The Academy of Research: Creating a Sustainable Future through Research and Understanding the Challenges in Research

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Abstract

Research is rarely a solo activity, even solo research. Research must be conceived, constructed, processed and disseminated in appropriate settings within frameworks that have been developed and refined over centuries by trusted, wise and experienced fellow-researchers. Our peers contribute in many fundamental ways to our understanding of what research is and how it should be conceptualised. This is no more significant than in research institutes within universities where the criteria for project approval, project funding and budgeting, ethical approval and project reporting are set and monitored. Further, the acceptance of project reports is mediated by panels of peer reviewers. Research is a team activity (even, again, in solo research) because the outcomes of research are measured against the accumulated outcomes of research by other researchers stretching back decades or even further. This paper raises the question of how universities may foster and support an expansion in quality and range of research activities. What functions do university research institutes have in enhancing the quality of the work of their most experienced researchers, in encouraging and supporting new researchers and in increasing the research output of their institutes? How can they increase the creative or innovative elements of research and how can they ensure that research is conducted for productive and sustainable purposes for the benefit of humankind?

Keywords: research output, institutes of research, university research, research promotion, collaborative research

1. Introduction

Research is an indispensable and major function of universities. The dual role of universities is to create and disseminate knowledge. Research helps to create that knowledge while the dissemination of knowledge is carried out through the articulation of that knowledge and through the teaching of it to students. The measures of universities' success are generally more strongly based upon measures of research and writing rather than teaching and such measures tend to disadvantage newer universities and universities in the Asian region. Why is research such a significant part of the task of universities and how can

universities foster and encourage research activities amongst their faculty? Why, in newer universities, is there such a resistance to research and an unconscious drive to divert funding away from research and into other worthy enterprises?

2. The significance of research

Universities have a unique responsibility and privilege to contribute substantively to national, social and economic development (McConnell et al, 2012, Sulo et al, 2012). They are regarded as the supreme academies of learning in which trusted and distinguished scholars, artists and scientists promote and maintain the highest of standards in creating and disseminating knowledge. Although scholars have institutional allegiances, they form part of a larger composite community of scholars extending worldwide and across time. Research is an enterprise which is undertaken with due regard to the work of current and past researchers. It is hardly an individual activity. Our research efforts depend upon the work of others who previously have brought some light to the problems we tackle. Peer researchers even sit in judgment of our own research efforts. Research may best be considered a team activity because of the interdependence of researchers and the interdependence of their findings. Research activity results in the creation of an accumulated mass of interrelated knowledge which helps us to explain and appreciate ourselves and our environment. This mass of knowledge is assembled in written form in 'the literature' or 'the research literature' and it is tested and refined over many generations of scholars. The enterprise of accumulating the literature is encompassed by a series of procedures (research methodology) and verified by a community of recognized researchers (peer review).

Research is a creative and innovative activity which attempts to identify important issues to our communities and nations, to analyse them and to test possible solutions to them. Universities therefore have a major responsibility to be aware of local, regional, national and global problems and to devote their expertise to tackling them.

Many smaller or newer universities in developing economies tend to disassociate research functions from teaching functions while the natural link between the two is often missed. Often, staff imagine their roles as either teachers or researchers and if they consider themselves to be researchers, the proportion of time they can allocate to research is far less than the proportion they devote to teaching. Research is regarded as a non-core or supplementary activity. Research can however, enhance teaching functions (Lertputtarak, 2008). Newer universities also tend to rapidly expand teaching loads which, in itself, reduces time allocated overall to research (Sulo et al, 2012). Moreover, when specialization in

teaching by some university faculty occurs, the development of greater teaching effectiveness is not necessarily assured (Ibid).

3. Competition in research

Yet research is also a competitive activity. Universities realise that they need to compete with other universities in gaining research funding and in developing a strong research output (or research quantum). Funding of research is limited nationally and within universities. Measures or indices of research output are debated, framed and revised continuously and they determine fund allocation across the university sector. But more than that, measures of the status of universities are closely related to research output and help to create status rankings of universities which are publicly known and which determine funding success and student demand. For academic staff, the task is simple. Publication in well-regarded journals or with academically recognized publishers is essential for survival (Creswell, 1986, Oloruntoba & Ajayi, 2006, Hadjinicola & Soteriou, 2005 and Jauch & Glueck, 1975). Future research funding is more likely to be received by scholars who have a stronger publication record. Resources gravitate towards experienced, successful scholars.

Bibliometrics is the statistical study of research quantum in universities and has been gradually introduced to the university sector in the last three to four decades accompanied by vigorous debate on the topic (Rotten, 1990, Jauch & Glueck, op. cit.). The major reason for the move to bibliometric analysis has been the need to quantify research success across universities so that funding allocation can be made more fairly. Because of bibliometrics, national departments of higher education are able to rely upon objectively measured outcomes in determining funding decisions. Not only that, university staff themselves are in agreement that research should be a measure of academic success and productivity (Perry et al, 2000). Bibliometrics is an analysis of bibliographies, assessing the relative value of publications such as books and journal articles. Scientometrics is the statistical study of the spread or impact of ideas derived from publications especially through citations (Howard, 2012) and these are unevenly distributed through journals with most citations coming from higher impact publications (Chung, 2007). Yet again, altmetrics is the study of the spread and impact of scholarly writing in online scholarly work through analysis of social media such as blogs, Twitter and Mendeley, providing broader and faster measures of scholarly impact (Priem et al, 2012).

The hegemony held by leading researchers and their publications is similarly seen in the publication industry where commercial publishers like Trove, Elsevier, Taylor and Francis and Google have a large amount of control of privately sourced articles and books. This hegemony was opposed by the movement towards open access journals, which was greatly assisted by the Berlin Declaration on Open Access to Knowledge in the Sciences and

Humanities (Max-Planck-Gesellschaft, 2003) in which universities and publishing companies declared that they would make knowledge openly available to the public without charge. Access to the literature, particularly in institutions with insubstantial access to the global literature is particularly important. Restricted access to western literature in Asian university libraries provides a significant barrier to publication in international journals and therefore needs to be addressed primarily through online open access and then through subscription to online data sources such as Springer and Emerald.

Competition between universities as well as competition between researchers themselves for limited research resources may increase the overall quality of research and the products of research but it comes with costs and consequences. The winners continue to win and the less experienced researchers find it difficult to break into the game. A sense of exclusiveness of published researchers may develop which tends to exclude other less qualified researchers. There is therefore a need to ensure that the methods by which articles are accepted for publication remain fair and equal to all who submit them and that some level of assistance to or cooperation with younger or less experienced researchers is made available within universities or professional associations.

4. Collaborative research

Collaborative research which embraces both highly and less experienced researchers may be one solution to this problem. The growth of collaborative research globally has been dramatic and may have been fanned by a number of factors. An increase in institutional funding for research in itself has been important (Wagner et al., 2001) in stimulating greater collaboration but this has been accompanied by the rise in the use of communication technologies as a means of facilitating communicating between people in different institutions as well as different countries (Ponds, 2009) and the greater acceptance of English as the lingua franca of international publication (ibid.).

International collaboration has been reported to be growing more quickly in Western Europe and the US than in other parts of the world (Carayannis & Laget, 2004). Within the EU itself, collaboration has been progressively increasing (Ponds, op cit.), particularly since the EU has increased its funding of research which promotes collaboration between organisations or institutions in partner EU member states (Caloghirou et al., 2001). Some have suggested that international collaboration is growing at a faster pace than national inter-institutional collaboration (Ponds, op cit., Zitt & Bassecoulard, 2004) and that interdisciplinary research is growing at a greater rate than discipline based research (Ponds, op cit.). Collaboration is more likely to occur in Western academic settings, and, when it happens in developing countries,

collaborative teams are more likely to have to struggle against institutional barriers to research (Bozeman & Corley, 2004, Ynalvez & Shrum, 2011, Toivanen & Ponomariov, 2011).

Why has collaboration grown at such a pace and what are the perceived benefits of collaboration? A number of studies have concluded that collaboration, because of the very nature of mutual or team work, enhances the production of new knowledge (Lee & Bozeman, 2005, Wuchty et al., 2007, Huang & Lin, 2010). It confers a certain amount of status upon collaborators in enhanced academic reputation (Bozeman, Fay & Slade, 2013) and results in an increase in the number of citations (Katz & Hicks, 1997, Beaver, 2004) with even more citations if the work is international. Collaborative work is thought to provide better outcomes than sole work simply because collaboration provides the opportunity for the consideration of diverse and multiple viewpoints and the engagement of a greater set of skills and expertise. It is said to provide better quality research (Frenken et al., 2005) and the results of collaborative research are thought to be diffused more quickly (Singh, 2005). There are simply more people to do the work. Participants in collaborative projects also find that they are more likely to be further linked into other academic networks (Etzkowitz & Leydesdorff, 2000).

If scholars take seriously their role to act within a community of scholars in their work, then collaborative research creates a means for them to do so. Collaborative research teams with members from diverse backgrounds will help create the circumstances in which younger neophyte researchers will be nurtured and encouraged as well as be challenged by the demands of sometimes complex projects (Salim & Waterworth, forthcoming). It is vital that the research departments of universities provide training and incentives for it and that professional associations provide avenues for the publication of work from less experienced researchers.

5. Discussion

Competition for research funding between universities and between researchers within universities is continuously escalating as higher education becomes increasingly internationalized and globalized. Bibliometrics provides information on universities and their researchers by counting the number of publications they produce each year, the assessed quality of the journals where their articles appear, the number of citations their articles receive, the size of the competitive research grants they receive and the status of the granting bodies. The problem many researchers have is to have a ‘first’ article accepted for publication in a high status journal. Researchers who are inexperienced or who are located in newer universities without a strong research culture or who are unused to writing in English face increased barriers to being published.

What can universities do to develop their research strategies and to support their budding researchers? There are a number of possible strategies which newer universities might consider to consolidate their place amongst ranks of the most prestigious research institutions.

5.1 Building a stronger research culture

Institutions need to develop strategies which will demonstrate that they are committed to developing their research outcomes. Universities should

- develop institutional research foci related to their local region and arising out of the research expertise of their staff
- examine national research priorities and devise ways to match their institutional research foci to national economic development
- encourage existing staff to complete doctorates with a research focus
- appoint staff who have research doctorates or who have almost completed them.
- appoint senior staff with proven research records

5.2 Building a stronger research quantum

Institutions should work deliberately to improve their bibliometric rankings. Universities should

- develop a culture which values and rewards successful completed research and publication
- seek funding and allocate more funds to research
- provide staff incentives which recognize research success and divert funding from projects that reward seniority or that promote inter-institutional links
- provide promotion opportunities for academic staff based on research success rather than seniority
- develop Quality Assurance criteria (Harman, 2015) that focus more directly on increasing the research quantum

5.3 Creating inter-faculty and inter-institutional collaborative research teams

Institutions should attempt to create collaborative research teams which are targeted towards achieving institutional research priorities. Universities should

- create diverse teams which bring together experienced and inexperienced researchers
- encourage doctoral adviser-advisee collaboration in the presentation of conference papers or research articles which represent equal contributions from each

- encourage the development of inter-institutional cooperation where research resources are allocated to the development of collaborative projects
- make use of internet based communication networks to develop, maintain, monitor, manage and report upon collaborative research projects

5.4 Developing institutional links with regional industries and local government

Universities need to have strong links to local industries and civic organisations so that they may meet community needs in their development of knowledge (PriceWaterhouseCoopers, 2015). Universities should

- create incentives for university-local collaboration
- train researchers to increase their understanding of local industrial needs and local bureaucracies
- enhance career mobility between the university, industry and the government
- provide incentives for industries' co-investment in research

5.5 Developing academic staff into stronger researchers

Universities need to focus attention on both experienced and neophyte individual researchers and develop their capabilities in order to increase their research productivity. Universities should

- identify staff research strengths and preferences
- encourage staff to focus on simple research projects which arise out of local or community needs or teaching
- develop researcher capacity in selecting reasonable, strategic and beneficial project topics, in selecting appropriate research methodologies, in searching and describing appropriate research literature, in using appropriate analytical tools, in drawing powerful conclusions and in enhancing the writing of articles for publication

6. Conclusion

As public institutions that bear a key developmental responsibility within the community, universities are academies of knowledge that should produce research outcomes for the public good. Universities should engage with the regions within which they are placed and contribute to the sustainable economic development of those communities, locally and nationally. However, universities are constrained as well as enlivened by the measurement of their academic success in the form of bibliometric analysis of their research and publication outputs. There is much that universities can do to increase their research profiles including capacity building of research staff and research collaboration across

faculties and institutions. Universities within the Asian region are able collaborate to bring about such high aims and work together to produce a more sustainable world.

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To date, research in sustainability science has focused. largely on understanding complex coupled human-natural. systems (Clark 2007; Miller 2013). These efforts have. made signiï¬cant contributions to our understanding of. coupled systems dynamics, brought sorely needed attention. to research that is problem-oriented and spurred exploraÂ ented research more meaningful and relevant through. solutions-oriented sustainability science. First, scenario. studies have employed and further developed approaches. for visualization and the crafting of narratives that make. future pathways more tangible to decision-makers (Bryan. et al. Research in basic geological sciences, geophysical and geochemical methods, and drilling technologies could improve the effectiveness and productivity of mineral exploration. These fields sometimes overlap, and developments in one area are likely to cross-fertilize research and development in other areas. Geological Methods. Underlying physical and chemical processes of formation are common to many metallic and nonmetallic ore deposits.Â socioeconomic and cultural issues, including sustainable development. Page 21 Share Cite. Suggested Citation:"3 Technologies in Exploration, Mining, and Processing." National Research Council.Â Currently, a number of research challenges are being addressed for hyperspectral technology, especially for spaceborne systems. Towards a more sustainable future for our water resources. FutureWater is a research and consulting organization that works throughout the world to combine scientific research with practical solutions for water management. FutureWater works at both global, national and local levels with partners on projects addressing water for food, irrigation, water excess, water shortage, climate change, and river basin management.Â FutureWater has a pro-active approach to research where we use models to investigate a variety of problems and challenges in water management and emphasize possibilities for the future. FutureWater has offices in Wageningen (The Netherlands) and in Cartagena (Spain). Once a researcher has formed a testable hypothesis, the next step is to select a research design and start collecting data. The research method depends largely on exactly what they are studying. There are two basic types of research methods: descriptive research and experimental research. Descriptive Research Methods. Descriptive research such as case studies, naturalistic observations, and surveys are often used when it would be impossible or difficult to conduct an experiment. Start studying Research Methods Chapter 10. Learn vocabulary, terms and more with flashcards, games and other study tools.Â Before creating an interview schedule, a researcher ought to: create an outline. Which of the following is not a type of interview used in qualitative research? all of these types of interviews are used in qualitative research. All the information a researcher logs in the context of the qualitative interview is known as the: audit trail. Missing data in qualitative research serves as a type of: connector that accounts for what participants declined to mention. Grounded theory stems from: analysis of patterns and themes.Â To understand the critical realist perspective, one most understand: their stance on the nature of reality. Rapport is the process of