CHAPTER 5

FINDINGS, SUGGESTIONS AND CONCLUSION

5.1. RESEARCH GROWTH ANALYSIS

The year wise research publication of records on Nano Thin Films published from the years 1999 to the year 2012 and indexed in the Web of Science were retrieved and processed in the form of tabulation which were 8386 at an average growth of 599 records per year. The total Global Citation Score and Local Citation Score received for the research publications are 11280 and 3965 with an average of 8006 and 283 respectively. The research growth started slowly, but grows steadily and attained to the record count of 8386 in the year 2012, which may grow annually in the near future.

5.1.1 TEST OF REGRESSION ANALYSIS

It is concluded that there is relationship between the number of publications of the first half of the years and the second half of the data selected for the research work from 1999 to 2012. Since the P-value is 0 and lesser than the critical value of 0.05, which is well known that there is a significant relationship between the publications of two set of records. The correlation test also reveals the result as 0.98, which makes it crystal clear that the two set of publications have high relationship. It can also be interpreted in percentage that the relationship between the two variables as 97%. Again to move ahead in the research area and to predict the future it is suggested that through the forecast analysis the future research growth on Nano Thin Films can be determined.
5.1.2. MOVING AVERAGE OF THE RESEARCH GROWTH

The moving average of the research publications on Nano thin films indicates a steady moving growth. The moving average of the year 2001 is 140 as shown as the beginning and in the year of 2012 it has increased to 1072. There is no stagnation of the research publications in any year. This itself proves that the research on Nano Thin Films grows year after year all over the world. It is suggested that if more concentration were shown by the scientists and more funds allocated towards the research on Nano Thin Films many more publications and innovations will result in the field of Nano Thin Films.

5.1.3. FORECAST ANALYSIS OF THE YEARWISE PUBLICATIONS

A forecast analysis has been conducted on the basis of the existing research publication published from 1999 to 2012, which reveals that the total number of records expected to be published for the next 15 years retrieved through the Time Series analysis year by year from 2013 to 2026 are predicted as 25259. It is suggested a pre-planned budget for every five years may be allocated on the basis of the present research findings in an intention to motivate the researchers as well as to enhance other research facilities towards the increase of the number of research publications on Nano Thin Films.

5.1.4. GROWTH RATE AND DOUBLING TIME

The relative growth rate neither inclines or declines at a steady growth which leads to accept the null hypothesis framed such as H0, “There is no significant regular growth rate in the research publications published on Nano Thin Films” is accepted and the alternate hypothesis framed is rejected. The research analysis reveals that the doubling time of the
records is 6.47 years. It is observed that its relative growth rate fluctuates from year to year. The
growth rate in the beginning is 0.08 and at the end is 0.05 and the doubling time of the records
has been computed in the beginning as 9.04 years and ends with 12.85 years. It was further
revealed that there is no significant constant doubling time throughout the research publications
published on Nano Thin Films. In order to regularize the growth rate it is suggested that the
research may be increased by the researchers worldwide and the respective governments may do
the needful towards the development of the research. So, that the doubling time can be achieved
in a short span of time.

5.1.5. EXPOENTIAL GROWTH RATE

The Exponential Growth rate of publications on Nano Thin Films during fourteen
years was observed during 1999 to 2012. The highest growth rate (1.51%) was found during
2001 with 184 publications followed by (1.40 %) with 351 publications in the second place and
during 2003 (1.36%) with 251 publications in the third place.

5.2 SOURCEWISE DISTRIBUTION OF RESEARCH PUBLICATIONS ON NANO
THIN FILMS

The source wise publication on Nano thin Films has been segregated from the whole data
and it was identified that the articles published in journals were 6274 (74.82%) and considered to
be the maximum number of publications among the other publications. It is very clearly stated
that 9 types of publications were published on Nano Thin Films. It was found that 1767
(21.07%) articles were published in the conference proceedings and it occupies the second place.
Reviews were counted as 17 (0.20%) and were placed in the third place of the table followed by
meeting abstract, letters, book review, editorial, correction and reprint. The Journal articles have played a pre-dominant role over the other sources towards the publications on Nano Thin Films.

5.2.1. YEARWISE v/s SOURCEWISE PUBLICATION OF RESEARCH PUBLICATIONS ON NANO THIN FILMS

The articles published in the journals plays predominant role continually from 1999 to 2012. Year by year it increases without any fluctuation. In the year 1999 the number of journal articles published were 65 and the steady growth takes to the number of articles published in the year 2012 is 1065. The articles published in the conference proceedings are in the second place which starts with a record count of 41 in the year 1999. In the year 2006 it has a highest record count of 220 follows by 214 records in the year 2007. The rate of growth of the articles published in conference proceedings show more fluctuation. Reviews on Nano Thin Films were 48 in the year 2012, which is the top among the 14 years of research analysis. In the year 2009, 43 reviews were published to be placed in the second place and during the year 2011, 38 reviews were published, which is considered as the third spot. The other types of research publications were not chosen among the whole database on Nano Thin Films. It is suggested that all the research scholars should be encouraged to print it in the paper, what they think, experiment, their small research output and intellectualness. This is the only way to make the scholars to think in a better way, which will develop them to prove their intellectuality in the form of any type of sources, such as meeting abstracts, letters, book reviews, editorials, corrections and reprints. Of course this is the first and foremost act towards reaching research articles in the future.
5.3 LANGUAGEWISE DISTRIBUTION OF RESEARCH PUBLICATIONS ON NANO THIN FILMS

English Language plays vital role towards dominating the publications on Nano Thin Films, worldwide with 8050 publications. The Total Global Citation Score for the English language is 111182 and the Local Citation Score for the same is 3915. The Chinese language stood in the second place with 270 research publications with 770 Global Citation Score and 44 Local Citation Score. Japanese language ranked in the third place with 43 publications, 44 Total Global Citation Score. It is very easy to judge that there is no significant individual domination of a particular language among the records published on Nano Thin Films as the English language publications played a pre-dominant role over the other language publications on Nano Thin Films research output.

5.3.1. YEARWISE V/S LANGUAGEWISE PUBLICATION OF RESEARCH PUBLICATIONS ON NANO THIN FILMS

The yearwise publications on Nano Thin Films of all the ten languages were reveals that the English language publications inclines year by year. It starts with 107 number of publications in the year 1999 and reached 1150 in the year 2012 with an average number of publications as 575. The Chinese language publications, which is in the second rank started with three number of publications on Nano Thin Films in the year 1999 and ends with 10 number in 2012 with an overall average of 19.29. There are variations in the research growth among the Chinese language publications. The Japanese language publications starts with 2 in the year 1999 and ends with 2 in the year 2012 with an average of 3.07. It is suggested to the non-speaking English community to develop the English language among the research scholars, as the majority of the publications are nowadays published in English throughout the world and that
too if an article is published in regional language, that particular research papers can be accessed
and utilized by their own country people alone.

5.4.1. YEAR WISE V/S NO. OF AUTHORS AND JOURNALS WITH CITED
REFERENCE CONTRIBUTION ON THE RESEARCH PUBLICATIONS OF
NANO THIN FILMS

The analysis helps to find out that 33695 authors were involved in a span of 14 years
towards publishing 8386 research publications on Nano Thin Films. It was inferred that the
number of scientists community increases year by year. The average growth rate reveals that
2407 scientists supports the research project on Nano Thins Films, world wide. The references
cited also seems to have steadily increased, which shows that the scientists refer more and more
documents to publish their publications. 241128 references were cited towards the publications
of 8386 research publications on Nano Thin Films. It is noteworthy that the author doing
research increased gradually and further it is suggested that this may be encouraged by the
Government policies towards higher education in every nation, which may lead each and every
citizen to do innovative research on Nano Thin Films.

5.4.2. YEARWISE V/S AUTHORSHIP DEGREE OF COLLABORATION

The degree of Collaboration of the literatures on Nano Thin Films from 1999 to 2012 is
(C=Nm/Nm+Ns) 0.96. There is no significant domination of the single authored papers among
the records published on Nano Thin Films. It is very clear that the multi-authored papers
are pre-dominant over the single authored publications through the findings of the degree of
collaboration of the Subramanyan’s formula. Therefore there is no significant domination of the
single authored papers among the records published on Nano Thin Films. It is good to see collaborative contribution and this may be encouraged by the parental institution or Government to do more and more collaborative research on Nano Thin Films.

5.4.3. AUTHORSHIP PATTERN

The single author publications were only 327 among the overall publications. Two authors published 1115 number of research publications, three authors contributed 1475 research publications, five authors contributed 1386 number of publications and six authors contributed 1024 number of publications. But on the ranking basis, the four authored publications were the first among all the number of authors collaboration with 1664 number publications on Nano Thin Films. The three authored publications stood in the second place with 1475 publications and five authored papers in the third place with 1386 publications, leaving six authored papers in the fourth place with a record count of 1024; two authored publications in fifth place with 1115 publications.

5.4.4. AUTHOR PRODUCTIVITY OF LOTKA’S LAW

The Lotka’s prediction about the author’s productivity on the basis of the actual contribution of authors towards the research on Nano Thin Films has been tested through the Lotka programme in otherwise it can be stated as the Kolmogorov Smirnov Test. The proven results helps to interpret that there is no similarity or relationship between the actual number of
authors and the prediction of Lotka. It is suggested that the Lotka’s Law cannot be accepted as there is no similarity between the actual number of authors and the prediction of Lotka.

5.5. TOP 100 AUTHORS ON THE BASIS OF THE MAXIMUM NO. OF PUBLICATIONS ON NANO THIN FILMS

Accordingly, Kim.J.H. is the author who ranked first among the 33695 authors with a publication count of 55 records. Wang J. placed in the second rank with a publication count of 49 records. Kim J and Wang Y., both of them published 36 number of publications and jointly hold the third place towards the publication of Nano Thin Films. Wang J., who secured the second place in the publications of more number of publications, is the top rank holder for securing more number of Global Citation Score of 885. Kim J.H., who is considered as the first scientists towards publishing more number of publications placed in the second place for securing 579 Global Citation Score. Again for the third place, Li Y and Zhang X shares with a Global Citation Score of 477.

It is suggested that the prolific authors may not only be selected on the basis of the number of maximum publications at the same time they should be selected on the basis of the citation score what they have gained.

5.6.1 YEARWISE PUBLICATIONS OF KIM J.H. (TOPPEST RANK HOLDER IN MAXIMUM NO. OF PUBLICATIONS)

The analysis shows that 2011 is more prolific for him to publish 9 (16.36%) research publications and in 2006 he published 8 (14.55%) papers which is second best in terms of his number of publications on Nano Thin Films. In 2007 and 2010, he published 7 (12.73%) papers and in 2005 and 2009, he is responsible of publishing 6 (10.91%) research papers. An overall,
he secures of 579 Global Citation Score for all his publications. In the year 2008, he published only 1 paper and from the year 1999 to 2001, he has not even published one paper, but still stood on the top of the table to have the credit of publishing more number of publications

5.6.2 **TYPES OF PUBLICATIONS OF KIM J.H**

Kim J.H. publications includes only Journal article and articles published in Conference Proceedings. Out of the sources he published, journal article 34nos (61.8%) dominates the 21 (38.2%) number of articles published in Conference Proceedings.

5.6.3 **LANGUAGEWISE PUBLICATIONS OF KIM J.H**

Kim J.H. publications were published only in English language. The overall period of research work on Nano Thin Films from 1999 to 2012 consists of 10 language publications. Likewise the English language dominates the total number of language wise publications, Kim J.H. articles were also fully in English Language.

5.6.4 **SOURCEWISE PUBLICATIONS OF KIM J.H**

It is inferred that 36 number of journals were involved in publishing the publication of Kim J.H. Among the 36 journals, “Journal of Nano Science and Nano Technology” has published more number of articles with a count of 8 numbers (14.55%) leaving “Journal of Korean Physical” in the second place with a record count of 6 numbers (10.91%).

5.6.5 **BRADFORD’S LAW ON THE PUBLICATION SOURCE OF KIM J.H**

The application of Bradford’s Law reveals that the selection of core journals are the most prolific on the basis of the publications of Kim J.H. His 55 journal articles were
categorized into three zones on the basis of the law of Bradford. The first zone consists of 4 journals responsible of publishing 20 (36.36%) articles, second zone consists of 16 journals with 19 articles (34.55) and the third zone consists of 16 journals (29.09%). Altogether, 36 journals were utilized towards the publication of 55 articles of Kim J.H.

5.7.1 YEARWISE PUBLICATIONS OF WANG J. (SECOND TOPPER IN MAXIMUM NO. OF PUBLICATIONS)

It is inferred that Wang J, the second rank holder of maximum number of research publications on Nano Thin Films has published 49 research works on Nano Thin Films. During his research work, the year 2010 seems to be more prolific, in which he published 8 (16.3%) research articles. The year 2007 is the least number of publication among his research period. His overall research period covers from 2000 to 2012. He starts with four publications and ends with seven research publications in the year 2012. He secured a Total Global Citation Score of 925 and a Local Citation Score of 8.

5.7.2 TYPES OF PUBLICATIONS OF WANG J

It is inferred that Wang J. published 44 (89.8%) articles in journal and 5 (10.2) articles in the Conference Proceedings. His journal articles secured a Global Citation Score of 878 and Local Citation Score of 7. His Conference Proceedings papers secured 47 Global Citation Score and only one number of Local Citation Score.

5.7.3 LANGUAGEWISE PUBLICATIONS OF WANG J

It is inferred that Wang J. involved in publishing two medium of languages towards publishing his research work on Nano Thin Films. English and Chinese are the two medium of
languages he utilized to publish his research work. Out of the two languages, English plays dominant role, by publishing 45 (91.8%) number of publications over the Chinese language, in which he published 4 (8.2%) research publications.

5.7.4 SOURCEWISE PUBLICATIONS OF WANG J

It is inferred that Wang J utilized 37 source titles to publish his research work of 49 records (Table 4.7.4). Out of that “Acta Physica Sinica”, shares the top rank on the basis of the maximum number of publications with four records with “Journal of Sol Gel Science & Technology”. The second top place also were shared by two source titles viz., “Chinese Physics Letters” and “Journal of the American Chemical Society” with three publications each. The third place has also been occupied by two source titles viz., “Nano Science and Nano Technology Letters” and “Surface and Coating Technology” with 2 number of publications each.

5.7.5 BRADFORD’S LAW ON THE PUBLICATION SOURCE OF WANG J

Through the application of Bradford’s Law, it is inferred that out of the three zones, the first zone consists of top 5 source titles which were responsible towards the publication of 16 (32.65%) records. The second zone consisting the next 15 source titles which were responsible for 16 (32.65%) records are comparatively better than the last zone consists of 17 source titles which yields 17 (3.469%) records.

5.8.1 YEARWISE PUBLICATIONS OF KIM J. (THIRD TOPPER IN MAXIMUM NO. OF PUBLICATIONS)

It is inferred that Kim J. has published 36 number of publications on Nano Thin Films from the year 1999 to 2012. Further the year 2012 consists of 6 (16.67%) publications, which is
the most number of publications from the years 1999 to 2012. The second number of highest publications were 5(13.89%) and that too twice he published 5(13.89%) number of publications in the year 2007 and 2009. Third more number of publications were published in the year 2004 and 2008 and the number of publications were 4(11.11%). The total number of Global Citation Score secured by the author is 479 and nil towards the Local Citation Score.

5.8.2 TYPES OF PUBLICATIONS OF KIM J

It is inferred that the total number of publications of 36 number of Kim J were analysed and found that it was two types of documents were involved in the publication on Nano Thin Films by the author. The research work consists of 27 (75%) number of articles published in journals and 9 (25%) number of articles published in Conference Proceedings on Nano Thin Films. Out of this, the Journal articles secured a Global Citation Score of 437. The 9 Proceedings paper secured a Global Citation Score of 42.

5.8.3 LANGUAGEWISE PUBLICATIONS OF KIM J

It is inferred that out of the publications of Kim J., English language was incharge of publishing majority number of publications of 35(97.2) records and only 1 number (2.8%) of record was published in Korea by Kim J. The journal articles published in English language secured the majority number of Global Citation Score of 478 and the publications in Korean language secured only 1 Global Citation Score.
5.8.4 SOURCEWISE PUBLICATIONS OF KIM J

It is inferred that Kim J. published his 36 research papers in 28 research sources. Out of the “Journal of the Korean Society” published 4(11.11%) research papers and placed in the top place. The journal entitled “Applied Physics Letters” published 3(8.33%) publications and placed in the second place. The third place in the publication point of view shared by three source titles viz., “Journal of Magnetism and Magnetic Materials”, “Micro Electronic Engineering” and “Synthetic Metals” with 2(5.56%) publications each. It is very interesting to see that the journal which published 4 number of publications secured only 19 Global Citation Score, but the Journal which published three publications secured 68 Global Citation Score and the journal entitled “Synthetic Metals” published 2number of publications secured the highest Global Citation Score of 107.

5.8.5 BRADFORD’S LAW ON THE PUBLICATION SOURCE OF KIM J

It is found that the top 5 sources were more productive among the total number of 28 source materials and the same is proved by the application of the Bradford’s Bibliometric law. It is proved through the three zones. The top zone consists of 5 sources with 13 (36.11%) publications, the second zone consists of 12 sources and 12 (33.33%) research works and the third zone consists of 11 sources has published the remaining 11 (30.56%) publications. The zone 1 secured the maximum number of Global Citation Score of 204, the zone 2 secured 123number of Global Citation Score and the third zone secured the second place in Global Citation Score of 152, which is more than that of the second zone.
5.9.1 COUNTRYWISE PUBLICATIONS ON NANO THIN FILMS

It is found that 97 countries, worldwide involved in publishing 8386 research publications on Nano Thin Films. It is very clear that country, China tops the table with 1184 number (14.12%) of research publications on Nano Thin Films. United States of America stands in the second place with 961 (11.46%) research outputs. The third place has been occupied by Japan with 873 (10.41%) research publications followed by South Korea with 606 (7.23%) records and India with 517 (6.17%) records. The other countries published below 500 research publications.

5.9.2 YEARWISE v/s COUNTRYWISE PUBLICATIONS ON NANO THIN FILMS

It is found that China leads the table with more number of publications. The year 1999 shows very low number of publications than USA and Japan, from the year 2005 onwards the publication count increased gradually and outplayed USA and Japan, which were placed in the second and third place. The steady growth of literature from 1999 to 2006 can be seen, but there is a slight decline in the number of publications in 2007 and 2008 and in 2011. The difference is not much but only 2 to 3 number of publications. During the year 2001 to 2004, Japan shows a marginal difference in the number of publications than the top two countries of China and USA, but later on the top two countries did more research work and overtook the research publications of Japan. From the year 2010 to 2012, the table displays a clear picture of the rapid growth in the research work and as a result the research publications of China shows a great difference in the number of publications than the other two countries, USA and Japan, which are placed second and third for more productive publications on Nano Thin Films among other countries.
5.9.3 CONTINENT WISE PUBLICATIONS

It is found that the total number of publications were shared among the 6 continents on the subject discipline of Nano Thin Films. Among the 6 continents involved in the research work on Nano Thin Films, Asia is responsible for 4426 (52.78%) number of publications, which is considered as the most number of prolific continent towards the research publications on Nano Thin Films among the other continents. Asia secured a Global Citation Score of 959 and 59 Local Citation Score. Europe is placed second in the publishing more number of publications with a record count of 2436 (29.05%) with a maximum of Global Citation Score of 43722 and 2118 Local Citation score. From the Citation score point of view Europe is topped all the other continents. North America is placed in the third place for the publication of more number of research articles with a record count of 1141 (13.61%) for which the continent secured a Global Citation Score of 42333 and Local Citation Score of 1025. From the Citation Score point of view North America is placed in the second place as the continent secured more number of citation score than the Asian Continent. Oceanic countries published a record count of 164 (1.96%) publications and secured a Global Citation Score of 20803 and Local Citation Score of 693. From the citation score point of view Oceanic countries secured more Global citation score comparing to the Asian continent and placed in the third place. Africa published 126 records (1.50%) and secured a Global Citation score of 989 and 17 for the Local Citation score. The Global citation score is greater than the Asian Continent research publications. The South American countries are placed in the last rank among all the continents with a record count of 93 (1.11%) for which this continent secured 53274 Global Citation score and 53 Local Citation score.
5.9.4 CONTINENT V/S YEARWISE PUBLICATIONS ON NANO THIN FILMS

The year wise publication count of all the continents is found. As it was already indicated that Asia stood first in publishing more number of publications, the year wise analysis reveals that the Asian countries were involved in the steady growth of the number of publication every year from 1999 to 2011 and only in the year 2012 it seems to be slightly low in the number of publications published when comparing to the year 2011. The European continent publications show a steady growing trend in the number of publications on Nano Thin Films except the year 2010 in which a slight declination in the publication count comparing to the year 2009, but it follows by a rapid raise in the next two years of 2011 and 2012. For the North American countries we can see a slight oscillation from the years 1999 to 2001 and then later on in the year 2009. The other continent published their research work in two digits throughout the years, from 1999 to 2012 with ups and down in the record count from one year to another.

5.9.5 PRIORITY AND SPECIALIZATION INDEX OF ASIA

The priority value of each and every year towards the publications of research work on Nano Thin Films in the Asian continent is found. The years from 1999 to 2001 show high priority towards the research discipline on Nano Thin Films. The years 2003 and 2004 show an average priority towards the research publications on that particular discipline. Again the years from 2005 to 2007 show higher priority towards the publication on Nano Thin Films. The years 2008, 2009 and 2012 is very clearly showing a decline in the priority of the publications. The years 2010 and 2011 show higher priority. Altogether out of the 14 years of analysis of Priority Index, it is found that 8 years show more priority, 2 years showed an average priority and four
years showed below average priority towards the publications on Nano Thin Films. The specialization index value of 1.01 states that the Asian Continent had specialized relationship in publishing the research publications in the particular discipline of Nano Thin Films, worldwide. It is proved that there is priority and specialization in the Asian Continent towards the research publications on Nano Thin Films.

5.9.6 PRIORITY AND SPECIALIZATION INDEX OF EUROPE

It is found that the analysis of Priority and Specialization Index for the Europe continent research publications on Nano Thin Films. The years 1999, 2000, 2004, 2006, 2010 and 2011 shows low priority of the Europe research scholars towards the publication of research work on Nano Thin Films. The years 2001 to 2003, 2005 to 2008, 2009 and 2012 show that the European research scholars gave more priority towards the publications of research work on Nano Thin Films. On the basis of the value of Specialization Index of 0.98 for the European Continent, it is declared that there is no priority and specialization in the European continent towards the research publications on Nano Thin Films.

5.9.7 PRIORITY AND SPECIALIZATION INDEX OF NORTH AMERICA

The research contributions of North America with the application of Priority and Specialization Index is found to analyse the priority and specialty of the research. The years 1999, 2000, 2004, 2006, 2007, 2010 and 2011 show that a very less priority has been given by the research scholars of the continent on the discipline of Nano Thin Films. During the years 2001 to 2003, 2005, 2008, 2009 and 2012, high priority was shown towards the particular
discipline of Nano Thin Films research work. At the outright, the low and high priority was equally balanced for 7 years each but the SI value is lesser than 100 which makes way to interpret that there is no priority and specialization on the subject area. It is further inferred that there is no priority and specialization in the North American Continent towards the research publications on Nano Thin Films.

5.9.8 PRIORITY AND SPECIALIZATION INDEX FOR OCEANIC

The Priority and Specialization index of the Oceanic Countries towards the research on Nano Thin Films is inferred. The priority towards the research is high in 1999, 2003 and the years from 2009 to 2012. The years from 2000 to 2002 and 2004 to 2008 indicates a low priority towards the research on this particular discipline. Altogether, 6 years have given more priority towards the research and the remaining 8 years have not given much priority towards the research on Nano Thin Films. But it is very interesting to see that from 2009 to 2012 as more priority was given, it means that the research on Nano Thin Films had been the modern trend of research in Oceanic countries. The specialization towards the relationship with the research publications worldwide is low. As the specialization index value reveals 0.96, there is no priority and specialization in the Oceanic Continent towards the research publications published on Nano Thin Films.

5.9.9 PRIORITY AND SPECIALIZATION INDEX OF AFRICA

It is found that the Priority and Specialization index of the African countries shows that only 2008, 2009, 2011 and 2012 were the years in which the priority towards the research on Nano Thin Films was high. All the other years were not given priority for the research work on Nano Thin Films. It is good to see that the years 2011 and 2012 were the last two years and this
interprets that the current research may continue further on Nano Thin Films. During the 14 years taken for this research work show the non-priority years over the discipline is 10, which is more than the priority years of 4. The specialization index is very low (0.64) to have priority and specialization towards the publications on Nano Thin Films.

5.9.10 PRIORITY AND SPECIALIZATION INDEX OF SOUTH AMERICA

It was identified that the years 2003, 2004, 2009, 2010 and 2012 were given more priority towards the research on Nano Thin Films for the South American Countries. The other 9 years were not given that much of priority towards the research works on the discipline of Nano Thin Films. The Specialization Index indicates that the South American Countries were 0.89 which shows that no specialized interest and priority was shown towards the research contribution on Nano Thin Films.

5.10.1 YEARWISE CITATION ANALYSIS

It is inferred that 241128 number of references were cited by the authors towards publishing 8386 number of research publications on Nano Thin Films. The number of references cited by the author increases year after year with a steady growth. The number of references utilized in the year 1999 is 2822 (1.17%) but it rapidly increased and reached a destination to 40289 (16.71%) of research publications in the year 2012, which shows very clearly that the research scholars or scientists before publishing their intellectual thoughts and inventions, refer more and more documents relevant to their research discipline.
5.10.2 REGRESSION STATISTICAL TEST

Since the P-value is 0 and lesser than the critical value of 0.05, it is inferred that there is a significant relationship between the number of references cited in the first half of the year and second half of the year of 1999 to 2012. It is further inferred that the correlation test also reveals the result of 0.98, from which it is evident that the two set of cited references have high relationship. The test can also be interpreted in percentage that the relationship between the two variables as 97%.

5.11.1. AUTHORSHIP PATTERN OF CITED REFERENCES

It is inferred that single authored records were cited for 221786 (91.98%) times from the year 1999 to 2012. Two authored records were cited for 15182 (6.30%) times. The three authors were cited for 2754 (1.14%) times. Four authored paper were cited for 774 (0.32%) times. Five authored papers were cited for 289 (0.12%) times. Six authored papers were cited for 147 (0.06%) times. Seven authored papers were cited for 69 (0.03%) times. The eight authored papers were cited for 44 (0.02%) times. The nine authored papers were cited for 25 (0.01%) times. The ten authored papers were cited for 17 (0.01%) times. Eleven authored papers were cited for 9 times. The twelve authored papers were cited for 7 times. The thirteen authored papers were cited for 2 times. The fourteen authored papers were cited for 2 times. The fifteen authored papers were cited for 3 times. The sixteen authored papers were cited for 5 times. The seventeen authored papers were cited for only 1 time. The eighteen authored papers were cited for 2 times. The nineteen authored papers were cited for only one time. The twenty authored papers were one time. The twenty two authored papers were cited for only one time. The twenty four authored papers were cited for two times. The twenty seven authored papers
were cited for two times. Twenty nine authored papers were cited for only one time. The thirty three authored papers were cited for one time. Thirty seven authored papers were cited for only one time. The overall analysis reveals that 241128 references were cited by different types of collaborated authors towards the publication of 8386 records. The analysis also reveals that the single authored papers play a predominant role in the reference cited towards the publication on Nano Thin Films.

5.11.2. HIGHLY CITED TOP 3 PROLIFIC AUTHORS

The top three authors were found out to be the most prolific of all the authors who were frequently utilized in the references cited are listed. The number of records was also displayed in the table 4.11.3 along with the number of publications which were cited in the references during the process of publishing 8386 records on Nano Thin Films. Among them Oliver W.C. responsible of 283 records which were cited in the references in the top. Oregan B is ranked 2\textsuperscript{nd} with 118 records cited and Fujishima A. is ranked 3\textsuperscript{rd} with 91 records citations.

5.11.3. OLIVER W.C. V/S YEARWISE CITATION ANALYSIS

The findings of the year wise citation of records in the references towards the publication of 8386 research publications on Nano Thin Films from the years1999 to 2012 reveals that during the references cited, the year 2012 consists of more number of references of the author, Oliver.W.C. with a record count of 37 (13.1\%). The year 2011, stood in the second place with 33number (11.7\%) of publications cited in the reference. The year 2010 is in the third place with 29 (10.2\%) of references cited. An overall Global Citation Score gained for the references cited is 4052 and a count of 423 Local Citation Score.
5.11.4 OLIVER W.C. DOCUMENTWISE CITATION ANALYSIS

The findings segregated the 283 research works of Oliver W.C. into the different types of resources cited in the references during the process of publishing 8386 research publications from the year 1999 to 2012, for which these sources gained 4052 Global Citation Score and 123 Local Citation Score. Further, the findings reveal that 4 types of resources were involved in 283 references cited. Among the four types of sources, the Journal article is in the top rank with a count of 219 reference cited, for which the articles gained a Global Citation Score of 2759 and a Local Citation Score of 87. The articles published in the proceedings are in the second place with 55 references cited for which the papers gained a Global Citation score of 783 and 23 Local Citation Score. The Reviews are in the third place with 8 reviews cited in the references, for which the reviews gained a Global Citation score of 510 and 13 Local Citation Score. The final source which were included in the cited reference is only 1, for it gains no Global Citation Score as well as Local Citation Score.

5.11.5 OLIVER W.C. LANGUAGEWISE CITATION ANALYSIS

The findings reveals that the research publications of the author Oliver W.C., who were cited in the references were further segregated language wise. The table reveals that the papers cited of Oliver consists of three languages viz., English, Chinese and Japanese. Among the three languages 277 (97.88%) papers were in English, 5 (1.77%) papers were in Chinese and 1 (0.35%) paper in Japanese. The English language papers cited in the references gained a Global Citation Score of 4048 and 123 Local Citation Score. The Chinese language papers cited in the references gained a Global Citation Score of 4 and nil Local Citation Score. The Japanese language papers gained no Global Citation Score as well as Local Citation Score.
5.11.6. OREGAN .B V/S YEARWISE CITATION ANALYSIS

The findings shows that the year 2011 is the most prolific year in which his publications were cited in the references for 17 (14.4%) times. The year 2012 stood in the second place with 16 (13.6%) publications cited in the references and the year 2010 in the third place with 15 (12.7%) publications cited in the references. His citation references gained a Global Citation Score of 3893 and 18 Local Citation Score.

5.11.7. OREGAN .B V/S DOCUMENTWISE CITATION ANALYSIS

The findings reveals that the most cited references were journal articles with a record count of 91 (77.1%). The remaining number of the cited references shared between the articles published in the Conference Proceedings with 14 (11.9 %) and review of 13 (11%). The cited journal articles gained a Global Citation Score of 1518 and a local Citation Score of 8. The Conference Proceedings cited in the references gained a Global Citation Score of 197 and a Local Citation Score of 3. The Reviews cited in the references gained a Global Citation Score of 2178 and a Local Citation Score of 7, which is lesser than the journal articles and greater than the articles presented in conference proceedings, which were cited in the references.

5.11.8 OREGAN .B v/s LANGUAGEWISE CITATION ANALYSIS

The findings of the language wise cited references of the research papers of Oregan.B reveals that the English language dominates the total number of papers cited in the references with 113 (95.8%) followed by Chinese Languages with 4 (3.4%) and Korean with 1 (0.8%). The English language papers cited in the references gained a Global Citation Score of 3860 and a Local Citation Score of 18. The Chinese language papers cited in the reference gained a Global
Citation Score of 29 and the Korean language papers cited in the reference gained a Global Citation Score of 4. Both the languages Chinese and Korean papers cited in the reference fail to gain even a single citation score as Local Citation Score.

5.11.9. FUJISHIMA.A. V/S YEARWISE CITATION ANALYSIS

The findings of A. Fujishima’s papers cited in the references towards the publications of 8386 research papers published on Nano Thin Films from 1999 to 2012 reveal that the year 2011 was the most productive for the author with 16 number (17.58%) of his papers cited in the references towards the publications on Nano Thin Films. The second top was in the year 2012 with 15 (16.48%) papers cited in the references. The third prolific year was 2009 with 14 (15.38%) of his research papers were cited. An overall of 2630 of Global Citation Score was gained and 16 Local Citation Score was gained.

5.11.10. FUJISHIMA.A. v/s DOCUMENTWISE CITATION ANALYSIS

The source wise findings reveals that the journal article were 79 (86.8%) with 1094 number of Global Citation Score and 11 number of Local Citation Score. The review papers were the second among the cited papers of Fujishima A. A record count of 7 (7.7%) reviews were cited in the references, for which it gained a score of 1437 Global Citation Score and 5 Local Citation Score. The articles published in the Conference Proceedings were cited in the references with a count of 5 papers (5.5%), for which the papers gained a Global Citation score of 99 and fails to gain even a single Local Citation Score.
5.11.11. FUJISHIMA A. LANGUAGEWISE CITATION ANALYSIS

The findings reveals that three languages shared the 91 papers cited in the references towards the publication of 8386 research contributions on Nano Thin Films. English language plays vital role in the references cited with a 86 number (94.5%) of references. The Chinese language paper cited in the references were 4 (4.4%) and the Japanese Language paper cited in the references was only 1 (1.1%). The English language papers cited in the references, gained a Global Citation Score of 2606 and a Local Citation Score of 16.

5.12. CONCLUSION

The research work has been organized in such a way that the introductory part briefly explains the relevant factors related to the Nano Thin Films and the application of scientometric techniques towards the completion of research. The related literatures towards the scientometric analysis were reviewed in the second chapter. The Research design is very clearly designed to implement a very good strategy in the analysis part of the research work. The step by step analysis were made according to the research design and also the inferences through appropriate statistical tools and scientometric techniques. The results were interpreted in a comprehensible manner. For each and every inference appropriate suggestions are given in the final chapter.

The scientometric analysis on the Nano Thin Films research publications shows a clear picture of the contributions made by several countries. The author of this thesis has a zeal to express sincere thanks to the Ministry of Human Resource Development for their excellent support and effort to place the Indian research on Nano Thin Films in the 5th place at the global level. It is further suggested that the researchers may be encouraged by allocating many more
funds which will facilitate to enhance the research, to that it becomes the best across the world. This analysis will help the researchers on Nano Thin Films to identify and gain the in-depth knowledge on Nano Thin Films, which will definitely be an enlightening factor to all the scientists involved in this particular discipline to do further research on Nano Thin Films so that it contributes towards the academic enrichment of the concerned nation in particular and the world at large.

References:


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