

## An Analytical Survey on the Stance of DSpace Digital Library Software Clients in India

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### Abstract

*The magnitude of global resources for information is unfathomable, in the form of digital libraries, world wide web, institutional repositories etc., and in the contemporary set-up, the tools for accessing the information data base are also meticulously inestimable. DSpace is one of such innovative tool for accessing data bases. The present study was conducted to investigate the utility of DSpace application in digital library as a means to improve document organization and retrieval of scholastic materials. The study also investigates: The popular DSpace versions among the responders, the preference of DSpace User interfaces and Operating platforms among the responders, the priority of Relational database and Integrations / customizations among the responder groups, the importance given by responders for DSpace in Use cases, type of Content and types of files accessed and the Overall Satisfaction of responders pertaining to usage of database in digital libraries. A questionnaire with 10 indices has been presented to responders who were categorized into 3 groups' viz., Academic Institutions, Research Centers and Government organizations for their response. The data collected from the questionnaire was tabulated and analyzed to test and fulfill the stated objectives, using Stratified Random Sampling Technique. For this purpose Unscramble software package was utilized. Analysis of data reveals that majority of responders (24.59%) were accessing DSpace 1.5x version and among all the responders, Academic institutions were highest (18.03%) in accessing 1.5x version. Regarding the platform for accessing, a greater proportion of responders (62.30%) were using MS Windows as an accessing platform and among the responders, Academic Institutions opted highest (50.82%) in using MS Windows as a platform for accessing. Pertaining to Integrations/ customizations of DSpace, Creative Common Open URL and Dublin Core Meta Tool Kit were highest (31.15%) and within the responders, Academic Institutions attribute the highest (13.11%), with regard to Dublin Core Meta Tool Kit and Research Centers attribute the highest (13.11%) with regard to Creative Common Open URL. Institutional repository ascribed to the highest (70.49%) for Use Cases and among the responders, Academic Institutions attributed the highest (50.82%). With regard to the type of files accessed, Text documents were highest (68.85%) in accessing and as expected, Academic Institutions were highest (52.46%) to access text documents within the responders. Majority of responders (80.33%) opined DSpace as a good accessing tool and among the responders; Academic Institutions were highest (62.30%) in expressing DSpace as a good tool for access.*

**Keywords:** Digital Library. DSpace. Versions. Academic. Dublin Core. Meta Tool Kit. Users study.

## 1 Introduction

Considerable attention has been drawn towards the development and implementation of institutional repositories [1] but the efforts to evaluate them are scanty. People all over the world have little knowledge of and little enthusiasm to use DSpace. Many people and organizations use alternatives to institutional repositories, such as personal Web pages and disciplinary repositories, which are perceived to have higher community salience than institutional affiliation. The digital revolution has affected the scholars to create, communicate and preserve new knowledge. Faculties have technologies to create their digital content, while the Scholars have technologies to manage their digital content, but both are not efficient on preserving the new knowledge, as a consequence, their digital objectives are hosted on a personal website, which is not secure for long term preservation.

DSpace is a ground breaking digital institutional repository [2] that captures, stores, indexes, preserves and redistributes the intellectual output of an organization in digital formats. DSpace is a worldwide freely available open source system which can be customized and extended. It is developed jointly by MIT Libraries and Hewlett-Packard Co., and is renowned for ease of use, with a Web-based user interface, that can be personalized for institutions as well as individual clients. DSpace is an open-source software system that enables institutions to capture and describe digital works using a custom work flow process, distribute an institution's digital works over the Web, so that users can search and retrieve items in the collection and preserve digital works over long term.

DSpace is not regarded as a competition to commercial publishers but is considered as a resource to capture, preserve and communicate [3] the diversity of intellectual output of the faculty and researchers in an institution. It was designed to deal with a wide range of content types including research articles, grey literature, theses, cultural materials, scientific datasets, institutional records and educational materials among many other specific types. The present study was focused to analyze the attitude of DSpace users in India.

## 2 Review of Literature

Kurtz, Mary (2010) compared Dublin Core (DC) and DSpace [4] together with an examination of the institutional repositories of three public research universities, which used DC and DSpace to create and manage their repositories. He drew a sampling of records from each repository and examined them for metadata quality using the criteria of completeness, accuracy, and consistency and also examined the quality of records with reference to the methods of educating repository users. One repository used librarians to oversee the archiving process, while the other two employed two different strategies as part of the self-archiving process. The study revealed that, librarian-overseen archive had the most complete and accurate records for DSpace entries.

Cherukodan, Surendran (2013) studied the design and development of a digital library [5] at Cochin University of Science and Technology (CUSAT), India, using DSpace open source software. The study covered the structure, contents and usage of CUSAT digital library, which examines the possibilities of applying open source in libraries. An evaluative approach is carried out to explore the features of the CUSAT digital library. Google Analytics service

is employed to measure the amount of use of digital library by users across the world. Their findings indicated that CUSAT has successfully applied DSpace open source software for building a digital library. The digital library has had visits from 78 countries, with the major share from India. The distribution of documents in the digital library is uneven. Previous exam question papers share the major part of the collection. The number of research papers, articles and rare documents is less. The study is the first of its type that tried to understand digital library design and development using DSpace open source software in a university environment with a focus on the analysis of distribution of items and measuring the value by using statistics, employing the Google Analytics service. The study inferred that the digital library model can be useful for designing similar systems.

Chen, Ya-Ning (2004) opined that DSpace is a software [6] tool that is often used as a digital repository for academic institutions to achieve management and reuse of information. The Metadata Architecture and Application Team (MAAT) website in a case study examined the feasibility of DSpace suitability as a virtual digital repository for inter-institutional use. The MAAT website is arranged in a static manner and comprises a number of documents for various digital library projects conducted by different institutions in Taiwan. The study summarize that DSpace is not only a digital repository suitable for single-institutional use, but also a virtual digital repository suitable for cross-institutional use; that is, DSpace offered more flexible customizations for functions, such as hierarchical level and query of community and collection, association and linkage search, vocabulary control, re-index, and Chinese query.

### 3 Objectives

The specific objectives of the study are:

- To investigate the types of DSpace versions commonly used by the responders.
- To evaluate the preferences of operating systems among the responders.
- To examine the priority of Relational database and Integrations / customizations among the responder groups.
- To explore the importance given by responders for DSpace in Use cases and type of Content accessed.

### 4 Limitation

The study covers only 61 institutions [7], although there are about 103 institutions across India, using DSpace software in their institutions.

### 5 Methodology

Stratified random survey method is adopted to collect the data from the clients. For this, a questionnaire was prepared and distributed to 103 clients. Out of 103 clients, 61 clients have responded. Total response rate from the clients are 59.22%. The collected data is presented in the form of tables and analyzed using statistical designs Table 1 reveals the response rate and figure 1 shows that percentage of sample size.

**Table 1.** Sample Size

S.No	Type of Institutions	Distribution	Received
1	Academic	80 (77.67)	49 (80.33)
2	Research center	12 (11.65)	7 (11.48)

3	Government	11 (10.68)	5 (8.20)
<b>Total</b>		<b>103</b> <b>(100)</b>	<b>61</b> <b>(100)</b>

(Figures in Parentheses indicate percentage)

Response Rate

59.22%

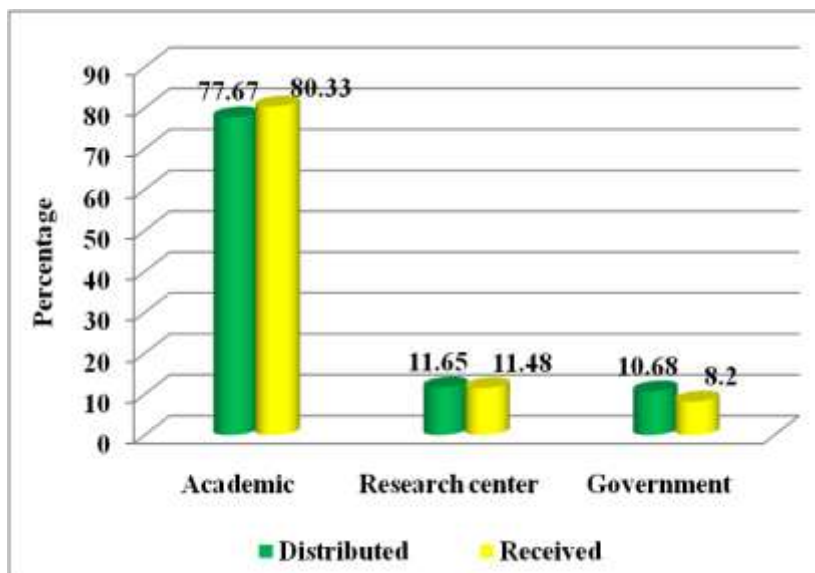


Fig. 1. Percentage of Sample Size

## 6 Data Analysis and Interpretation

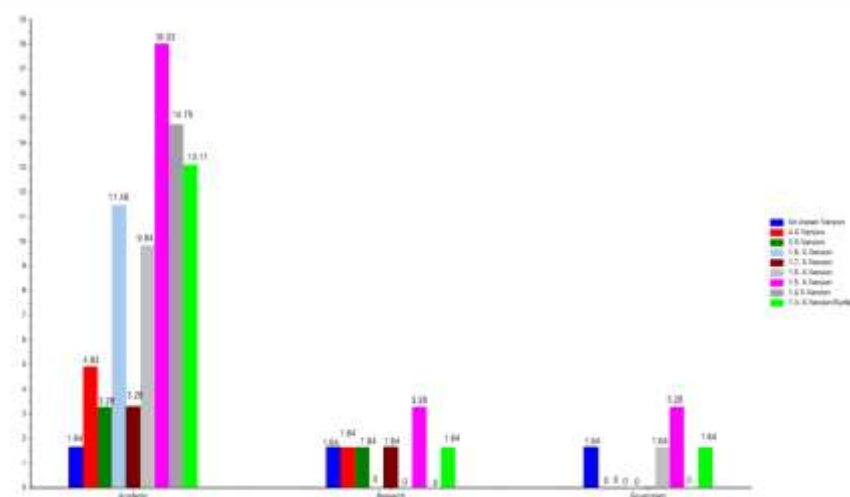
The data collected from the clients has been analyzed to test the objectives framed. For this purpose, The Unscramble [8] software package has been used for the analysis of data. Statistical analysis techniques such as Mean, Standard Deviation, Skewness and Regression Analysis have been employed depending on the nature of the data collected from the respondents.

Table 2. Types of Institutions Vs DSpace Version

S.No	DSpace Version	Academic	Research center	Government	Total	Mean	Std. Dev.	Skewness
1	Unknown Version	1 (1.64)	1 (1.64)	1 (1.64)	3 (4.92)	1.64	0	0
2	4. x Version	3 (4.92)	1 (1.64)	0	4 (6.56)	2.18	2.50	0.93
3	3. x Version	2 (3.28)	1 (1.64)	0	3 (4.92)	1.64	1.64	0
4	1.8. x Version	7 (11.48)	0	0	7 (11.48)	3.82	6.62	1.73
5	1.7. x Version	2 (3.28)	1 (1.64)	0	3 (4.92)	1.64	1.64	0
6	1.6. x Version	6 (9.84)	0	1 (1.64)	7 (11.48)	3.82	5.27	1.54

7	1.5. x Version	11 (18.03)	2 (3.28)	2 (3.28)	15 (24.59)	8.19	8.51	1.73
8	1.4. x Version	9 (14.75)	0	0	9 (14.75)	4.91	8.51	1.73
9	1.3.x Version and earlier	8 (13.11)	1 (1.64)	1 (1.64)	10 (16.39)	5.46	6.62	1.73
<b>Total</b>		<b>49</b> <b>(80.33)</b>	<b>7</b> <b>(11.48)</b>	<b>5</b> <b>(8.20)</b>	<b>61</b> <b>(100)</b>			

It is evident from the table 2 that DSpace 1.3 X version and earlier is most accepted (16.39%) compared to other versions. Academic institutions accept DSpace 1.3 X version maximum (13.11%) among the respondents in comparison to research center (1.64%) and government institutions 1.64%. Figure 2 depicts the data an types of institutions Vs DSpace Versions through a bar diagram.

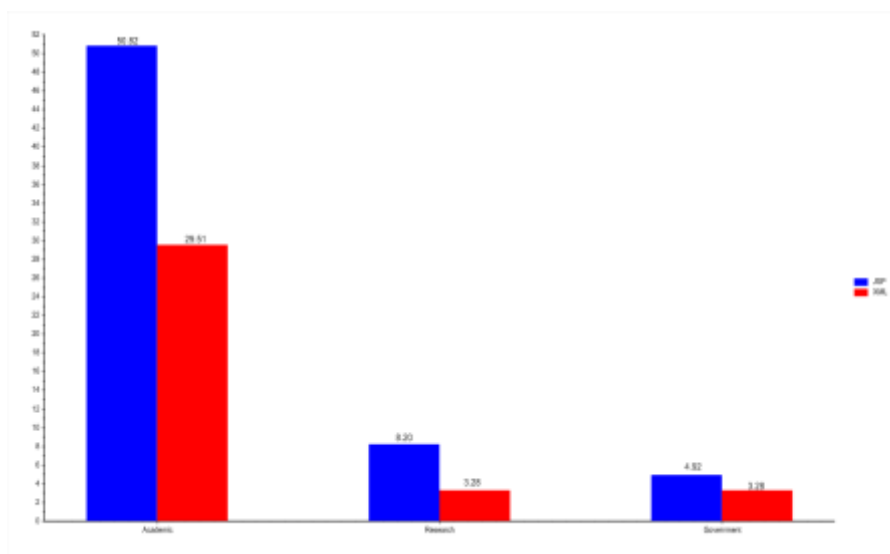


**Fig. 2.** Types of Institutions Vs DSpace Version

Table 3 reveals that most of the respondents prefer JSP as DSpace interface (63.93%) compared to XML (36.7%). Among the respondents JSP preferred as DSpace user interface mostly by academic institutions (50.82%) compared to research centers (8.2%) and government institutions (4.92%). Figure 3 shows the bar diagram of types of institutions Vs DSpace user interface.

**Table 3.** Types of Institutions Vs DSpace user interfaces

S.No	DSpace user interfaces	Academic	Research center	Government	Total	Mean	Std. Dev.	Skewness
1	JSP	31 (50.82)	5 (8.20)	3 (4.92)	39 (63.93)	21.31	25.60	1.70
2	XML	18 (29.51)	2 (3.28)	2 (3.28)	22 (36.07)	12.02	15.14	1.73
<b>Total</b>		<b>49</b> <b>(80.33)</b>	<b>7</b> <b>(11.48)</b>	<b>5</b> <b>(8.20)</b>	<b>61</b> <b>(100.00)</b>			

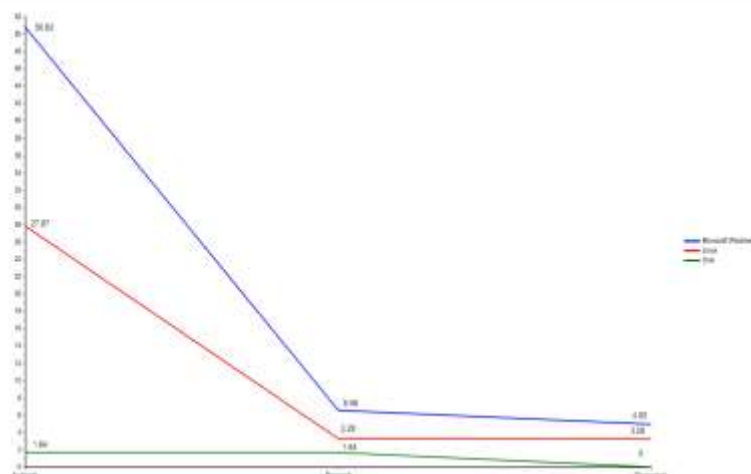


**Fig. 3.** Bar diagram of Types of Institutions Vs DSpace user interfaces

The present survey interprets that MS-Windows is the most popular OS 62.30%, when compared to Linux (34.43%) and Unix (3.28%). Among the respondents Windows is most popular in academic institutions (50.82%) in comparison to research center (6.56%) and government 4.92%. The data are presented in table 4 and figures 5.

**Table 4.** Types of Institutions Vs Operating System/Platform

S. No	Operating System	Academic	Research center	Government	Total	Mean	Std. Dev.	Ske wness
1	Microsoft Windows	31 (50.82)	4 (6.56)	3 (4.92)	38 (62.30)	20.76	26.03	1.72
2	Linux	17 (27.87)	2 (3.28)	2 (3.28)	21 (34.43)	11.47	14.19	1.73
3	Unix	1 (1.64)	1 (1.64)	0	2 (3.28)	1.09	0.94	1.73
<b>Total</b>		<b>49 (80.33)</b>	<b>7 (11.48)</b>	<b>5 (8.20)</b>	<b>61 (100)</b>			

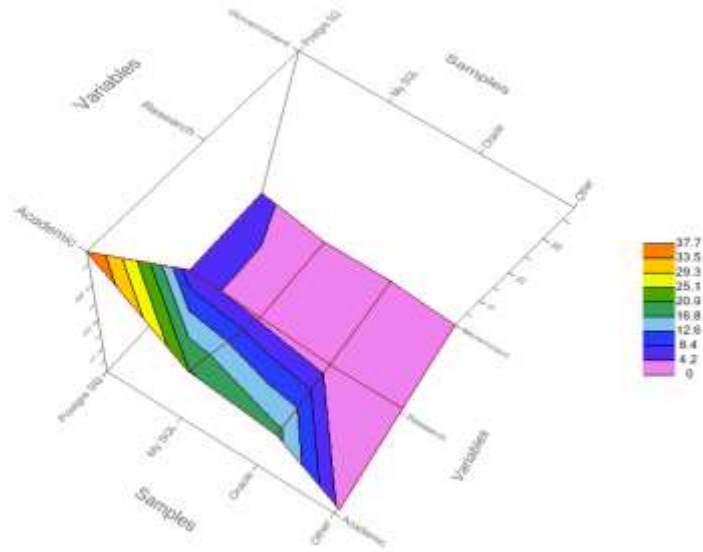


**Fig. 4.** Line diagram of Types of Institutions Vs Operating System / Platform

It is clear from table 5 that PostgreSQL emerged as the most reliable relational database (47.54%). MySQL (26.23%), Oracle (21.31%) and Others (4.92%). Occupied the subsequent positions within the respondents, Academic institutions relied most (37.70%) on PostgreSQL whereas research centers (4.92%) and government (4.925%) were similar. Figure 5 represents 3D matrix plot on types of institutions and Relation Database.

**Table 5.** Types of Institutions Vs Relational Database

S.No	Relational Database	Academic	Research center	Government	Total	Mean	Std. Dev.	Skewness
1	PostgreSQL	23 (37.70)	3 (4.92)	3 (4.92)	29 (47.54)	15.84	18.92	1.73
2	MySQL	13 (21.31)	2 (3.28)	1 (1.64)	16 (26.23)	8.74	10.91	1.68
3	Oracle	11 (18.03)	1 (1.64)	1 (1.64)	13 (21.31)	7.10	9.46	1.73
4	Other	2 (3.28)	1 (1.64)	0	3 (4.92)	1.64	1.64	0
<b>Total</b>		<b>49 (80.33)</b>	<b>7 (11.48)</b>	<b>5 (8.20)</b>	<b>61 (100.00)</b>			



**Fig. 5.** 3D-Matrix plot of Types of institutions Vs Relational Database

With regard to integrations/customizations table 6 infers that Creative Commons Open URL and Dublin Core Meta Toolkit were the highest (31.15%) and within the respondents academic institutions attribute the highest (13.11%), with regard to Dublin core Meta tool kit and research center attribute the highest (13.11%), with regard to creative common URL. Figure 6 represents the 3D matrix plot of types of institutions Vs institutions/customizations.

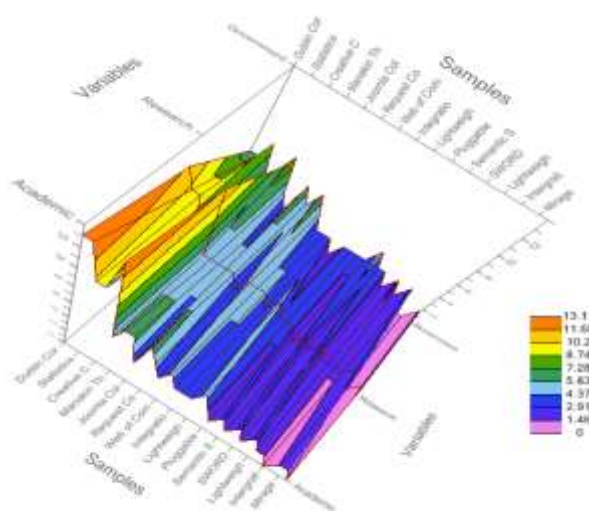
**Table 6.** Types of Institutions Vs Integrations/Customizations

S.No	Integrations/ Customizations	Academic	Research center	Government	Total	Me an	St d. Dev.	Skew- ness
1	Dublin Core Meta Toolkit	8 (13.11)	7 (11.48)	4 (6.56)	19 (31.15)	10.38	3.40	1.29
2	Google Indexing of DSpace Instances	8 (13.11)	6 (9.84)	4 (6.56)	18 (29.51)	9.83	3.27	0.004
3	Statistics	6 (9.84)	6 (9.84)	5 (8.20)	17 (27.87)	9.29	0.94	1.73
4	Commenting	4 (9.84)	6 (6.56)	3 (4.92)	13 (21.31)	7.10	2.50	0.93
5	Creative Commons Open URL	6 (13.11)	7 (11.48)	6 (6.56)	19 (31.15)	10.38	3.40	1.29
6	Integration of Open Journal	3 (4.92)	3 (4.92)	5 (8.20)	11 (18.03)	6.01	1.89	1.73
7	Manakin Themes	4 (6.56)	3 (4.92)	3 (4.92)	10 (16.39)	5.46	0.94	1.73
8	Google Analytics Tracking Code	4 (6.56)	3 (4.92)	2 (3.28)	9 (14.75)	4.92	1.64	0
9	Joomla Collections, Archives and Repositories	2 (3.28)	3 (4.92)	4 (6.56)	9 (14.75)	4.92	1.64	0
10	OAI Harvester Plug-	4	3	3	10	5.4	0.94	1.73



	gin for DSpace	(6.56)	(4.92)	(4.92)	(16.39)	6		
11	Request Copy	3 (4.92)	2 (3.28)	4 (6.56)	9 (14.75)	4.9 2	1.64	0
12	Language Packages	2 (3.28)	3 (4.92)	3 (4.92)	8 (13.11)	4.3 7	0.94	1.73
13	Web of Communications	3 (4.92)	3 (4.92)	2 (3.28)	8 (13.11)	4.3 7	0.94	1.73
14	Embargo	2 (3.28)	3 (4.92)	2 (3.28)	7 (11.48)	3.8 2	0.94	1.73
15	Integration of Moodle	2 (3.28)	2 (3.28)	2 (3.28)	6 (9.84)	3.2 8	0	0
16	Integration of Shibboleth	2 (3.28)	3 (4.92)	1 (1.64)	6 (9.84)	3.2 8	1.64	0
17	Lightweight Network Interface	3 (4.92)	2 (3.28)	2 (3.28)	7 (11.48)	3.8 2	0.94	1.73
18	Website	2 (3.28)	2 (3.28)	2 (3.28)	6 (9.84)	3.2 8	0	0
19	Pluggable Storage/S3	1 (1.64)	2 (3.28)	2 (3.28)	5 (8.20)	2.7 3	0.94	1.73
20	Recommendation	2 (3.28)	1 (1.64)	2 (3.28)	5 (8.20)	2.7 3	0.94	1.73
21	Semantic Search for Dspace	1 (1.64)	2 (3.28)	3 (4.92)	6 (9.84)	3.2 8	1.64	0
22	SFX	2 (3.28)	1 (1.64)	2 (3.28)	5 (8.20)	2.7 3	0.94	1.73
23	SWORD	1 (1.64)	2 (3.28)	2 (3.28)	5 (8.20)	2.7 3	0.94	-1.73
24	Controlled Vocabulary/Ontology	2 (3.28)	1 (1.64)	1 (1.64)	4 (6.56)	2.1 8	0.94	1.73
25	Lightweight JHOVE format validator and virus check	1 (1.64)	1 (1.64)	2 (3.28)	4 (6.56)	2.1 8	0.94	1.73
26	Integration of DOME	1 (1.64)	1 (1.64)	1 (1.64)	3 (4.92)	1.6 4	0	0
27	Integration of Sakai	0	1	2	3	1.6	1.	0

			(1.64)	(3.28)	(4.9 2)	4	64	
28	Tombstoning	1 (1.64)	2 (3.28)	0	3 (4.9 2)	1.6 4	1. 64	0
29	Mirage	1 (1.64)	0	0	1 (1.6 4)	0.5 4	0. 94	1.73
30	Other	0	1 (1.64)	1 (1.64)	2 (3.2 8)	1.0 9	0. 94	1.73



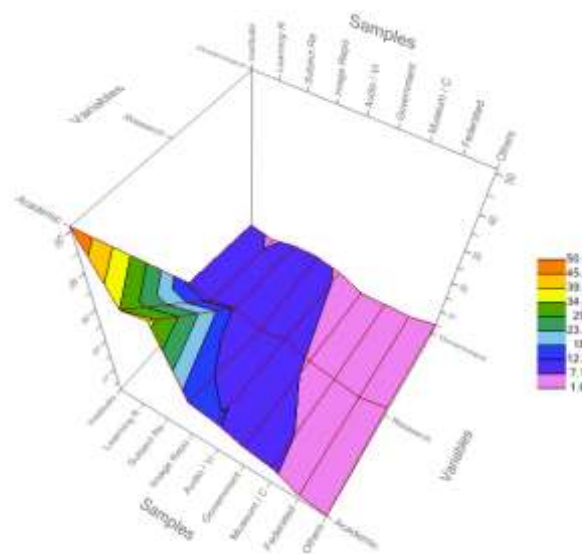
**Fig. 6.** Types of Institutions Vs Integrations/Customizations

The data provided in table 7 interprets that institutional repository attributed highest for use cases (70.49%). Academic institutions attributed the maximum (50.82%) for Institutional Repository compared to research center (11.48%) and government (8.20%). (Figure 7).

**Table 7.** Types of Institutions Vs Use Cases

S. No	Use Cases	Aca- demic	Re- search center	Government	To- tal	Mean	Std. Dev.	Skewness
1	Institutional Repository	31 (50.82)	7 (11.48)	5 (8.20)	43 (70.49)	23.50	23. 71	1.69
2	Learning Resources	21 (34.43)	6 (9.84)	4 (6.56)	31 (50.82)	16.94	15. 23	1.64
3	Subject Re- pository	22 (36.07)	7 (11.48)	5 (8.20)	34 (55.74)	18.58	15. 23	1.64
4	Image Re- pository	9 (14.75)	5 (8.20)	5 (8.20)	19 (31.15)	10.38	3.7 8	1.73
5	Audio/Video Repository	8 (13.11)	6 (9.84)	4 (6.56)	18 (29.51)	9.83	3.2 7	0.004

6	Government Records / Reports	6 (9.84)	4 (6.56)	2 (3.28)	12 (19.67)	6.56	3.28	0
7	Museum / Cultural Heritage	5 (8.20)	3 (4.92)	2 (3.28)	10 (16.39)	5.46	2.50	0.93
8	Federated Repositories / Networked Instances	2 (3.28)	2 (3.28)	2 (3.28)	6 (9.84)	3.28	0	0
9	Other	1 (1.64)	3 (4.92)	3 (4.92)	7 (11.48)	3.82	1.89	1.73



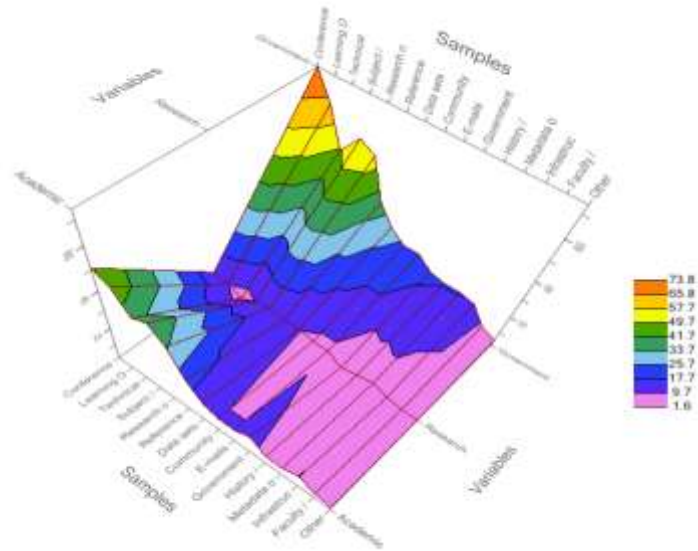
**Fig. 7.** Types of Institutions Vs Use Cases

Conference papers and presentations are the most popular (73.77%) types of content preferred to others like learning objects and resources (63.93%) datasets (29.57%) metadata only (18.03%) and others (4.92%) (Table 8). Within the respondents, conference papers and presentations were mostly preferred by academic institutions (50.82%) than research centers (14.8%) and government organisations (8.20%). (Figure 8).

**Table 8.** Types of Institutions Vs Type of Content

S. No	Type of Content	Academic	Research center	Government	Total	Mean	St d. Dev.	Skewness
1	Conference papers and presentations	31 (50.82)	7 (11.48)	5 (8.20)	45 (73.77)	45.35	31.50	0.75
2	Learning objects & re-	29 (47.54)	6 (9.84)	4 (6.56)	39 (63.93)	40.43	27.73	1.07

	sources				93)			
3	Technical reports / work papers	23 (37.70)	4 (6.56)	3 (4.92)	30 (49.18)	31.14	22.05	1.21
4	Subject/Special Collections	25 (40.98)	6 (9.84)	4 (6.56)	35 (57.38)	36.06	24.14	0.87
5	Research or development organization project	21 (34.43)	7 (11.48)	5 (8.20)	33 (54.10)	33.33	21.33	0.23
6	Reference Documents	13 (21.31)	6 (9.84)	4 (6.56)	23 (37.70)	22.95	14.00	0.51
7	Data sets	8 (13.11)	6 (9.84)	4 (6.56)	18 (29.51)	17.48	10.54	1.54
8	Community / cultural project	6 (9.84)	5 (8.20)	4 (6.56)	15 (24.59)	14.21	9.02	1.66
9	Emails	6 (9.84)	5 (8.20)	4 (6.56)	15 (24.59)	14.21	9.02	1.66
10	Government Documents	2 (13.11)	2 (3.28)	8 (3.28)	12 (19.67)	12.02	8.24	0.58
11	History/Art Archives	4 (6.56)	3 (4.92)	4 (6.56)	11 (18.03)	9.83	7.14	1.62
12	Metadata only	4 (6.56)	4 (6.56)	3 (4.92)	11 (18.03)	10.38	6.62	1.73
13	Infrastructure / Administrative Records	6 (9.84)	2 (3.28)	2 (3.28)	10 (16.39)	9.83	6.55	0.002
14	Faculty / staff / student output	3 (4.92)	1 (1.64)	1 (1.64)	5 (8.20)	4.92	3.28	0
15	Other	2 (3.28)	1 (1.64)	0	3 (4.92)	3.28	1.64	0



**Fig. 8.** Types of Institutions Vs Type of Content

### 6.1 Regression Analysis

In statistics, the coefficient of determination  $R^2$  is the proportion of variability in a data set that is accounted for by a statistical model. In this definition, the term "variability" is defined as the sum of squares [9]. There are equivalent expressions for  $R^2$  based on analysis of variance decomposition. A general version, based on comparing the variability of the estimation errors with the variability of the original values, is

$$R^2 = 1 - \frac{SS_E}{SS_T}$$

$$SS_T = \sum_i (y_i - \bar{y})^2 \quad SS_E = \sum_i (y_i - \hat{y}_i)^2$$

Where  $y_i, \hat{y}_i$  are the original data values and modeled values respectively. That is, SST is the total sum of squares; SSE is the sum of squared errors.

The Root Mean Square Error [10] (RMSE) (also called the root mean square deviation, RMSD) is a frequently used measure of the difference between values predicted by a model and the values actually observed from the environment that is being modelled.

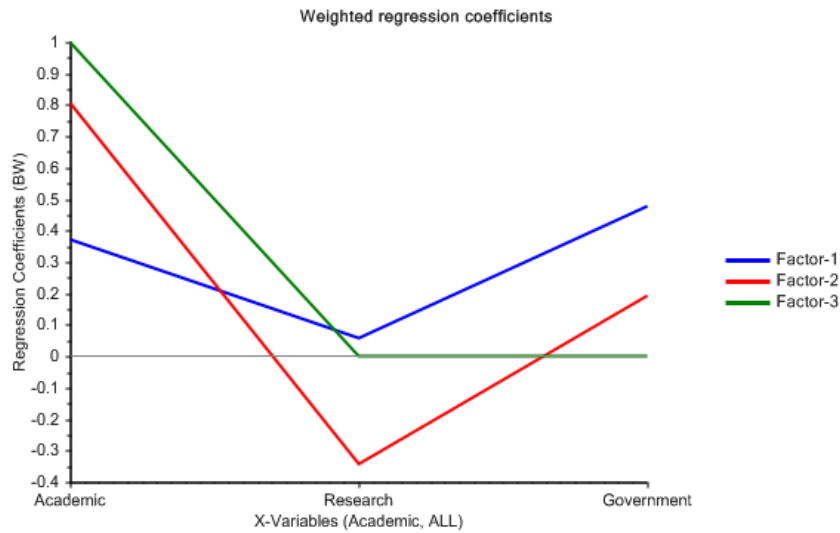
$$RMSE = \sqrt{\frac{\sum_{i=1}^n (X_{obs,i} - X_{model,i})^2}{n}}$$

Where  $X_{obs}$  is observed values and  $X_{model}$  is modelled values at time/place  $i$ .

**Table 9.** Regression Analysis for Types of Institutions Vs Types of Content

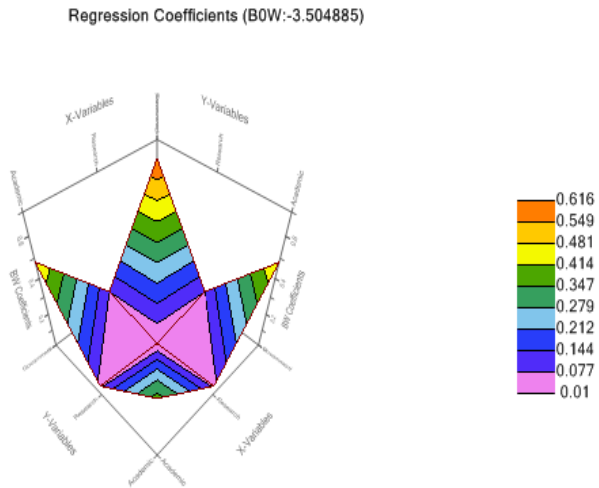
S. No	Types of Institutions	Factor-1		Factor-2		Factor-3	
		RMSE	R-Square	RMSE	R-Square	RMS E	R-Square
1	Academic	2.1779945	0.9819318	0.2354325	0.9997889	2.9815e-07	1
2	Research Center	2.0718756	0.6096679	0.4177356	0.9841325	8.324e-08	1
3	Government	1.4515593	0.9950613	0.2359612	0.9998695	8.324e-	1

Table 9 reveals that there is high correlation (0.9819318) among the types of content used in DSpace software under academic institutions pertaining to the study area. Similarly a very high correlation coefficient (0.9950613) among the types of content used in DSpace software under government institutions was observed. On the contrary there exists a low correlation (0.6096679) among the types of contents used in the DSpace software under Research centers.

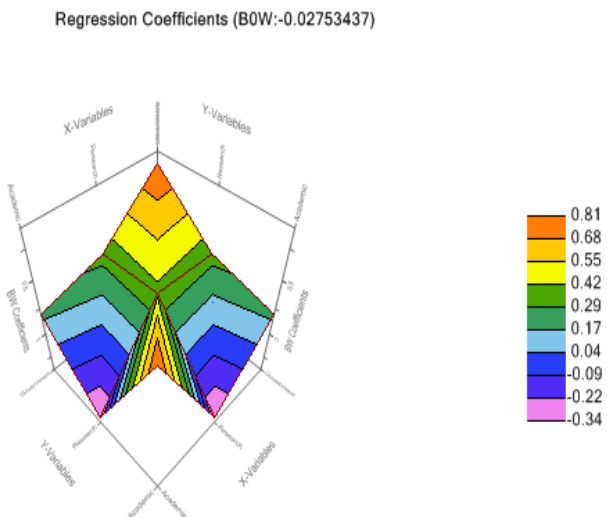


**Fig. 9.** Weighted Regression Coefficients

The overall regression coefficients pertaining to the academic research and government institutions were depicted in Figure 9 in a form of line diagram. Figure 10 shows that factor -1 depicts regression coefficients as 0.347, 0.144 and 0.481 for Academic, Research and Government institutions, respectively. Figure 11 show that Factor -2 depicts regression coefficients as 0.81, -0.34 and 0.29 for Academic, Research and Government institutions, respectively. Further Figure 12 shows that Factor -3 depicts regression coefficients as 1 for Academic institutions.

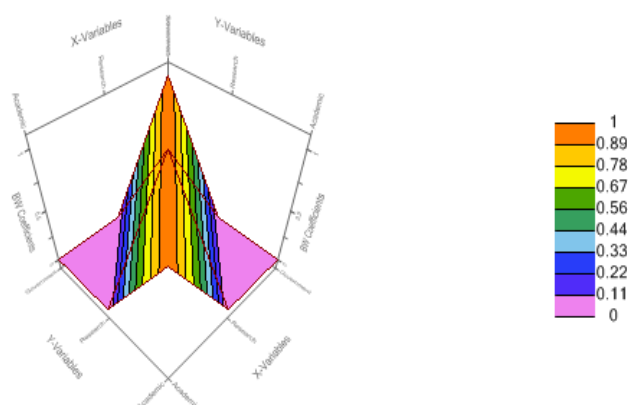


**Fig. 10.** Regression Coefficients Factor-1



**Fig. 11.** Regression Coefficients Factor-2

Regression Coefficients (B0W:-1.692056E-06)



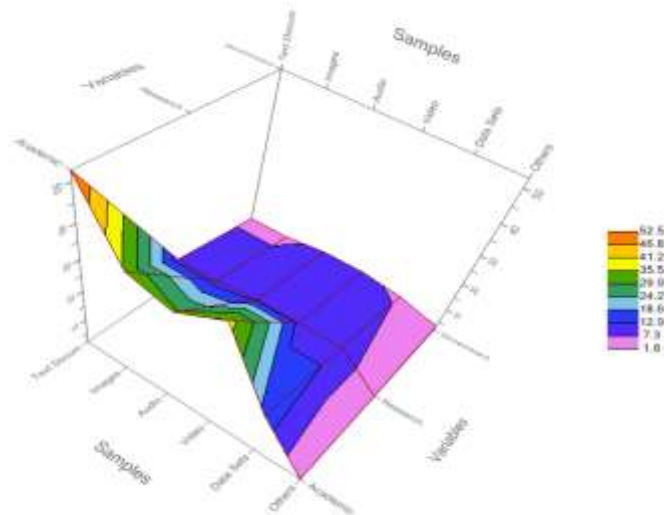
**Fig. 12.** Regression Coefficients Factor-3

Pertaining to the types of files accessed, table 9 reveals that text documents were most accessed (68.85%) than the videos (57.38%), images (50.82%), audio (50.82%) data sets (34.43%) and others (6.56%). Academic institutions were the highest to access text documents (52.46%) which is an expected response, compared to research centers (9.84%) and government organisations 6.56%. 3D matrix plot types of institutions Vs types of files depicted in figure 14.

**Table 10.** Types of Institutions Vs Types of Files

S. No	Types of Files	Academic	Research center	Government	Total	Mean	Std. Dev.	Skewness
1	Text Documents	32 (52.46)	6 (9.84)	4 (6.56)	42 (68.85)	22.9 5	25.60	1.70
2	Images	21 (34.43)	6 (9.84)	4 (6.56)	31 (50.82)	16.9 4	15.23	1.64
3	Audio	19 (31.15)	7 (11.48)	5 (8.20)	31 (50.82)	16.9 4	12.41	1.59
4	Video	23 (37.70)	7 (11.48)	5 (8.20)	35 (57.38)	19.1 2	16.16	1.65
5	Data sets	10 (16.39)	7 (11.48)	4 (6.56)	21 (34.43)	11.4 7	4.91	0.00 3
6	Other	1 (1.64)	1 (1.64)	2 (3.28)	4 (6.56)	2.18	0.94	1.73



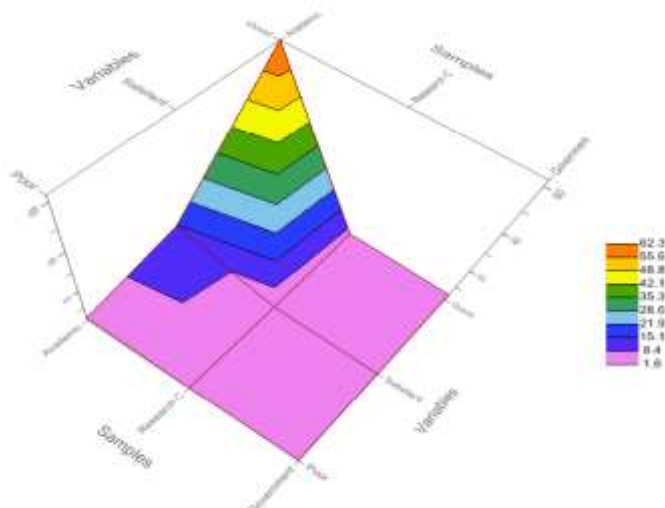


**Fig. 13.** 3D-Matrix plot of Types of Institutions Vs Types of Files

Table 11. Suggests that majority of respondents (73.77%) opined that DSpace is good accessing tool for institutional repository. Most of academic institutions (62.30%) recommended the overall satisfaction levels for DSpace as good compared to research center (6.56%) and government institutions (4.92%). Figure 15 shows the 3D matrix plot of types of institutions Vs Overall satisfaction.

**Table 12.** Types of Institutions Vs Overall Satisfaction

S.No	Overall Satisfaction	Academic	Research center	Government	Total	Mean	Std. Dev.	Skewness
1	Good	38 (62.30)	4 (6.56)	3 (4.92)	<b>45</b> <b>(73.77)</b>	24.59	32.66	1.72
2	Satisfaction	9 (14.75)	2 (3.28)	1 (1.64)	<b>12</b> <b>(19.67)</b>	6.55	7.14	1.62
3	Poor	2 (3.28)	1 (1.64)	1 (1.64)	<b>4</b> <b>(6.56)</b>	2.18	0.94	1.73
<b>Total</b>		49 (80.33)	7 (11.48)	5 (8.20)	<b>61</b> <b>(100.00)</b>			



**Fig. 14.** 3D-Matrix plot of Types of Institutions Vs Overall Satisfaction

## 7 Conclusion

DSpace is designed for use by “metadata naive” contributors. This is a conscious design choice made by its[11] developers and in keeping with the philosophy of inclusion for institutional repositories. DSpace was developed for use by a wide variety of contributors with a wide range of metadata and bibliographic skills. The present study summarizes that DSpace is principally used by clients of academic and research centers. Most of academic institutions found satisfied using DSpace compared to research center and government institutions. Among the respondents JSP preferred as DSpace user interface mostly by academic institutions compared to research centers and government institutions, Windows is most popular in academic institutions compared to research center and government. There exists high correlation among the types of content used in DSpace software under academic institutions pertaining to the study area.

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