The h-index of Faculty-Researchers in a Public Philippine University

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ABSTRACT

The quality or impact of published research is considered a responsibility of the researcher or scientist. This study aimed to determine the impact of Faculty-Researchers' (FRs) h-index and investigate the correlation of factors such as age, the field of knowledge, academic rank and language of publication to this measurement. The descriptive and correlational research design was used. Publish or Perish (PoP) software provided electronically the h indices of the one hundred seventy-eight (178) FRs.Pearson rho and Chi-square tests were implemented in the data analysis. Findings revealed that out of one hundred seventy-eight (178) LNU FRs, only 30 of them have journal publications. Their h index range from 0 to 2. There were no significant associations on the h index and factors such as age, the field of knowledge and academic rank. Moreover, all publications were in English so there is a difficulty in its association with individual's h index.

Keywords: *h index, impact research, descriptive and correlational, Publish or perish software*

INTRODUCTION

The conduct of research is one of the major functions of university instructors and professors around the world (Fairweather, 1999; Tierney, 1999; Layzell, 1999; Shanklin, 2001 Bernardo, 2003). Publishing these research works in different highly reputable referred journals increases scientific sharing and dissemination. Though there are millions of published research around the world, a question on how to measure the increasing impact and significance of one's scientific research productivity should be investigated. These quantifications are needed for evaluation and comparison purposes (Hirsch, 2005).

The publication of an individual and their citation records provide large amount of data which contain salient information. These pieces of information according to Hirsch (2005) include the number (Np) of papers published over (n) years, the number of citations (Njc) for each paper (j), the journals where the papers were published, their impact parameter, etc. This large amount of data will be evaluated with diverse criteria by different people. Several scientists in the field of Scientometrics have developed different indices or citation matrix which could serve as metric systems calculating the quantitative impact of a researcher, published researches and even journal publications.

One of the most suggested and commonly used numbers/quantifications to determine the scientific output of a researcher is the *h index*. According to Hirsh (2005) "scientists have index *h* if *h* of their (Np) published papers have at least *h* citations each and the other (Np - h) papers have $\leq h$ citations each". This index has numerous advantages: (a) it combines production with impact, (b) the indispensable data is easy to access in Thompson ISI Web of

Science database, (c) it is not sensitive to extreme values, (d) it is hard to inflate, (e) automatically samples the most relevant papers concerning citations, etc (Batista, Campeteli, Kinouchi& Martinez, 2006).

H index measures the broad impact of individual's work and may avoid disadvantages if the following will only be utilized:(i) total number of papers (Np): measures productivity only but does not measure importance or impact of papers; (ii) Total number of citations (Nc,tot) measures total impact but hard to find and may be inflated by a small number of ''big hits,'' which may not be representative of the individual if he or she is a coauthor with many others on those papers; (iii) Citations per paper (i.e., ratio of Nc,tot to Np) allows comparison of scientists of different ages but hard to find, rewards low productivity, and penalizes high productivity;(iv) Number of ''significant papers,'' defined as the number of papers with >y citations (for example, y= 50) eliminates the disadvantages of criteria i, ii, and iii and gives an idea of broad and sustained impact but y is arbitrary and will randomly favor or disfavor individuals, and y needs to be adjusted for different levels of seniority and (v) Number of citations to each of the q most-cited papers (for example, q = 5) overcomes many of the disadvantages of the criteria above but is not a single number, making it more difficult to obtain and compare. Also, q is arbitrary and will randomly favor and disfavor individuals. H-index has seen to remove all these disadvantages cited.

Looking at the potential of the h index, it can be utilized in evaluating the growing research publications of professors or instructors of the Philippines' Higher Education Institution (HEI). Traditionally, professors and instructors of a Philippine university or HEI have been working in trifocal. This consists of teaching, research and community service/extension. University faculty is required to become teachers, researchers, and service-oriented professionals (Clemeňa& Acosta, 2007). Faculty doing these works are evaluated in different ways and is dependent on the practice of a university. Because of this variance, the quality of a research paper is not measured to its fullest removing biases or disadvantages.

Leyte Normal University as one of the Centers of Development (COD)- Public Higher Education institutions in the Philippines is committed to uplift lives of its clientele by conducting relevant research works in education and other sciences. Based on the Alpha List (the summary of conducted research works of professors and instructors of the university)of the Research and Development Office (RDO), there has been an increasing trend of published works. The university as mandated by the Commission of Higher Education (CHED) must see to it that quality papers should be produced but as to measuring the impact of these research works in the world of scientific investigation must also be addressed. Though the university's RDO has ways of evaluating the involvement of research works of its faculty, assessing the impact of published research works of its faculty-researchers using an accepted index or measurement is essential.

In this light, this paper will explore the use of h index proposed by Hirsch (2005) to determine the impact of the published research works of Faculty-Researchers (FR) of a Public Philippine university.

Specifically, this sought to investigate the following:

a. What is the h-index of Leyte Normal University faculty research works from 2012-2017 first semester?
b. What is the relationship between the h-index of the faculty-researcher with the following:

b.1. age;
b.2. field of knowledge;
b.3. academic rank; and
b.4. the language of publication

This paper will help expand the landscape of knowledge on the evaluation of scientific papers published in different journal publications using an acceptable index. The result will be very helpful to a university research center in locating their faculty and research works in the scientific community. Furthermore, the results may help the Research and Development Office of the university in re-aligning research priorities of the university's research agenda, giving of incentives or recognition and even policy formulation.

Theoretical underpinning

This research is anchored on the impact evaluation principle (Khandker, S. R., Koolwal, G. B., &Samad, H. A. (2009) which states that an "assessment of how certain factors being evaluated affect outcomes, whether these effects are intended or unintended. The proper analysis of impact requires a counterfactual of what those outcomes would have been in the absence of the intervention." In this manner, the use of h index as a determinant of scientific achievement is used to assess faculty-researchers' contribution to the world of scientific investigation.

Review of Related Studies

This section covers a review of literature and studies relevant to the use of h-index in providing impact analysis of researchers and their conduct works in different fields of knowledge around the world. Though there are limited research studies in the Philippines, some studies gathered through different portals in the web and journals contributed to the understanding of the issues surrounding the use of h-index and its empirical evidence which could somehow capture the impact of a researcher. It also serves as a backdrop against which the data and findings revealed with the use of the PoP software.

The development of h index. The notion that "recognizing excellent quality science is indispensable for science to advance" obviously caution or remind scientists that published works must not only be posted in the world wide web but should be utilized to bridge another gap in a literature, to further a present study or even make a society be prosperous. Currently, there is a wide range of tools used to measure the quality of a research paper. It started when Eugene Garfield and Irving H. Sher define the value of scientific publications through the journal impact factor (IF). This is calculated by the scientific division of Thomson Reuters (New York, NY, USA) and is published annually in the Journal Citation Reports (JCR). It can be done by simply counting the number of articles a journal published in any given year would miss out small but influential journals in their Science Citation Index (Garfield, 2006). But the use of the said measurement has sprung more criticisms and even ridicule (Petsko, 2008). This is because many critics have argued that it wrongly equates the importance of a paper with the IF of a journal in which it was published (Notkins, 2008) and that some scientists are now more apprehensive about publishing in high-IF journals than they are about their research. This causes the dilemma in the peer-review and scientific publication process.

In August 2005, a physicist at the University of California, San Diego, the USA in the name of Jorge Hirsch developed h index as a new indicator for quantifying the research output of scientists (Bornmann& Daniel, 2007; Hirsch, 2005). "A scientist has index h if h of his or her Np papers have at least h citations each and the other (Np– h) papers have ≤h citations each" (Hirsch, 2005). All papers by a scientist that have at least h citations are called the "Hirsch core" (Rousseau, 2006). An h index of 4 means that a scientist has published four papers that each has at least four citations. An h index of 0 does not certainly direct that a scientist has been totally sedentary: he or she might have already published numerous scientific papers, but if none of these were cited at least once hence, an h index of 0 (Bornmann& Daniel, 2008).

When h index was transmitted by Hirsch in an electronic archive arXiv.org as a primary manuscript, Nature (Ball, 2005) and Science (Anon, 2005) made commentaries and reported about it. It was then published in the Proceedings of the National Academy of Sciences through the initiative of Manuel Cardona, an Emeritus Professor of Max Planck Institute for Solid State Research in Stuttgart, Germany. Until late 2008, the preprint has been cited about 200 times which only postulates that Hirsch's single number quantification on the research achievement of scientists has fascinated various individuals. However, the mixture of publications and citation occurrences into one value has been condemned by some scientists as making diminutive sense: "The problem is that Hirsch assumes an equality between incommensurable quantities. An author's papers are listed in order of decreasing citations with paper i having $C(i)$ citations. Hirsch's index is determined by the equality, $h=C(h)$, which posits an equality between two quantities with no evident logical connection" (Lehmann et al, 2008).

The h index can now be determined automatically for any publication set in the Web of Science (WoS; provided by Thomson Reuters). WoS is not the only literature database that provides calculations of an author's h index. There are other publications such as Chemical Abstract Services (Columbus, OH, USA), Google Scholar, or Scopus by Elsevier (Amsterdam, The Netherlands, Jasco, 2008) an even a most recent Publish or Perish by Harzing (2007). The use of these literature databases will bring one to different results, for example, those that need payment in the access of the quantification provided a different result than that of the Google Scholar. Moreover, h index has been regarded as the counterpart of IF (Gracza&Somoskovi, 2007)

The use of h index and associated factors. Hirsch's h index is not only used in the measurement of a scientist's achievement but also helps in measuring the scientific output of a group of researchers (van Raan, 2006; Csajbók et al, 2007), scientific facilities and even countries (Bornmann& Daniel, 2008). In addition, it is also possible to calculate successive h indices at higher aggregate levels (Prathap, 2006): "The institute has an index h2 if h2 of its N researchers have an h1-index of at least h2 each, and the other (N-h2) researchers have h1-indices lower than h2 each. The succession can then be continued, for example, for networks of institutions or countries or other higher levels of aggregation" (Schubert, 2007). h index was also recommended by Braun, Glanzel, & Schubert (2005) as an alternative number in determining IF. Like in any other bibliometric measures, h index is dependent on the length of an academic career and the field of study in which the papers are published and cited.

Given these pieces of literature and studies presented, h index as a single number has potential to determine or represent the impact of a particular researcher. However, no research

studies have been conducted in a Philippine Public University. This research draws from previous research evidence to identify the h index of Faculty-Researchers in a Philippine Public university to address the gaps in knowledge about the potential use of h index in quantifying and knowing the impact of a scientist. This research draws to contribute to the existing information on the usage, issues, and dealings of h index in quantifying research achievements.

Methods

This research entails descriptive and correlational investigation on the impact of the research works of one hundred seventy-eight (178) Faculty Researchers. The primary source of data came from the university's Research and Development Office (RDO) particularly the Alpha List (LNU RDO, 2017). This Alpha List is the summary of conducted, published and on-going faculty research works. These pieces of information were officially retrieved by the RDO from the Thomson ISI Web of Science database and Google Scholar with the help of the authors themselves. The researcher wrote a letter of request to the university president on the conduct of this study. The approved letter was then transmitted to the RDO Director and Human Resource Management Officer (HRMO) for it to be disseminated to the concerned authors whose research papers were published in the different journals. Since the Alpha List contains detailed information on the faculty researchers from 2012-2017, it became easier for the researcher to trace and cross-check in the list provided by the HRMO. Furthermore, the said list will provide the recent ways of checking/evaluating the research impact of the faculty.

Faculty concerned were informed of the study and agreed because they will be able to know their impact factor through the study of their h index. Their names were coded to protect the integrity of the subjects under study. Faculty Researchers (FR) 1, FR 2, FR 3 up to FR 30 are assigned to each of the selected respondents. Moreover, confidentiality of the results was explained and ethical considerations were also practiced throughout the conduct of the study.

All names of the faculty were encoded manually in a software program called Publish or Perish (PoP) (Harzing, 2007). The said software is designed to "empower individual academics to present their case research impact to its best advantage". The software provides not only the h-indices of faculty but as well as other metric system or citation metrics. But for this study, the researcher will limit only on the use of researcher's h-index (Hirsch, 2005) since extant of literature were already intensive in this field. Another reason why h-index is only considered since this study aims to determine the academic's impact combining quality with quantity.

From 178 FRs, only thirty (30) or 14% of them were included in the study since these are the only persons who have publications in the national and international refereed journals. This is, of course, limited to the data retrieved with the use of the PoP software. Their individual h-index was copied from the platform and pasted in a Microsoft Excel for analysis. Since upon copying many data were given by the software, only the h-index section was used for this study. Following the framework used by Hirsch (2005) when he ranked physicists on their h index, the ranking system will be followed.

Finally, age, the field of knowledge, academic rank and language of publication will be correlated to the FRs' h-indices. Data were analyzed in SPSS and Pearson rho and Chi-square

correlation coefficient was utilized to determine if there is an association between factors mentioned to the h-indices of the FR. Level of significance is set to a p-value of 0.05.

RESULTS AND DISCUSSIONS

This section presents the results and deliberations of the study. First, the result of the determination of the h-indices of FR using Harzing's Publish or Perish software is laid down. Association of factors such as age, the field of knowledge, academic rank and language of publication towards the individual h-index will be presented. Finally, discussions on the aforementioned matters will also be positioned.

Table 1
H-index of LNU Faculty Researchers as of October 2017

Faculty Researchers	No. of Published Papers	h-index
FR1	3	0
FR2	1	0
FR3	12	1
FR4	1	1
FR5	1	0
FR6	1	1
FR7	4	2
FR8	2	0
FR9	1	1
FR10	2	0
FR11	1	0
FR12	1	0
FR13	3	0
FR14	2	1
FR15	2	1
FR16	2	1
FR17	11	1
FR18	1	0
FR19	7	1
FR20	3	0
FR21	5	0
FR22	1	1
FR23	2	0
FR24	1	1
FR25	1	1
FR26	1	0
FR27	1	0
FR28	1	0
FR29	2	0
FR30	1	0

Table 1 presents the h-index of LNU Faculty-Researchers retrieved with the use of PoP software as of October 2017. It reveals that out of one hundred seventy-eight (178) FRs only thirty (30) or 14% of them published papers in national or international refereed journals. Seventeen (17) or fifty-six point sixty-seven percent (56.67%) of them got 0 h-index, twelve (12) or forty percent have one (1) h-index and only one FR or three-point thirty-three percent (3.33%) got an h-index of two (2).

Table 1 further show that majority has 0 h-index (FR1, FR2, FR5, FR8, FR10, FR11, FR12, FR13, FR18, FR20, FR21, FR23, FR26, FR27, FR28, FR29, and FR30). The 0 h-index does not necessarily mean that a faculty-researcher has been completely inactive but it indicates that he/she has published one or several research papers but was/were not cited (Bornmann& Daniel, 2008; Hirsch, 2005). FR7 received the highest h-index of 2 though he/she only published 4 papers compared to FR3 and FR17 with 12 and 11 publications respectively. This only reveals that even if an FR published many scientific papers it does not warrant the increase in h-index or the impact it made to the scientific community. There might be factors that could affect the increase or decrease of the h-index of an FR. Ebbs (n.d.) cited ways on how to increase citations thereby increasing h-index.

Table 2
Correlation between the FR's h-index and their age

Spearman's rho	Correlation Coefficient	P-value
h-index vs age	0.135	0.477

Table 2 shows the result of the Spearman's rho correlation between the Faculty- Researchers' (FR) h-index and their age. It revealed a p-value of 0.477 which is greater than .05. This means that the null hypothesis is not rejected. Thus, there is no significant relationship between the FR h-index and their age. This supports the assumption of Kelly and Jennions (2008) when they stated that the context and relevance of citations are crucial in realizing that age and sex could affect judgment. This only means that comparing h-indices of older researchers with that of young ones is difficult to achieve. In contrary, according to Bornmann& Daniel (2008), if h index is used to evaluate research performance of scientists, similar age comparison is encouraged to get a more vivid result.

Table 3
Correlation between the FR's h-index and their field of knowledge

Pearson's Chi-Square	Correlation Coefficient	P-value
h-index vs field of knowledge	9.010	0.830

Table 3 shows the result of the Pearson Chi-Squared test on FR's h-index and field of knowledge. It showed the value of $x(1) = 9.010$, $p = .83$. This tells us that there is no statistically significant association between the h-index and the field of knowledge of FR. Thus, the null hypothesis is accepted. This result does not coincide with the study conducted by Iglesias and Pecharroman (2007) on their paper "Scaling the h-index for different scientific ISI fields. Furthermore, according to van Raan (2005), publication and citation conventions differ considerably across disciplines, it is also important to use additional

bibliometric indicators that measure the "relative, internationally field-normalized impact" of publications.

Table 4
Correlation between the FR's h-index and academic rank

Spearman's rho	Correlation Coefficient	P-value
h-index vs academic rank	0.273	0.145

Table 4 reveals the computation using Pearson product-moment correlation test to assess the relationship between the FR's h-index and academic rank. Findings revealed that there was no correlation between the two variables, r =0.273, n=30, p = 0.145. Thus the null hypothesis is accepted. This finding did not support with the studies ofBenway, Kalidas, Cabello and Bhayani (2005) and Lopez and Susarla (2015) when they discovered that h-index appears to be highly associated or strongly correlated with academic rank. This means that FRs who are in the lowest academic rank (e.i. Instructor 1) can have h-index higher or lower than those who are full professors of any institution.

Since all published research works of the faculty are in English, it is impossible to get its association to the h-index of the faculty-researchers.

CONCLUSIONS

The findings show that the h-index of LNU FRs varies from 0 to 2. Their age, field of knowledge and academic rank are not significantly related to the h-index. Since all papers were published in the English language, its association towards FRs' h-index is impossible to determine.

RECOMMENDATIONS

Several recommendations can be suggested based on the results of the study. First, since there are more researchers whose h-index is 0, getting more people cite their work or use it in the community where the transfer of theories, products, or findings must be encouraged. Second, to conduct an investigation on the association of keywords to the h-index of faculty-researchers. Third, the determination of the h-indices of the Faculty-Researchers in the different colleges of the Leyte Normal University would somehow help in the evaluation of the Research Agenda of the university. It can be done by looking into which papers are highly cited and disseminate it to the whole faculty members for knowledge sharing and realignment of their research interests.Finally, encourage other faculty-researchers to publish in Filipino or other languages.

BIBLIOGRAPHY

i.   Almonte-Acosta, S. A. (2007). *Developing Research Culture in Philippine Higher Education Institutions: Perspectives of University Faculty Rose Marie Salazar-Clemeña, PhD Dean, College of Education De La Salle University–Manila.*

ii. Anon (2005) *Data point*. Science 309: 1181

iii. Ball P (2005*) Index aims for fair ranking of scientists*. Nature 436: 900

iv. Benway, B. M., Kalidas, P., Cabello, J. M., &Bhayani, S. B. (2009). *Does citation analysis reveal association between h-index and academic rank in urology?*. Urology, 74(1), 30-33.

v. Bernardo, A. B. 2003. *Towards a typology of Philippine Higher Education Institutions. In Towards Rationalizing Philippine Higher Education*. Proceedings of the Symposium on the Rationalization of the Philippine Higher Education System. CHED: Philippines

vi. Bornmann, L., & Daniel, H. D. (2005). *Does the h-index for ranking of scientists really work?*. Scientometrics, 65(3), 391-392.

vii. Bornmann, L., & Daniel, H. D. (2009). *The state of h index research*. EMBO reports, 10(1), 2-6.

viii. Braun T, Glänzel W, Schubert A (2005) *A Hirschtype index for journals*. The Scientist 19: 8 Csajbók E, Berhidi A, Vasas L, Schubert A (2007) *Hirsch-index for countries based on Essential Science Indicators data.*Scientometrics 73: 91–117

ix. Fairweather, J. S. 1999. *The highly productive faculty member: Confronting the mythologies of faculty work*. Tierney, W. G. (ed.) Faculty Productivity: Facts, Fictions, and Issues (pp.5598). New York: Falmer Press

x. Garfield E (2006) *The history and meaning of the Journal Impact Factor*. JAMA 295: 90–93

xi. Gracza T, Somoskovi I (2007*) Impact factor and/ or Hirsch index?*OrvosiHetilap 148: 849–852

xii. Harzing, A.W. (2007) *Publish or Perish*, available from http://www.harzing.com/pop.htm

xiii. Hirsch, J. E. (2005). *An index to quantify an individual's scientific research output.* Proceedings of the National academy of Sciences of the United States of America, 102(46), 16569.

xiv. Layzell, D. T. 1999. *Higher education's changing environment: Faculty productivity and thereward structure.* Tierney, W. G. (ed.) Faculty Productivity: Facts, Fictions, and Issues (pp.3-38). New York: Falmer Press.

xv. Lehmann S, Jackson A, Lautrup B (2008) *A quantitative analysis of indicators of scientific performance.*Scientometrics 76: 369–390

xvi. Notkins AL (2008) *Neutralizing the impact factor culture*. Science 322: 191

xvii. Petsko GA (2008) *Having an impact (factor).* Genome Biol 9: 107

xviii. Prathap G (2006) *Hirsch-type indices for ranking institutions' scientific research output*. CurrSci91: 1439

xix. Schubert A (2007) *Successive h-indices*. Scientometrics 70: 201–205

xx.   Shanklin, C. 2001. *A Faculty Perspective: Intrinsic Research Rewards that Make a Successful Faculty Member Tick.*

xxi. Tierney, W. G. 1999. *Faculty productivity and academic culture.* Tierney, W. G. (Ed.) Faculty Productivity: Facts, Fictions, and Issues (pp.39-53). New York: Falmer Press.

xxii. vanRaan AFJ (2006) *Comparison of the Hirschindex with standard bibliometric indicators and with peer judgment for 147 chemistry research groups.* Scientometrics 67: 491–502