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Research Trends in Total Quality Management (Tqm): A Comparitive Assessment of Publication Output of India and Japan Using Scientometrics

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ABSTRACT

The study examines Indian and Japan Total Quality Management analysis output on several parameters at the side of growth, analysis communication in core journals, and geographical distribution of publications. The study focuses on the articles disclosed by Indian and Japan and indexed in Science Citation Index – web of Science for the periodfrom 2012 to 2016. India has published 811 papers within the TQM field and received 12768 citations and Japan has published1095 papers and received 9044 citations in the field during the period 2012 to 2016. The study suggests the need to increase the pace of Indian and Japan scientific discipline analysis and improve their quality. It suggests boosting the building ability and mental object to help bridge the scientific discipline gap with leading countries. It conjointly counsels to make competency and knowledge domain to assist bridge the gap between leading countries.

Keywords : Doubling time, Growth of rate for Scientific publication, Total quality management,

Relative growth rate, Scientometrics

I. INTRODUCTION

The importance of knowledge has been recognized like never before in the history of human civilization, particularly scientific and social knowledge. "Few dispute the claim that a nation's science and technology base is a critical element of its economic strength, political structure and cultural validity", says (Garfield & Welljams-Dorof, 1992). The national developments are going to be increasingly dictated by the research and development. Today there is a tremendous desire in virtually every country to step up investment in Science & Humanities (S & H) research and to reap the benefits of such research. There is a need to assess different basis upon which the scarce resources can be allocated to different areas of scientific and technological research both human and economic. An important and tangible component of studies in information sciences is citation analysis, for assessing the extent of utility of research publications in journals, conference /seminar /symposium proceedings and other literature, at national and international levels.

According to (P é ter Vinkler, n.d.) — Scientometrics indicator is a Scientometrics measure which can be attributed to Scientometrics organizations ‖ and which can be classified into basic indicators, e.g., number of citations, number of

synchronous references, and number of papers, etc; and complex ones which is based on relations between the referencing and referenced sets. Bibliometrics, a subfield of Scientometrics or the science of science itself, offers a robust set of ways and measures for finding out the structure and processes of intellectual communication. Citation analysis, the known bibliometric approach, is widely utilized in analysis output analysis for assessing research performance or impact of researchers, establishments, regions, articles, journals, etc. Despite its wide use, there are opinions that deny the intrinsic worth of the citation analysis outcomes. even so, the self-same author of the citation indexes distinguished that citation counts couldn't determine significance that was unrecognized by the scientific community(Garfield & Merton, 1979). For qualitative analysis, as a mirrored image of the community's work and interests, fitness needs peer judgments.

In the Eighties and Nineteen Nineties, there began a brand-new part of internal control and management, that became called Total Quality Management (TQM). Having ascertained Japan's success at quality development, western firms began to introduce their own quality initiatives. TQM was developed as an enclosure phrase for the broad spectrum of quality-focused ways, programs, and techniques throughout this era, and have become the centre of focus for the western quality movement. Initial TQM definitions were client cantered. However, as time progressed following the event of business excellence models—the definitions became broader and cantered on all stakeholders.TQM is predicated on the number of concepts. It means that puzzling over quality in terms of all functions of the enterprise and maybe a start-to-finished method that integrated reticular functions in the slightest degree levels. it's a systems approach that considers each interaction between the varied parts of the organization (Ross, 2017).

Total Quality Management (TQM) and Japanese Management System (JMS) as two-sided coin. Both complement one another. the link between Total Quality Management and Japanese Quality Management System are thus shut that some have the understanding that TQM might solely achieve success in Japanese culture. Current socio-economic scenario of Japan has created new ways that of perceiving Japan aggressiveness. which stand on the thought of long employment, is currently seen as not relevant in today's quick pace business world. once JMS is collapsing, TQM has lost its half; so, being labelled as superannuated management system. the guts of TQM, continuous improvement is being suspect as the block obstructive innovative thinking for the Japanese and so moving Japan's aggressiveness. The authors disagree! The authors believe that the link of JMS and TQM is moving to a brand-new era wherever there are rather more to be told from the Japanese experience.

Objectives:

1. To assess the research productivity in total quality management for a specific period of 2012-2016
2. To know about GrowthofIndia and Japan publications.
3. To assess the contribution of Prolific Research Institutions

II. REVIEW OF LITERATURE

There don't seem to be several bibliometric studies in a scientific discipline. (Jagadeesh, 1999)The various surveys severally conducted by researchers and business publications have disclosed that awareness on quality of merchandise and services has picked up in India. With quality-based competition thickening, Indian industries and businesspeople are showing a keen interest in up the standard of merchandise through TQM. many organizations, non- public, and Government are actively propagating TQM through a spread of coaching and academic programs. TQM has evidenced to be a significant ingredient for fulfilment and currently has its permanent roots within the ``mission and vision'' of the Indian company sector.

(Ravichandra Rao and Suma) analyzed Republic of Indian engineering literature and located that engineers in India publish during a choose few journals and engineering analysis is targeted in a few establishments in. They determined that analysis output in applied physics, light-weight and optics, technology and knowledge science are increasing each at the planet and Republic of India levels.Karamourzov8 assessed the results of freelance development of the CIS countries within the field of science over the amount 1990–2009. , Tsay, Arunachalam, Kostoff, Sangam, Biradar, Sangam, Gupta, Bhattacharya dole out similar Scientometrics studies to assess research project outcome in numerous topics like output, comparative studies between countries, collaboration patterns studies, growth pattern, etc.

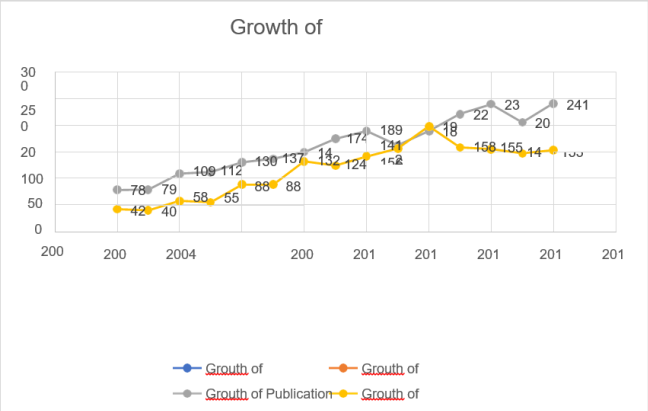
III. METHODOLOGY

The data for this study was collected from the ScienceCitation Index- Expanded (SCI-E) of Web of Science, acomprehensive and exhaustive database enveloping almostall subjects of Social Sciences. Its coverage of Social field is quite comprehensive. The distributionof publications, source wise distribution, most prolificinstitutions, leading research areas, prolific authors,highly cited papers, and international collaboratorscan be retrieved from the database. The database wassearched for collecting documents in the areas of Total Quality Management, Quality Assurance, Quality Control, TQM, published between 2012 and2016.

Table 1 Growth of Publication

Publication Year	Japan	India
2016	241	153
2015	205	147
2014	239	155
2013	221	158
2012	189	198
2011	162	156
2010	189	141
2009	174	124
2008	149	132
2007	137	88

Figure 1. Doubling time of Total Quality management publicationfrom India and Japan



IV. RESULTS AND DISCUSSION

4.1 Growth of Publications

One of the apparent options of scientific literature in recent years has been its rate of growth. range of growth models are planned during this regard. In 1963 Price18 planned Associate in Nursing exponential rate of growth of scientific literature. He expected a daily exponential growthwith doubling amount of 10 to fifteen years. within the topics thought about during this study it absolutely was found that the articles from Total Quality Management analysis output of Asian country and Japan in terms of total range of publications and citations, citations per papers are illustratein Table2. India has published 811 papers and received 12768 citations throughout the amount 2012-2016, Citations per Paper is 15.74. As per the Web of Science knowledge, accumulative publications growth, the accumulative output of India had inflated from 198 articles in 2012 to 153 articles in 2016. the information collected for this study shows a gradual decrease over the years. Japan published 1095 articles and received 9044 citations throughout the amount 2012-2016 with a mean citation per article being 8.25. Japan has printed 189 articles in 2012 and 241 publications in 2016. the information for this study shows a gradual increase over the years. Figure 1 shows the annually inflated citations received by each country. The publications from each country have inflated year by year. One vital

issue note to it India has cut the expansion of articles year by year.

Table 2.	Growth of Publications							
	India				Japan			
Years	TNP	TNC	CPP	RCI	TNP	TNC	CPP	RCI
2016	153	3661	23.93	1.52	241	3580	14.85	1.80
2015	147	3004	20.43	1.29	205	2690	13.12	1.60
2014	155	2418	15.6	0.99	239	1748	7.31	0.89
2013	158	1986	12.57	0.79	221	849	3.84	0.46
2012	198	1699	8.58	0.54	189	177	0.93	0.11
	811	12768	15.74		1095	9044	8.25	

(TNP, total number of publications; TNC, total number of citations; CPP, citations per paper; RCI, relative citation impact forms. (The citation impact is basically the number of citations per paper that that group has received over a certain time period., in the Table 2 the RCI is calculated as CPP divided by average CPP)

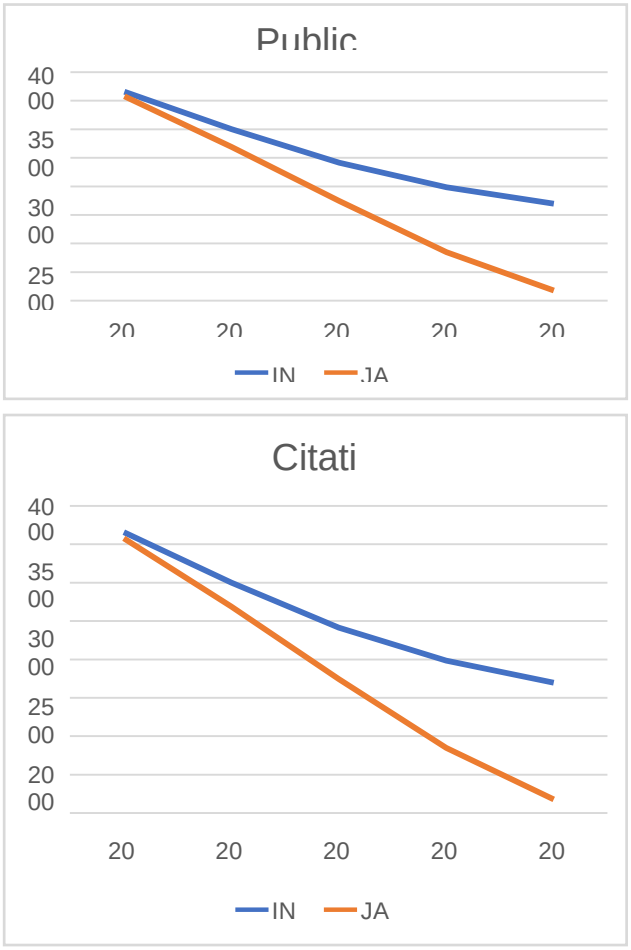


Figure 2. Pattern of growth of publications in Total Quality Management in India and Japan (2012 – 2016).

Prolific Research Institutions

Table 3 displays results of top institutions and comparisonbetween India and Japan based on number ofpublications. INDIAN INSTITUTE OF TECHNOLOGY SYSTEM IIT SYSTEMcontributed the highest number of articles, i.e. 138 articles with 7.95%COUNCIL OF SCIENTIFIC INDUSTRIAL RESEARCH CSIR INDIA,Bangalore with 137 articles (7.90%) is a distant secondfollowed by BHABHA ATOMIC RESEARCH CENTERwith 94 articles (5.42%). With regard to Japan the UNIVERSITY OF TOKYO, has published the highestarticles i.e. 204 (6.53%), followed by KYOTO UNIVERSITY, with 92 articles (4.40%), Osaka University with 86 articles (7.854) RIKEN, with 525 articles (7.671%),JAPAN SCIENCE TECHNOLOGY AGENCY JST,with 63 articles (5.753%), KYUSHU UNIVERSITY, with 53 articles(4.84%), NAGOYA UNIVERSITY,with 46 articles (4.201%), NATIONAL INSTITUTE OF ADVANCED INDUSTRIAL SCIENCE TECHNOLOGY AIST, with 44 articles(4.012%) and TOHOKU UNIVERSITY, with 42 articles (3.836%).

INDIA

Table 3

INDIAN INSTITUTE OF TECHNOLOGY SYSTEM IIT SYSTEM	138	7.95%
COUNCIL OF SCIENTIFIC INDUSTRIAL RESEARCH CSIR INDIA	137	7.90%
BHABHA ATOMIC RESEARCH CENTER	94	5.42%
INDIAN COUNCIL OF AGRICULTURAL RESEARCH ICAR	59	3.40%
INDIAN INSTITUTE OF TECHNOLOGY IIT DELHI	35	2.02%
JADAVPUR UNIVERSITY	34	1.96%
JAMIA HAMDARD UNIVERSITY	34	1.96%
NATIONAL INSTITUTE OF PHARMACEUTICAL EDUCATION RESEARCH NIPER	33	1.96%
INDIAN INSTITUTE OF CHEMICAL TECHNOLOGY	30	1.73%
TATA MEMORIAL HOSPITAL	30	1.73%
JNTUK UNIVERSITY COLLEGE OF ENGINEERING	29	1.67%
ALL INDIA INSTITUTE OF MEDICAL SCIENCES	28	1.61%
DEFENCE RESEARCH DEVELOPMENT ORGANISATION DRDO	28	1.61%
INDIAN INSTITUTE OF TECHNOLOGY IIT KHARAGPUR	27	1.56%
DR REDDYS LABS LTD	26	1.50%
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD	26	1.50%
NATIONAL BOTANICAL RESEARCH INSTITUTE INDIA	26	1.50%
INDIAN INSTITUTE OF TECHNOLOGY IIT MADRAS	25	1.44%
DEPARTMENT OF SCIENCE TECHNOLOGY INDIA	24	1.38%

ANDHRA UNIVERSITY	22	1.27%
CSIR CENTRAL DRUG RESEARCH INSTITU	22	1.27%
GUJARAT UNIVERSITY	22	1.27%
CHRISTIAN MEDICAL COLLEGE HOSPITAL CMCH VELLORE	21	1.21%
INDIAN INSTITUTE OF SCIENCE IISC BANGALORE	20	1.15%
BHARATI VIDYAPEETH DEEMED UNIVERSITY	18	1.04%
UNIVERSITY OF CALIFORNIA SYSTEM	17	0.98%
INDIAN COUNCIL OF MEDICAL RESEARCH	16	0.92%
INDIAN INSTITUTE OF TECHNOLOGY IIT KANPUR	16	0.92%
ANNA UNIVERSITY	15	0.87%
CENTRAL INSTITUTE OF MEDICINAL AROMATIC PLANTS INDIA	15	0.87%
DEPARTMENT OF BIOTECHNOLOGY DBT INDIA	15	0.87%
KARNATAK UNIVERSITY	15	0.87%
UNIVERSITY OF MYSORE	15	0.87%
ICAR INDIAN VETERINARY RESEARCH INSTITUTE	14	0.81%
INSTITUTE OF HIMALAYAN BIORESOURCE TECHNOLOGY	14	0.81%
SAVITRIBAI PHULE PUNE UNIVERSITY	14	0.81%
ANNAMALAI UNIVERSITY	13	0.75%
MINISTRY OF EARTH SCIENCES MOES INDIA	13	0.75%
PGIMER CHANDIGARH	13	0.75%
PSG COLLEGE TECHNOLOGY	13	0.75%
ST XAVIERS COLL	13	0.75%
UNIVERSITY OF LONDON	13	0.75%
ALIGARH MUSLIM UNIVERSITY	12	0.69%
ANNA UNIVERSITY CHENNAI	12	0.69%
INDIRA GANDHI CENTRE FOR ATOMIC RESEARCH	12	0.69%
JAMIA MILLIA ISLAMIA	12	0.69%
NATIONAL INSTITUTES OF HEALTH NIH USA	12	0.69%
INDIAN INSTITUTE OF CHEMICAL BIOLOGY	11	0.63%
INDIAN INSTITUTE OF TECHNOLOGY IIT BOMBAY	11	0.63%

JAPAN

Table 4

Organizations-Enhanced	Records	% of 1095
UNIVERSITY OF TOKYO	105	9.589
KYOTO UNIVERSITY	92	8.402
OSAKA UNIVERSITY	86	7.854
RIKEN	84	7.671
JAPAN SCIENCE TECHNOLOGY AGENCY JST	63	5.753
KYUSHU UNIVERSITY	53	4.84
NAGOYA UNIVERSITY	46	4.201
NATIONAL INSTITUTE OF ADVANCED INDUSTRIAL SCIENCE TECHNOLOGY AIST	44	4.018
TOHOKU UNIVERSITY	42	3.836
HOKKAIDO UNIVERSITY	35	3.196
HIROSHIMA UNIVERSITY	32	2.922
NATIONAL CANCER CENTER JAPAN	32	2.922
OKAYAMA UNIVERSITY	32	2.922
NATIONAL INSTITUTE OF HEALTH SCIENCES JAPAN	28	2.557
TOKYO MEDICAL DENTAL UNIVERSITY TMDU	28	2.557
KEIO UNIVERSITY	22	2.009
KUMAMOTO UNIVERSITY	22	2.009
JUNTENDO UNIVERSITY	21	1.918
NATIONAL INSTITUTE OF RADIOLOGICAL SCIENCES JAPAN	21	1.918
NATIONAL METROLOGY INSTITUTE OF JAPAN	21	1.918
NAGOYA CITY UNIVERSITY	20	1.826
TOKYO INSTITUTE OF TECHNOLOGY	20	1.826
CHIBA UNIVERSITY	19	1.735
GUNMA UNIVERSITY	19	1.735
NIIGATA UNIVERSITY	19	1.735

4.1. Source-wise Distribution of Research Output

The sources of Total quality management research include articles published in journals, reviews, conference and seminars proceedings, editorials, meeting abstract and book chapters (Table 5). A total of 1938articles in total quality management were published from India and Japan from 2012 to 2016. Out of them, journal articles accounted for 1634, (84.31%) from both countries. The comparative analysis indicates journal articles accounted for 88.16% of India's output and 81.54% of Japan's output.

Table 5. Source-wise Distribution of Research Output of India and Japan

Document Type (INDIA)	Publication	%	Document type (JAPAN)	Publication	%
ARTICLE	715	88.16	ARTICLE	919	81.54
Review	63	7.77	REVIEW	121	10.74
PROCEEDINGS PAPER	13	1.60	MEETING ABSTRACT	42	3.73
MEETING ABSTRACT	12	1.48	PROCEEDINGS PAPER	25	2.22
Editorial Material	4	0.49	EDITORIAL MATERIAL	13	1.15
DATA PAPER	2	0.24	DATA PAPER	7	0.62
BOOK REVIEW	2	0.24	BOOK CHAPTER	-	-
	811	100		1127	100

V. CONCLUSION

The present study provides a scientometric analysis of Total quality management analysis in India and Japan. both the countries are robust in Total Quality management, with a varied focus. India lacks in terms of number of publications during the study period. whereas Japan scores high compared to India thought about for the study. Nevertheless, the no of citations received by Indian articles are reasonable high and gives us an indication that the articles were of significant value to the research community. We can also see despite lesser number of Japan Institutes that are available in the data, there is a reasonable contribution from all the institutes to create more publications when compared to India.

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