research productivity of 50 universities in first phase by using e-resources through the UGC-INFONET Consortium, and found out that more than 75 per cent of research publications were published in past 5 years i.e. from 2005 to 2009 in comparison to previous block of 5 years i.e. 2000 to 2004.

A lot of research have been carried out by eminent

professionals – Lal[6], emphasised the importance of consortia for sharing of resources, especially for biotechnology institutions in India. Rogani[7], prepared a questionnaire and submitted to 1,350 patrons to know the satisfaction level of users to improve the information access. Francis[8], evaluated the pattern of access and use of digital resources by the research scholars at Kerala Agricultural University.

3. OBJECTIVES OF THE STUDY

- To find out the cost effective utilisation of e-journals by DRDO research community
- To know the importance of DRDO e-journal Consortium among DRDO community
- To find out the growth of research productivity after implementation of e-journal services
- Whether users are friendly with consortium or they need training in accessing the e-journals
- To find out highly used publishers and journals in Consortium.

4. METHODOLOGY

The Microsoft excel package was used for analysis and evaluation of qualitative and quantitative data. The data was collected from various sources and methods – from publisher's website by login facility, direct harvesting using SUSHI compliance reports, provided by publishers in excel format, downloaded from Web of Science (WoS) database, and by distributing feedback proforma among DRDO scientists. The data analysis was carried out for the period 2012 – 2017, however productivity of users in published literature were taken since the year 2000 onwards to know the growth pattern. The expenditure of e-journals was taken from recorded minutes of negotiated meeting for their authenticity. The process of data analysis involved sorting, interpretation, categorisation and calculation.

5. DATA ANALYSIS

The data was collected either from publisher's websites or provided by publishers. So the authenticity and cost effectiveness depends on publisher's trust. There is no mechanism to fetch real-time usage from any of the publishers. The usage of e-journals is reflected by the publishers after one or two months, either manually or automatically by using SUSHI. To know the growth pattern of DRDO scientists in publications, the data was taken from WoS, which covers only high impact factor journals. So actual productivity depends on coverage of WoS. Feedbacks were received from DRDO users and were analysed to judge the importance of e-journals at various parameters.

5.1 Coverage of E-journals under Consortium

The subscription of e-journals under DRDO Consortium is different from other Consortia – E-Shodh Sindhu (eSS), Consortium for e-Resources in Agriculture (CeRA), DBT e-Library Consortium (DelCON), etc. Usually publisher offers either full package or bundle of selected titles with cross access model or minimum unique title list (UTL) access to sites. Such types of model (full package or bundle) are suitable for academic institutions, where students/scholars prefer research in various discipline. But DRDO scientists are developing technology/ products for defence core areas, so selection of periodicals/ journals depends on ongoing projects and are decided on the basis of the technical aspects of the project.

Table 1 shows that the access of ACM, IEEE, Jane's and NPG were never discontinued, while subscription of Elsevier and AIAA was discontinued in the year 2016, due to non-acceptance of terms and conditions by publishers. The access of ACS was discontinued due to in judicious hike in price by publisher, while publisher had already signed in 2009 for 5 per cent escalation for multiyear contract. The Science was discontinued as they denied for signing on standard document of request for proposal (RFP) of DESIDOC.

5.2 Utilisation of Publishers on the Basis of Articles Viewed

Total 37.97 lakh article were viewed during the period from 2012-17 as shown in Table 2, in which approx 50 per cent i.e. 19.75 lakh articles were viewed in the year 2014 only. The trends of utilisation clearly show that in the year 2014 the excess of articles were either viewed without knowledge of perpetual access or because of so many training/ awareness programmes were arranged in this year. It is very difficult to justify which publisher is number one in the ranking or on last position, because number of titles are varying for each publisher. However as per utilisation, the Elsevier is in 01 ranking and IEEE is in 02 ranking.

5.3 Average Cost per Articles during the Period 2012 – 2017.

The cost effectiveness of consortium can only be judged on the basis of number of articles viewed. The publications may be subscribed or discontinued only on the basis of utilisation. But sometimes it is very difficult to take any decision, when publisher escalate price based on the utilisation. In the year 2009, DESIDOC subscribed American Chemical Society (ACS) for all DRDO labs, but it was discontinued after Dec 2012 due to very high price escalation quoted by ACS, which was based on utilisation. However, average cost per article of ACS was economical with ranking 1. Subsequently IEEE ranking 2; Elsevier ranking 3; Jane's ranking 4; ASME ranking 5; NPG ranking 6; AIAA ranking 7; ACM ranking 8; Science ranking 9 and Taylor & Francis ranking 10. It is not necessary that articles subscribed in that year would also be used in the same year. Due to perpetual accessibility articles may also be viewed in subsequent years. The Table 3 shows that articles of IEEE and AIAA were most viewed in 2012; articles of Science, ASME, Elsevier, Jane's and NPG were most viewed in 2014, and articles of ACM were most viewed in 2017.

It is very difficult for top management to take decision to continue the e-journals subscription on previous utilisation, since the utilisation of individual publisher is varying year-wise for example cost per articles of ACM was $ 19.7 in 2013, while $ 0.3 in 2014 and again $ 22.2 in 2015. The same things were happened for all the publications except IEEE.

Table 1. Publishers/ labs covered

Publisher	2012 Title (Subs) [Lab]	2013 Title (Subs) [Lab]	2014 Title (Subs) [Lab]	2015 Title (Subs) [Lab]	2016 Title (Subs) [Lab]	2017 Title (Subs) [Lab]
ACM	FP (CA) [05]	FP (CA) [05]	FP (CA) [05]	FP (CA) [05]	FP (CA) [05]	FP (CA) [05]
ACS	FP (CA) [All]	#	#	#	#	#
AIAA	7 (CA) [10]	07 ( ) [08]	07 (CA) [10]	07 (CA) [12]	#	07 (CA) [11]
ASME	10 (CA) [10]	10 (CA) [10]	10 (CA) [10]	#	#	#
Elsevier	204 [42] + 5 UTL	204 [42] + 5 UTL	197 [41] + 05 UTL	194 (380) [42] + 05 UTL + MS	#	200 (341) [26]
IEEE	FP (CA) [All]	FP (CA) [All]	FP (CA) [All]	FP (CA) [All]	FP (CA) [All]	FP (CA) [All]
Jane's	5 (CA) [05]	05 (CA) [10]	05 (CA) [10]	05 (CA) [10]	4 (CA) [10]	04 (CA) [13]
NPG	1 [17]	1 [17]	15 (106) [27]	18 (60) [17]	14 (29) [09]	15 (53) [14] + 01 UTL
Science	1 [11]	1 [11]	1 [11]	#	#	#
T&F	52 [24]	51 [24]	51 (75) [23]	29 (45) [20]	#	#

Note: # Discontinued; CA : Cross access; FP : Full package; UTL: Unique title list

Table 2. Utilisation of publishers with ranking

Year	ACM	ACS	AIAA	Science	ASME	Elsevier	IEEE	Jane's	NPG	T&F
2012	0.16	2.70	1.45	0.21	0.36	20.13	17.16	0.64	0.25	0.52
2013	0.15	#	0.47	0.09	0.25	19.72	17.27	1.11	0.45	2.41
2014	10.74	#	0.92	7.03	4.13	125.86	16.93	1.19	29.62	1.17
2015	0.22	#	0.91	#	#	38.19	13.68	0.42	1.01	0.51
2016	0.94	#		#	#	#	9.30	0.69	0.75	#
2017	3.04	#	0.65	#	#	8.60	16.80	0.20	0.76	#
AVG viewed per year	2.54	2.70	0.88	2.44	1.58	42.50	15.19	0.71	5.48	1.15
Rank on AVG	5	4	9	6	7	**1**	2	10	3	8
Grand total	15.25	2.70	4.40	7.33	4.75	212.51	91.14	4.24	32.86	4.61
Rank on total	4	10	9	5	6	**1**	2	8	3	7

Note: Articles taken in the ratio of 10 k for each publisher, # Discontinuation of publisher.

Table 3. Average cost per articles during 2012 – 2017 (Jan-Dec)

Publishers	2012	2013	2014	2015	2016	2017	AVG
Science	$ 10.8	$25.3	$ 0.4	#	#	#	$12.2
ACM	$ 18.0	$19.7	$ 0.3	$22.2	$3.3	$1.1	$10.8
ACS	$ 4.8	#	#	#	#	#	$4.8
AIAA	$ 4.4	$ 9.0	$ 7.8	$10.1	#	$13.9	$9.0
ASME	$ 9.6	$14.4	$ 0.9	#	#	#	$8.3
Elsevier	$ 7.5	$ 8.1	$ 1.3	$5.0	#	$17.9	$8.0
IEEE	$ 4.2	$ 4.4	$ 4.7	$6.1	$9.4	$4.8	$5.6
Jane's	£ 2.8	£ 1.6	£ 1.5	£4.5	£12.0	£27.2	£8.3
NPG	£ 9.4	£ 5.6	£ 0.5	£11.4	£8.9	£17.2	£8.8
T&F	$ 35.0	$ 7.6	$19.4	$31.6	#	#	$23.4

Notes: # Discontinued

5.4 Growth of Publications Output by DRDO Scientific Community after Implementation of Consortium

Records were downloaded from "Web of Science" during the period 2000 to 2016 to analyses the growth of publications output published in high impact International/National journals. Total 4,057 research articles were published during the period from 2000 to 2008 i.e. per year average rate of publishing the articles was 450.78 before implementation of Consortium. And total 7,339 research articles were published during the period 2009 to 2016 i.e. per year average rate of publishing the articles was 917.38 after implementation the Consortium. There was 50.86 per cent escalation in publishing of research papers on highly cited international/ national journals.

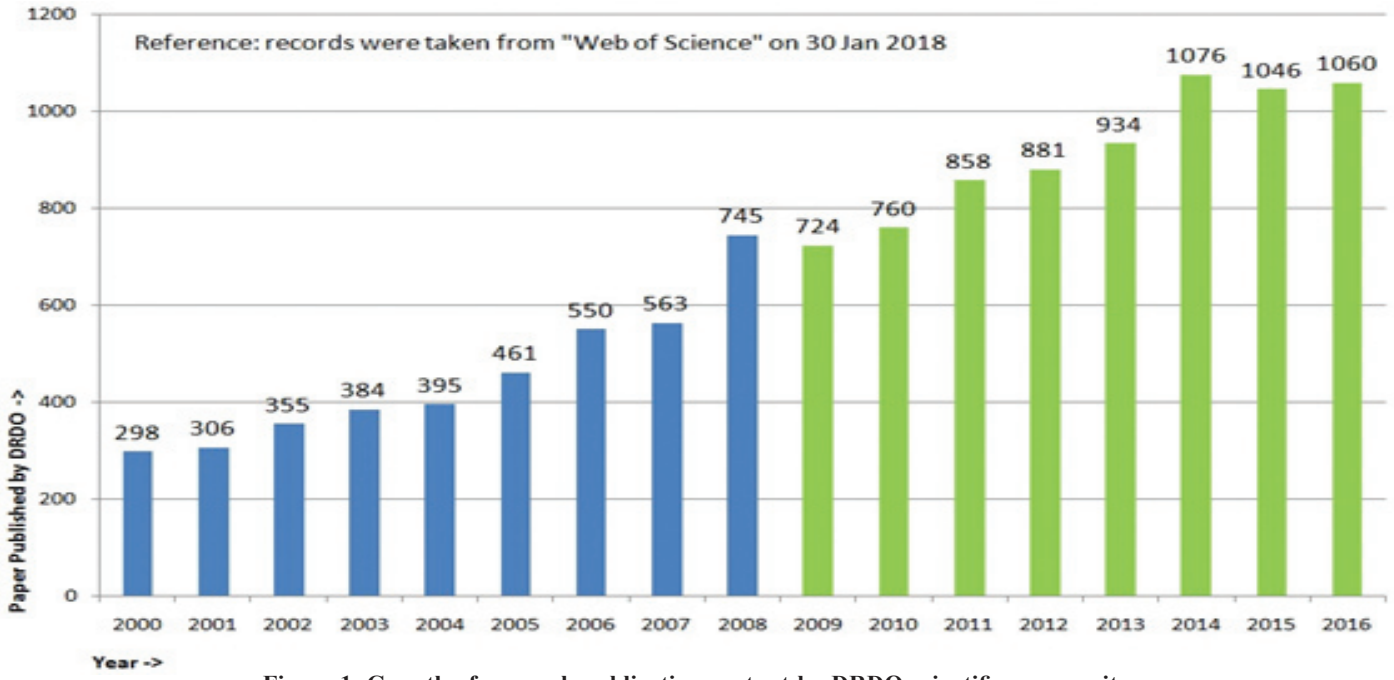

Figure 1. Growth of research publications output by DRDO scientific community.

Table 4. Responses of various groups of officials

	Awareness of E-Journals website	Usefulness of E-Journals for project	Remote access facility	Awareness/ Training programme	Print journals not preferred
Category-1 [11]	10	9	6	8	7
Category-2 [62]	59	59	53	26	50
Category-3 [52]	47	50	43	26	44
Category-4 [17]	14	12	14	7	13

Notes: Category-1 [TO 'A' and Below]; Category-2 [Scientist 'B' to 'D' or Equivalent]; Category-3 [Scientist 'E' & 'F']; Category-4 [Scientist 'G' & above].

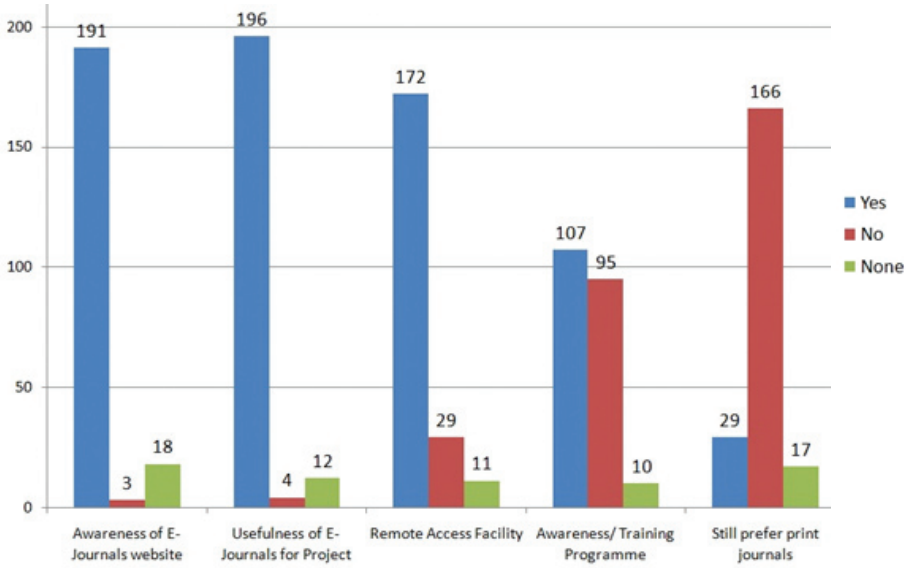

Figure 2. Level of users

5.5 Feedback of Scientists

To evaluate the cost vs importance of e-journals, a feedback proforma was distributed to all DRDO scientists by email and post. A number of responses (212 feedbacks) were received at DESIDOC in 2017. The feedback form was designed mainly to know the importance and utilisation of e-journals among users - how much they are familiar with Consortium, their satisfaction level, and to know the most useful publications. The feedback proforma was designed in three major parts. The part-1 contains level of users, part-2 contains responses of users in Yes or No, while part-3 contains responses of users in the form of multiple options as shown in Table 4.

Figure 2 indicates that more than 90 per cent of users are aware about e-journals website. The e-journals are very useful for project and assignments and it was recognised by ≥ 92 per cent of scientific community. DRDO scientists were keen to access e-journals beyond lab premises i.e. remote access (≥ 81 %). The DRDO e-journal consortium was implemented in 2009, the trend shows that only ≤ 14 per cent of officials prefer print journals that means officials are switching to adopt technology.

As shown in Fig. 3, total 11 responses were received from category-1; 62 responses were received from category-2; 52 responses were received from

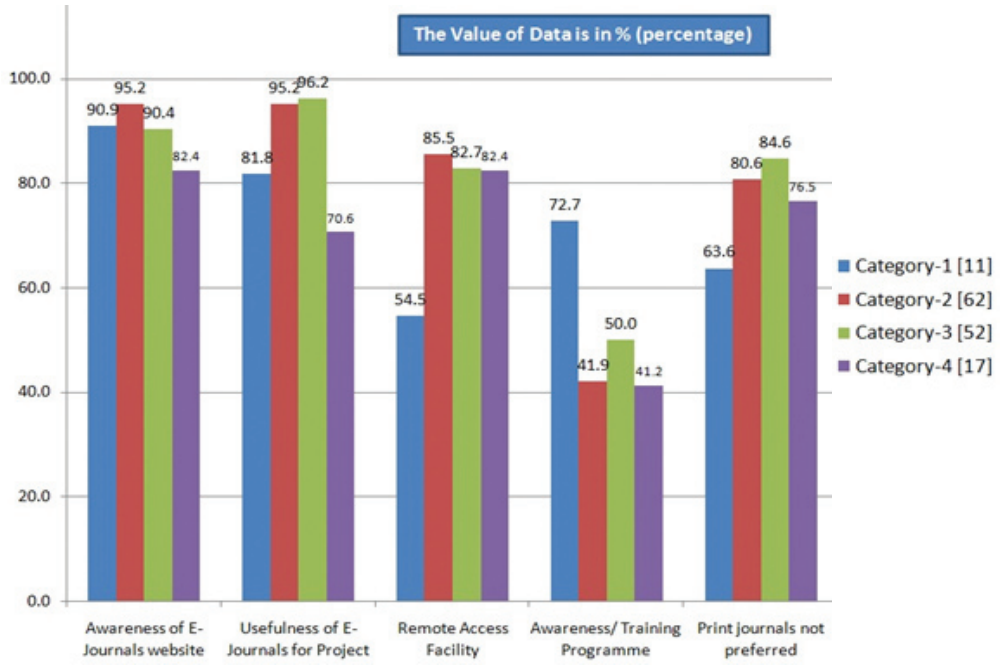

Figure 3. Category wise responses.

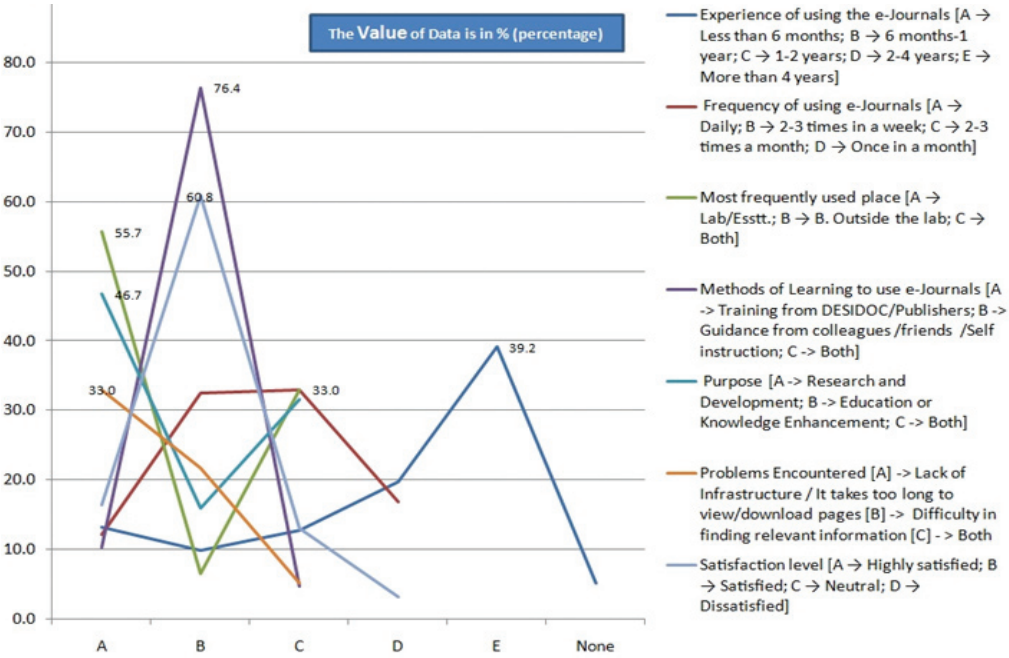

Figure 4. Experiences, frequency and satisfaction level of users.

category-3; and 17 responses were received from category-4. However, there were 70 officials who have not mentioned their designations. After analyzing the data, it was found that officials in category-2 were more aware (≥ 95 %) about the e-journals website, while officials in category-3 (≥ 96 %) stated about the importance of e-journals in their projects/ assignments. Majority of officials in category-2 were keen to access e-journals remotely (≥ 85 %), while officials in category-3 (≥ 84 %) did not prefer the print journals.

Data shown in the Fig. 4 was collected from various users in regards of experience, frequency of usages, learning methods and their satisfaction level. Five per cent users never used e-journal, while 39 per cent of users were using this service since more than 4 years. Seventy nine per cent of users frequently used the e-journals and 55.7 per cent users preferred access of e-journals within lab campus. As per the feedbacks more than ≥ 77.4 per cent of users satisfied with e-journal services and 94 per cent users wanted to access of e-journals either for research or knowledge enhancement purpose. Only 10 per cent users wanted awareness/ training from DESIDOC/ publishers. Overall e-journal services are highly useful for scientific community with high level of satisfaction index.

6. RESULTS/ FINDINGS

- Elsevier and IEEE are highly useful publications for all DRDO labs while others are useful within clusters only

- Full package or bundle model is most convenient for DRDO consortium
- Utilisation of e-journals in previous years should not be the proper criteria for renewal of subscription, at least average of three years usage should be taken
- The average cost per articles is less than the cost of per article charged by individual publisher, i.e. subscription of e-journals through consortium is economical
- The growth of research publication output by DRDO scientists was increased upto 50 per cent in highly impact factor journals after implementation of DRDO e-journal Consortium
- Majority of scientists would like to prefer e-journal services and believe that e-journals are important for their research project.

7. CONCLUSIONS

E-journals provided latest R&D information to scientific community working on their projects. Research study for the period 2012-17 has shown that utilisation of e-journals is economical and cost effective. E-journals are great demand with DRDO scientific community, further there has been an increase in research publications of Elsevier and IEEE journals are most popular with DRDO scientists. R&D organisation like DRDO which is working in defence core technology areas, cannot be compared with other Consortia. The productivity in the form of research publication has increased after implementation of consortium. Majority of users prefer e-journals instead of print subscriptions and have requested for more publications viz Wiley, Springer, SAG, OSA, etc.

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