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ASSOCIATION OF DEMOGRAPHIC VARIABLES VERSUS FREQUENCY OF USE OF AEROSPACE INDEXING, ABSTRACTING AND CITATION SERVICES - A RESEARCH SURVEY OF AEROSPACE SCIENTISTS AND ENGINEERS OF BANGALORE

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Abstract: *It is absolutely clear that the use of electronic media to support scientific communication has undoubtedly been one of the paradigm shifts in the practice of science in this era. For a research scientist today, with access to the Internet, working across continents in different time zones and keeping in touch with his peers had indeed become a reality due to the exponential growth of the telecommunication infrastructure the world has witnessed. With the coming e-resources, there has been significant transformation by which scholarly information is disseminated throughout the world. In fact, with the arrival of e-journals has greatly affected the way a scientist or an engineer seeks this information, acquires it and then uses it effectively.*

Demography is the scientific study of characteristics and dynamics pertaining to the human population, including things like size, growth rate, density and distribution of a specified group. The primary reason people use demography is to create statistics--in fact, the term roughly translates to "people measurement." These allow a person to get a picture of how common specific traits within a group are. Comparing statistics over time also allows researchers to show changes that are happening in the target group.

A research survey was undertaken to ascertain the 'Association of Demographic Variables versus the Frequency of Usage of Core Aerospace Engineering Indexing, Abstracting and Citation Services' amongst the aerospace scientists and engineers of selected 16 aerospace organizations of Bangalore. The major findings of this study are: The $\chi 2$ test indicates that the demographic variable, viz., Category Wise Distribution of the Respondents [Aerospace Scientist / Aerospace Engineer]($\chi 2$=20.832, P Value = 0.000), Occupation($\chi 2$=65.978, P Value = 0.000), Qualification($\chi 2$=28.207, P Value = 0.005), and Specialization($\chi 2$=42.228, P Value = 0.003), by 'Frequency of Use of Core Aerospace Engineering e-Databases' have significant association. This implies that the percentage of preference for the above mentioned demographic variables are not approximately the same [Not Uniformly *distributed]. The $\chi 2$ tests for the remaining demographic variables, namely, Gender and Age-Group by the 'Frequency of Use of Core Aerospace Engineering Indexing, Abstracting and Citation Services' have no significant association. This implies that percentages of preference for these demographic variables are approximately the same [Uniformly distributed].*

Keywords: *Electronic Information Resources, Demography, Aerospace Indexing, Abstracting and Citation Services, Aerospace Scientists and Engineers, City of Bangalore*

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INTRODUCTION

The Aerospace industry is not a homogenous industry but it consists of several sub industries: the civilian aerospace industry, the defense or military aerospace industry and the space industry. Each of these industries faces a different industrial structure, a different innovation system and faces different major challenges. In a nutshell, the aircraft industry can be described as a multi-technology sector.

In fact, the Aerospace sector is highly R&D intensive and levels of competition are high. Knowledge production in the Aerospace industry is paramount. It is not only a high-tech industry but also a powerful driver of innovation in the economy as a whole. These Aerospace companies consider forecasting technology and markets and in-house R&D capacities as the most important innovation drivers of the sector **[1].**

NEED FOR ELECTRONIC INFORMATION RESOURCES AMONG SCIENTISTS, ENGINEERS AND TECHNOLOGISTS

During the late 1980s and early 90s many new information technologies arose that revolutionized the way in which people searched for and gathered information. More and more publications began to profile the impact that new electronic resources had on different populations. The coming of the Internet itself was the most fundamental shift since Guttenberg's invention of the printing press **[2].**

Somewhere between 1994 and 1996 there was a profound shift in electronic resource usage by scientists. This shift could be attributed to the increase in popularity and usability of the Internet itself as well as the resources it contained. The increase in the use of electronic information resources was attributed to the availability of more and better electronic information resources, desktop access through networked workstations, and user-friendly search engines, **[3].**

With the coming of the twenty-first century, successful storage and retrieval of the exponentially growing body of scientific information quickly became dependent upon the Internet and the World Wide Web. The way in which scientists seek information to support teaching, research and creative activities is changing as new technologies and information delivery systems emerge, **[4].**

Electronic information resources are obviously an upcoming and endearing activity among all the scientists and engineers irrespective of their disciplines and work environment. The on-line access services and the Internet services are the two of the most popular library services in electronic formats today.

In this information explosion age, it is practically impossible for an aerospace scientist or engineer to carry out his research work without embracing the network and Internet technologies. They greatly depend upon these electronic innovation tools for accessing electronic information resources in the form of e-journals related to aerospace engineering right at their desktops. In fact, many of the scientists in today's R&D organizations have the unique privilege of downloading full-text e-journals right at their desktops through their Organization's e-conglomerate.

With the coming of age of e-journals, there has been a significant transformation by which scholarly information is disseminated throughout the world. In fact, the arrival of e-journals has greatly affected the way a scientist or an engineer seeks this information, acquires it and uses it effectively.

USE PATTERNS OF ELECTRONIC INFORMATION RESOURCES

Several studies on the influence of the use of electronic information resources on scholarly work have indicated that the use of electronic literature has improved their work considerably in several ways.

Today Governments, R&D institutions and Universities invest substantial sums of money for providing scholars with the digital literature they need for their research work with the intention that improved access to electronic information resources will lead to increasing scholarly productivity. The transformation of the physical library to the virtual library probably saves time, since one can access publications from one's desktop. The extent of publications available online combined with easier access has tremendously improved scholar's ability to keep abreast in their field, and perhaps inspire new ideas and ultimately enhance the quality of their work.

Several studies on the perceived influence of e-resources on scholarly productivity have indicated that factors like: (a) Easier to find material, (b) Easier to get hold of material, (c) Extended range of material available electronically, (d) Easier to keep updated in one's field of research, (e) Improved quality of work, (f) Inspired new ideas, (g) Greatly saved working time, (h) Reduced time browsing in libraries, (i) Multi-user access, fast access, (j) 24 hour access, (k) Available before print, (l) Multiple file formats for downloading and storing (PDF, RTF, DOC, HTML etc..), (m) Enhanced access and visibility to scientific papers, (n) Keeps current about global R&D etc.. has indicated that the use of electronic resources has considerably influenced the quality of work of the scholars and inspired new ideas to some extent.

INDEXING, ABSTRACTING AND CITATION SERVICES – A SHORT DESCRIPTION

Today, referencing forms the core of a good research activity. It paves the way for a strong foundation several other processes which follow up later. Without a good referencing practice one cannot obtain very good research results. Referencing itself comprises of some important features such as citation, abstracting and indexing.

Indexing service is a base service that extracts content from files and constructs an indexed catalog to facilitate efficient and rapid searching. Abstracting service is that which comprises or concentrates in itself the essential qualities of a larger thing or of several things, specifically: a summary or an epitome, as of a treatise of a book, or of a statement etc. Finally, Citation services is a reference to a published or unpublished source (not always the original source).

Coming to the context of this paper, a large number of indexing, abstracting and citation services are periodically referred and made use of by the aerospace engineers.

An abstracting service is a service that provides abstracts of publications, often on a subject or group of related subjects, usually on a subscription basis. An indexing service is a service that assigns descriptors and other kinds of access points to documents. The word indexing service is today mostly used about computer programs, but may also cover services providing back-of-the-book indexes, journal indexes and related kinds of indexes. An indexing and abstracting service is a service that provides shortening or summarizing of documents and assigning of descriptors for referencing documents. The product is often an abstract journal or a bibliographic index, which may be a subject bibliography or a bibliographic database.

In other words, indexing service is a base service that extracts content from files and constructs an indexed catalog to facilitate efficient and rapid searching. Abstracting service is that which comprises or concentrates in itself the essential qualities of a larger thing or of several things, specifically: a summary or an epitome, as of a treatise of a book, or of a statement etc. Finally, Citation services is a reference to a published or unpublished source (not always the original source). [i].

A citation index is a kind of bibliographic database, an index of citations between publications, allowing the user to easily establish which later documents cite which earlier documents. The first citation indices were legal citations such as Shepard's Citations (1873). In 1960, Eugene Garfield's Institute for Scientific Information (ISI) introduced the first citation index for papers published in academic journals, first the Science Citation Index (SCI), and later the Social Sciences Citation Index (SSCI) and the Arts and Humanities Citation Index (AHCI). The first automated citation indexing was done by CiteSeer in 1997. Other sources for such data include Google Scholar.

While citation indexes were originally designed for information retrieval, they are increasingly used for bibliometrics and other studies involving research evaluation. Citation data is also the basis of the popular journal impact factor.

There is a large body of literature on citation analysis, sometimes called scientometrics, a term invented by Vasily Nalimov, or more specifically bibliometrics. The field blossomed with the advent of the Science Citation Index, which now covers source literature from 1900 on. The leading journals of the field are Scientometrics, Informetrics, and the Journal of the American Society of Information Science and Technology.

There are also universally available free citation tools such as CiteBase, CiteSeerX, Google Scholar, and the former Windows Live Academic (now available with extra features as Microsoft Academic Search).

Legal citation analysis is a citation analysis technique for analyzing legal documents to facilitate the understanding of the inter-related regulatory compliance documents by the exploration the citations that connect provisions to other provisions within the same document or between different documents. Legal citation analysis uses a citation graph extracted from a regulatory document. [ii].

REVIEW OF LITERATURE

The number of and variety of sorts of databases ranging from journal databases to reference databases to fact databases are increasingly accessible from scholar's desktops **[5, 6]**

The author in his study on the influence of electronic information resources on scholarly work and publication productivity mentions that the influence of electronic resources on scholarly productivity can be differentiated in two dimensions: (a) an improved accessibility and availability to literature and, (b) the second is more directly related to the content and quality of research work. The perceived improved access is positively associated with the number of international publications produced among doctoral students in particular. The more direct influence of e-resource use on the content of scholarly work, is however, not associated with publication productivity. The results seem to imply that investments in academic digital libraries are beneficial for the researchers and the Universities.

He studied the perceived influence of e-resource use on scholarly work and productivity and mentions that about 60% of the researchers are of the opinion that the use of digital resources has considerably extended the range of material available, made it easier to keep up-to-date with the developments in their field, and saved their working time. The majority of the scholars also felt that the use of e-resources has improved the quality of their and inspired new ideas. **[7, 8].**

Several studies by other researchers have revealed that the 'product of quality of electronic information resources can be judged by the accuracy, currency relevance and ease of use. Resource use is better explained as a function of 'fitness for purpose', i.e., the extent to which the information resource is of appropriate quality for the situation in which it is to be used **[9].**

Another research survey at the University of Alabama of the science and engineering faculty examined the use of electronic resources for answering scientific and technical information needs **[10].**

In another survey, the authors opine that libraries of all sizes and types are embracing digital collections, although most libraries will continue to offer both print and digital collections for many years to come. New purchases and purchases of journals, magazines, and abstracting and indexing services are heavily weighted toward digital, while digital books (e-books) are only beginning to become a presence in library collections **[11].**

Information services continue to provide ease-of-access to content-rich databases encompassing invaluable scholarly research **[12]**. Important studies conducted in the United States and the Soviet bloc countries on the usefulness of indexing, abstracting and citation services have indicated that the important role of these services in the diffusion and utilization of scientific and technical information. These studies revealed that these countries rely heavily upon these services as a basic media for scientific and technological communication [**13]**. To corroborate this view further, a study conducted by the authors among the Indian Aerospace Scientists and Engineers of Bangalore it was observed that the second largest source of awareness of e-resources from them comes from, 'Citations in a report/journal conference proceedings (Mean=2.21, CV=59.28)', followed by 'Bibliographic databases search (indexing and abstracting databases (Mean=2.1, CV=61.9), **[14].**

Studies conducted on agricultural scientists **[15]**, revealed that indexing and abstracting journals (45%) constituted an important source of formal scientific and scholarly information. Also, as far as locating references, searching of indexing/abstracting tools was significantly important (55%). Citing an example in the medical field, **[16]**, it was observed that when the medical indexing/abstracting database Medline was offered free on the Web through the PubMed system, the number of users of this medical index set new records (7.6 million).

All this goes to show that, these value added services like indexing and abstracting immensely help the readers to find the most valuable articles more quickly and also thereby enabling reading more high quality articles. Most importantly, these studies strongly gives a correlation that the scientific and engineering community considers indexing, abstracting and citation services as a very important formal source of scientific scholarly communication and which immensely propagates the diffusion and utilization of scientific and technical information.

CSIR-NATIONAL AEROSPACE LABORATORIES, BANGALORE

The National Aerospace Laboratories is India's premier civil aviation R&D aerospace research organization in the country. Its main mandate is the 'Development of aerospace technologies with strong science content and with a view on their practical application to the design and construction of flight vehicles'. NAL is also required 'to use its aerospace technology base for general industrial applications'. 'Technology' would be its core engine-driver for the future. NAL is also best known for its main sophisticated aerospace R&D testing facilities which are not only unique for this country but also comparable to similar facilities elsewhere in the world.

OBJECTIVES OF THE STUDY

- To determine whether there is any association of 'Demographic Variables by the Frequency of 'Use of Core Aerospace Engineering Indexing, abstracting and citation services' amongst the Aerospace scientists and engineers of Bangalore.
- To determine whether the percentage of preference for the demographic variables, viz., (a) Category wise distribution of the respondents [Aerospace Scientist / Aerospace Engineer], (b) Occupation profile, (c) Gender, (d) Age groups, (e) Qualification and (f) Specialization by the Frequency of Use of Core Aerospace Engineering Indexing, abstracting and citation services' are approximately the same.

NULL HYPOTHESES

- There is no association between the 6 demographic variables, namely, (a) Category wise distribution of the respondents [Aerospace Scientist / Aerospace Engineer], (b) Occupation profile, (c) Gender, (d) Age groups, (e) Qualification and (f) Specialization of the respondents and the 'Frequency of Use of Aerospace Indexing, Abstracting and Citation Services' by the Aerospace Scientists and Engineers.

MATERIALS, METHODS AND SELECTION CRITERIA OF THE SAMPLE

The present study is restricted to the selected 16 prominent aerospace organizations in Bangalore. A total number of 650 survey questionnaires were distributed amongst the aerospace scientists and engineers belonging to these 16 aerospace organizations. A total number of 612 questionnaires were received back finally 583 (89.7%) were selected for the study which were found suitable for the study.

Apart from the distribution of Source Data, Occupational Categories of the respondents, age-group of the respondents, Qualification profile and the Specialization of the respondents were taken into consideration during the circulation of the questionnaire and later on during analysis and interpretation of the data.

The qualification profile of the respondents was broadly classified into: (a) Doctorate Degree, (b) Masters Degree, (c) Bachelor's Degree and (d) Diploma Degree. The Occupation profile of the respondents has been categorized into: (a) Scientific / R&D, (b) Armed Forces, (c) Teaching and Research and finally, (d) Managerial. The age group of the Aerospace Scientists and Engineers in this study is restricted between 21-60 years. Last but not the least the Specialization of these Aerospace Scientists and Engineers have been broadly classified into: (a) Thermal and Fluid Sciences, (b) Avionics Guidance and Control, (c) Aerospace Structures and Allied Mechanical Sciences, (d) Materials and Metallurgy, (e) Flight Operations and Allied Disciplines, (f) General Engineering and Support Sciences. These are indicated in the respective tables below:

Random sampling methodology has been adopted for selection of the sample size.

The distribution of Source Data is indicated in Table 1.

Table-1: Distribution of Source Data

Sl.No.	Organizations	No. of Questionnaires distributed	No. of Questionnaires received	No. of usable questionnaires usable
1.	ADA	67	63	58
2.	AFTC	19	16	15
3.	ADE	14	12	12
4.	ASTE	33	30	29
5.	CABS	16	15	14
6.	CEMILAC	33	30	29
7.	C-MMACS	8	6	6
8.	DARE	11	9	9
9.	LRDE	5	3	2
10.	GTRE	24	22	21
11.	HAL	144	140	134
12.	IAM	40	36	33
13.	ISRO-ISTRAC	25	24	22
14.	IISc	38	37	34
15.	JNCASR	5	3	1
16.	NAL	168	166	164
Total		**650**	**612**	**583 (89.7%)**

Geographical Boundary of the Study (16 Prominent Aerospace Organizations of Bangalore, INDIA).

Key: ADA=Aeronautical Development Agency, AFTC=Air Force Technical College, ADE=Aeronautical Development Establishment, ASTE=Aircraft Systems Testing Establishment, CABS=Centre for Airborne Systems, CEMILAC=Centre for Military Airworthiness and Certification, C-MMACS=Centre for Mathematical Modeling and Computer Simulation, DARE=Defense Avionics Research Establishment, LRDE=Electronics and Radar Development Establishment, GTRE=Gas Turbine Research Establishment, HAL=Hindustan Aeronautics Limited, IAM=Institute of Aerospace Medicine, ISRO-ISTRAC=Indian Space Research Organization, IISc=Indian Institute of Science, JNCASR=Jawaharlal Nehru Centre for Advanced Scientific Research, NAL=National Aerospace Laboratories.

Table 2 indicates the broad occupational categories from the selected 16 prominent Indian Aerospace Organizations of Bangalore.

Table-2:

Broad Classification of the Occupation Categories

Sl.No.	Broad Occupational Categories	Designations / Grades
1.	Scientific and R&D	Scientist B, Scientist C, Scientist D, Scientist E, Scientist E1, Scientist E2, Scientist F, Scientist G, Scientist A1, Scientist B1, Scientist C1, Deputy Secretary Grade, Junior Technical Assistant, Scientist/Manager(Inter-Organizational Collaborative Projects)
2.	Armed Forces	Doctor, Squadron Leader, Wing Commander, Group Captain, Captain, Lieutenant Colonel, Flight Lieutenant, Major
3.	Teaching and Research	Professor, Associate Professor, Assistant Professor, Principal Research Scientist, Senior Scientific Officers, Research Scholars.
4.	Managerial	Dy. General Manager Grade-7, Chief Manager Grade-6, Senior Manager Grade-5, Manager Grade-4, Dy. Manager Grade-3, Engineer Grade-2, Assistant Engineer Grade-1.

Table 3 shows the broad specialization categories of the selected sample.

Table-3:

Broad Classification of the Specialization Categories

Sl.No.	Broad Specialization Categories	Designations / Grades
1.	**Thermal and Fluid Sciences**	**Comprising of:** (Aerospace Propulsion, Fluid Dynamics, Power plant and Fuel Systems, Aerodynamics, Energy Systems, Propulsion, AeroEngines, Fluid Flows, Computational Fluid Dynamics, CFD Software Development, Fluid Mechanics, Thermal Engineering, Gas Turbine Engines, Gas Turbine Engineering, Turbomachinery, Control Propulsion Group, CFD Aerospace, Thermal Power Engineering, Hypersonic Aerodynamics, Fluid Diagnostics, Unsteady Flows)
2.	**Avionics Guidance and Control**	**Comprising of:** (Aerospace Engg., Guidance and Control, FTE (Avionics), Radar Communication, Guided Missiles, Electronical, E & C, Systems Avionics, Engine Control Systems, Electronic Communication, ECE, Embedded Systems, Communication Systems, Communication, Control Engineering, Dynamics Control, Flight Mechanics, Flight Simulation, Modelling and Simulation, Simulation, Electrical and Electronics, Avionics, Parameter Estimation, Digital Signal Processing (DSP), Signal Processing, Instrumentation and

		Control, Micro Electronics, Control Systems, Satellite Based Navigation, Engine Control Systems, Communication Systems, Aircraft Control, Flight Control)
3.	**Aerospace Structures and Allied Mechanical Sciences**	**Comprising of:** (Aerospace Structures, Aerospace Fatigue Analysis, Structures, Structural Design, Aircraft Structures, Structural Design, Aerospace Design, Weight and CG, Computational Mechanics, Composite Structures, Smart Structures, Aerospace Mechanics, Aircraft Design, Aircraft-Aeronautical Mechanics, Composite Product Development, Stress Analysis, Design, Aero-elasticity, Structural Design, Crashworthiness, Structural Health Monitoring, Composites, Composite Structures, Fatigue and Fracture, Solid Mechanics, Structural Dynamics, Experimental Structures, Structural Vibration and Control, Finite Element Method)
4.	**Materials and Metallurgy**	Comprising of: (Aerospace Materials, Alloy Development, Materials Science, Fractography, Failure Analysis, Ceramics, Metallurgical Engineering, Polymer Science).
5.	**Flight Operations and Allied Disciplines**	Comprising of: (Flight Testing, Flight Test Engineer, Flight Test Pilot (FTP), Flying Instructor, Test Pilot, Fighter Pilot, Jaguar Trained, Flying, Maintenance Engineer, Flying, Radar, Antenna/Radar, Test Flying)
6.	**General Engineering and Support Sciences**	Comprising of: (Aeronautical Engineering, Human Resource Management (HRM), Mechanical Engineering, Aerospace, Aeronautics, Physics, Oceanography, Trained Aerospace, Production Engineer, Industrial Engineering, SQC Automobile, Industrial Engineering, Aircraft Armament, Computer Science, Aerospace, Aviation Medicine, Aviation Medicine, Aviation Psychology, Aviation Physiology, Physiology, Aerospace Medicine, Aircraft Production Engineering, Engine Assembly, Quality Assurance, Mechanical, CAD, Electro-Magnetics, Rotorcraft, Electrical and Power, Mechanical Electronics, Machine Design, Chemical Engineering, Technical Documentation, Biotechnology, Mechanical Electronics, Microwave Engineering, Manufacturing Engineering, Design Engineering, Production Technology, Manufacturing Engineering, Design and Analysis, Machine Design, Power Systems, Software System, Design, CAE, Project Management, Optical Communication, Neural Networks, Rotary Wing Research, Helicopter Technology, Engineering Design, Earth Science, International Business,

		Industrial Engineering, Quality Engineering, Chemistry, Digital Logic Designing, Production Engineering, Aircraft Design, Software Development, CSE, Information Science, Aerospace Vehicles, Radar Dynamics, Mechanical Electronics, Instrumentation System).

The association of the 6 main Variables of Demography chosen for the study, viz., (a) Category wise distribution of the respondents [Aerospace Scientist / Aerospace Engineer], (b) Occupation, (c) Gender, (d) Age, (e) Qualification and (f) Specialization of the Aerospace Scientists and Engineers by the 'Frequency of Use of Aerospace Indexing, Abstracting and Citation Services', viz., (1) Aerospace and High Technology Database (Cambridge Scientific Abstracts, (CSA)), (2) Engineering Index (Compendex), (Engineering Village 2), (3) INSPEC (Engineering Village 2), (4) ISI Web of Science (ISI Citation Indexes), (ISI Web of Knowledge), (5) NASA Technical Reports Server (NTRS), (6) NTIS: National Technical Information Services Indexes, (Cambridge Science Abstracts), (7) Search Tools (http://searchtools.lib.umich.edu), (8) SCOPUS (Abstract and citation database), (http://www.info.scopus.com) are indicated in Table 4.

Table-4: Association of Demographic Variables versus Frequency of Use of Aerospace Engineering Indexing, Abstracting and Citation Services

CATEGORY WISE DISTRIBUTION	Category V/s. Frequency of Use of Aerospace Engineering Indexing, Abstracting and Citation Services					Total
	Never Use	Monthly	Fortnightly	Weekly	Daily	
Aerospace Scientist	87	128	51	26	3	295
	(29.5)	(43.4)	(17.3)	(8.8)	(1.0)	(100.0)
Aerospace Engineer	135	103	28	19	3	288
	(46.9)	(35.8)	(9.7)	(6.6)	(1.0)	(100.0)
Total	222	231	79	45	6	583
Percent	(38.1)	(39.6)	(13.6)	(7.7)	(1.0)	(100.0)
Chi-Square and P Value	$\chi^2 = 20.788$, P=0.000					
OCCUPATION PROFILE	Occupation V/s. Frequency of Use of Aerospace Engineering Indexing, Abstracting and Citation Services					Total
	Never Use	Monthly	Fortnightly	Weekly	Daily	
Scientific/ R & D	87	152	58	26	4	327
	(26.6)	(46.5)	(17.7)	(8.0)	(1.2)	(100.0)
Armed Forces	51	21	3	6	0	81
	(63.0)	(25.9)	(3.7)	(7.4)	(0.0)	(100.0)

Teaching & Research	8	17	10	1	1	37
	(21.6)	(45.9)	(27.0)	(2.7)	(2.7)	(100.0)
Managers	76	41	8	12	1	138
	(55.1)	(29.7)	(5.8)	(8.7)	(0.7)	(100.0)
Total	222	231	79	45	6	583
Percent	(38.1)	(39.6)	(13.6)	(7.7)	(1.0)	(100.0)
Chi-Square and P Value	$\chi^2 = 73.689$, P=0.000					

GENDER PROFILE	**Gender V/s. Frequency of Use of Aerospace Engineering Indexing, Abstracting and Citation Services**					**Total**
	Never Use	**Monthly**	**Fortnightly**	**Weekly**	**Daily**	
Female	25	30	10	5	1	71
	(35.2)	(42.3)	(14.1)	(7.0)	(1.4)	(100.0)
Male	197	201	69	40	5	512
	(38.5)	(39.3)	(13.5)	(7.8)	(1.0)	(100.0)
Total	222	231	79	45	6	583
Percent	(38.1)	(39.6)	(13.6)	(7.7)	(1.0)	(100.0)
Chi-Square and and P Value	$\chi^2 = 0.494$, P=0.974					

AGE-GROUP	**Age Group V/s. Frequency of Use of Aerospace Engineering Indexing, Abstracting and Citation Services**					**Total**
	Never Use	**Monthly**	**Fortnightly**	**Weekly**	**Daily**	
21-30	79	73	36	20	2	210
	(37.6)	(34.8)	(17.1)	(9.5)	(1.0)	(100.0)
31-40	66	75	21	16	2	180
	(36.7)	(41.7)	(11.7)	(8.9)	(1.1)	(100.0)
41-50	48	62	13	5	2	130
	(36.9)	(47.7)	(10.0)	(3.8)	(1.5)	(100.0)
51-60	29	21	9	4	0	63
	(46.0)	(33.3)	(14.3)	(6.3)	(0.0)	(100.0)
Total	222	231	79	45	6	583
Percentage	(38.1)	(39.6)	(13.6)	(7.7)	(1.0)	(100.0)
Chi-Square and P Value	$\chi^2 = 13.996$, P=0.301					

QUALIFICATION	**Qualification V/s. Frequency of Use of Aerospace Engineering Indexing, Abstracting and Citation Services**					**Total**
	Never Use	**Monthly**	**Fortnightly**	**Weekly**	**Daily**	
Doctorate Degree	15	47	21	2	1	86
	(17.4)	(54.7)	(24.4)	(2.3)	(1.2)	(100.0)
Masters Degree	88	105	38	23	3	257
	(34.2)	(40.9)	(14.8)	(8.9)	(1.2)	(100.0)
Bachelors Degree	118	76	20	20	2	236
	(50.0)	(32.2)	(8.5)	(8.5)	(0.8)	(100.0)
Diploma	1	3	0	0	0	4

	(25.0)	(75.0)	(0.0)	(0.0)	(0.0)	(100.0)
Total	222	231	79	45	6	583
Percent	(38.1)	(39.6)	(13.6)	(7.7)	(1.0)	(100.0)
Chi-Square and P Value	$\chi^2 = 46.366$, P=0.000					

SPECIALIZATION	**Specialization V/s. Frequency of Use of Aerospace Engineering Indexing, Abstracting and Citation Services**					**Total**
	Never Use	**Monthly**	**Fortnightly**	**Weekly**	**Daily**	
Thermal & Fluid Sciences	20	48	11	6	0	85
	(23.5)	(56.5)	(12.9)	(7.1)	(0.0)	(100.0)
Avionics, Guidance and Control	36	48	23	7	2	116
	(31.0)	(41.4)	(19.8)	(6.0)	(1.7)	(100.0)
Aerospace Structures and Allied Mechanical Sciences	18	27	13	10	0	68
	(26.5)	(39.7)	(19.1)	(14.7)	(0.0)	(100.0)
Materials and Metallurgy	8	13	8	0	0	29
	(27.6)	(44.8)	(27.6)	(0.0)	(0.0)	(100.0)
Flight Operations and other Allied Disciplines	25	16	4	2	0	47
	(53.2)	(34.0)	(8.5)	(4.3)	(0.0)	(100.0)
General Engineering and Support Sciences	115	79	20	20	4	238
	(48.3)	(33.2)	(8.4)	(8.4)	(1.7)	(100.0)
Total	222	231	79	45	6	583
Percent	(38.1)	(39.6)	(13.6)	(7.7)	(1.0)	(100.0)
Chi – Square and P Value	$\chi^2 = 54.559$, P=0.000					

Key 1: Aerospace Indexing, Abstracting and Citation Services: (1) Aerospace and High Technology Database (Cambridge Scientific Abstracts, (CSA)), (2) Engineering Index (Compendex), (Engineering Village 2), (3) INSPEC (Engineering Village 2), (4) ISI Web of Science (ISI Citation Indexes), (ISI Web of Knowledge), (5) NASA Technical Reports Server (NTRS), (6) NTIS: National Technical Information Services Indexes, (Cambridge Science Abstracts), (7) Search Tools (http://searchtools.lib.umich.edu), (8) SCOPUS (Abstract and citation database), (http://www.info.scopus.com).

Key2: Figures in Brackets indicate Percentages

RESULTS AND DISCUSSION

- The $\chi 2$ test indicates that the demographic variable, viz., Category Wise Distribution of the Respondents [Aerospace Scientist / Engineer]($\chi 2$=20.788, P Value = 0.000), Occupation($\chi 2$=73.689, P Value = 0.000), Qualification($\chi 2$=46.366, P Value = 0.000) and Specialization ($\chi 2$=54.559, P Value = 0.000) by 'Frequency of Use of

Aerospace Indexing, Abstracting and Citation Services' *have significant association.*

- The $\chi 2$ tests for the remaining demographic variables, namely, Gender and Age Group by the 'Frequency of Use of Aerospace Indexing, Abstracting and Citation Services' *have no significant association.*

CONCLUSION

The main conclusions that the authors would like to infer in this paper are:

- The $\chi 2$ test indicates that the demographic variable, viz., Category Wise Distribution of the Respondents($\chi 2$=20.788, P Value = 0.000), Occupation($\chi 2$=73.689, P Value = 0.000), Qualification($\chi 2$=46.366, P Value = 0.000) and Specialization ($\chi 2$=54.559, P Value = 0.000) by 'Frequency of Use of Aerospace Indexing, Abstracting and Citation Services' *have significant association.*
- This implies that the percentage of preference for the above mentioned demographic variables are not approximately the same [Not Uniformly Distributed].
- The $\chi 2$ tests for the remaining demographic variables, namely, Gender and Age-Group by the 'Frequency of Use of Aerospace Indexing, Abstracting and Citation Services' have no significant association.
- This implies that percentages of preference for these demographic variables are approximately the same *[Uniformly Distributed].*

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