The “Index of MCW” as a way to resolve some problems of negative influencing of scientometric on the science

Abstract: The purpose of this work is an analysis of advantages and disadvantages the scentometric as an effectiveness of scientist’s action and a presentation the indicator which able to solve some disadvantages of scientometric. The methods of acheiveng the goals were an empirical analysis of scientometric based on using the popular scentometrics databases, critical analysis of empirical information, the social networks surveys, theoretical syntheses of research problems. In the paper was received the next results: Were revealed such problems of scentometric as: cheating, public relation, negative citing, citing of non-scientific works, writing the scientific papers in the most popular realms, the time problem, the coauthors problem. As a way of design some of these problems the Index of “maximum cited work” has been presented. The practical implication of the paper is a possibility to use this index for an assessment of action effectiveness of scientists.

Keywords: scentometric, scientists’ effectiveness, scientometric criticism, science specific.

Introduction

The problem of productivity and effectivity assessment of scientist’s work is one of the main problems in development of modern science. The effectivity of their work was defined firstly the funding of their works and secondly a wellbeing the scientists as a person the same as their families and their prestige as scientists thirdly All of these factors determine importance of the problem.

It is impossible to overestimate the last point especially because a psychological rewards at least not less important for this type of social activities then financial payments. Especially due to concerning about heritage which every scientist would be left in future. This point of view assumes than more effective his works than much prestige he will be able to have and then much more heritage he will be able to leave in a world history.

Before modern information technologies appeared the problem of effectiveness scientists’ works was solved as the sum scientific papers published by scientists or times after which the activities and name of a scientist was completely forgotten or special science rewards which a scientist received.

The situation in science changed when internet appeared. The citing of each scientist has become the main factor of scientist work’s effectivity. Different indexes of citing such as Hirsh index and others appeared. The base of them was statement which state a quantity of citing particular scientist as importance of his scientific work.

Such indicators first of all have been really criticized in scientific community and the second of all are widely used and it is doubtful that community will refuse to use it in future. In this regard, three questions arise

1. What are the main points of criticizing a scientometrics?
2. Why despite of so serious critics, using of scientometrics still is so wide- spread around the world?
3. How could improve the scientometrics to overcome at least some disadvantages of scientometrics?

The goals of this work are in finding the answers these questions.

The literature review

1. The theory of citing was considered at the next works: (Cronin, 1981; Bredihin, 2013). But it didn't touch a scientometric as is.

2. A lot of works (Leydesdorff, 2001; David, 2015; de Rijcke, 2015; Van Raan, 1997; Ershteyn, 2016; Mingers, 2015 Garfield, 1979) introduced the general criticism of scientometric.It is impossible to mention all of them, but we should notice the alternative of scientometric was not offered almost nowhere.

3. The ways of cheating a scientometric also considered in many works (Paolucci, 2014; Sharma, 2022; Stech, 2011; Scheffler, 2020) but methods to cope were not offered.

4. The same case in criticism of Hirsh index. Many works (Franceschini, 2011; Thelwall, 2021; Barnes 2017; Bornmann, 2009; Waltman, 2012; Koltun, 2021; Loan, 2022; Egghe, 2010) represented the criticism of it but any alternatives were not provided.

A methods of researching

1. The work has based on empirical analysis of scientific citing databases. This analysis has shown the disadvantages of scientometrics.

2. To reveal an advantages and disadvantages of our decision the problem we used the method of survey of social networks.

3. The critical analysis of literature and comparing an information in scientific citing databases were used to identify a main disadvantage of scientometrics indexes.

4. The situation in a science of past was determined by method of historical review.

5. The synthesis of data which was derived by using analytical methods of researching give us to find our own decision of problem.

The main part

A Criticize the scientometrics

1. The problem of cheating

Intention to increase a quantity of citing has noticed by a lot of scientific papers. This situation drives an artificial exaggeration quantity of citing of particular authors. As we think here is acting the next regularity: then less citing is required then much simple to cheat a system.

Here we should notice the next: in the west science a citing means no citing as is but just mention the author's name. As we think this is not correct and citing should be understood as certain part of text and or sense which had been written by particular authors and it should be shown the page numbers of cited work. But in modern scientific literature a citing is any mentions of author, so here we will understand it exactly the same.

So, then less of citing is required than much simple to cheat an index. It is especially connected with the Hirsh index. The Hirsh index means some quantities of papers are cite some quantity of times. For example, if the Hirsh index 25 it means the 25 scientific works is cited 25 times each paper. Hence to increase the Hirsh index till 25 we need to have 25 people and each of them should cite each of them 25 times and a Hirsh index of each will be 25. Much more difficult but of course not completely impossible to increase the cite index to make it a scientist should have more people. For example, to get cite index equal 400 scientist should find 400 people or somebody should cite him accouple of times. Anyway, as we are thinking increasing the cite index much more difficult than a Hirsh index.

2. *The problem of public relation*

Truly will the scientist be cited or not mostly depends not of real scientific value of particular paper. It depends of how much scientist or his paper is famous. But fame mostly depends of public relation technologies using but not from real value of anything. And as everybody knows the most effective public relation technology is the advertising on TV. It is expensive, but some scientists can afford it and sometimes it is possible to get it completely for free. For example, very controversial theory of passionary which had been developed by Russian scientist Lev Gumilev has become so popular because on Russian TV were showed accouple programs about this theory. The same advertising has got many pseudoscientific theories, and sometimes they have become more famous than real scientific knowledge and it gets a TV time completely for free. Except of it an administrative and financial resources could be used to make scientific papers more popular if they authors have them.

3. The negative citing

For citing indexes doesn't matter the context of citing. They count only facts of mentioning but was it mention positive or negative scientometrics doesn't consider at all. So, if some scientific paper got the negative citing it would increase a citing index of his authors even if these papers contained an absolute nonsense. And if authors of this kind of papers have been shown in list of literature for this article it would have increased their citing index.

Of course, it should not be so because it changes the goal of science from open the new facts and phenomena to writing any paper that will be cited. So then more shocking papers will be written than more popular it could be and then more it would have a citing index and then more scientific authorities would have its authors. Evidently it is not correct at all.

4. Citing study books and publication not scientific papers as scientific

Study books are published as scientific papers very often. Many scientometrics databases include these kinds of papers in authors citing index. For example, it does Google Academy. On our opinion it is a wrong. The study books in different from scientific papers do not have any new information, it contains the materials which have been known and have been verified very well. Of course, a citing these kinds of papers do not relate with science productivity of authors of these papers. One more example if somebody would publish the literature review as scientific articles. We know the case when such review was cited more than 1000 times. But of course, this paper is not scientific because it does not contain any new information.

5. Writing scientific works only in most popular realms

The aim to increase his scientometrics indexes oblige scientists to conduct their researches in fields which would potentially be cited. But very often the value of problem could not be realized by contemporaries. Sometimes the value of scientific findings would be recognized only after time and sometimes after the authors' death. For example, that situation was with Gregor Mendel. His name is known for everybody now. Other example is elaborated by author of this paper problem of losing an information in modern information society. For now, this problem doesn't realize almost nobody, hence the works about this problem will not be cited at all.

The specific of a real scientific action means a denial of any social conventions. The scientific action is an independent searching the new information out of any social results. In the same time the scentometric indicators is a formal social outputs, and they are a typical social convention and they have been contradicted by a scientific actions as is.

Hence many of scientific fields is becoming blind spots because authors who would be study of those fields will not get anything from it.

It is possible to suppose if scientists of past placed at the center of their studies a citing, many of researches would have never been made and much of knowledge which would have become later as the base of scientific realm could not be found. And those fields would not get their development.

6. The coauthors problem

One more scientometric problem is a coauthors problem. The essence of this problem is very often authors shows as their coauthors a person who even have not read these papers. Especially it is very popular for coauthors who have an administrative resource.

This problem has a dual character. First of all, it is increasing the scientific prestige of people in subjects where those people are not engaged. And the second then more coauthors are shown in paper than easier to find it due to then more places the paper is placed then easier to find it eventually especially if compare it with study which has placed just in a one place (if author is one).

7. The time problem

If even very important scientific work just had been published it would take a time while the paper will become famous and hence it would be cited. For example, the most citing work of author of this paper was published more than fifteen years ago.

The empirical verification

The empirical verification was made by us for the Hirsh index and the citing index as most popular indicators of scientometric. The Russian Index of Citing (RINC) database of citing had been used as most available database. Implied then more these indexes than more scientific value of his author.

The first one is a historical data. Many scientists in the past have very low scientometric indexes. For example, Gregor Mendel who has been already mentioned has it equal zero because his works was not published in his lifetime. But his contribution to a science has no doubt.

The second. We used RINC for checking indexes of scientists whose contribution to science is avowed very high by the community of scientists. So, U. Knorozov who decrypted the Maya writing system has the Hirsh index 10 and the citing index 796, this measure is not very high. One of the founders transplantology V. Demihov has the Hirsh index – 3, and the citing index – 166. Our contemporary G. Perelman who has proved the Puankare theorem has the Hirsh index – 11 and citing index – 1029 also not highest measure.

At the other hand the unknown Russian educator L. Timoshenko has the Hirsh index – 45 and the citing index – 5693.

Hence, as you can see his verification shows there is no any connection between the scientometric indexes and scientific effectiveness of scientists.

Why scentiometric is so popular?

Despite all criticize which has shown above using scentiometric still has been very popular and continue to use everywhere around the world. Hence the question is appeared: why is it so? In our opinion it is happen because using these indexes most simple way to assess the scientist’s effectiveness and productivity. It is very difficult to assess the contribution of scientist into the science. The scientiometric indexes gives everybody very simple way to

make this assessment. It is enough to say the digits of indexes and for everyone has become everything clearly. So, this why people scarcely will refuse to use those indicators in the future. If it is so, the necessity of findings the indicator which can correct at least some disadvantages of scientometric is appeared.

Other question is: Why has become so popular the Hirsh index? In reality an appearance and popularity the Hirsh index reflects a transfer of science from craft paradigm to technological paradigm of society development. Modern scientist should make not great science discoveries but many of middle level scientific papers. But they should do it in during all of his professional life. In our opinion this situation is completely wrong. The Scientific work could not be a conveyor it still has become the acts of singles persons. The science is developed only by great discoveries. And only great discoveries still have been source for the development of science. The requirement high digits of the Hirsh index stop the science development because the main goal in this case become do not get high scientific result but get the middle level permanent results which contains is not new knowledge but only development of old knowledge.

Index MCW

A specific of science action is very rarely one scientist could write more than one great scientific paper. More often he (or she) can make accouple or just one outstanding discovery. Hence the effectiveness of scientist has shown not by quantity of papers those has been written by the scientist, but just one work which contribute to the realm it was made. Specifically, this work shows the potential of the scientist.

For example, A. Fleming which invented a penicillin had only one significance paper. After this work he had a lot of scientific papers but only his work about penicillin was greatly important. And it is possible to write a lot of such examples.

But here has appeared the coauthors problem which was mentioned before.

A matter of fact a lot of papers in natural science is written by a couples of authors and every author shows the work as he was of its author. On our opinion to correct this problem need the general quantity of citing to divide by quantity of coauthors of this work. The citing of the scientific work which has been cited the most of times we are offering to call an “index MCW”, “Maximum cited work”. This index will be counted as quantity of most citing scientific work divided by quantity of coauthors of this work.

We discussed this index in special communities in a social network. In general, the positive opinion was got. The main criticize was concentrated on disadvantages which has the scentiometric as is. Also was criticized the idea about dividing quantity of citing by quantity of coauthors of the work.

To these points we want to say the following:

The first, scientometric was used and will be used due to reasons which is shown below.

The second, dividing by quantity of coauthors oblige any authors to think a lot about including or not including coauthors in his work. Here are many ways to thank anybody for contributing to the work except including the person into the work as coauthor. This design (to divide by quantity of coauthors) lets to escape the situations when some of papers have thousands of coauthors because contributing to the work which has made by each coauthor will be miserable.

The third, as we have told below, to cheating this index would be much more difficult than the Hirsh index, because for it the author should have much more people and finding them not so simple than he (or she) need to get fewer people.

We have made the empirical verification of this index. So we are showing how it works by scientist who have been mentioned below. 1. U Knorozov has it 92. 2.V Demihov – 76, G. Perelman – 72.6, this is high enough

digits. V. Timoshenko which was also mentioned has this index – 74.6 and this is not so high especially in comparing with his Hirsh index.

The scientists cannot work for citing the particular work because it is impossible to know how would be cited this work. Hence an achieving of some level of index MCW could not be oblige the scientist to work only for it. So, this index is less formalized than other scientometric indicators.

Definitely the using index MCW unable to solve all scientometric problems. But by our opinion it can decrease some disadvantages of them.

Conclusion

Hence, our conclusion is:

1. One of most popular indicators of scientist's effectiveness are the scientometrics indexes which had been used and will be used as very simple way to measure it.
2. But the using of scientometrics indexes drives the problems of cheating, coauthors, times, publishing not scientific papers and striving authors to make their scientific works in most popular realms of science.
3. The "index MCW", "Most cited work", could be one of ways to resolve some of scientometrics problems. The index is counted as dividing the quantity of most citing work by quantity of coauthors of this work.

As a result, we can state that scientometrics indexes not as finishing facts, but more as is developed process which give an ability to reveal the effectiveness and productivity of scientific works. And the "index MCW" is one of the levels of this process.

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