Original Research Article

J A A S

S Sage

Research and Development Collaborations Within the Context of a South African Developmental State

Madikana J. Mokgokong (iD)
Tshwane University of Technology, South Africa

Ricky M. Mukonza (iD)
Tshwane University of Technology, South Africa

Abstract

The article explores the significance of research and development (R&D) collaborations and partnerships between government and academia as a strategy to be employed in shaping the developmental agenda in states. The authors provide both a conceptual view and findings from primary data which interrogated the notion that a 'research community' should be anchored on its collaborative efforts and continuously strive for partnership creations with the aim of transforming societies and serving the public. An observation is made on the prospects of South Africa's provincial governments and academia forging collaborations and partnerships with an open approach and common goals in order for the collaborations to have a purposeful meaning to the public. The current state of affairs in South Africa as alluded to in the National Development Plan (NDP) warrants for a developmental agenda that is dominated by knowledge production, dissemination and its uptake thereof. This context therefore enjoins different role players such as government and academia/research institutions and the private sector to work together and solve developmental problems such as poverty, inequality, unemployment and service delivery challenges. It is through initiatives such as R&D collaborations and partnerships that these aforementioned challenges can be curbed; however, this requires these sectors to do things differently. The Public Management Reform Theory provided the theoretical framework in this article as it advocates for an improved public sector's administrative structures, coordination, management and operations. In addition, this theory envisages a better and modernized public service that delivers services in an effective and efficient manner. The theory points out to a paradigm shift in terms of how the public sector is traditionally perceived to one that is modernized, decentralized, customer friendly and economically and socially reformed. The methodology adopted in this article includes a qualitative research method, desktop research and document analysis. There is substantial primary data and secondary literature in the public domain that was used to substantiate arguments advanced in this article. It should be noted that over the years, there has been on-going academic conversations on research collaborations between academia and the public sector as a prerequisite for socio-economic development; therefore, this article is further contributing to this debate.

Keywords

Research and development, research collaborations, developmental state, provincial administrations, academic institutions

Corresponding author:
Madikana J. Mokgokong, Department of Public Management, Tshwane University of Technology, 109 Market Street, Polokwane Ext 67, Polokwane 0699, South Africa.
Email: madikanam@gmail.com

Introduction and background

Over the years, research and development (R&D) has been commonly acknowledged and viewed as a tool for planning, long-term sustainable development, economic growth and socio-economic development (Adams et al., 2001; Fourie, 2007; Schumpeter, 1996 [1934]; Solow, 1957; Stratmann, 2005; Gyekye et al., 2012). Generally, it has been noted that among others, a prerequisite for a developmental state is research (both basic and actioned (applied) research); in essence, research is pivotal for socio-economic development and economic growth. Thus, the end-product of R&D if properly adopted can fuel innovations and breed commercialisation of products, thus growing economies, creating employment and alleviating poverty (Gyekye et al., 2012). However, there is a need to recognize that R&D alone is not and cannot be sufficient for a developmental state. Other factors such as the political will, research collaborations and partnerships, financing research agendas and research funding and investment are necessary and do play a significant role in shaping the socio-economic development landscape of a country (Fourie, 2007).

The phenomenon of research collaboration and partnerships across sectors is not entirely new, it has been there for a longer period. However, this phenomenon has gained great popularity in recent years due to the inevitable changing times as far as socio-economic development and transformation across nations, regions and localities are concerned. The phenomenon has been discussed in policy and developmental discourse across disciplines and fields such as development studies, political science and public administration (Borgatti and Foster, 2003; Freeman, 2003; Hwang and Moon, 2011). It is for this reason that a conceptual overview of the research collaborations and partnerships as a strategy to strive towards a developmental state is explored in this article. This article looks at the research collaboration landscape from an international and South African perspective. Moreover, the article provides opportunities posed by research collaborations between government, academia and the private sector and characteristics of research collaborations. Furthermore, the article will attempt to look at strategies that can be employed to manage research collaborations and partnerships across sectors. The article will contribute to theory and practice by demonstrating the significance of R&D collaborations as a strategic tool in the advancement of developmental states. Furthermore, it adds a South African Provincial Administration's perspective to the process of theorization of the R&D collaboration phenomenon. In addition, the article intends to provide government officials, planners and policy-makers with a deeper understanding of R&D collaborations as a catalyst for meaningful development and growth in developing countries. The empirical evidence presented in this article is derived from three provincial administrations in South Africa, and this provides insights into contextual realities of South Africa's provincial governments. Notably, literature has provided empirical evidence on this studied phenomenon with concentration to developed countries and national governments than provincial governments (Freeman, 2002; Lundvall, 2002, 2007; Nadiri, 1993; Patra, 2017; Tsvakirai et al., 2018). Hence, the article provides provincial context from a developing country's perspective to add to the existing literature.

Conceptual framework

R&D collaborations

Research collaborations and partnerships are defined as 'the working together of researchers to achieve a common goal of producing new scientific knowledge' (Katz and Martin, 1997). According to scholars such as Katz and Martin (1997) and Cattaneo et al. (2019), research collaborations are complex, can take many forms and tend to be characterized by various levels of engagements

among collaborators and partners. In the recent years, research collaborations have involved not only academics but also practitioners in both government and private sectors. Hence, research collaboration has become extremely significant and relevant in research practices and research and knowledge uptake (Brew et al., 2016; Etzkowitz and Kemelgor, 1998; Smeby and Try, 2005). Furthermore, as alluded in the preceding section, the ideology of R&D collaborations is not entirely a new one in the network science space in particular and the research community in general (Cattaneo et al., 2019). According to scholars such as Cattaneo et al. (2019) and Powers and Campbell (2011), research collaborations can happen between academics and outside academia. Similarly, Cattaneo et al. (2019: 2067) alludes that 'research collaborations gained a new dimensionality after the mid-twentieth century as the focus of analyses of research collaborations considered not only collaboration between academic researchers in academic settings but also increasingly between academics and non-academics'. Notably, academic institutions have become a part of the community, hence their involvement in community engagements initiative; it is for this reason that they have recently been viewed as part of the social and economic change agents (Balduzzi and Rostan, 2016; Cattaneo et al., 2019). Moreover, there has been an increase in global trends of academic institutions getting involved in nation-building programmes and initiatives by playing critical roles in the socio-economic development of nations, regions, cities and localities in collaboration with states (Brundenius et al., 2009; Cattaneo et al., 2019). It is in this context that research as an exercise and R&D as a creative work cannot be done for its own sake; it has to be done purposefully to inform policy-making and build the developmental state. Hence, research partnerships have to be formed for the purpose of research uptake and implementation and mainly to pursue a country's developmental agenda.

Equally, the application of research collaborations and partnerships is arguably the most significant factor in an environment that seeks to pursue a developmental state. A research community should be anchored on its collaborative efforts, collaborative networks, interorganizational networks and continuous strive for partnership creations with an aim of transforming societies (Hwang and Moon, 2011; Zulu, 2017). Different sectors ought to come together to forge collaborations, and this should be done with an open approach in mind; furthermore, actors or collaborators should find a common ground and have common goals. The collaboration and partnership should be a mutually beneficial one in order for it to go a long way and serve its purpose. Over the years, such collaborations and partnerships have been seen in the research, development and innovation space where different actors and stakeholders came together for a common purpose such as producing and disseminating knowledge and developing innovation for market economy, socio-economic development and economic growth purposes (Fagerberg, 2013; Zulu, 2017). These partnerships and collaborations were anchored on studies such as innovation studies (Zulu, 2017). Similarly, scholars within the network science space have also documented the rapid increase in research collaborations, research networks and research partnerships in recent years (Borgatti and Foster, 2003; Freeman, 2003; Hwang and Moon, 2011).

Over the years, there has been an attitude of 'us' and 'them' between academic institutions and non-academic institutions such as the government sector. On one hand, non-academics such a government sectors argued that academics do not understand the practical side of things including decision-making processes in government and are only viewing things from a theoretical and academic point; on the other hand, academics believed that the non-academics are performing their work from an uninformed position, and they are not keen to use research evidence when taking decisions (Bogenschneider and Corbett, 2010; Cherney et al., 2012). However, things are beginning to change and shift towards a point of togetherness in addressing socio-economic challenges. Consequently, there has been a growing trend and paradigm shift from individual sectors and organizations to a more collective and intersectoral research endeavours (Senker, 2006). Evidently,

research advances in certain fields and areas in both academia and government have become relevant to other disciplines and field, which therefore make it imminent for research collaborations and partnerships to occur (Senker, 2006). This article finds sentiments shared by Etzkowitz and Leydesdorff (1997) and Senker (2006) interesting that there has been growing collaborations forged by academia, government and industry with an aim of stimulating and building socio-economic development to drive a developmental state across the globe. Evidently, these forged collaborations are seen as a new form of science in a network science space and are done purposefully to influence and inform policy- and decision-makers to channel resources towards socio-economic development and economic growth. Thus, successful R&D collaborations and partnerships are characterized by trust, mutual benefits, skills and knowledge transfer, bridging gaps between different mindsets, common approach and priorities and understanding each parties' role and aspirations and purpose of collaborations (Cattaneo et al., 2019; Hemmert et al., 2014; Senker, 2006).

Developmental state

The concept of a 'developmental state' is associated with socio-economic development, economic growth and ordinary citizens' improved standards of living (Ng, 2008). Burger (2014) describes the term 'a developmental state' as a state where the government plays a significant role in the economy and in support of private sector industries. One cannot mention the concept 'a developmental state' without mentioning Asian economies such as Japan, China, Singapore and Hong Kong mainly because of their rapid and unexpected economic development over the years and the role Asian states played in their economic transformation and in building their booming economies (Berger, 1998; Gilpin, 1995). On the contrary, the 1997–1998 Asian financial depression has seen scholars and practitioners beginning to be sceptical about the effectiveness of states in driving market economy and developmental agenda (McLeod and Garnaut, 1998). However, the transformation that occurred post the Asian financial depression has made it obvious that the states' involvement in the process of building socio-economic development, market-based economies and economic growth is inevitable and therefore requires capable states (Beeson, 2006; Dent, 2003). Hence, Asian economies such as China and Japan should be exemplary to African countries such as South Africa (Burger, 2014). South Africa is marred by the triple challenges known as poverty, inequality and unemployment, and if the country is intentional about alleviating these triple challenges and transforming into a capable and developmental state, it has to play an active role in economic growth and policy development that support industries and create an enabling environment for education systems that focus on the growth of the economy (Baissac, 2009; Burger, 2014). More importantly, R&D should be placed at the centre of what the 21st century developmental state ought to look like. The current state of economies globally is focusing on knowledge-based economy as a tool to accelerate market economy, socio-economic development and economic growth. Thus, in an era that demands a rapid increase in productivity to attain and maximize economic growth and build social and economic development, research, development and innovation become important tools.

Theoretical framework

This article is grounded on the Public Management Reform Theory. The Public Management Reform advocates for an improved administrative structures, coordination, management and operations in public sectors (Vyas-Doorgapersad, 2011). Basically, the theory aims at promoting a better and modernized public service that delivers basic services in an effective and efficient manner; in addition, the theory is inclined towards making states or government institutions more 'market

friendly, lean, managerial, decentralized and customer friendly' (Omoyefa, 2008: 18; Vyas-Doorgapersad, 2011). Moreover, the reform theory provides a paradigm shift in how government and states ought to operate and manage the public affairs in comparison to how they traditionally operate. This paradigm shift involves public institutions doing things differently, thus having a paradigmatic shift towards economic and social reform and digital governance (e-governance); (Vyas-Doorgapersad, 2011). There is a greater likelihood that when institutions apply these shift in paradigms, their performance will, on one hand, greatly improve and reach greater heights and, on the other, create an enabling environment for a developmental state to occur through socio-economic development and economic growth. The public administration's focus into reforming the public sector will provide a space for public institutions to do away with compliance approach and adopt a result-based approach (Mauri and Muccio, 2012).

The R&D collaborations and partnerships that could be forged between sectors such as government and institutions such as academia and science councils will be a way of supporting the Public Management Reform Theory's essence on using new paradigms to improve the public sector's administrative, management and traditional operations by using R&D in building a capable and developmental state by putting R&D at the centre of public administration.

Methodology

The research methodology employed in this article is a pragmatism research philosophy, and a qualitative research method and case study research design were employed. The rationale for adopting this methodology is chiefly to unearth the relevance between R&D collaborations and the desire to build developmental states. This article has adopted the desktop research and document analysis approach wherein substantial primary and secondary literature from books, journals, Internet sources and government reports were utilized and has also used primary data gathered from 9 government officials in Limpopo, Gauteng and Northwest Provinces, 6 research fora members in Limpopo and Northwest Provinces and 4 university representatives in Limpopo, Gauteng and Northwest Provinces. The utilization of both primary and secondary sources has assisted the authors to substantiate arguments on the significance and relevance of research collaborations and partnerships within the context of a developmental state.

R&D collaborations and partnerships: international perspectives

As correctly advanced by scholars such as Hwang and Moon (2008) and Zulu (2017), a research community should be anchored on its collaborative efforts, collaborative networks, interorganizational networks and continuous strive for partnership creations with an aim of transforming societies. The notion that collaborations should be beneficial to all involved parties cannot be emphasized enough mainly because mutual beneficiation ties collaborators together. The mutual beneficiation goes a long way; research collaborations and partnerships that have been existing over the years involved different actors coming together for a common purpose such as producing and disseminating knowledge and developing innovation for market for socio-economic development and economic growth purposes (Fagerberg, 2013; Zulu, 2017). Similarly, scholars within the network science space have also documented the rapid increase in research collaborations, research networks and research partnerships in recent years (Borgatti and Foster, 2003; Freeman, 2004; Hwang and Moon, 2011).

Research collaborations between governments, academia and private sectors have worked immensely well in other countries across the globe. For instance, in the United Kingdom, over 725 collaborations through public-private partnerships at a worth of 54.2 billion Euros have been

developed to build and improve the lives of the ordinary citizens by providing infrastructures such as hospitals, schools, roads, bridges and more (Mikhaylov et al., 2018). These public goods are created through collaborative efforts and ultimately get translated into public service improvement. Some of the countries that have used knowledge creation and production through collaborative efforts to contribute to socio-economic development and innovation systems include Denmark, France, Germany, Italy, Spain, United States and more. These countries have adopted the Organization for Economic Cooperation and Development's (OECD) definition of research as "original investigation undertaken to acquire new knowledge" (Senker, 2006: 67). These aforementioned countries have put pressure on collaborators to carry out research, development and innovations works that meet and contribute towards government priorities and meet the needs of the users and citizens by ensuring that research results are translated into practice and policy. Furthermore, funders of research promote collaborations and cooperation between sectors such as government, academic institutions as well as across countries (Senker, 2006).

R&D collaborations and partnerships: South African experience

The South African State understands the significance of R&D in planning and development. Evidently, the National Development Plan (NDP): Vision 2030 highlights that research, innovation and technology should be prioritized by 'building a properly qualified, professional, competent and committed teaching, academic, research and public service core' and that by 2030, 75% of the university academic staff should hold PhDs either as staff or postdoctoral fellows (NDP, 2012). Simply put, the NDP emphasizes that research should dominate the developmental agenda of the country through knowledge production, dissemination and its uptake thereof. This context brings together the public sector/government research institutions such as National Research Foundation (NRF), Council of Scientific and Industrial Research (CSIR), Human Science Research Council (HSRC), Agricultural Research Council (ARC) and Medical Research Council (MRC), as well academia/universities. In addition, these highlighted research institutions and universities have an important role to play as key stakeholders that have the ability and capacity to solve the developmental problems in the country using R&D. However, the commitment and will of the South African government to prioritize R&D funding through agencies such as the NRF, Department of Science and Innovation and research councils HSRC, CSIR, NRF, ARC and MRC is very critical if the country is to curb and eradicate the country's triple challenges as enshrined in the NDP and provincial strategic plans. As Gyekye et al. (2012) have rightfully captured it, 'research and innovation has been acknowledged as critical factors for fueling long-term sustainable economic growth and, concomitantly, employment creation and poverty alleviation in developed and developing economies'; this notion is supported by other scholars such as Thirtle et al. (1998) and Tsvakirai et al. (2018). Hence, research collaborations remain critical; however, these sectors also get funding from foreign entities and through publications. According to the Department of Science and Innovation National Science Technology and Innovation Information Portal (2019), the science councils, the business sector and universities do engage in collaboration projects. These research collaborations between the aforementioned entities are among others characterized by co-authorships of publications and patents (Cattaneo et al., 2019; Laudel, 2002). Table 1 illustrates the research areas that the sectors collaborated on during 2010–2014.

A very important element of an academic institution is to produce, generate and disseminate knowledge through papers, articles, policy briefs, conference proceedings seminars, colloquiums, conferences and more. Table 2 will illustrate the intersectoral collaborations as far as co-authorship is concerned. This table shows the total output of sectors dated from 2010 to 2014.

Table 1. Research areas emphasized by various South African sectors (2010–2014).

Universities	Science councils	Business sector
Chemistry	Science and Technology: other	Chemistry
Environmental Sciences: Ecology	Biochemistry Molecular Biology	Engineering
Engineering	Astronomy Astrophysics	Materials Science
Physics	Public Environmental Occupational Health	Energy Fuels
Science and Technology: other	Physics	Nuclear Science Technology
Mathematics	Environmental Sciences Ecology	Metallurgy, Metallurgical Engineering
Plant Sciences	Infectious Diseases	Parasitology
Public Environmental Occupational Health	Chemistry	Mining Mineral Processing
Infectious Diseases	Immunology	Veterinary Sciences

Source: Department of Science and Innovation (DSI) National Science Technology and Innovation Information Portal.

Table 2. Intersectoral co-authorship matrix in South Africa (2010–2014).

Sectors	Universities	Science councils	Business sector
Universities	45,386	4229	281
Science councils	4229	8828	34
Business sector	281	34	455

Source: National Science Technology and Innovation Information Portal.

Table 3. Benchmarking of R&D expenditure as a percentage of GDP (2006/07–2012/13).

	South Africa	Brazil	Russia	India	China	Japan	South Korea	United Kingdom	United States
2006	0.90	0.99	1.07	0.80	1.38	3.41	2.83	1.65	2.55
2007	0.88	1.08	1.12	0.79	1.38	3.46	3.00	1.68	2.63
2008	0.89	1.13	1.04	0.84	1.46	3.47	3.12	1.69	2.77
2009	0.84	1.12	1.24	0.82	1.68	3.36	3.29	1.74	2.82
2010	0.74	1.16	1.13	0.80	1.73	3.25	3.47	1.69	2.74
2011	0.73	1.14	1.09	0.82	1.79	3.38	3.74	1.69	2.76
2012	0.73	1.15	1.13	–	1.93	3.34	4.03	1.62	2.70
2013	0.73	–	1.13	–	2.01	3.47	4.15	1.66	2.74

Source: OECD 'Main Science and Technology Indicators'; Brazil and India data were from the UNESCO Institute of Statistics.

The South African government is the main funder of the R&D activities in government departments, science councils and universities. Table 3 shows the benchmarking of South Africa's R&D expenditure as a percentage of gross domestic product (GDP) by countries in the Brazil, Russia, India, China and South Africa (BRICS) as well as other developed countries. This benchmarking table above has somewhat proved that South Africa is not investing in R&D initiatives as it should in comparison to its counterparts across the globe especially those in BRICS and OECD. The

painted picture is not a very satisfactory one as it puts South Africa at the lowest as far as R&D expenditure, investment and funding is concerned. This picture also says a lot about the importance of countries championing R&D efforts and advocacy for collaborations between sectors with an aim of building capable states.

R&D collaborations and partnerships as a prerequisite towards a developmental state

It should be noted that over the years, there has been on-going academic conversation on research collaborations between the academia, the public and private sectors as a prerequisite for socio-economic development. Evidence presented in this article thus far has illustrated how major economies around the world have utilized research collaborations to contribute to their innovative economies (Mikhaylov et al., 2018). Some of these growing economies have gone to an extent of using artificial intelligence to build innovative economies, improve public services and promote socio-economic development (Mazoni, 2018; Mikhaylov et al., 2018). Scholars such as Etzkowitz and Leydesdorff (1997) and Senker (2006) have alluded to the importance of academia, public and private sectors forging partnerships that aims to stimulate the knowledge-based economic development. According to Senker (2006), these collaborations between the academia, industry and government have been created by academic entrepreneurialism, industry's need for external providers of knowledge and government policies to promote socio-economic development and transform the market economy.

Looking at most developmental states such as Japan, China, South Korea and Taiwan, one would come to a realization that government has played a critical role in the advancement of capable states. In addition, these governments have been catalytic in driving their developmental agenda by inducing entrepreneurship, transforming their investments and bolstering the competitiveness of their firms in global markets. All these catalytic factors were done by forging partnership with external parties such as the private sector and the academic institutions (Ng, 2008). For instance, Singapore exercised extensive control over the market, and this state provided the market with all necessary apparatus for it to thrive; the government provided land and invested greatly in human capital (i.e. human resource development), and it also provided funding for research, development and innovation (Ng, 2008). Now, this is how intentional developing countries should be about building capable states.

An analysis of South Africa's research collaboration landscape: lessons from selected provincial administrations

According to Gyekye et al. (2012: 915), 'research and innovation has been acknowledged as critical factors for fueling long-term sustainable economic growth and, concomitantly, employment creation and poverty alleviation in developed and developing economies'. This suggests that the success of a government reaching and achieving an impactful R&D in provincial administration lies in building solid and mutually beneficial relationships between government and universities mainly because research, development and innovation (R&D&I) cannot be separated from academia because it is the very business of academic institution to do R&D. The authors therefore probed the level of research collaboration in Limpopo, Gauteng and Northwest Provinces in order to understand the extent of the research collaboration phenomenon. Research respondents probed include government officials in offices of the premier, in institutions of higher learning/academic institutions and research fora members within these selected provinces.

The authors posed a question to the officials in the offices of the premier of the selected provinces on how research collaboration should be approached. In their response, one government official from Limpopo Province highlighted this:

> The province should extensively engage and discuss the implementation of research collaboration MOU, and decide if it is worth it or not to have such initiatives. If this initiatives are seriously considered and implemented, it will strategically change the role of R&D in the province. There is also need to establish the provincial research hub in collaboration with research institutions and institutions of higher learning. Priority should be given to institutions that reside within the Province. The province should further invest more into R&D in terms of human, financial and technical resources. The research forum should be given a mandate and hold departments and municipalities accountable for research activities.

Another official from the Northwest Province supported this:

> Province need to consider the following: link between the research function of the office of the premier and the sector departments, this should also manifest itself in the alignment of roles and responsibilities; review of funding or support model for research and development services; and establishing a structure for the concentration of relevant research and development skills and initiatives from academic and public sector in the Province.

Interestingly, a respondent from Gauteng also highlighted the importance of research collaboration between government and the academic and research institutions, saying:

> There should be a coordination unit to oversee R&D collaborations, expenditure and impact. Research councils, National Research Foundation (NRF) and innovation hubs must work collaboratively with provincial administration on issues of R&D. Longitudinal versus short-term research goals must be mediated to ensure that some phenomenon is observed over time.

What is of critical importance in this response is the issue of establishing units in provinces or using the existing ones in the National Department of Science and Innovation to be responsible for coordinating research collaborations, research expenditure in provinces and its impact. However, this can only be relevant in cases wherein there is R&D funding and investment within provinces. A respondent from the Northwest Province suggested that the office of the premier should use leverage on its strategic position to make it easier for R&D investment to take place:

> The housing of the research structure in the OtP, it is placed strategically therefore the OtP Chief Director must leverage on this important strategic position and make sure that the structure is used to its full potential. This is a very important position to market and elevate the important of research and development.

This response is corroborated by one response in Limpopo and another in Northwest saying, respectively: 'Office of the Premier as a centre of governance within provincial administration should start embracing the R&D concept and provide an increased advocacy for R&D' and 'Educate senior management about the role and function of research so that they can enforce and oversee implementation of research findings and innovation for planning initiatives'. All these measures are critical to the advancement of R&D in provincial administration, and if well-articulated and implemented, they have the potential to change the status quo and improve planning and development.

Formalized partnerships are critical for achieving the developmental mandate of the provinces, but only if they are explored to their full potential by all involved parties. The partnerships have the potential to ensure that the R&D and planning and development initiatives in provinces thrive.

More importantly, these partnerships need to be nurtured with important resources, both financial and human, so that they yield positive deliverables and that the fruits of such partnerships and relationships become tangible. These partnerships and collaborations are significant for driving a developmental agenda. According to Brundenius et al. (2009) and Cattaneo et al. (2019), research partnerships are important in nation-building programmes and initiatives by playing critical roles in the socio-economic development of nations, regions, cities and localities in collaboration with states. Hence, these partnerships and relationships forged by these sampled provinces with the universities are very important in the shaping of the R&D and planning and development landscape of provinces.

The respondents from universities were asked to comment on the research partnerships, relationships and collaborations between government and the academic institutions, and their responses made an emphasis to the fact that the relationships or partnerships can be made to be both formal and informal. When the question on the extent of the relationship between government and universities was posed, the university representatives indicated that they had cordial relationships, with some saying they had solid relationships with the provincial administrations in their respective provinces. A remark made by one of the respondents was that,

> The relationship comes back a long way and it is cordial in various levels. University has layers of leaderships and relationships are built mutually with the executive of the government. Regularly, MEC interacts with the universities and vice versa. For instance, the MEC of health has been a regular on health issues, e.g. newest degree in medical school in the university. Strategic partnerships are in existence as well, the relationship between directorate of research in the university and the research unit in the Office of the Premier is another good example. We have a good partnerships to implementation of research forum as well as ethical and research committee and also keeping record of research taking place in government and university. However, more still need to be done to ensure that these collaborations thrive.

In addition, a respondent from another university remarked about the cordial relationship they have with their provincial administration by highlighting that,

> The relationship is cordial. There are no tensions. There are areas that are not very hostile, and we work together on number of areas. However, it is not really solid relations as it should as it doesn't have targets of national and provincial priorities. Because of not having a very tight strategic relationship then it becomes unmeasurable.

The respondent from one of the universities in Gauteng Province also indicated that the university had memoranda of understanding (MOUs) and memoranda of agreement (MOAs) with the provincial administration, saying that 'The University has the relationship with government. Through MOUs and MOAs to work together on different issues. There are also MOAs on innovation transfer projects and other seven research projects'.

The researchers posed a question on what forms the basis of the collaborations and partnerships between the government and academic institutions. This is essentially centred on what the foundation of such relationships is. The respondents highlighted that the basis was essentially on the mutual needs of the partners in line with provincial developmental mandates. A needs analysis resulted in the parties agreeing to enter into partnerships. All the respondents indicated that MOUs and MOAs governed their relationships with the provincial administrations. One of the respondents indicated this about the basis for the relationship to exist between his university and government: 'Needs analysis exercises which the MOU emanated from formed the basis for partnerships'. Another response was that, 'The MOU and collaboration efforts such as MOAs. When there's budget, the partners would often match it against the MOU and MOAs'.

These findings corroborate well with what literature is saying about the significance of entering into intersectoral research collaborations. According to Hwang and Moon (2011) and Zulu (2017), a research community should be anchored on its collaborative efforts, collaborative networks, interorganizational networks and continuous striving for partnership creations with the aim of transforming society. This notion that collaborations should be beneficial to all involved parties but even more importantly to the citizenry and the general public is once more emphasized, mainly because mutual beneficiation ties collaborators together, and for government and universities to enter into collaboration for the sake of improving the lives of the people is significant. However, all these partnerships must be nurtured for the sake of the beneficiaries; hence, resource allocation is critical in R&D partnerships and collaborations.

From the empirical data and literature reviewed, the authors deduce that research collaborations and partnerships should be anchored in mutual beneficiation and issues of commonality concerning socio-economic development in provinces. These collaborations should be driven by the partners' desire to improve and transform the lives of the people.

The predominant view among the respondents was that the relationship needed improvement although there were some pockets of effectiveness. The respondents from the two universities in Limpopo Province said that the relationship was somewhat effective. In his response, one representative said, 'It is 60% effective. There's room for improvement. And need for financial resources as well particularly from government's side', and his counterpart said, 'It is effective in the sense that, over the years, there is a lot of easy seamless ways of accessing research fields/sites and information from government'. However, a representative of another university in Gauteng Province had a different view, saying that

> The relationship is not as effective as it can be. This is due to institutional arrangements in government and university because relationship is mostly driven by individuals, sometimes when individuals leave the institutions then the relationship suffers. University does not necessarily have a central point that manages such relationship, it is an added task to different units/directorate.

The point raised earlier about individualizing partnerships is of great interest because it is something that may not always be openly discussed between partners and, as a result, may be a stumbling block for the success of the relationship. This challenge may be due to the lack of policy or its poor enforcement, especially in cases wherein the relationship and partnerships were not centralized in institutions. Another university representative highlighted that it was difficult to measure the effectiveness of the relationship because the MOU with the provincial administration was fairly new: 'There is clear outline plan for interventions. It is still a start, the MOU is its first 5-year cycle, so it is still early'.

The findings resonate with the perspectives of respondents from the offices of the premier in Limpopo, Gauteng and North West Provinces, as well as those from the research forums in these selected provinces, on the ineffectiveness of R&D and planning and development in the provincial administration. A contributing factor to this ineffectiveness may be the limitation on resource allocation for a seamless implementation of the partnerships and for collaborations to be impactful towards government's developmental agenda and mandate.

The researchers posed a question on whether the research partnerships and collaborations are beneficial. On this question, the university representatives voiced different perspectives. The researcher sought to understand if the universities considered the relationship or partnership to be beneficial or not. The evidence suggests that there was some benefit that came with the relationship. One of the respondents viewed the relationship as beneficial as it linked the university with other potential funders. The respondent said that,

> It is beneficial in a sense that the university is able to access platforms and relevant research communities through the research forum, this gives an opportunity to interact with stakeholders e.g. national government such as the presidency, DSI/DST etc. to address the universities on other platforms to ensure universities get funding and donors and opportunities to be on other strategic initiatives. Also, the partnership has served as a neutral ground for other universities in Limpopo e.g. UNISA, TUT and UNIVEN to come together under one umbrella and not be competitive. This has resulted in these institutions having to easily collaborate with each other and see the relationship with government as an opportunity.

To corroborate this view, a representative from the North West University said that:

> The benefits are there as some activities are currently going on such as projects on Local Economic Development (LED), human settlements. Any activity that happens at the local level benefits the university on teaching, learning and research and community engagement because it fits into the university research agenda in one way or the other. Interactions with the government will yield benefits going forward.

The representative from another university in Gauteng also elaborated on how the university was benefitting from the relationship with government. However, his view was that what the university had managed to achieve through the partnerships was not necessarily benefits but the responsibility of what a university ought to do in communities; he elaborated that,

> It is not necessarily the benefit but the responsibility of university to assist government and its citizenry. It justifies the existence of the university. The relationship has also assisted the university to have access to data and research sites in the province.

The aforementioned views that there are benefits from the existing partnerships with government were met with an opposing view emanating from counterparts in other universities, namely that the existing relationships or partnerships did not yield tangible results: Even though they seemed to be working at times, the tangibility of the relationship was not highly evident or substantial. This view was expressed by a respondent from the University in Limpopo:

> Currently, there are no real tangible benefits, even though the MOU is being facilitated but there are no measurable results. Much more needs to be done from government's side. Maybe incentives for staff to register for courses to build capacity in the province or government prioritize the local universities in the province for research commissioning and contractual research works.

It should be noted that the views raised by these four different universities depended on individual experiences of each university with their provincial government, although, to some extent, there may be similar and relatable experiences from one institution to another. The picture provided by these findings is that even though the relationships between the universities and provincial administrations were not perfect, the intention to have a workable environment was nevertheless there. It remained evident that there was still more work to be done to ensure that the partnerships reached a desired level of mutual benefit.

Opportunities posed by research collaborations and partnership

Research collaborations and partnerships (through MOUs/MOAs) between the government, academia institutions and the private sector are one of the most important tools to enhance a government's functions. Respondents were requested to provide their views and perceptions on the opportunities that research collaborations can provide for provincial administrations. Responses were centred on the following issues:

- **Knowledge exchange between collaborators:** Parties can share and exchange knowledge residing in their organizations with one another. These collaborators will leverage their joint knowledge on broader research areas. With the vast knowledge and access to various network residing in government, academia and private sectors, these research collaborations have a potential to tackle existing developmental challenges such as poverty, inequality and unemployment. The study's respondents have indicated that there is a need for provincial administration to have collaborations with other institutions, as well as have links with sector departments to avoid silo approaches. This is important because the offices of the premier play a coordinating role, and it was important that they know and understood what other institutions are doing and, similarly, sector departments and even academic institutions must know what was expected of them by the offices of the premier;
- **Access to funding**: The respondents from the government officials, university representatives and research forum members have highlighted that funding support and a workable funding model for R&D functions within provinces are some of the critical opportunities that can come out of collaborations. This could be done through partnerships with the academia and the private sector. The private sector in particular should be central, and the government should provide a proper policy landscape that would attract investors for R&D in provinces. Coordination units can be established in provinces to oversee R&D expenditure and its impact, and this can be done when provinces provided budget and funding for R&D functions. This may yield a positive result as far as funding provincial research agenda is concerned. Therefore, sectoral government departments will have to implement a funded research agenda.
- **Expertise and skills transfer:** The respondents have indicated that collaborations can provide an opportunity to have qualified, skilled and motivated officials; for instance, critical skills such as research, strategic management, communication, development and planning, policy-making and analysis and financial decision-making provide an opportunity for the government to achieve its mandate. Such skilled officials would provide much needed direction on how to forge partnerships and how to integrate strategic functions in provincial governments. Qualified officials should be appointed in both senior-management and middle-management levels. In addition, when collaborating with academic institutions and private sector, the government sector will be able to access research facilities and knowledge networks from different disciplines and fields. Similarly, the academia and private sector will also have access to policy-makers and decision-makers in government and potentially access relevant information and data, which may be useful for research publication purposes (Cherney et al., 2012; Wooding et al., 2007).
- **Knowledge, innovation creation and commercialisation**: Innovation systems thrive on research collaboration involving various institutions; thus, the research collaborations between government, academia and the private sector can yield positive results on the innovation creation and commercialisation front. Commercialisation of research, development and innovation outcomes will not only create job opportunities which will translate to economic development and economic growth but also enhance human capital development, which is extremely important in the pursuit of a development or capable state. Evidently, knowledge and technological innovation are becoming widespread in such a way that developing technological innovation benefitted from a well of knowledge integration and expertise of multiple sources (Melese et al., 2009). Respondents have indicated that provincial administration should establish provincial research and innovation hubs in collaboration with universities to harvest knowledge and innovation created, and this will assist government to improve the lives of ordinary citizenry and ultimately achieve a developmental

mandate of governments. Respondents have also alluded to the fact that research collaborations can create platforms for impactful knowledge production to influence policy and practice while simultaneously transferring existing knowledge and skills to each other; and

- **Research uptake**: Respondents have alluded to the fact that if research collaboration networks are properly used, they will assist government and practitioners to properly utilize research recommendations that will translate into research uptake and influence policy and practice.

Challenges of research collaborations and partnerships

All 19 respondents from government, universities and research forums cited a number of challenges that provincial administrations were faced with in planning and development activities. A high proportion of them indicated that among the challenges, some of the leading issues were linked to the following:

- **Organizational culture difference**: The respondent have highlighted that institutional arrangement matters are a challenge for R&D collaborations to thrive, arguing that some of the challenges were in relation to 'The poor liaison between organizations (i.e. government and universities) due to institutional arrangements differences and organizational cultures. Also, bureaucratic challenges, for instance, signing of MOUs can take over six months'.
- **Funding:** Financial constraints in terms of lack or poor funding for research, planning and development activities as well as not prioritizing R&D or even investing in it came out strongly from the responses. Less linkage or collaboration between the government and private sector for R&D investment was also highlighted as a challenge and that the prospects of partnering with existing multinational corporations and domestic corporations for R&D purpose was not being sufficiently explored. Literature has indicated that gross domestic expenditure on research and development (GERD) of South Africa is very low in comparison to that of other countries such as Brazil, China, Japan, South Korea, United Kingdom, United States, among others (Department of Science and Innovation (DSI) National Science Technology and Innovation Information Portal, 2021; Kahn, 2007). In fact, the R&D Survey report has recorded a decline of 0.08% from the 2017/18 financial year into the 2018/19 financial year (DSI, 2021). Conversely, the higher education sector and science councils seem to be growing. However, the higher education sector in the 2018/2019 financial year has recorded a 0.27% decline compared to the growth recorded at 0.28% in 2017/2018, and the growth of science councils dropped from 0.14% in 2017/18 to 0.11% in 2018/19 (DSI, 2021). The reason for providing this picture is to illustrate that funding for R&D activities is very low in South Africa, and this is a challenge most research collaborators deal with from time to time. Importantly, transformational policies to support creation and production of knowledge and its uptake thereof are necessary for the pursuit of a capable and developmental state.
- **Research uptake:** Research uptake has always been a challenge that most researchers encounter when disseminating knowledge to non-academic sectors (Cherney et al., 2012). The dominant view from the respondents point to the inability of government to utilize these collaborative structures as one of the key strategic mechanisms that can shape the planning and development landscape with the aim of creating a culture of using research for strategic planning and developmental purposes. The findings also reveal that some of the hindering factors for the collaboration to succeed is the silo approach or mentality by strategic directorates within the offices of the premier as well as a lack of support from the National

Department of Planning, Monitoring and Evaluation. An interesting element that emerged from the findings also points to researchers or academics not having access to policymakers or the executives of the provinces where research findings can be presented for research uptake purposes. Most members who sit in the research forums are officials who do not have powers to influence decisions at top management and on executive management platforms. Cherney et al. (2012) posit that most researchers have difficulty in disseminating research to non-academic sectors; hence, research collaborations are important. These collaborations are significant both in the undertaking of research and in the research uptake that follows (Brew et al., 2016; Cattaneo et al., 2019).

- Inadequate utilization of expertise in academic and research institutions was another challenge linked to the provincial administration's inability to capitalize on the partnerships it had with academic and research institutions. The conception of R&D as an enabler for investment and economic growth was underrated or understated by key decision-makers and high-ranking administrators in government mainly because they had not yet understood the role of R&D in government and how this strategic tool could be used to accelerate growth and development and influence public policy.

Recommendations

Ways to manage research collaborations and partnerships for a developmental state are discussed below:

- **Leadership:** For collaborations of this nature to succeed a visionary leadership is of high significance. Leaders should be able to promote the spirit of togetherness and influence for active participation of all involved team members. In addition, commitment of leadership also forms ingredients in ensuring that collaborations are successful and achieve the intended objectives. Basically, leaderships from all involved parties will form a catalyst for the collaboration to thrive (Ansell and Gash, 2007; Mikhaylov et al., 2018). The findings have revealed that the inability to differentiate between the public administration and politics is an extremely worrisome factor which impeded collaborations and partnerships between government and universities in the selected provinces. As one respondent expressed it:

The reality in the Republic of South Africa (RSA) is that it is difficult to distinguish between politics and administration/government, which results in having no political will by the political heads on prioritizing R&D and advocating for research collaborations'. The calibre of politicians who understand the role of university as far as R&D is concerned is very important in the pursuit of planning and development.

- **Political interferences:** According to one of the respondents "Political interferences resulting in political appointments in critical positions that required specialized technical expertise such as R&D affect the developmental agenda of provincial administrations. This practice bred a cohort of unskilled and unqualified officials. In addition, there are too many political appointments in critical positions that require specialized technical expertise".
- **Research uptake:** Research collaboration may create a platform for the intended end-users of the produced knowledge to adapt the research outcomes. As the end-users (policy-makers, decision-makers, and practitioners) are already interacting with the knowledge producers, that is, academics, it becomes easier for them to engage with an effort to disseminate research and uptake thereof. Government and institutions of higher learning should create

platforms where high-ranking government officials and decision-makers engage with researchers, and at these platforms, research recommendations can be shared to pave way for research uptake.

- **Shared goals and objectives:** Shared objectives and goals in collaborations and partnerships yield positive results because they tend to guide parties on what decisions to make and how to arrive at those decisions. The shared goals and objective should emanate from the NDP as a country-wide macro-policy and Provincial Growth and Development Strategies (PGDS) as these strategies are regarded as macro-policies of provinces and not only the government. More importantly, shared objectives create a reference for evaluation of success and how to improve going forward (Farnham and Horton, 1993; Mikhaylov et al., 2018).
- **Communication:** Regular communications and interactions are essential in a partnership. A good communication strategy is vital for collaborators within provincial administrations and academic institutions to communicate their aspirations, expectations, performance determinants, challenges, successes, and quick wins of the partnership with one another. Importantly, partners should share knowledge with each other. This regular communication assists in trust-building among partners.
- **Availability of financial resources:** For provincial administrations to be able to have meaningful and successful research collaborative efforts, government must begin to appreciate full costs of research, development and innovation. Research, development and innovation requires financial injections for it to take off and be sustainable; notably in the preceding sections, South Africa's GERD was discussed, and the picture depicted by GERD suggests that South Africa is not doing well as far as investing and funding research is concerned. Each of the identified research collaborators should be responsible for funding the partnership and collaborating in coming up with funding models to sustain their partnerships, and some of those funding models can include attracting investors and the business sector to fund R&D initiatives.

Conclusion

The article has presented an argument about the potential of R&D collaborations as a contributor towards building developmental and capable states especially in provincial administrations of developing countries such as South Africa. The authors posit that in order for South Africa to fulfil its potential in building a developmental state, the government is expected to take a leading role on investing in research collaborations, infrastructure, financial and human resources as other countries such as Japan and China have done so (Mokgokong and Mukonza, 2023). In addition, states such as China continue to demonstrate the significance of policy enforcement pertaining to research, development and innovation issues and its advocacy therefore (Baskaran and Muchie, 2008; Mokgokong and Mukonza, 2023). Moreover, the state should push forward the transformational policy agenda through intersectoral collaborations with academia and the private sector. Some of the opportunities that comes with R&D collaborations have been highlighted in this article, and these opportunities have the potential to improve and maximize development in provinces. The evidence advanced in this article suggests that R&D collaborations and partnerships are workable tools that should be embraced if South Africa's provincial administration is to be intentional about building its capabilities as a developmental state and improve the lives of the people. Although it is also important to note the complexities and dynamics of research collaborations and partnerships as presented in this article, the bigger picture presented in this article is that these collaborations are doable and have worked in other countries, and they can work for South Africa.

Funding

ORCID iDs

Madikana J. Mokgokong https://orcid.org/0000-0001-7608-1714

Ricky M. Mukonza https://orcid.org/0000-0001-8121-1501

References

Adams D, Kee GH and Lin L (2001) Linking research, policy, and strategic planning to education development in Lao people's democratic republic. *Comparative Education Review* 45(2): 220–241.

Ansell C and Gash A (2007) Collaborative governance in theory and practice. *Journal of Public Administration Research and Theory* 18: 543–571.

Baissac C (2009) A South African developmental state? The tripartite alliance plan, its probable fate and a perspective into alternatives. Working paper, June. Available at: https://www.academia.edu/40325730/A_South_African_Developmental_State_The_Tripartite_Alliance_Plan_its_Probable_Fate_and_a_Perspective_into_Alternatives_Introduction_the_ANCs_Manifesto_and_the_Challenge_of_Delivery (accessed 20 June 2021).

Balduzzi G and Rostan M (2016) 'Organizing the productive transformation of knowledge': linking university and industry in traditional manufacturing areas. *Tertiary Education and Management* 22: 19–35.

Baskaran A and Muchie M (2008) Foreign direct investment and internationalization of R&D: the case of BRICS economics. Development, Innovation and International Political Economy Research (DIIPER). Working paper no. 7, January. DIIPER Publishers, Aalborg University, Denmark.

Beeson M (2006) Politics and markets in East Asia: is the developmental state compatible with globalisation? In Stubbs R and Underhill GRD (eds) *Political Economy and the Changing Global Order*. 3rd ed. Don Mills, ON, Canada: Oxford University Press, pp.443–453.

Berger MT (1998) A new East-West synthesis? APEC and the competing narratives of regional integration in the post-cold war Asia-Pacific. *Alternatives* 23: 1–28.

Bogenschneider K and Corbett TJ (2010) *Evidence-Based Policy Making: Insights from Policy Minded Researchers and Research-Minded Policymakers*. London and New York: Routledge.

Borgatti SP and Foster PC (2003) The network paradigm in organisational research. *Journal of Management* 29(6): 991–1013.

Brew A, Bous D, Namgung SU, et al. (2016) Research productivity and academics: conceptions of research. *Higher Education* 71: 681–697.

Brundenius C, Lundvall BA and Sutz J (2009) The role of universities in innovation systems in developing countries: developmental university systems–empirical, analytical and normative perspectives. In: Lundvall BA, Joseph KJ, haminade C, et al. (eds) *Handbook of Innovation Systems and Developing Countries*. Cheltenham: Edward Elgar, pp.311–325.

Burger P (2014) How suitable is a 'developmental state' to tackle unemployment, inequality and poverty in South Africa? Available at: http://www.econ3x3.org/tag/welfare-state (accessed 23 May 2021).

Cattaneo M, Horta H and Meoli M (2019) Dual appointments and research collaborations outside academia: evidence from the European academic population. *Studies in Higher Education* 44(11): 2066–2080.

Cherney A, Head B, Boreham P, et al. (2012) Perspectives of academic social scientists on knowledge transfer and research collaborations: a cross-sectional survey of Australian academics. *Evidence & Policy* 8(4): 433–453.

Dent CM (2003) Taiwan's foreign economic policy: the liberalization plus' approach of an evolving developmental state. *Modern Asian Studies* 37(2): 461–483.

Department of Science and Innovation (DSI) National Science Technology and Innovation Information Portal (2021) South African National Survey of Research and Experimental Development: statistical report 2018/19. Available at: https://archivesite.hsrc.ac.za/en/research outputs/view/11167

Department of Science and Innovation (DSI) (2019) National Science Technology and Innovation Information Portal. Available at: https://nstiip.naci.org.za

Etzkowitz H and Kemelgor C (1998) The role of research centres in the collectivisation of academic science. *Minerva* 36: 271–288.

Etzkowitz H and Leydesdorff L (1997) Introduction to special issue on science policy dimensions of the triple helix of university, industry and government relations. *Science and Public Policy* 4(1): 2–6.

Fagerberg J (2013) Innovation: a new guide. TIK Working Papers on Innovation Studies no. 20131119, November. Centre for Technology, Innovation and Culture, Oslo. Available at: https://ideas.repec.org/p/tik/inowpp/20131119.html (accessed 23 May, 2024).

Farnham D and Horton S (1993) *Managing the New Public Services*. London: Macmillan.

Fourie PT (2007) Operation research and development. *ORiON* 23(1): 59–72.

Freeman C (2002) Continental, national and sub-national innovation systems-complementarity and economic growth. *Research Policy* 31(2): 191–211.

Freeman C (2003) Preface. In: Muchie M, Gammeltoft P and Lundvall B (eds) *Putting Africa First: The Making of African innovation Systems*. Aalborg: Aalborg University Press.

Gilpin R (1995) *APEC in a New International Order*. Seattle, WA: APEC Study Center at the University of Washington.

Gyekye AB, Oseifuah EK and Vukor-Quarshie GNK (2012) The impact of research and development on socio-economic development: perspectives from selected developing economies. *Journal of Emerging Trends in Economics and Management Sciences* 3(6): 915–922.

Hemmert M, Bstieler L and Okamuro H (2014) Bridging the cultural divide: trust formation in university–industry research collaborations in the US, Japan, and South Korea. *Technovation* 34: 605–616.

Hwang S and Moon IC (2011) Are we treating networks seriously? The growth of network research in public administration and public policy. *Connections* 29(2): 4–17.

Kahn M (2007) Internationalization of R&D: where does South Africa Stand? *South African Journal of Science* 103: 7–12.

Katz JS and Martin BR (1997) What is research collaboration? *Research Policy* 26: 1–18.

Laudel G (2002) What do we measure by co-authorships? *Research Evaluation* 11: 3–15.

Lundvall BA (2002) The University in the learning economy. DRUID Working Papers 02–06, DRUID, Copenhagen Business School, Department of Industrial Economics and Strategy, Aalborg University.

Lundvall BA (2007) National innovation systems – analytical concept and development tool. *Industry and Innovation* 14(1): 95–119.

McLeod RH and Garnaut R (eds) (1998) *East Asia in Crisis: From Being a Miracle to Needing One?* London and New York: Routledge.

Mauri AG and Muccio S (2012) The public management reform: from theory to practice. The role of cultural factors. *International Journal of Advances in Management Science* 1(3): 47–56.

Mazoni J (2018) *Civil Service Transformation Speech*. London: London School of Economics.

Melese T, Lin SM, Chang JL, et al. (2009) Open innovation networks between academia and industry: an imperative for breakthrough therapies. *Nature Medicine* 15(5): 502–507.

Mikhaylov SJ, Esteve M and Campion A (2018) Artificial intelligence for the public sector: opportunities and challenge of cross-sector collaboration. *Philosophical Transactions of the Royal Society A* 376: 20170357.

Mokgokong MJ and Mukonza RM (2023) Research and development funding patterns in BRICS countries: policy lessons for South Africa's provincial administration. *Politeia* 42(1): 20. DOI: 10.25159/2663-6689/15272

Nadiri I (1993) *Innovations and Technological Spillovers*. New York: New York University.

Ng C (2008) The 'developmental state' and economic development. Available at: https://www.e-ir.info/2008/06/15/the-developmental-state-and-economic-development/ (accessed 20 June 2021).

Omoyefa PS (2008) Public sector reforms in Africa: a philosophical re-thinking. *Africa Development* 33(4): 15–30.

Patra SK (2017) Foreign R&D units in India and China: An empirical exploration. *African Journal of Science, Technology, Innovation and Development* 9(5): 557–571.

Powers JB and Campbell EG (2011) Technology commercialization effects on the conduct of research in higher education. *Research in Higher Education* 52(3): 245–260.

Schumpeter JA (1996 [1934]) *The Theory of Economic Development*. Piscataway, NJ: Transaction Publishers.

Senker J (2006) Reflections on the transformation of European public-sector research. *The European Journal of Social Science Research* 19(1): 67–77.

Smeby JC and Try S (2005) Departmental contexts and faculty research activity in Norway. *Research in Higher Education* 46(6): 593–619.

Solow RM (1957) Technical change and the aggregate production function. *Review of Economics and Statistics* 39(3): 312–320.

Stratmann T (2005) The cost to the nation of underinvestment in educational R&D. Spectrum series working paper no. 10, February. New America Foundation, Washington, DC.

The National Development Plan (NDP) Vision for 2030 Our future-make it work (2012) *National Planning Commission*. Pretoria: Government Printers.

Thirtle C, Townsend RF, Amandi J, et al. (1998) The rate of return on expenditure of the South African Agricultural Research Council (ARC). *Agrekon* 37(2): 189–210.

Tsvakirai CZ, Liebenberg F and Kirsten JF (2018) Does research and development (R&D) investment lead to economic growth? Evidence from the South African peach and nectarine industry. *African Journal of Science, Technology, Innovation and Development* 10(4): 463–472.

Vyas-Doorgapersad S (2011) Paradigm shift from new public administration to new public management: theory and practice in Africa. *The Journal for Transdisciplinary Research in Southern Africa* 7(2): 235–250.

Wooding S, Nason E, Klautzer L, et al. (2007) *Policy and Practice Impacts of Research Funded by the Economic and Social Research Council: A Case Study of the Futures of Work Programme, Approach and Analysis*. Cambridge: RAND Europe.

Zulu MF (2017) *The Review of the Performance of Zambia's National System of Innovation for the Period 2001 to 2010: A Minor Dissertation*. Cape Town: University of Cape Town.

Author biographies

Dr Madikana J. Mokgokong is a Deputy Director in the Limpopo Office of the Premier and a Part-time Lecturer in the Department of Public Management at Tshwane University of Technology, Polokwane Campus in South Africa. She is a member of the South African Association of Public Administration (SAAPAM) and the Research Ethics Committee Association of Southern Africa (REASA). Her niche areas include Research, Development and Innovation (R,D&I), Development Planning and Management, Local Government, Public Sector Transformation and Gender Studies.

Prof Ricky M. Mukonza is an Associate Professor in the Department of Public Management and the current Academic Manager in the Faculty of Humanities, Polokwane Campus at Tshwane University of Technology in South Africa. He is a member of the South African Association of Public Administration and Management (SAAPAM); his areas of interest in research include E-government, Intergovernmental Relations, Public Financial Management, Local Government, Public Policy, Migration, Public Administration and Governance.