PREPARING AND RESPONDING TO THE NEXT GLOBAL PANDEMIC

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Abstract

This paper developed a publication and citation based scheme to identify potential skilled personnel that can serve in a collaborative project to curb epidemics. Importance and need for scheme to identify Skilled Personnel that can serve in collaborative projects to curb large-scale infectious disease outbreaks were identified, and used as basis to justify adoption of publication and citation system to evaluate potential and appropriateness of personnel to serve in collaborative project of curbing epidemics. The study forms one of the first rational approaches that attempts to identify appropriateness of a potential personnel from attributes of published works of the personnel. In this context, the study is original and of great potentials.

Keywords: Research metrics, Research performance, Citation Analytics, COVID-19

Introduction

Responding to the global situation of COVID-19 pandemic, the chairman of Branded Entertainment Network, Mr. Bill Gates has identified important responsibilities of leaders in managing the crisis. While it is important to solve the immediate pandemic problem, it is equally important to keep it from happening again. The world needs to save lives now while also improving ways to respond to outbreaks in general. The first point is more pressing, but the second has crucial long-term consequences (Gates, 2020). Regarding the long term challenge, i.e improving societal ability to respond to outbreaks, global health experts have identified for years that another pandemic is not a matter of *if* but *when*. Advising on ways to improve response to outbreaks, Gates (2020) suggested the need for Governments to be able to identify personnel with relevant skills required to contain an outbreak. In this endeavor, countries are required to collaborate to immediately deal with an epidemic.

The need for trained personnel in curbing an outbreak is easily understandable; however, it should be made clear that the level of teaching professional subjects can vary significantly around the world. Therefore professional proficiency can vary significantly around the world. In a collaborative project to manage an epidemic, one of the crucial factors is sourcing for appropriate local leaders and global experts. Appropriateness of a collaborator is determined

in terms of relevance of their skills, skill proficiency, collaborative strength, and ability to work in a threatening situation. In this paper, a citation based scheme to quickly identify professional around the globe that can serve in collaborative teams to manage pandemics is proposed. The use of frameworks in health systems to help in managing public health emergencies is well documented, and includes: World Health Organization. Community Case Management During an Influenza Outbreak World Health Organization. Infection-Control Measures for Healthcare of Patients With Acute Respiratory Diseases in Community Settings; International Health Regulations 2005 (IHR); Joint External Evaluation Tool (JEE) (Boyce and Katz, 2019). The use of citation based schemes for managerial solutions is also well documented (Adedayo, 2017a,b; Adedayo 2015 & 2016; Glanzel and Schubert, 1988; Glänzel et al., 2016 ; Bornmann and Glanzel, 2016)

The particular advantage of the framework proposed in this study is that while Governments around the world may have lists of trained personnel, from local leaders to global experts, which may include retirees or late professionals, the scheme herein proposed is capable of generating list of professionals who are currently active in the area of need. The proposed scheme is agile and can easily apply to curb any type of epidemic.
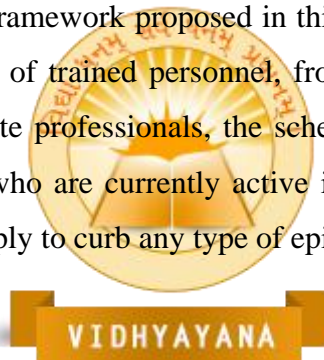
Study Methodology

A systematic approach methodology was adopted in quantifying the skillfulness of personnel. To achieve this, a brief exposition on the importance and need of framework to identify skilled personnel was made. This was used as rationale to adopt publication and citation based system as basis to design the scheme to identify skilled personnel. Average citations of personnel publications and average position of personnel in the author list of the publications of the personnel are considered and used to compute the appropriateness of personnel to serve in an area of need.

Importance and Need for Framework to Identify Skilled Personnel

The need for skilled personnel to curb epidemic cannot be overemphasized. Particularly, the International Health Regulations 2005 (IHR) and the corresponding Joint External Evaluation Tool (JEE) which are the preeminent international frameworks for building and assessing resilient public health systems, have advised that countries should have a skilled and competent workforce of physicians, veterinarians, biostatisticians, laboratory scientists, livestock professionals, and field epidemiologists for maintaining sustainable public health surveillance and response mechanisms (Boyce and Katz, 2019). Gates (2020) equally advised that Governments should have access to lists of trained personnel, from local leaders to global experts, who are prepared to deal with an epidemic immediately. However, because pandemics are unexpected events caused by Large-scale infectious disease outbreaks, it is difficult getting handy list of trained professionals that directly fits the need per time. For example, the list of professionals that served for Ebola epidemic might not be the best fit for COVID-19 situation. A government list of trained personnel might contain professionals who may have changed their professional line of practice, and as a result have not honed their professional skill to meet up with the current epidemic. These professionals are also not aware of the current best practices to curb the epidemic, as a result they have weak capacity to serve in collaborative projects that is required of most of the large-scale infectious disease outbreaks.

Identifying Potential Skillful Personnel

In a situation of life threatening large-scale infectious disease outbreaks, the only motivation for professionals to genuinely serve to curb the outbreak is interest - interest to achieve break through solutions to curb the epidemic. This interest is identified by the current professional interest of the personnel. This also manifest in current areas of research of the personnel.

The identification of potential skillful personnel is computed based on the attributes of publications of candidate collaborators. In this scheme, the average sum of the position of the candidate in the author list in all publications where the candidate has been listed as an author

is considered (Adedayo, 2017a,b). The position of the candidate in the author list is expressed to be proportional to the weighted fraction of his skill in the published works. Therefore, the weighted fraction of candidate author skill based on his authorship position in his specific publication cited in the real section of another publication is expressed as:

$$S_p = \frac{(n_i - r_i + 1)}{n_i^2} \qquad (1)$$

Where S_p is the weighted fraction of author skill based on authorship position, n is the total number of author listed in the publication cited in real section, and r is the position of the candidate in the author list.

Also, relative frequencies of citations of the candidate author in real sections of relevant publications are equally considered. For this purpose, only citations made in the real sections of the publications are counted and considered. Adedayo (2015, 2016) classified citations made in a manuscript into two. These are citations made in the imaginary section and citations made in the real sections of the manuscript. It is only citations made within the methodology and/or results and discussions that reflect the relevant skills of the cited candidate author. The frequency of citation to an author within the methodology and discussion of result sections reflects the preference of the cited authors skills over other authors similarly cited in the methods and discussion of results sections. This is an indication of the level of quality of the skill of the cited author. For example, an author that has been cited thrice is adjudged to have more impactful skill than the author cited once. For most articles that report empirical studies, the practical of the work reported actually starts from the methodology. It is here that the skills of the authors manifest. Any sections written before the methodology are just to set premise for the article. The pertinence, and therefore, the impact of citations made in these sections to the research being reported can only be imagined. Therefore, the weighted fraction skill of the candidate author based of his citations in real sections is computed as:

**S p e c i a l   I s s u e -   I n t e r n a t i o n a l   O n l i n e   C o n f e r e n c e
V o l u m e – 5 ,   I s s u e – 5 ,   M a y   2 0 2 0**

Page 5

An International Multidisciplinary Research E-Journal

The weighted fraction skill of candidate author based on his citations (S_c) is defined as thus:

$$S_c = \frac{f_{Ri}}{\sum_{i=1}^{n_R} f_{Ri}} \qquad (2)$$

Where f_{Ri} is the frequency with which candidate author publication i has been cited in the real sections which consist of methodology, results, and discussion of results. $\sum_{i=1}^{n_R} f_{Ri}$ is the summation of the frequencies of citations of n_R authors cited in the real sections which consist of methodology, results, and discussion of results. n_R is the total number of authors cited in the real sections which consist of methodology, results, and discussion of results. The effective weighted fraction of candidate author skill is thus computed as:

$$S_w = \sum_{k=1}^{N} \left\{ \frac{n_i - r_i + 1}{n_i^2} \cdot \frac{f_{Ri}}{\sum_{i=1}^{n_R} f_{Ri}} \right\}_k \qquad (3)$$

Where k indicates a particular publication where a candidate author has been cited, and N indicates the total number of publications where candidate author has been cited in real sections.

Classifying Skills of Candidate Personnel

To classify candidate personnel for knowing whether they have appropriate skills required for collaborative project, the Characteristic Scores and Scales (CSS) methods were adopted. CSS approaches were introduced in the 1980s (Glanzel and Schubert, 1988). This method has been equally applied by Glänzel et al., (2016) and Bornmann and Glanzel, (2016). In the CSS method, characteristic scores are obtained from iteratively truncating samples at their mean value and recalculating the mean of the truncated sample until the procedure is stopped

or no new scores are generated. The mathematical description as applied to classifying effective weighted fraction of candidate author skill (S_w) is as follows.

In the first step the mean S_w is calculated for all candidate authors cited in real sections of papers with relevant methods. All candidate authors with S_w values below the mean are classified as "poorly skilled". Authors with S_w values above the mean are used for further calculations in the second step. For these authors, the mean S_w values is calculated again and the authors with S_w values below the mean are designated as "fairly skilled". In the third step the procedure of mean calculation and separation of two groups is repeated which results in two further impact groups labelled as "remarkably skilled " and "outstandingly skilled" authors.

Preparing for the Next Global Pandemic

Governments around the world should adopt policies that encourage their workforce in areas relevant to curbing epidemics to publish. Relevant workforce all over the world should be required to publish as part of their professional duties. This way, there will be a record of the current interest of the professional. This will also serve to propel professional to hone their skills through personal studies, collaborations as they make efforts to publish.

Conclusion

A scheme for determining skills of a potentials collaborator has been developed. The scheme works on measuring publication attributes of the published candidate personnel. Attributes such as positions of potential collaborator in author lists of his publications, number of citations made to the published works of the author in real sections of other publications, are considered useful and relevant parameters required to determine the potential of a candidate to serve as a collaborator.

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