The developing world needs more than numbers

Policymakers should read the contents of published papers and not just count them, says Dyna Rochmyaningsih.

Most scientists know that journal impact factors are a crude and sometimes misleading measure of published research. But the appeal of simple metrics will not go away. We see this in last month's launch of a rival to the impact factor by the publishing giant Elsevier, and in the continued use of the metric to assess and reward individual researchers.

Here in Indonesia, the government has started to reward scientists who publish in high-impact journals with hard cash. The International Scientific Publication Award aims to encourage scientists to publish their research in international journals indexed by Scopus or Thomson Reuters. Individual scientists can obtain awards of up to 100 million rupiah (US\$7,400) per published paper, depending on the journal's impact factor.

Other developing countries adopt a similar approach. In Thailand, private universities give incentives to scientists who publish their research in peer-reviewed journals. In Vietnam, there is no monetary award, but international publications earn scientists 'points' that affect their career progression.

In Indonesia, the first round of the scheme saw the authors of 475 papers win extra money. It can make a significant difference: 100 million rupiah is more than 10 times the monthly salary of a scientist working under a government agency. The money can help to build long-term projects.

Under the current system, Indonesian scientists funded by the government receive only single-year grants. Sometimes, bureaucracy means that the money doesn't arrive until the middle of the year, and the scientists have to write up final reports in November. According to Sangkot Marzuki, president of the Indonesian Academy of Science, this system makes it difficult for our researchers to publish in high-impact journals because the time is too tight for them to do rigorous and high-quality research.

The statistics seem to back this up. Out of 159 countries in the Nature Index database, 103 produced fewer than 100 scientific papers in the selected journals in 2015–16. Indonesia is one of them. We are the world's fourth most populous country, yet we produced just 0.16% of the number of papers published by US scientists over the same period.

The government's reward scheme — although crude — is a welcome way to create more quality research. Boosting international links and authorship is, along with investment in infrastructure, a textbook approach to scientific development.

But there is something more crucial that must be done. Indonesia produces just a few studies per year, but there are stories in each — stories that might have a profound impact on the world in general and Indonesia in particular. There is peril in seeing research papers as the sole product of science, and this applies as much to the scientific

superpowers, including the United States and Europe, as it does to developing nations such as Indonesia.

In the case of Indonesia, the small number of papers contains research about climate change, earthquake geology, the genetics of malaria, tropical forests, peatlands and high-energy physics. The findings could help to make our country a better place to live in. Yet, in my experience in covering science issues, most of these findings are ignored in the process of policymaking. This is a problem that Indonesia — and others — should address.

For example, last month, Indonesian scientists published a study of a new geological fault system in the Indian Ocean, which increases the chance of earthquakes in the north of Sumatra (S. C. Singh *et al.*

Sci. Adv. 3, e1601689; 2017). The value of such a paper is not in its contribution to boosting our national scientific profile abroad, but in its role in improving disaster-mitigation policy at home.

For science to affect policy, there must be a way for scientists to speak or to be heard by the government. Last year, the Indonesian Young Academy of Science tried to provide a voice for researchers. One member, Berry Juliandi, told me that the academy is facing many challenges to ensure the government makes science-based policy.

The other way to bridge local science and government is to develop science journalism in the country to increase public awareness and debate. There is a pressing need for this, clearly demonstrated by the long-running saga of government attempts to eliminate lymphatic filariasis, a neglected tropical disease caused by worms.

Scientists from the University of Indonesia have suggested that the government locally adjust a World Health Organization (WHO) recommendation to eliminate the disease. The WHO's advice for annual massive drug administration is based on tackling *Wuchereria bancrofti*, the worm that causes the globally dominant strain of filariasis and which has a life cycle of 9–12 months. But the scientists argued that the most common strain of filariasis in Indonesia is caused by *Brugia malayi*, another worm that has a shorter life cycle. Annual drug administration is ineffective because the worm has time to grow and spread. The scientists have published the findings in journals (for example, T. Supali *et al. Clin. Infect. Dis.* 46, 1385–1393; 2008), but the Ministry of Health is ignoring them and refuses to change its plan.

The disconnect between researchers and the government should be under the spotlight when policymakers in Indonesia or anywhere else want to formulate strategy to boost science. Our science might be small, but we can still do more to make the most of it. ■

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