

Reforms for Quality Improvement in R&D in Water Sector

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Abstract

This paper presents perceptions of the author on assessment of quality of research in the water sector in the country, identifies areas where improvements are necessary and provides a list of reforms to ensure a quality improvement in R&D in the water sector.

Introduction

Quality is a matter of perception, but it is generally acknowledged that quality in research varies very widely across research and academic institutes. The same research project carried out by two different institutes and/or individuals often bears different stamps of quality. How then do we define quality in research in the water sector or, at least, measure it? Is it possible, or even desirable to do this?

For the purpose of discussion in this paper, we do not attempt to define quality in research, but rather focus on issues that need to be addressed to enhance the quality in research and development in the water sector in the country. A good reference for issues related to definition and assessment of quality is the classic book 'Zen and the Art of Motor Cycle Maintenance' by Pirsig.

Most research funding agencies evolve criteria for assessing impact of the research projects they fund. Often, these criteria are based on quantitative outputs, such as for example, number of research publications, number of institutes benefited by the research, number of persons trained, percentage utilization of the sanctioned funds and so forth. Impact of research is not the same as quality of research. Research in the water sector, as

indeed in other sectors, is a cumulative enterprise and should be evaluated as such. Methods need to be evolved for assessing the overall quality of research in the country, with critical inputs from the funding agencies, research institutes, government bodies and the end users themselves.

Institutional Constraints and Accountability in Research

Quality in research is a researcher's response to the accountability he/she perceives. The more accountable one feels about one's work, the better is the quality of the work one generates. The quality of research is thus closely associated with the overall ambience and the work culture within the institute in which the research is carried out. Accountability can hardly be imposed by administrative rules – although such rules may help in many situations – but is self-imposed by the research teams and individuals themselves. Such an accountability is unfortunately lacking in most research organizations dealing with water, in the country. The most fundamental aspect of the quality improvement should therefore be related to creating better work ambience in the research institutes - ensuring an individual's growth to his/her full potential, freedom of expression, and healthy competition among peer groups. Critical self appraisal of the type practiced by the corporate sector should help, but this should be achieved only after a thorough overhaul of the administrative mechanism to encourage an individual's freedom of expression. In most reputed institutes of higher learning in the country, such as the IITs, IIMs and the IISc, it is this enormous autonomy for the individual that ensures a high quality of research. The old adage, "freedom always comes with responsibility" can only be experienced if there is freedom, in the first place! Most research institutes dealing exclusively with water are in the public sector, having been created either under the ministry of water resources or under the state governments, and lack of autonomy for the younger and junior researchers in these institutes often hinders the quality of research.

Relevance of academic research

Research in academic institutes is primarily carried out with the motivation of career advancement and individual recognition. A well accepted measure of quality in the

academic circles is the quality of publications resulting from the research. Systematic methods of 'citation index' for a research paper and 'impact factor' of the journal in which the paper is published, have been evolved as measures of the quality of research contributions. A well known fact among the research community, for example, is that a paper published in journals such as Water Resources Research (WRR) and Journal of Contaminant Hydrology reflect a very high quality of research contributions.

How relevant is academic research in the country today, particularly with the emphasis placed on developing new projects in the country? The primary benefit of publishable academic research is the visibility that the Indian research community gets in the international circles. Critical discussions on hydrologic, hydraulic and technical aspects of specific case studies along with problems and solution approaches that often form the main body in journal papers help develop clarity of understanding and advance knowledge in the field. But it is the secondary benefit of training, development of problem solving capability and knowledge generation that is of a great relevance to the water sector in the country today. In the author's experience of dealing with practical problems in the water sector spanning from simple problems dealing with hydraulics of pumping systems to much more complex problems of developing operating policies for multi purpose multi reservoir systems, it is the quality of academic training and research that has always helped in developing clarity of understanding of practical situations. It is therefore vital that academic research is maintained at its highest level, so that scholarly input will be readily available at the time of need to solve practical problems. Good quality of academic research leads to trained manpower geared up to handle practical problems.

Strengthening Industry-Government-Academia Interactions

Quality of research is also determined to an appreciable extent by the quality of problems addressed. With the procedures for structural designs fairly well established, more and more research problems in the water sector are now related to non-structural measures, such as, in the field of hydrology and water resources for example, assessment of flood

frequencies, flood routing under uncertainty, maximization of hydropower production for a given hydrology, derivation of reservoir operating policies and so on. A great deal of interaction among various players – the industry, the government, the researchers and the end users or stakeholders – is essential in meaningfully addressing such problems. When the interest is in sustainable development of water resources, for example, the research should address the multidisciplinary nature of the problem by encouraging interaction among the stakeholders, engineers, social scientists and systems analysts.

Overall quality of research in water sector is bound to improve if more and more practical, real life problems are referred to the academic and research institutes. The gap between research and practice in the water sector is very wide in the country, and most research studies remain restricted to the academic arena. In contrast, most developments in other fields such as the aerospace, computer science, and telecommunications are closely associated with the state-of-the-art research conducted in research institutes. In a study of systems policy analysis for irrigation in India, Chaturvedi (1992) has brought out several reasons for existence of such a gap. Prominent among them are: (a) despite a gradual shift of orientation of decision making bodies from big dams and structural infrastructure options to wider aspects of technology and systems analysis, institutional constraints have greatly hindered the progress of real-life applications, and (b) considerable capability exists in academic institutions, but they suffer from two handicaps – one, the interaction of academics with real life problems is much more limited than in their counterpart institutions in advanced countries, and two, their facilities and more importantly their environment is essentially that of the Third World, despite very generous support from the Government. The best approach for closing the gap is through academic linkages with government bodies and industries, and developing networks at the academic level, focusing on applied research in the context of real-life problems. There is an urgent need to bring together the expertise of the academia/researchers and the extensive experience and wisdom of the field engineers, industries and decision makers. It is rather discouraging for the research institutes that critical problems of national importance are rarely referred to them, and even in cases

where such problems are referred, it is often at the insistence of the external funding agency such as the World Bank.

Research Culture in Government Research Institutes

Water sector being predominantly a public sector, poor work culture and work ethics among the lower cadres has, over the last many decades, corroded the very fabric of research in the sector. It is well recognized that while there are a large number of extremely talented, capable and dedicated engineers in most central government research organizations in the sector, the overall image of a state government research institute (such as a state research laboratory) is not as impressive. Unless a research culture is inculcated in such organizations – encouraging and rewarding research and analytical capabilities among the employees – the overall quality of research in the water sector is bound to remain poor. It is again necessary to compare the water sector with other sectors such as space/satellite technology, where the overall image of a research institute – state or central – is much superior. It would also appear that poor funding and lower priorities of development accorded to research laboratories in the water sector has further deteriorated the research quality. Greater autonomy and merit based career advancement schemes are badly needed in such institutes.

Specific Reforms

With the background provided in the earlier sections, the following specific reforms may be considered for discussion in the workshop. Since the list is rather long, only key phrases are indicated. For the purpose of identifying specific reforms at various institutions, the institutions are subgrouped as research funding organizations, universities/academic/research institutes and government departments in the water sector.

Research Funding Organizations

Increase transparency with respect to status of research proposals - e.g., adopt US National Science Foundation -NSF- mode of functioning, with all information available on web sites; Reduce administrative delays; Prioritize research areas and institutes; Create national facilities for research in identified areas; Increase funding for academic, fundamental and applied research; Identify nationally relevant problems for target institutes and invite proposals; Build a panel of top quality reviewers, with provisions for adequate financial compensation for their time; Build a think-tank consisting of experienced senior engineers, research administrators and academics to advise the funding agency; evolve very strict criteria for evaluation of research projects - black list individuals/institutes not satisfying the criteria. Internal review of staff based on projects they have coordinated from the funding agency's side - similar to the review of the DST scientific staff; Reward pro-active scientists in the funding organizations; Encourage merit based career advancement.

Universities/Academic/Research Institutes (other than IITs, IIMs, IISc, IAHR etc)

Encourage faculty generated funded research; Increase autonomy for the faculty in carrying out research; Reward the faculty/research staff through merit based career advancement schemes; Measure the merit based on quality of contributions rather than on the quantity of work; Maintain a high morale among the sincere and dedicated faculty/research staff; Encourage academic leadership and knowledge transfer through training programmes; Create better work ethics, ambience and culture. Upgrade and improve higher education/post graduate programmes in water resources engineering.

Attract good faculty in water related programmes by providing better incentives and work atmosphere.

Government departments in the water sector

Training of technical staff on a continuing basis. Develop transfer and deputation policies to ensure that engineers/officers with aptitude for research are posted at research institutes. Encourage interaction with academic/research institutes; Increase transparency of functioning; Make available critical hydrologic and other data for research studies. Increase funding and autonomy to refer critical problems to research institutes. Create jobs for water resources specialists.

Summary

A few issues related to reforms in the R&D in the water sector are discussed in this paper. A list of suggested reforms is provided for various types of institutions. The material presented in the paper is simply a collection of random thoughts of the author and needs to be discussed threadbare in the workshop platform.

Reference

Chaturvedi, M.C., (1992) Irrigation and Drainage – Systems Policy Analysis and India Case Study, *Journal of Water Resources Planning and Management*, Vol. 118, No. 4, pp. 445-464.