Bibliographic indicators have traditionally referred to abstracting and indexing services for scholarly literatures. Examples of these indicators include: Citation Index, Impact Factor (IF), H-Index etc. The importance of bibliometrics has led to the emergence of many bibliographic database sources such as: CiteBase; CiteSeerX; Google Scholar; Web of Knowledge; Elsevier Scopus; former Windows Live Academic (now available with extra features as Microsoft Academic Search) etc. These services focused on collecting the citation information and making them searchable (Trawick and McEntyre, 2013). Bibliographic indicators provide descriptive and organized collection of references to published literature to allow the user to easily establish which later documents cite which earlier documents. This may be general in scope or cover a specific subject area.

While bibliometrics were originally designed for information retrieval, they are now increasingly used in a number of academic endeavours based on the enumeration and statistical analysis of scientific output in the form of articles, publications, citation and other more complex indicator (Okubo, 1997). It has become the most commonly used metric for evaluation of scientific output of researchers, laboratories, departments and their institutions, scientific specialisation and performance of countries; however now there is increasing critical view to this standpoint. Many critiques have developed to undermine the use of IF as a metric for evaluation of scientific output of researchers/authors. This article forms the first attempt to identify that all citations to an article do not necessarily count for quality. In this context, the article is original and of great potentials.

The considerable opinion among scholars is that IF is an index that express the quality and scientific value of a given researcher/author; departments and their institutions, scientific specialisation and performance of countries; however now there is increasing critical view to this standpoint. Many critiques have emmerged to this effect.

In this present paper, IF is examined against the critical view point in clinical medicine. Sociological and statistical factors are also considered. Attempt is also made to elucidate on what citation exactly should count for quality in calculation of IF.

Critical View Points in Clinical Medicine

The IF is a measure of the frequency with which an article has been cited in a particular year or period. There is Journal IF, Aggregate IF, Median IF, and Author IF. Journal IF is the average number of citations to those papers that were published during the two preceding years (University of Alberta Library Guides, 2012). For example, if A equals the number of times articles published in 2006 and 2007 were cited by indexed journals during 2008; and B is the total number of "citable items" published in 2006 and 2007. ("Citable items" are usually articles, reviews, proceedings, or notes; not editorials or Letters-to-the-Editor.), then the 2008 impact factor of the journal would be calculated as the ratio A/B. The use of impact factor as an index of journal quality relies on the theory that citation frequency accurately measures a journal's importance to its end users. This theory is plausible for journals whose audiences are primarily researchers, most of whom write manuscripts for publication. By citing articles from a given journal in their own
manuscripts, researchers are in essence casting votes for that journal (Saha et al., 2003). Impact factor serves as a tally of those votes (Saha et al., 2003). Saha et al.(2003) believe that a journal's impact within clinical medicine depends largely on its importance to practitioners, most of whom never write manuscripts for publication and thus never have a chance to “vote.” Citation frequency may therefore better reflect the importance of clinical journals to researchers than practitioners. The opinions of both practitioners and researchers are relevant in judging the importance of clinical journals, the validity of impact factor as a measure of journal quality in clinical medicine is uncertain (Saha et al., 2003). Journal impact factor has its limitations. There should be further evaluation of whether and how impact factor measures journal quality before it is widely adopted as a quantitative marker of journal quality (Saha et al., 2003).

**Sociological and Statistical Critical View Points**

Amin and Mabe, (2007) identified that the value of the IF is affected by sociological and statistical factors. Sociological factors include the subject area of the journal, the type of journal (letters, full papers, reviews), and the average number of authors per paper (which is related to subject area). Statistical factors include the size of the journal and the size of the citation measurement window (Garfield, 2008). It was shown that the absolute value of the mean IF exhibits significant variation according to subject field. In general, fundamental and pure subject areas have higher average IF than specialized or applied ones. The variation is so significant that the top journal in one field may have an IF lower than the bottom journal in another area. The phenomenon of collaboration between authorship has also been identified as source of variation in IF evaluation. The average number of authors on a publication depends on the subject area. In social sciences, there is the average of about two authors per paper while there are over four in fundamental life sciences (Amin and Mabe, 2007). Due to the tendency for authors to refer to their own work, there is a strong and significant correlation between the average number of authors per paper and the average IF for a subject area. As the IF is an average value, it also shows variation due to statistical effects (Garfield, 1998). These relate to the number of items being averaged, that is the size of the journal in terms of articles published per annum. It is obviously inadequate to employ them in determination of quality of all types of journals in all subject areas, and even comparing the same type of journal in the same subject category (Lee et al., 2002; Amin and Mabe, 2007).

**Citations to Errors**

IF is a measure reflecting the average number of citation which is expressed as a ratio. A clear and unambiguous definitions of the items counted to evaluate this ratio are essential (Amin and Mabe, 2007). Generally, the published IFs are calculated by a count of the number of citations to all parts of the journal and the number of papers. But what citation exactly should count for quality? Actually, a definition of quality should connote high degree of approval because it is free of errors. The believe that citation to an article signify quality is borne out of the opinion that citation of an article establishes its approval. This opinion, in the general, is not true. It should be pointed out that not all citations to an article actually count for quality. Sometimes articles are cited to point out errors that should be corrected. For example, Adedayo, (2010a, 2010b, 2010c,) and Adedayo (2011) cited DeGarmo et al., (1999) and MIT, (2002) to identify error that have caused serious industrial conflicts. Powell, (2009) has also cited: Di Pietro (1994); Hsu (1994); Yilbas (1996); Kaplan (1996); Chen (1997); Abdulhadi (1997); Brezola (2006); Ermolaev (2006); Li (2007); Sobih (2007) all to point out errors. Citations to articles for the purpose of indicating errors which may have significant consequences do not imply the articles are quality.

**What Citations in Which Part of the Article should Count for Quality?**

For most articles that are reports of empirical studies, the main features of the papers can easily be recognized to include: The Abstract, Introduction/Literature Review, Methodology/Materials and Methods, Results/ Results and Discussions; and Conclusion. Review and other articles forms can have highly varied features as the author may be inspired. As a general rule, for most journal publications, Abstracts and Conclusions do not contain citations to articles.

Introduction/Literature Review sections of an article are written to establish knowledge pertinent to the research subject. Identification of gaps, arguments and opposing views in the literature is made (Emerald, 2012). The background knowledge is used to provide justification for further research efforts along the identified area. Justifications for research are borne out of established facts of limitations of status quo knowledge. A limited knowledge should not be adjudged as quality. Essentially, the citations to an article made in the Introduction/Literature Review sections may imply the importance of the article; however, importance does not necessarily connote quality. When citations are made in the Methodology/Materials and Methods section of articles, it is probably because there is an adoption or correlation of methodology/materials in the cited article. This gesture signifies approval and should count for quality.

In discussing results, the attempt is to present the results in a broader context of other works on the subject so that they could be interpreted with minimum speculation. Actually, in science and particularly in engineering analysis, observations of nature are explained using equations, variables and functional relationships based on other established facts in related subjects. The essence is to be able to make generalizations and possibly very accurate predictions beyond the range confirmed by experience, experiment and practice. Citations made in this section of the article are used to support/correlate an argument or to establish the result. This shows approval of the idea presented in the cited article and should be counted for quality.

**Distinction between Importance and Quality**

Importance describes a situations of wide spread influence. It shows a general circumstance that is vital, crucial, essential and significant. Quality is a measure of excellence. It implies a state of being free from defects, deficiencies and significant variations. While a situation may be important because it is quality, however, quality is not necessarily a precondition for importance.

DeGarmo et al., (1999) reported that the product of oxidation of steel during oxy-fuel gas cutting is FeO. This statement is not quality information because FeO is the essential product of oxidation of steel when steel is cut by oxy-fuel gas method. Citation of DeGarmo et al., (1999) should not be regarded to count for its quality; however its citation is important because it has potential of grave consequences as reported by Adedayo, (2010a, 2010b, 2010c,) and Adedayo (2011).

**Conclusion**

A critique of the opinion that IF is an express indication of the quality and scientific value of a given researcher/author; departments and their institutions has been made. The theory that citation frequency accurately measures a journal's
importance to its end users is seen to be a plausible theory in
clinical medicine. Sociological and statistical factors also affect
IF values. These factors can significantly affect the values of IF
across subject areas. IF is calculated by a count of the number of
citations to all parts of the journal and the number of papers.
Counts of citations to error are also counted and these do not
reflect a true value of quality. IF possesses potentials to be a
valid criterion, however only appropriate citations counts should
be used in calculating the values of IF.

References
Abdulhadi, E., Pelletier, J-M., Lambertin, M. 1997 Development
in laser cutting of steel: analytical modelling and experimental
validation of the metallurgical effects. SPIE 3097 17.
Adedayo, A.V. 2010a, A Review of the Thermodynamics and
Kinetics of Oxyfuel Gas Cutting of Steels. Asian Journal of
Materials Science, ISSN 1996-3394, Vol. 2, pp 182-195
Adedayo, A.V. 2010b, Elucidation on Reactions
Thermodynamics and Kinetics of OFC-A of Steels, Journal of
Mineral, Materials Characterization and Engineering, Vol. 9,
No. 6, pp 601-611
Adedayo, A.V. 2010c, Elucidation on Reactions
Thermodynamics and Kinetics of OFC-A of Steels, Emirate
Journal for Engineering Research, Vol. 15 No. 2 pp1-6
Adedayo, A.V. 2011, Kinetics of Oxyfuel Gas Cutting of Steels,
Journal of the Brazilian Society for Mechanical Sciences and
Engineering, Vol. 33, No. 2; pp 183-188
Amin, M.; Mabe, M. 2007 Impact factors: Use and abuse;
Elsevier Perspectives in Publishing No 1, pp 1-6
Breaban, F., Entringer, P., Vantomme, P., Dard-Thuret, J.,
Rusaouen, G. 2006 Numerical Modelling of Laser Cutting
Chen, K., Yao, Y.L., Modi, V. 1999 Numerical simulation of
Technol. 15 835.
Daniel, L. 2013, e-mail correspondence with Prof. Leo Daniel.,
MKL Visiting Professor at MIT
Di Pietro, P., Yao, Y.L. 1995 A Numerical investigation into
cutting front mobility in CO\(_2\) laser cutting. Int. J. Tools
Manufact. 35 673.
Emerald 2012 Emerald Publishing Guide for African Authors,
emerald, pp 8.
Ermolaev, G.V., Kovalev, O.B., Orishich, A.M., Fomin, V.M.
2006 Mathematical modelling of striation formation in oxygen

Garfield E. 2008. Use of Journal Citation Reports and Journal
Performance Indicators in measuring short and long term journal
Garfield E. 1998 The Use of Journal Impact Factors and Citation
Analysis for Evaluation of Science, Presented at Cell
Separation, Hematology and Journal Citation Analysis
Mini Symposium in tribute to Arne Bøyum , Rikshospitalet,
Oslo
Hsu, M.J., Molian, P.A. 1994 Thermochemical modelling in
CO\(_2\) laser cutting of carbon steel. J. of Materials Science 29
5607.
Kaplan, A.F.H. 1996 An analytical model of metal cutting with

of journal quality indicators with methodological quality of
clinical research articles. JAMA .Vol. 287, No21, pp: 2805-
2808.
Li,L., Sobih, M., Crouse, P.L. Striation free laser cutting of mild
No9083, pp:1035.
Okubo, Y. 1997 File URL:http://dx.doi.org/10.1787/208277770603
Powell J, Petring D, Kumar R V, Al-Mashikhi S O, Kaplan A F H,
Voisey K T 2009 Laser–oxygen cutting of mild steel: the
Phys. 42 015504
measure of journal quality?, Journal of Medical Library
Association; Vol. 91, No1, pp: 42–46.
Seglen, P.O. 1997: Why the impact factor of journals should not
Sobih, M., Crouse, P.L., Li, L. 2007 Elimination of striation in
Thorston-Krell F., 2012 The Journal Impact Factor as a
performance indicator, European Sci Editing, Vol. 38, No 1, pp
3-5
Trawick and McEntyre, 2013 Bibliographic databases
University of Alberta Library Guides 2012: http://guides.library.ualberta.ca/
content.php?pid=94850&sid=710345
Yilbas, B.S. 1996 Experimental investigation into CO\(_2\) laser
cutting parameters. J. Materials Processing Technology 58 323.