

## EDITORIAL

**Quality in science: The need for constant vigilance\***

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**Introduction**

The government of Botswana has a standing commitment to promoting science as a vehicle for economic development and harnessing natural resources, value addition and diversification. This standing is evident by the establishment of Ministry of Infrastructure, Science and Technology (MIST) with the mandate to promote science and, research oversight for the enhancement of economic diversification and efficiency. This pledge was reinforced by re-orientating the functions of Tertiary Education Council from a specific sectorial focus to a more embracing and holistic human resource development and thus forming Human Resource Development Council in 2013. Among other things, one of the functions of HRDC is to promote the establishment, coordination and approval of institutional plans for public and private tertiary education in relation to research and innovation. This commitment is brought about by the fact that science plays a critical role in raising our standard of living, creating jobs, improving health, and providing for national security (National Academy of Sciences, 1997). The national security could be of food security or national defence, and in these areas, innovation and creativity is paramount. In the 21<sup>st</sup> century, science and technology has assumed increasing importance in society (National Academy of Sciences, 1997) and hence governments and the private sector have the responsibility to invest in science and technology. With this regard Botswana government do acknowledge this requirement before any benefits from science can be realized and thus MIST and HRDC has mounted structures for coordination, funding of and training in science and technology. However, achievements in science and research do not stop with increased funding. Beyond the allocation of resources to individual fields of research, how can government ensure that the research that it funds is of the highest quality possible? (National Academy of Sciences 1997). Therefore, it is imperative that government through its science and technology agency put in place quality assurance mechanisms during the production of science and technology and implementation of scientific innovations.

**The role of scientists in guarding against adulterating quality in science**

As scientists, the quality of work we do should reflect a profound sense of responsibility to our work, the community, tax payers as well as private funders. Quality in science embodies a set of institutions, instruments, procedures, cultural and moral values that need vigilant

protection. The need for vigilance is informed by the fact that, science from time immemorial has created a culture of unquestioned trust by consumers, communities and ordinary people. Therefore, guarding these values ensure that the trust society has endeared to science is not broken.

To illustrate this thesis of trust you are reminded of a debate that ensued at the house of parliament during which one MP proposed that a cordon fence be erected between cattle and elephant population because elephants could transmit foot and mouth disease to cattle. A rebuttal from another MP came in the form of these questions; which research found that elephants can transmit FMD? Where and when was it conducted? Who conducted it? Unlike the German Chancellor, Angela Merkel who is a trained physical chemist, our members of parliament are ordinary citizens with other qualifications than science. Being ordinary citizens, this rebuttal from MPs attempted to tease out issues of certification, competence, accreditation and recognition which are corner stones of quality assurance in scientific research. This shows that society trust science especially research that establish facts; credible facts which can back their everyday actions. This is because an overwhelming proportion of information we come to accept as knowledge derives from trusting others (Tobin 2003). It is common for one to be quizzed as to whether they have statistics to back their insinuation on any debate they are raising. In most cases these statistics are derived after carrying out rigorous research, therefore we should expect society to use research results to substantiate their decisions and formulate informed strategies. Therefore, we need to protect research instruments and the culture that ensure quality in science. Without readers trusting the words of an author, he/she has nothing (Tobin 2003), therefore to gain society trust let us be trustworthy.

**Quality of science**

Compromised quality in science may emanate from lack of funding; resulting in inadequate resources such as top notch scientists, equipment and facilities, and consumables. This is the area that should attract the attention of government as the main funding body of research. But low quality of research output can also be due to professional misconduct by scientists. This is where the set of institutions, instruments, and procedures, cultural and moral values that alluded before should be put in place and be protected. The world of science is full of narrations of professional misconducts; some cases being mere

negligence on the part of research managers and scientists themselves, others being deliberate cases of fraud, but others just ignorance by naïve scientists. The later circumstance can be averted through mentorship programmes. For upcoming scientists, the status of being published, accumulation of more articles and getting promoted, to establish one's name and earn respect from his/her peers put pressure on an individual and has compounded the problems mentioned above. Actions by young scientists who are under pressure to publish may include, but not limited to; submitting a manuscript to more than one journal concurrently (redundant publishing), lack of disclosure of financial relationship with industry that suppress unfavourable results or delay their publication (Tobin 2003), fabrication or falsification of data and plagiarism. In addition the so-called established scholars also fall in these same traps. Where promotion is based on number rather than quality of articles leads to mediocre scientists attaining the status of seniors and thereafter perpetuate the mediocrity across as they mentor juniors

#### Quality of published science

In the new age of electronic publishing and the move toward open access content, new journals are popping up overnight (Lewis and Wulster-Radcliffe 2014). These journals, called fly-by-night journals or predator journals by some people are basically open access and promise to publish one's article in two weeks. This quick reviewing and publishing time is attractive because of the pressure to publish and get promoted. What they do not realize is that most of these journals lack rigorous reviewing processes which is the backbone of the science publishing.

What can our Ministry of Infrastructure, Science and Technology and HRDC do? Together with institutions of higher education and research centres, they could create a list of what they deem honest and impact journals and place an embargo from publishing in any other journals besides from this list by scientists obtaining funding from them. How do we create this list? Most institutions, including those in South Africa use ISI Thompson-Reuters recognized journals. Department of Education of the Government of South Africa has enacted a policy which specifies procedures for measurement of research output for public higher education institution (Ministry of Education 2003). Botswana government can benchmark from this policy.

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