

Research and knowledge management in transforming South Africa

Trends and analysis

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ABSTRACT

The post-apartheid South African education landscape gave impetus to national debates on the higher education system with emphasis on skills needed in the knowledge-based economy. Higher education has re-defined its role in the transformation of South Africa's agenda regarding socio-economic needs. The focal point is: How best do institutions of higher learning, as engines of research and development, feed into the knowledge society and economy? Furthermore, the world of work is informed by changing environments that rely on research to inform new approaches, strategies and models. The article highlights that while research contributes to the knowledge management paradigm, it also enhances service delivery and benefits society at large. There are growing demands on higher education to produce more research. It is argued whether higher education is producing research to meet performance quotas or translating them into workplace learning amongst graduates, thus making a valid contribution to socio-economic development? This interconnectedness between research and knowledge management then supports the conclusion that a context of application of postgraduate research is central to address gaps in service delivery.

INTRODUCTION

Knowledge management through research is influenced by the information age and has led to the knowledge economy and knowledge society. This has increased demands for organisational performance improvement across all departments in the public service. Country-specific research and development (R&D) initiatives are indispensable for meaningful participation and contribution to the global society and economy. Development of human capital through research is inevitable for public sector management and



development. In the global economy, research should be embedded in development of leadership with an emphasis on creation of knowledge relevant to challenges of the 21st century. Research and its contribution to the knowledge management environment is a key dimension for such purposes. Thus, there is emphasis on the role of universities as 'reservoirs' of R&D. The role of higher education institutions (HEIs) is to produce graduates with transferable knowledge into the workplace. As such, this article poses two questions: Are graduates equipped with the required capabilities to contribute to the desired change? Are graduates able to transfer their knowledge to the *real-world of work*? Whilst research is seen to emphasise the need for more comprehensive approaches to measure the extent to which service delivery is improved, some form of knowledge transfer needs to be assessed regarding the impact. Hence the need for effective knowledge transfer in the workplace is an integral part of the knowledge economy and knowledge society. The knowledge economy and knowledge society are fuelled by higher education studies and research which have become strategically interlinked as forms of contribution to new learning.

DEVELOPMENT IN HIGHER EDUCATION – A SOUTH AFRICAN PERSPECTIVE

The pre-1994 higher education system in South Africa was characterised by vast inequalities. Proportionally, few blacks participated in higher education, which resulted in skewed distribution of graduates by disciplines. Blacks made a minimal contribution to the knowledge society and knowledge economy. Black students were enrolled in least recognised education fields including education, humanities and social science as opposed to science, engineering and technology (SET). These inequalities were alarming at postgraduate levels (Leuscher and Symes 2003:5). Consequently, transformation of higher learning was inevitable.

Post-1994, several initiatives for transformation of education were introduced. This led to noticeable changes in the education system with renewed purpose and goals, policy changes, adoption and implementation in the areas of governance, academic programmes and quality assurance (Badat 2010:4). Following on, Dison, Walker and McLean (2008:1) argue that globalisation and national demands for socio-economic development led to restructuring and reforms in education to become accustomed to the changing global economic climate. Similarly, Reddy (2004:38) maintains that higher education should provide training and innovation, and impart skills and knowledge that will afford South Africa an opportunity to integrate and interact with the dominant global economy on a competitive foothold. The National Research Foundation (NRF) asserts that commitment to R&D is a determinant of the country's willingness to become a global competitor.

Olssen and Peter cited in Dison *et al.* (2008:6) contend that the need for highly skilled professionals, the capacity to learn and adapt to changing contexts, and the ability to contribute to innovation are prerequisites of the knowledge society and growing economy. Singh and Lebea cited in Dison, *et al.* (2008:1–2) reiterate that the merit of education has been predominantly associated with its influence in boosting the competitive edge of the local economy in the global arena. Development of relevant curricula and research are the fundamental hallmarks of socially responsive institutions. This demands alignment of curricula with real world requirements, asserts Ensor (2004:339–340).

The South African legislation following the demise of Apartheid in 1994 unearths the new landscape and revolution of the higher education system. These include *firstly, the Constitution of Republic of South Africa, 1996* which pronounces the right to access quality education for all. *Secondly, the Higher Education Act, 1997* accentuates the need for a single co-ordinated higher education system for advancing human resource development, which is aligned to international standards of academic quality. The Act also proclaims that it was “desirable for higher education institutions to enjoy freedom and autonomy in their relationship with the State within the context of public accountability and the national need for advanced skills and scientific knowledge”. *Thirdly, the White Paper, 1997* highlights the mobilisation of human talent and potential for continued and positive contribution to knowledge in the information age.

Pityana (2004:2) is unequivocal that education should play a key role in embracing South Africa's role in the global economy. Similarly, the Green Paper for Post-school Education and Training commends an immediate re-visioning of the role of research in putting South Africa on the global map (RSA 2012:13). Consequently, the government promulgated a national R&D in 2002 in order to develop the country's research and intellectual capacity. The former and late Minister of Education, Prof. Kader Asmal asserted in 2004 that the strategic objective of the government in higher education was to:

produce graduates who are well-rounded and thoroughly grounded; who are skilled and competent; who are creative, flexible and adaptive to new challenges; who are adept in critical thinking and cultural literacy; who are enabled and empowered to participate fully in their economy, their society and their globalizing world.

To this effect, the intention is to promote research and development (R&D) and to enhance human capital that is required for a future knowledge economy.

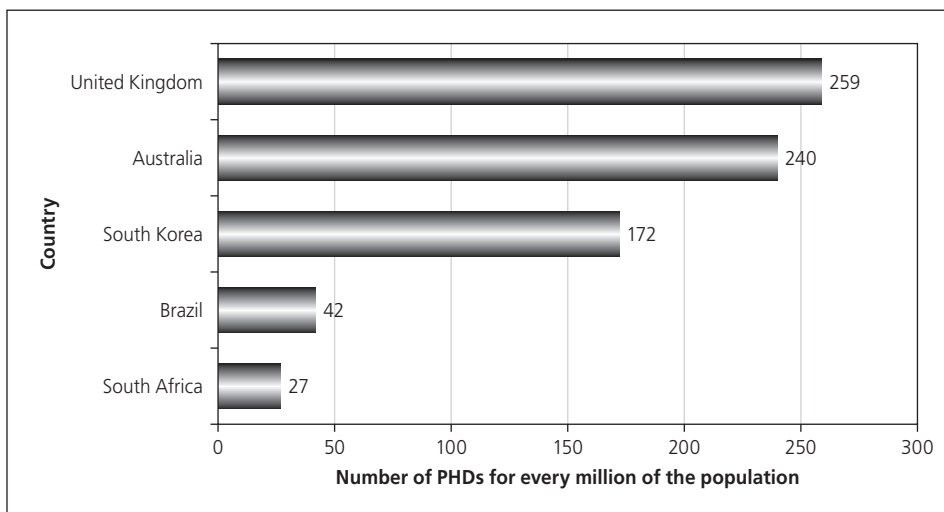
Teece cited in Marr, Guta, Pike and Roos (2003:771) argues that intellectual capital (IC) is pivotal for the organisational competitive advantage in today's knowledge-based economy. Therefore, an improved education system for the knowledge revolution is indispensable. To this effect, IEASA, (undated: 16) notes a significant increase in the number of graduates – 74 000 in 1994 to more than 127 000 in 2007, produced annually by South African universities, with an increasing number of postgraduate enrolments, from 70 000 to more than 120 000 since 1995. Efforts to produce graduates with the required abilities, especially in the fields of science, engineering and technology, have been successful. However, the numbers of PhD graduates are considered to be low compared to other countries, as indicated in Figure 1.

South Africa is currently producing only 27 PhDs for every million of its overall population compared to other countries, like the United Kingdom, with its rate of 259. In 2009, the then Minister of Science and Technology, Naledi Pandor, urged that the proportion of PhD graduates must increase over the next 10 to 20 years to build competencies for a knowledge-based economy specifically in science, engineering and technology (SET) (RSA 2009:2 and RSA 2012:13). Impressively, graduation rates in these fields have shown a positive increase of 5,5% between 2000 and 2010 as indicated in Table 1.

Despite this achievement, there is wide concern that South Africa is yet to produce adequate SET graduates to meet its economic development objectives and to improve its research capacity in order to facilitate active participation in the global economy (RSA 2012:38).



Figure 1 Global PhD success rates



Source: (CHE, 2009 cited in SA PhD Project Partnership Guide)

HIGHER EDUCATION, RESEARCH AND KNOWLEDGE-BASED PRODUCTION – THE KEY AXIS

The OECD, (2008:2) maintains that higher education is a major driver for economic development and competitiveness in an increasingly knowledge-driven global economy. The Global Competitive Report, 2012–2013 contends that today’s globalising economy demands a workforce capable of adapting rapidly to their changing environment and the evolving needs of the economy. Thus, the need for quality higher education is particularly crucial for the emerging and developing economies in the 21st Century. Therefore, Higher Education Institutions (HEIs) across the globe are, as knowledge creators, required to provide the market with highly skilled knowledge workers (Dison *et al.* 2008:2). Batagan (2007:60) argues that higher education systems should develop a closer relationship between tertiary

Table 1 Graduate output and growth—major field of study 2000–2010

Year	Actual Graduate											Average Annual (%)
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	
Science, Engineering, Technology	24,136	24,995	26,630	29,546	31,443	33,499	35,555	36,429	38,820	40,973	41,156	5,5
Business/ Management	19,912	22,590	24,217	26,954	29,327	28,144	30,108	31,062	31,871	33,788	40,751	7,4
Education	15,568	18,737	21,487	24,242	29,253	29,054	28,554	28,337	29,636	35,532	37,665	9,2
Other Humanities	28,581	25,236	24,955	24,988	27,060	29,355	30,404	30,788	32,844	34,571	30,015	0,5

Source: (RSA 2012)

education and the external world, including greater responsiveness to labour market needs to provide high-level occupational preparation in a more applied and less theoretical way. HEIs contribute to social and economic development (OECD 2008:2) through human capital and a knowledge base through research. Moore (1983:227) asserts that postgraduate research is critical for the development of intellectual capacity. The ability of students to formulate problem statements in research, to engage with society at large in addressing key aspects of service delivery by re-thinking old questions and formulating new ones, are some of the integral ways to address societal problems (Mamdani 2011:12). Thus, postgraduate research should be refined to meet contemporary developmental challenges of the public service (Walford 1983:242). As such, there is a profound demand across the globe to strengthen capacities of research institutions and universities for knowledge production. Universities play a major role in innovation and change (UNECA 2010:25). From a governance perspective, OECD (2008:4) confirms this evidence by arguing that institutions of higher learning should reconcile their priorities with broader social and economic objectives of their respective countries in order to build knowledge economies and societies.

Arising from this contention, the concept of knowledge management is explored in the article. Students are exposed to research at universities and are contributing to knowledge production. It is argued that their contribution could assist in addressing some of the gaps in service delivery. Kgomo (2011:24–25) argues that learning and knowledge are imperative for the public service to deliver quality services to the public. The article emphasises the need for postgraduate students to conduct research on areas in public sector management that contribute to developing knowledge-based innovation. It is submitted by the authors that a culture of knowledge production through new empirical research will provide added value by public officials through the provision of new knowledge for informed decisions.

Livingstone cited in Ambrosi (2006:18), argues that education within the context of the knowledge economy must enhance life-long learning as a feature of modern society. Furthermore, Cohen cited in Ambrosi (2006:19) advocates that education and research are key characteristics required for self-invention and flexibility, and contributes to a knowledge-based economy. The concept of ‘continual competence development’ advanced by Anell and Wilson cited in Ambrosi (2006:24), affirms the need for research in higher education to be closely linked to the needs of society and the economy. The subsequent part of the article focuses on these aspects as a predisposition to learning.

KNOWLEDGE SOCIETY AND KNOWLEDGE ECONOMY

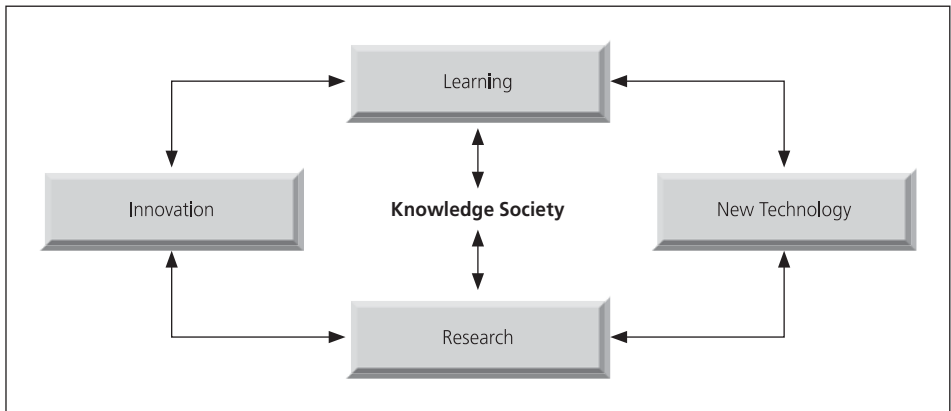
Meek and Davies cited in Meer, Teichler and Kearney (2009:13) argue that:

... knowledge is now recognized as the driver of productivity and economic growth, leading to a new focus on the role of information, technology and learning in economic performance. The term knowledge-based economy stems from this fuller recognition of the place of knowledge and technology in modern ... economies.

Batagan (2007:60) contends that knowledge is a fundamental resource in the knowledge society and economy. He further remarks that in a knowledge society, knowledge is



Figure 2 Knowledge society



Source: (Batagan 2007:27)

continuously incorporated in new products and services. The importance of learning and innovation, globalisation and sustainable development are major characteristics of a new society. Similarly, Kearney cited in Meer, Teichler and Kearney (2009:8), espouses that knowledge society results from higher education, research and innovation (HERI) as the system fuels developmental initiatives. The knowledge society involves interconnected organisations, standard protocols for transfers and communication and knowledge transfer (Batagan 2007:60).

In the knowledge society, as depicted in Figure 2, new technology, research, innovation and a process of learning are interconnected.

Development in knowledge societies requires changes in products, services, processes, practices and orientation. As a result, learning, new technology, research and innovation remain pivotal.

KNOWLEDGE ECONOMY

[We] are living through a period of profound change and transformation of the shape of society and its underlying economic base...The nature of production, trade, employment and work in coming decades will be very different from what it is today (Houghton and Sheehan 2000:1).

According to UNECA (2010:6), the knowledge economy refers to a society whose growth and development is based on continuous learning determining economic growth and society's competitive ability. The knowledge economy is characterised by initiative, creativity, problem-solving and openness to change as increasingly important skills (Houghton and Sheehan 2000:9). It depends on diffusion and use of knowledge, as well as its creation. The success of organisations and national economies will continue to rely on the effectiveness in gathering, absorbing and utilising knowledge and its creation (Houghton and Sheehan 2000:11). Therefore, learning and research in South Africa remain pivotal for knowledge production and national development.

Table 2 Assessing the knowledge economy in Africa

Country	KEI	KI	Economic	Innovation	Education	ICT
South Africa	5,8	5,3	5,55	6,85	4,68	4,45
Botswana	3,88	3,37	5,38	4,06	2,65	3,41
Swaziland	2,78	2,87	2,51	4,17	1,97	2,45
Ghana	2,46	1,97	3,93	2,02	1,78	2,12
Uganda	2,36	1,76	4,18	2,33	1,18	1,76
Zimbabwe	2,25	2,96	0,12	3,55	2,38	2,94

Source: UNECA, (2010:7)

The World Economic Forum’s Global Competitiveness Index (GCI) and the World Bank indicate that higher education and training is an important pillar for fuelling innovation and to facilitate rapid economic development. Higher education is critical for the development and provision of essential skills and the creativity needed to develop ICT products and processes, undertake innovative activities, assessment and management of the economic incentive regimes. In essence, capacity-building is vital for empowering members of the society at all levels with the necessary skills to remain relevant and useful in the new global world (UNECA 2010:4, 9 & 13).

According to the Department of Science and Technology’s (DST) Ten Year Innovation Plan (TYIP) (2008–2018), South Africa’s move towards a globally competitive economy is to ensure that its progress for a knowledge-based economy will be primarily driven by four key elements: human capital development, knowledge generation and exploitation through research and development, knowledge infrastructure and addressing the innovative chasms between research results and socio-economic outcomes (RSA undated: vii) The Department of Science and Technology (DST) is working with the National Research Foundation (NRF) to facilitate the creation of knowledge, innovation and development in all fields of the natural and social sciences, humanities and technology, including indigenous knowledge systems, in order to advance human development.

The knowledge economic index (KEI) and knowledge index (KI) for South Africa is proportionally more impressive than its African counterparts, as indicated in Table 2.

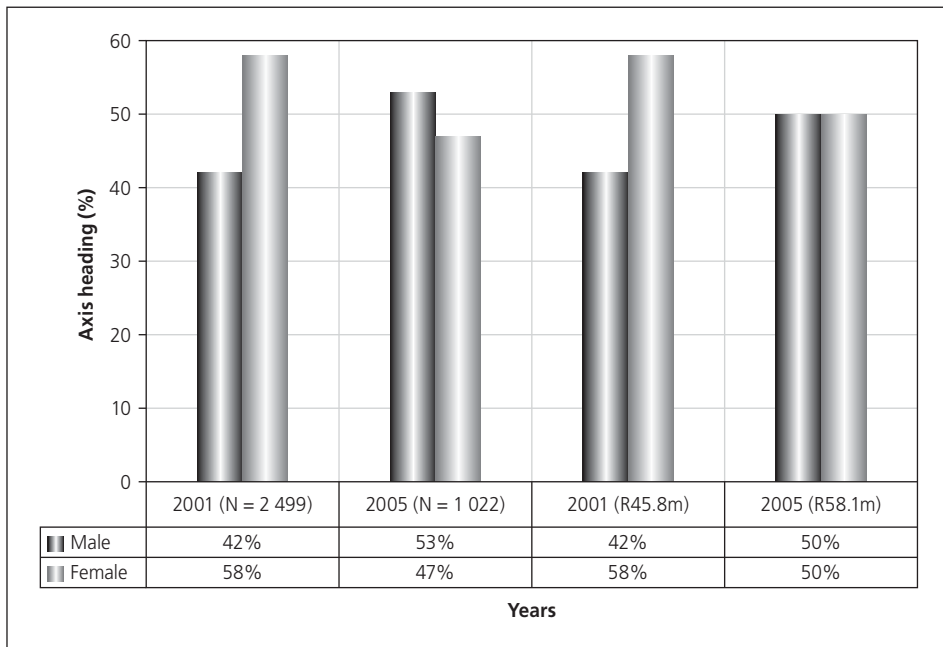
IEASA (undated:4) confirms South Africa’s positive efforts in the area of education by noting that South Africa’s research base is strong, diverse and also the largest in Africa. 80% of basic research conducted in Southern Africa is produced by South Africa, with positive contribution to the economic development.

HUMAN CAPITAL DEVELOPMENT

While South Africa can be commended for its endeavours and the improvements made in the area of education, continued investment and supportive policies for human capital development and knowledge generation are necessary (UNECA 2010:11). Sanyal and



Figure 3 Distribution of NRF masters and doctoral scholarships and their monetary value, by sex (2001 and 2005)



Source: (RSA 2009:33)

Varghese, (2006:2) argue that knowledge economies depend on the capacity of countries to invest in research and development (R&D) activities for the development of human capital. The authors further argue that in the future, a country’s research potential and human capital development will largely depend on investment in research, available staff and capacity, and an expanded higher education system. Impressively, South Africa spends more than 0,9% of Gross Domestic Product (GDP) on R&D, which places the country at a level with Brazil in terms of research spending (IEASA, undated:17).

Figure 3 depicts an increase in National Research Foundation (NRF) funding for masters and doctoral scholarships in 2001 and 2005.

In 2001, the total funding for females was R45,8 million. This saw an increase to R58,1 million in 2005. This indicates progressive realisation of the importance and government’s commitment towards improving higher education and R&D which is a prerequisite in building a knowledge society and economy.

UNECA (2010:24) asserts that the higher education system is increasingly playing a critical role in the country. Some of the key trends that have driven this belief include: collaboration between the private sector and research universities, increasing protection of knowledge generated in universities, changing mandates of research universities and the commercialisation of university knowledge for further intellectual and human capital development. Moving the human capital agenda forward in South Africa starts with university students, specifically post- graduates engaged in research, and the delivery of ‘world class’ researchers on the other end of the spectrum. Universities can play a pivotal role in knowledge generation and knowledge transfer by providing opportunities for expanding

research activities and training and an increased volume of researchers (RSA undated: 31). This demands the creation of 'world-class' and research-intensive universities.

Meek and Davies cited in Meer, *et al.* (2009:63) distinguish world-class universities by the following basic features: excellence in research, high levels of government funding and talented students. Salmi cited in Meer, *et al.* (2009:63) argue that achieving excellence in universities can be attributed to high concentration of talent, channeling of resources and supporting a renewed culture of learning and research. In pursuit of 'world-class' universities, interaction of the above key factors is essential. The authors emphasise the point that the relationship between knowledge and skills obtained in degrees with emphasis on a research component, is intrinsically linked to the vocational skills necessary in the workplace, and in so doing, the *missing feed* is explored below.

THE MISSING FEED?

HEIs are placing emphasis on research driven by both staff and students on various operational, systematic and strategic issues. There is also pressure on university academics to engage in research and publish the work in established and reputable journals. It has become a *numbers game* for assessing the productivity levels of academics as a forerunner to assessing their competency to *stay* in their current jobs. Furthermore, students are encouraged to engage in research as part of their postgraduate work. The net effect of research undertaken by postgraduate students is that the *new knowledge* should be *put back into the system*. This practice is located in a return on investment (ROI) policy which the authors maintain requires attention. Through ROI, *new knowledge* gained can be tested to gauge if it is put into practice for enhancing service delivery overall.

Universities can make unique contributions addressing societal problems and challenges in the public service through knowledge creation and knowledge transfer. Knowledge production by postgraduate students is usually informed by gaps in policy implementation. The challenge is to assess the quantum of input fed back into the system following completion of research. This is equated with the pressure to attain a higher qualification where the emphasis is currently located, as opposed to implementing findings into working environments. A *triad* is proposed between universities as research engines, public service departments and an ROI strategy to assess knowledge transfer. Kearney cited in Meer *et al.* (2009:7) argues that knowledge generated by research is the basis of sustainable social development. In this regard, three dimensions merit attention: placing knowledge for development, converting knowledge into value and sharing good practice.

Knowledge production of research conducted by postgraduate students is usually informed by gaps in policy implementation related to their work. The challenge is assessing the quantum of input that is fed back into the system following completion of research. This challenge is equated with pressure to attain higher qualifications where the emphasis is currently located as opposed to implementing the findings of empirical studies back in the working environment. Enders (2005:122) reveals that the majority of PhD graduates perceive their employment as a reasonable return-on-investment as reflected in their career aspirations. This is supported by the notion that the abilities of research-trained individuals are able to contribute significantly to the solution of the major problems facing the nation. It



is therefore conceded by the authors that the 'missing feed' should be directed at addressing the *gaps* in socio-economic issues, amongst others, as postgraduate research is more often than not research conducted by students from their employment sectors.

The view is advanced by Kearney cited in Meer *et al.* (2009:7), that there is a need for applied and innovative research so new knowledge becomes aligned with developmental goals. The DST reiterates that applied research and experimental development is pivotal to economic development by providing new R&D products and processes (RSA 2002:7). Therefore, research should incorporate inventive thinking and creative experimentation (Kearney cited in Meer *et al.* 2009:7). What is proposed is a *triad* between universities as research engines, public sector institutions and a return on investment strategy to assess the knowledge transfer for enhancing service delivery. This serves as a nexus for the dissemination of knowledge and know-how into other sectors of society, including the socio-economic environment (Enders 2005:124). In essence, the *missing feed* must focus on the context of application as opposed to a context of mere knowledge production.

CONTRIBUTION OF RESEARCH TO SOCIO-ECONOMIC DEVELOPMENT

The quality and function of educational research is to explore and inform policy development and policy implementation in the public sector. Students and staff in institutions of higher learning are encouraged to pursue scholarly research and contribute to *evidence* informed by policy and practice, as put forward by Humes and Bryce, (2001:329). There is a growing need for more public debate around policy implementation, expanding of the knowledge management arena and for research and evidence to contribute to the agendas and priorities of government (Humes *et al.* 2001:330). Therefore, the higher education system should provide a support base to meet developmental challenges such as the triple challenges of development – unemployment, poverty and inequalities.

Bloom, Canning and Chan (2006:1) note that higher education is commonly perceived and accepted as a leading instrument to advance economic growth through increased savings and investment and yields social benefits such as poverty reduction and strengthened governance. India, the authors note, leapt onto the world economic arena as a result of government's decade-long successful efforts to offer high quality and development-oriented higher education systems to communities. Therefore, investing in higher education remains important, as Kearney cited in Meer *et al.* (2009:7) argues: that progressive nations achieve and sustain levels of development through benefits that accrue from their investment in knowledge. Thus, increasing R&D capacity becomes a priority in any country's developmental agenda.

In university environments, academics are pursuing a scholarship of research as required by performance agreements. While writing scholarly articles and demonstrating empirically-based research add value to policy and practice, the research contributes to databases and productivity of academic institutions. For academics, published research means pushing up productivity. One of the major problems faced with research is finding that balance between conducting research, opportunities to influence issues around service delivery and presenting findings to wider audiences (Roos and Shapiro 1999:299).

IS KNOWLEDGE PRODUCTION THROUGH HIGHER EDUCATION TRANSFORMING PUBLIC SECTOR PRACTICES?

Ongoing research is generated by academics and postgraduate students engaged in empirical studies for further learning. Furthermore, funding of higher education institutions has changed to encourage more research to elicit more funds to institutional coffers. Given global economic pressures, cutting back on subsidies to higher education institutions is a reality. Emergent shifts in knowledge production and research are placing increasing challenges on universities to be responsive and relevant to teaching, research and community services. This paradigmatic move has caused higher education institutions to re-think new knowledge production and engage educators and learners in knowing, understanding, implementing and reflecting, rather than processes of producing knowledge. It is the kind of knowledge that is able to impact and make a difference in enhancing public service delivery. Waghid (2002:457) contends that research conducted by academics should be socially distributed knowledge that would cause academics to engender community service which integrates their research at universities and its application in the broader community. Harvey and Knight cited in Waghid (2002:459) suggest:

...producing people who can lead, who can produce new knowledge, who can see new problems and imagine new ways of approaching old problems. Higher education has a role to prepare people to go beyond the present, and be able to respond to a future which cannot be imagined.

On the afore-going discussion and *missing feed*, some of the challenges of research in higher education can be attributed to increased funding pressures on universities. This in turn, places an onerous burden as posited by Gordon cited in Waghid (2002:475), as equipping students to handle practical problems in policy implementation, providing life-long learning, critical enquiry and analysis. Regarding joint responsibility, Braskamp and Wergin cited in Waghid (2002:458) argue that academic research can provide applied knowledge to assist communities in socio-economic problems.

Therefore, a challenge exists for both universities and public institutions to undertake research to ascertain the net effect of these research initiatives. In pursuit of this line of defence, some international trends reveal that Chinese and Indian economies have displayed unprecedented levels of sustained growth by embarking on a knowledge-based growth track and attracting foreign investment and building on indigenous knowledge capacity in research and education (Cloete, Bailey and Maassen 2011:1–2).

CONCLUSION

Universities are increasingly being challenged about their responsiveness and relevance to societal needs and demands. The pressure is on universities as institutions of higher learning to contribute to knowledge production and knowledge sharing whilst assisting in addressing public service challenges through research. As research evolves, the intention is to improve governance in the public service. Research provides a utilitarian outlook that links universities



to innovations in public service delivery. The authors concede that university researchers are confronted with publishing their research and contributing to performance while increasing outputs. Students engaging in postgraduate research must be able to engage in research that makes valid and valued contribution to service delivery, and not only be regarded as *desktop* research. Only further research can test this inference!

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