

Assessing research: the slippery slope

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With the inevitable push towards better assessment of academics, new quantitative parameters have emerged such as the *h*-index, which is a measure of how many times an academic, typically a scientist, is cited by others in the field, and the impact factor (IF) of a journal, which is roughly an equivalent measure for the publishing medium itself. These numbers are a bit like retweets and 'likes' in Twitter. How many people like you and how many followers do you have? Is not it unfair that those with more followers get more retweets and 'likes' for putting out more or less the same kind of material?

The quantification of research output through bibliometrics has become *de rigueur* worldwide, often even substituting for qualitative assessments that can supposedly become subjective and therefore whimsical. However, *h*-indices and IFs, while they may be precise in one way, need not always be accurate with respect to judging the importance of a researcher's work.

The University Grants Commission (UGC), New Delhi and the government science departments (DST and DBT) have been rightly concerned with the proper use of these parameters, noting as it were, their application to schemes of promotions, funding and recognitions in several countries. UGC also uses a simpler quantitative measure, namely the number of publications of a scientist, as a rigorous criterion for appointment and certification as a research supervisor.

Regulatory actions by UGC and the science departments, while undertaken with the best possible intentions, have led to at least two unfortunate consequences in the Indian context. The first concerns careless application of bibliometrics while deciding appointments, promotions and awards. Research points to things that are not visible. It is not about repeating what is obvious. Just doing incremental things, merely extending what has been said and done, does not constitute meaningful research. You may receive a publication from such work, but you can be sure it is not going to be impactful or with long-lasting influence.

There is now the distressing trend of appointing and rewarding people merely

because they have publications in high IF journals.

A pedestrian 'follower' paper from India can appear in a high IF journal for various reasons, including but not limited to the patronage sometimes extended by a First World referee towards an author from the Global South, a sense of *noblesse oblige* as it were, or a tendency to 'allow' an Indian follower in the same field to publish in a high IF journal if he/she cites a big 'leader' scientist from the First World. Such a 'leader' may well be the referee; the Indian paper gets published but it is never cited. Such 'follower' papers from the Global South will not be cited where it really matters.

Indian committees for appointments, assessments or awards at the Central Government level often go, sadly enough, by IFs of the publication journals of candidates. These committees are necessarily of a general composition. They cannot be expected to go into the finer but more crucial details of the candidates' research. And here is the rub: the devil is in these details and it is only this devil that can discriminate between truly insightful and adequately competent work. It is not a surprise therefore that average academics get elevated to positions of authority in India because it is normally only the receipt of such awards that elevates one to such positions.

This anomaly concerns researchers at the higher end of the spectrum. Let us now consider the second distressing consequence of using bibliometrics, but this time at the lower end. Policy makers and administrators worldwide have been concerned for some time that research is being paid for twice over: the first time when it is funded and the second time when journal subscriptions are paid. Scientists should not be charged twice: once to undertake research and then to view its outcomes. This has led to the appearance of a new type of journal, namely the open access (OA) publication. In an OA journal, an author pays a one-time fee to publish a paper. Subsequently, its access is open to anyone. So if a government funding agency earmarks a certain amount (say 15%) of a research grant

towards OA fees, it would pay for research just once. The OA model has been successful and excellent OA journals now exist. The model has been widely adopted by European governments and there is little doubt that India should follow this path, because it is the future.

Now for the flip side. The UGC regulatory provisions for appointment and accreditation especially in smaller colleges and universities in the country, have led to the disgraceful phenomenon of predatory journals that adopt a perverted version of OA. These journals more or less publish any submitted paper without the usual protocols like screening, refereeing, revising and editing. Predatory journals are also able to fix IFs through fake citations. These dubious practices exploit the desperation of researchers who have found this loophole in the UGC regulations to attain eligibility for appointments, promotions and accreditations through a certain number of points to be accrued from publications. Bribe and be published seems to be the norm, as a consequence. Regrettably, India heads the list of countries in terms of the number of predatory journals published (64%) and the number of authors publishing in these journals (11%). According to the Nature Index (2014), a large percentage of research articles in India are being published in predatory journals defined as 'entities that prioritize self-interest at the expense of scholarship and are characterized by false or misleading information, deviation from best editorial/publication practices, lack of transparency, and/or use of aggressive and indiscriminate solicitation practices'. This is a disgrace to not just individuals but their employers and institutions. Retraction Watch is full of papers from Indian academics, proving that the quality of research and publication is dubious, at best.

UGC's Consortium for Academic Research and Ethics (CARE) promotes academic integrity and publication ethics, and aims to improve the quality of research in Indian universities. The CARE initiative to clean up research publications in India focuses on predatory publishers/journals. It has done a good job in

weeding out many suspect publications. The repeated public notices, gazette notifications and circulars to institutions are sensitizing researchers to the dangers of plagiarism/self-plagiarism, publishing in predatory journals and unethical publishing practices. While all this is welcome, more needs to be done and the benchmark for research evaluation needs to be continuously raised.

UGC has to make academics and students familiar with the research methodology. Publications arise from research. If the research is poor, the outputs will naturally be poor. UGC needs to be strict

about evaluation of the quality of research publications, and not just compute numbers. This also means being vigilant about the quality of research supervision. How research guidance is undertaken today must be rethought even more so in the fund-starved post-COVID dispensation in which we now find ourselves.

The golden mean would be a balance between quantitative and qualitative evaluation. The former could constitute a lower threshold and establish the minimum eligibility for an entry-level appointment or a preliminary/early career award. The latter should be the upper

bound, directed at subsequent career advancement (promotions, higher posts), and seek to establish excellence and leadership. However, implementation of both these yardsticks needs a high measure of honesty and integrity.

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Reconciling biodiversity conservation with agricultural intensification: challenges and opportunities for India

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India will surpass China as the world's most populous country by 2050, with a projected population of 1.67 billion¹. Although the rate of population growth has decreased, the total fertility rate of 2.2 will keep India's population growing for decades². The challenges posed by such increase in population to India's food security, already under strain from land and resource scarcity, are enormous. Climate change and extreme weather events are already impacting agricultural production, disproportionately affecting vulnerable sections of society through higher food prices, lost livelihood opportunities, adverse health impacts and displacement. Alongside food security, alleviating malnutrition, particularly among women and children, remains a challenge. The Food Insecurity Report 2014 by the United Nations Food and Agriculture Organization, Rome reveals that one in nine persons in the world is chronically undernourished, with a large percentage being in India³. The challenge of ensuring food and nutritional security of its population, while grappling with the impacts of climate change and environmental stresses, is therefore a huge concern for the country.

Agricultural intensification – imperative to meet food demands

Globally, fertilizer and external input-intensive conventional farming practices

have helped multiply agricultural output manifold over the decades. Food production increased 2.5 times between 1960 and 2000 through the use of hybrids and high-yielding varieties, application of fertilizers and pesticides, and increased irrigation^{4,5}. Benefitting from this, India was able to meet its food production demands through intensification of agriculture. The Green Revolution in India in the 1960s, resulted in vast increases in per capita food supply. From 1951 to 1997, gross irrigated areas across the country expanded fourfold, from 23 to 90 m ha (ref. 6). India is also among the top producers of several crops, including rice, wheat and various pulses. To attain self-sufficiency in the production of oilseeds, wheat, maize and pulses, the Government of India (GoI) pushed for a second Green Revolution in 2011. Thus, despite all odds, India has been able to ensure food security of its population through agricultural intensification.

However, further intensification of agricultural production, though imperative, is faced with two major challenges. First, India has been rapidly losing arable land due to combined impacts of land degradation, salinity, desertification and urbanization, ranking third after the US and China in terms of decreasing arable land. It is estimated that about 44% of the country's land area is degraded due to various reasons, including overuse of agrochemicals, mismanagement of irriga-

tion systems and natural hazards⁷. Thus, the extent of productive land available for food production is shrinking. Second, the 'yield ceiling' or maximum potential yield per unit area, is already close to saturation for many crops, making it difficult to attain any further increase in yield⁸. Added to these challenges, India is faced with a formidable target of doubling farmers' incomes by 2022 (ref. 9). In other words, meeting food security needs and sustaining it is perhaps one of the most challenging targets for the country in the coming years⁵.

The ecological and environmental cost of intensification

Agricultural intensification has resulted in detrimental environmental impacts such as biodiversity loss, habitat loss, deterioration of soil fertility, shrinking groundwater, pollution of soil, air and water, and rising greenhouse gas (GHG) emissions. Land conversion for agriculture has been the major driver of ecosystem change globally and numerous studies have shown that agricultural expansion and homogenization of land cover is the major cause of biodiversity loss^{10,11}. Besides being the leading cause of tropical deforestation, agricultural expansion has depleted over 45% of temperate forests, 50% of savannas and 70% of grasslands¹². Agriculture is threatening