CHAPTER 10

Research in Transforming Contexts: Ensuring Relevance and Impact

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Introduction and Background

Traditionally, research universities are dedicated generators of new knowledge and PhDs, deemed to be vital for the social and economic development of any country. However, the ongoing influence and impact of technology as a driver of the knowledge economy (and the 4th Industrial Revolution) and the increasing and cumulative sophistication of its various applications across an array of fields has contributed to a growing link between, and focus on, STEM research in particular.

This has given rise to a relatively small and select, but highly influential group of universities whose funding streams are diverse, whose focus and reach are global and whose aim is to produce innovative, cutting-edge research. Mohrman et al. (2007:1) named these universities *Emerging Global Model* (EGM) research institutions, which are characterized by an intensity of cutting-edge research, as well as worldwide competition for students, faculty, staff, and funding. EGM institutions are at the vanguard

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of research that is driving managed socioeconomic development and progress at a global scale. Furthermore, by aligning the role of the research university with the neoliberal view of education as a marketable commodity, EGM Universities have created a powerful dynamic around the role and influence of research as a directed, saleable commodity. Although relatively few, these are the institutions that head virtually every list of leading universities worldwide and include universities such as Harvard, Cambridge, Stanford, California-Berkley, MIT, Caltech, Columbia, Princeton, Chicago, Oxford, Yale and Cornell.

Table 10.1 reflects the top 20 universities globally, as derived from a study by Times Higher Education and QS Top Universities (2019), and clearly demonstrates the preponderance of these influential universities in the northern hemisphere. This trend is supported and to a large extent echoed by the other ranking instruments such as the QS World University rankings, which similarly compares and evaluates universities based on six quantitative criteria, with the main emphasis being on research (Table 10.2).

The rankings indicate overwhelmingly that most "top" universities are in North America with the remainder in the United Kingdom and Zurich, Switzerland. While universities in China have made strong showings in recent years and now have their own ranking systems (QS 2019) significant disparities are evidenced in ranking criteria and performance on these, placing them on the periphery of the most influential global universities. Africa and South Africa do not currently have their own ranking instruments either, but feature in both the QS and the THE education rankings (Table 10.3).

The QS 2019 ranked the top universities in Africa as follows:

1. University of Cape Town
2. The American University in Cairo
3. University of the Witwatersrand
4. Stellenbosch University
5. University of Johannesburg
6. University of Pretoria
7. Ain Shams University
8. Assuit University

The ranking of higher education institutions remains highly contentious although their ongoing popularity and use in branding and

Table 10.1 Times Higher Education (THE) World University Rankings 2019—Top 20

Rank	*Name*	*Overall*	*Teaching*	*Research*	*Citations*	*Industry income*	*International outlook*
1	University of Oxford United Kingdom	96.0	91.8	99.5	99.1	67.0	96.3
2	University of Cambridge United Kingdom	94.8	92.1	98.8	97.1	52.9	94.3
3	Stanford University United States	94.7	93.6	96.8	99.9	64.6	79.3
4	Massachusetts Institute of Technology United States	94.2	91.9	92.7	99.9	87.6	89.0
5	California Institute of Technology United States	94.1	94.5	97.2	99.2	88.2	62.3
6	Harvard University United States	93.6	90.1	98.4	99.6	48.7	79.7
7	Princeton University United States	92.3	89.9	93.6	99.4	57.3	80.1
8	Yale University United States	91.3	91.6	93.5	97.8	51.5	68.3
9	Imperial College London United Kingdom	90.3	85.8	87.7	97.8	67.3	97.1
10	University of Chicago United States	90.2	90.2	90.1	99.0	41.4	70.9
11	ETH Zurich Switzerland	89.3	83.3	91.4	93.8	56.1	98.2
=12	Johns Hopkins University United States	89.0	81.9	90.5	98.5	95.5	71.9

(*continued*)

Table 10.1 (continued)

Rank	*Name*	*Overall*	*Teaching*	*Research*	*Citations*	*Industry income*	*International outlook*
=12	University of Pennsylvania United States	89.0	87.4	89.2	98.4	70.3	63.6
14	UCL United Kingdom	87.8	79.1	90.1	95.9	42.4	95.8
15	University of California, Berkeley United States	87.7	78.7	92.3	99.7	49.3	69.8
16	Columbia University United States	87.2	85.4	83.1	98.8	44.8	79.0
17	University of California, Los Angeles United States	86.4	82.6	87.9	97.8	49.4	62.1
18	Duke University United States	85.4	84.1	78.8	98.2	100.0	61.0
19	Cornell University United States	85.1	79.7	85.4	97.4	36.9	71.8
20	Arbor United	84.1	80.0	85.9	96.0	45.9	58.0

marketing speaks to the generally perceived and accepted status of the rankings as a measure of excellence and performance amongst higher education institutions. Perhaps more crucially though, the rankings serve to highlight the significant divide between the so-called North and the South, as well as the difficulty faced by the vast majority of other universities, in competing in any truly meaningful way, against these top performers. This view becomes increasingly relevant where developmental needs, available resources, and complex socioeconomic and political dynamics circumscribe the scope and content of research (if at all) at universities in developing nations. This view is supported by Badat (2010:1) who questions the notion of university rankings and their relevance for the Global South and alludes to their inherent hegemonic influences and impacts.

Table 10.2 QS World University Rankings 2020 and 2019—Top 10

2020 rank	*2019 rank*	*University*	*Location*
1	1	Massachusetts Institute of Technology (MIT)	United States
2	2	Stanford University	United States
3	3	Harvard University	United States
4	5	University of Oxford	United Kingdom
5	4	California Institute of Technology (Caltech)	United States
6	7	ETH Zurich (Swiss Federal Institute of Technology)	Switzerland
7	6	University of Cambridge	United Kingdom
8	10	UCL (University College London)	United Kingdom
9	8	Imperial College London	United Kingdom
10	9	University of Chicago	United States

Table 10.3 Times Higher Education (THE) World University Rankings 2018 edition ranked top South African universities

SA rank	*World rank*	*University*
1	171[4]	University of Cape Town
2	251–300[5]	University of the Witwatersrand
3	351–400[6]	Stellenbosch University
4	401–500[7]	University of KwaZulu-Natal
5	601–800[8]	University of Pretoria
6	601–800[9]	University of Johannesburg
7	601–800[10]	University of the Western Cape
8	801–1000[11]	University of South Africa

In addition, virtually all the research conducted by these institutions tends to employ scientific methods of enquiry, even in disciplines outside of the sciences. Geiger cited in Mohrman et al. (2007:146) asserts that at the heart of the EGM is an expansion of the older functions of teaching, research, and service into an organization that can best be described as a "knowledge conglomerate." Increasingly this view is coming into contestation with discernable shifts to Multi-, Inter-, and Transdisciplinarity (MIT) research that encourages the harnessing of a variety of

methodologies across a number of disciplines, using a multiplicity of skills and training, in pursuit of more broadly relevant and applicable research.

Pau (2003:151) explains that much of the funding for this type of research comes from the private sector and a large number of the research projects are in fact done in partnership with business, to the extent that many EGM institutions, through their partnerships and funding, conduct specific types of research for their funders alone. This suggests that in this model, research has moved beyond the goal of knowledge acquisition in the purer academic sense, to the commissioned acquisition of specified kinds of knowledge for the purpose of exploiting their global applicability and marketability. It can therefore be argued that in such cases, the end goal of the research would appear to be primarily, the generation of income.

Interestingly, this profit-generation dynamic is increasingly evident in non-EGM universities across the globe as the need for third-stream income from innovation, patents and business generation takes hold in the context of funding constraints and a general global economic downturn, which is manifesting amongst others, in decreased income from state funding and other traditional income streams for higher education institutions.

Altbach (2006:151) summarizes these competing typologies and tensions, asserting the prestige and dominance of "scientific" research over non-"scientific" fields of enquiry; the advantage of English speakers over non-English speakers when it comes to accessing the most prestigious research publications; the inferior status of teaching in relation to research in the institutional hierarchy; the scorning of more esoteric disciplines and research initiatives in favor of the more practical, fund-generating initiatives that find favor with research partners and government; the inability of nations or institutions with limited financial resources to compete in the very expensive research "game"; the stagnation or decline in currency of higher education institutions or campuses that are not currently research-intensive; the preservation of language and culture not being seen as competitive with those who are discovering new knowledge; the necessity of accepting the methods, norms, and values of the universities in Western Europe and North America that currently dominate the system in order to join the international marketplace of ideas, especially in science; and the adherence to established research paradigms, irrespective of whether or not the themes and subject areas of interest to leading scientists are relevant to universities at the periphery.

These observations have become increasingly apposite, especially on the African Continent and South Africa in particular (and in other developing nations), as the striving for the decolonization of education and research is gaining ground in most universities.

There is evidently a widening gulf, based on historical advantage, wealth and privilege, between the top research institutions and the rest, which is not only broadening the research divide between North and South, but also impeding development and the achievement of the SDGs in historically disadvantaged nations. This is substantiated by the fact that numerous studies place research outputs from (for example) Africa, at less than 2% of global research outputs, with the major portion of that research emanating from South African Universities. It is also asserted that a significant portion of the research is in collaboration with scholars in the North, so it is currently quite difficult to determine the precise percentage of research done by individual African researchers (Tijjsen and Winnick 2018; Le Roux 2015). At the same time, the continued dominance of STEM research is contributing to the declining status of other fields such as the humanities and social sciences, underscoring the assertions of knowledge hegemony advanced by Ball (2006:15) and Badat (1999:17).

The foregoing discussion demonstrates quite clearly that research in developing nations and in Africa and South Africa in particular, requires urgent and innovative interventions and strategizing if it is to grow and develop, ensure progress on the SDGs and national development, and assert its status on the global stage. Furthermore, the narrow focus on STEM research needs to be addressed in the developing context, given that present and future socioeconomic and political challenges require research that is focused on humanities and social sciences and not only on STEM research. As Nowotny et al. (2001) assert: "There is an urgent need for a new mandate for science if it is to deal more effectively with complex societal challenges."

It is precisely this current global state of flux and fundamental reorganization, and the incongruent and disintegrated sources of knowledge and information across all spheres of human endeavor, which call for a more thoughtful and nuanced contemplation of the future of research in higher education.

The Transforming Higher Education Context

The current transformation in higher education is so profound that it is calling into question the very notion of the university and compelling us to adjust in fundamental ways to ensure our survival and our sustainability. Key drivers of this transformation include:

- Rapid technological innovation and advancement undergirded by expanding digitization and (inter)connectivity, the current phase of which is dubbed the 4th Industrial Revolution (4IR)
- Global concerns around the sustainability of the planet and its people and linked to the achievement of the SDGs and notions of global citizenship, social justice, inclusiveness and fairness
- An increasingly complex, interdependent, borderless, and deeply unequal world
- A growing array of role players/stakeholders/participants in the global higher education arena who are leveraging technological and digital affordances to promote their agendas and who are producing new research and knowledge outside of the bounds of the university

Research finds itself at the nexus of these drivers, immersed in an ever-widening, compounded cycle of innovation and response. The limits of the innovation are unknown and the speed of its uptake and implementation are unprecedented and unparalleled, begging the question: What key factors should we be considering in our design of models and strategies to ensure our relevance and impact in transforming contexts? Three key factors will be considered below.

Niche Research Focus Areas/Themes Aligned to National Socioeconomic and Developmental Priorities

Given the limited financial resources available to most universities nowadays (including research-intensive universities), as well as institutional pressures on university leadership to ensure a material Return On Investment (ROI), especially where public funding is involved, the relative luxury of "research for research" sake has largely disappeared (Tarran 2010).

In South Africa, Africa and many other developmental societies, the combined realities of a demand for ROI and the need to ensure socioeconomic development and relevance has resulted in a clear alignment of institutional research strategies with national and continental policy and developmental needs. These are supported by the establishment of various national, regional, and continental research associations and bodies whose aim is to integrate or align education policy, and promote quality, relevant scholarship, including research that has at its heart, social justice and development. It will therefore come as no surprise to note that research focus areas or themes in many developing nations are closely aligned to their national developmental and social justice needs, even as they aim to be globally relevant.

In South Africa, such legislation and policy in support of national development include:

- The Higher Education Amendment Act, No. 9 of 2016
- White Paper for Post-School Education and Training: Building an Expanded, Effective and Integrated Post-School System (2013)
- Education White Paper: A Programme for Higher Education Transformation (1997)
- National Skills Development Strategy III, DHET (2011)
- National Skills Development Plan (2018)
- Human Resource Development Strategy of South Africa (2010–2030) (2010)
- National Development Plan: Vision for 2030 (2013)
- The Sustainable Development Goals (2016)
- The UN Agenda 2063: The Africa We Want (2015)

The University of South Africa's Research & Innovation Strategic Plan (2019–2020) echoes those of many African universities in terms of its focus and intention and as such, Unisa has been used as an example of current research sentiments and trends in South Africa and on the Continent. Unisa is a dedicated Open Distance and eLearning (ODeL) university, (the largest on the Continent) and while it is not a research-intensive University, it nevertheless has a very dynamic Research &

Innovation portfolio, whose ambitious strategic intent articulates the belief that its own success in research, innovation, and postgraduate studies has significant potential to influence the future of research in South Africa and in Africa as a whole. In this belief, the portfolio also invests in, and supports, postgraduate studies, research, innovation, and commercialization projects and partnerships across the institution, by fostering collaborations within and across Unisa colleges, and with research councils, other universities, private sector entities, and government departments.

Echoing this ethos, the following research themes/focus areas linked to national development needs may be discerned in some of the foremost (South) African universities, the majority of which appear in the global rankings mentioned earlier. Clearly, universities in developmental contexts have realized the imperative to be both relevant and competitive in their own right and it is exciting to note a number of cutting-edge projects that have been receiving global and continental recognition and acclaim for their excellence, relevance, applicability, and contribution to the continental body of knowledge.

The Joint Science Academies' statement: *Science and technology for African development* asserts:

> African countries must be able to develop, adapt and exploit scientific and technological solutions appropriate to their specific needs, otherwise they risk becoming ever more dependent on advice and assistance from the developed world…...Without embedding science, technology and innovation in development we fear that ambitions for Africa will fail.

It would, however, be unfortunate to adopt a view of research that focuses narrowly on STEM and marginalizes Arts, Human and Social Sciences. It is becoming increasingly evident that the fundamental social reorganization that is taking place as technology advances and transforms our world will necessitate a vast amount of so-called soft discipline research to anticipate and propose innovative and pragmatic means of dealing with the social disruption and dynamics that have already begun occurring. It is in this context that the need for multi-, inter-, and transciplinary research comes to the fore.

Targeted Development of Research, Especially Multi-, Inter-, and Transciplinary Research (MIT) Toward More Integrated and Relevant Research Outcomes and Application

Interdisciplinary Research

The National Science Foundation in the USA defines Interdisciplinary Research as follows: "Interdisciplinary research is a mode of research by teams or individuals that integrates information, data, techniques, tools, perspectives, concepts, and/or theories from two or more disciplines or bodies of specialized knowledge to advance fundamental understanding or to solve problems whose solutions are beyond the scope of a single discipline or area of research practice." In some instances, interdisciplinary research leads to knowledge being integrated in such a way that a field beyond the original disciplines is created, often referred to as transdisciplinary research. It is evident though that there are broad conceptualizations, definitions, and interpretations of both interdisciplinary and transdisciplinary research and that these frequently overlap. The nature of the research conducted will inevitably offer the clearest evidence of whether the research is interdisciplinary, transdisciplinary, or both.

Multi-, Inter-, and Transdisciplinarity (MIT)

Multi-, Inter-, and Transdisciplinary (MIT) research is perhaps less known but concerns that which is at once between the disciplines, across the different disciplines, and beyond all disciplines. Its goal is the understanding of the present world, of which one of the imperatives is the unity of knowledge. The other imperative is the generation of knowledge that has transformative heuristics. The openness inherent in transdisciplinarity involves an acceptance of the unknown, the unexpected, and the unforeseeable; while the tolerance inbuilt within it implies acknowledging the right to ideas and truths opposed to our own. MIT thus forms a departure from the more traditional understandings and practices of research to pave the way for new knowledges, understanding, and practices that have particular relevance and application for the societies and countries in which they are found and from which they emanate.

MIT can be implemented to great effect as has been demonstrated at the University of South Africa, which is a key proponent of this methodology. Considering the projects mentioned subsequently, it is evident that most, if not all universities in South Africa and many in Africa, have embraced conceptualizations of MIT in research practice.

MIT is fundamental to Unisa's research strategy and practice. This ethos is evident in many developmental contexts and is supported in most cases by policy. The university uses several goals that are shared with other universities:

1. Collaborations with African universities and other centers of knowledge and promoting interactions with intellectuals and thinkers on the continent and Diaspora with a view to addressing critical issues relating to Africa's situation in the contemporary global context and commit to realigning education and its relevance to society in Africa
2. Promoting the recognition of indigenous knowledge throughout the continent through conscientious and context-sensitive research and sharing of insights emanating from this knowledge system
3. Restructuring relations with community holders of knowledge as fellow experts in the generation of knowledge. Research and development strategies must integrate ethical considerations as well as issues of the protection of Intellectual Property Rights, economic benefit sharing, poverty alleviation, and employment creation. Key tenets and aspects of IKS must be systematized and integrated into the curriculum
4. Proactively promoting and supporting MIT as a distinct and strategic institutional approach to addressing Africa's developmental imperatives and working toward developing and implementing support and incentivization strategies for transdisciplinary initiatives, including flagship initiatives that infuse MIT methodologies and approaches to research and curriculum development and practice

To this end, Unisa has a number of Chairs and is involved in a variety of projects, often in collaboration with other institutions and researchers across disciplines and at other universities. Unisa has already completed, or is engaged in, a number of initiatives that are not only exemplars of research excellence, but also deeply transformative in line with the promotion of indigenous knowledge, MIT, and the SDGs. These include:

- *MIT postgraduate studies including at Masters and PhD* levels across most disciplines. The defining characteristic of these qualifications is that the student will be required to demonstrate high-level research capability and make a significant and original academic contribution at the frontiers of the discipline or field. This work must be of a quality to satisfy peer review and merit publication. There is an array of niche areas across all the faculties that are contextually relevant, and which are calculated to dovetail with one another for research purposes.
- *Peace and Human Development Chair: Cultural Resources for Peace Building*

  The Chair takes up the research subject of peace and human development in Africa as a means of introducing critical perspectives on democracy, values, jurisprudence, human rights and human wrongs and the place of responsibility of different cultures, including peace building from an African perspective. The issue of peace, conflict resolution, peacebuilding, and recently, restorative justice is an area-cluster that can consolidate transdisciplinarity as an approach to discourse, practice, and thought.
- *Science, Culture, and Society*: *Science, Plurality, and Other Ways of Seeing*

  This research area takes the pronouncements contained in the UNESCO Declaration on Science for the Twenty-First Century, which states that all cultures can contribute scientific knowledge of universal value, and that there is, therefore, a need for a vigorous, informed, and democratic debate on the production and use of scientific knowledge. In order to help find ways of better linking modern science to the broader heritage of humankind, the Chair undertakes deep analyses of the linkages between science in relation to cosmology, constitution, citizenship, community, and syllabi, thus making propositions for curriculum reform and transformation.
- *Indigenous Knowledge Systems and Innovations: The Conditions for their Integration*. In the context of this Chair, Indigenous Knowledge is seen as part of the subaltern and heterogeneous forms of knowledge that had no place in the fields of knowledge that grew in compact with colonialism and science. Theoretically, Indigenous Knowledge Systems makes it possible to explore mean-

ings and theories of death, obsolescence, resilience, survival, globalization, freedom, and healing. It enables us to revisit concepts like "property" and the "commons" as well as the systems that govern these concepts. By taking on IKS, the Chair contemplates questions such as: What are the possibilities for alternative globalizations, alternative regimes of intellectual property, and of alternative times?

- *Universities and Society: Rethinking Community Engagement*. The Chair engages in the articulation of issues lying at the interface between university and society in Africa; and thus invest in cultivating a theory of praxis through linkages with innovative nonformal centers/indigenous communities in Africa and internationally with the aim of generating new insights and building discourse coalitions on the transformation of universities within South Africa, Africa, and beyond.

A number of community-focused initiatives prove the value and impact of MIT in tackling social challenges. These are directly linked to the SDGs and demonstrate the power of alternative approaches to sharing and leveraging knowledge and capacities.

- *Fog Harvesting Project*

A climatologist at Unisa's School of Agriculture and Environmental Sciences helped develop a system to harvest moisture from abundant mountain fog in a water-scarce region of the Eastern Cape. Funding came from the Water Research Commission, and the fog water system was designed in collaboration with colleagues from Pretoria University. Unisa is involved in ongoing research into water harvesting from fog, especially for isolated rural communities. The project has also been rolled out in other dry areas of South Africa. Villagers' lives have changed with the installation of the water-harvesting system and its inexhaustible supply. No electricity is needed to power the scheme, which makes it eco-friendly and low-cost, and suitable for areas with no power infrastructure.

- *Biogas Project*

Unisa's Exxaro Chair in Business and Climate Change (Exxaro Chair), the South African National Energy Development Institute (SANEDI) and the University of Fort Hare (UFH), are rolling out biogas as a renewable and sustainable source of energy. Researchers drawn from three colleges at Unisa (College of Economic and Management Sciences, College of Science, Engineering and Technology, and the College of Agriculture and Environmental Sciences) are involved in a transdisciplinary, interdisciplinary, and multidisciplinary research programs focusing on bio-derived fuels (BDF) and solar technology transition under climate change and the green economy. Biogas is one of the project streams in the research program. The project witnessed the installation of 13 household biogas digesters that will generate cooking gas. Waste from cattle, goats, and pigs is being used as feedstock. The by-product (digestate slurry) is a very good source of fertilizer (rich in nitrates and phosphates), which can be used for growing vegetables, fruits, and flowers.

- *The Institute for Dispute Resolution (IDRA)* is located within the College of Law.

However, its research agenda is not confined to the legal discourse. IDRA is a multi/inter/transdisciplinary institution (MIT) that transcends the borders of demarcated academic disciplines and building bridges for the gaps and dissonance formed/forming by sociopolitical conditions of our continent's past century by means of community-engaged research. IDRA is also in conversation with those continents to which we are closely related, be it politically, economically, or spiritually, and with whom we can share knowledge systems of dispute processing and dispute resolution. Researchers come from: the legal profession; the legal academy; English literature studies; social work; political sciences; and anthropology, and they share language, ideas, theory, experience, and spirit to create a team of researchers who reflect the diversity of the research institute. IDRA currently has postdoctoral fellows, masters, and doctorate students from countries such as the Congo, Ethiopia, Cameroon, and South Africa. The postdoctoral fellows are engaged in field and desktop research to build and evolve the literature in conflict, peace, and alternate dispute resolution. The research agenda is focused on developing a body of knowledge based on humanistic values, such as

the values of *Ubuntu*, which promotes a harmony model of dispute resolution. The research agenda fosters sensitivity to the cultural context of African community spaces, be they local or diasporic. The research agenda strives to serve humanity. A number of Unisa's Colleges also include IKS in the recurriculation of their courses.

- *Transdisciplinary African Psychologies programmes (TAP)*

TAP understands African Psychologies as covering all areas that mainstream Western Psychology covers, but from an African–situated decolonizing approach, as well as areas not investigated, or neglected by Western Psychology. As a transdisciplinary decolonizing program, TAP is interested in identifying points of convergence between disciplines of psychology and those that study Africa and Africans. TAP is the formalization of a space to bring about a dedicated and specific Africa–centered study of the intersectionalities related to power, race, identity gender, violence, community, the collective psyche, and much more. It builds on the traditions of criticality, compassion, and centeredness that the Institute has come to be known for over the past three decades.

These are some of the exciting projects in MIT, not only at Unisa but evidently at a number of South African and African universities. Examples of exciting medical breakthroughs in Africa centered medical challenges, using collaboration, MIT, harnessing cutting-edge and innovation technology and techniques have been noted at most of the research-intensive universities identified in the THE and QS rankings. Some of these include: *Wits scientists closer to slowing the progressions of Alzheimers*; *SA doctors cure deafness using 3D printing tech* (University of Pretoria medical team); and *UCT team in immune system breakthrough*. All these research projects point to the growing ubiquity of MIT as a key foundation stone of teaching and learning, research, and community engagement and as the key driver of relevant knowledge production. Shared ownership of knowledge and knowledge generation, strategies, efforts, and acknowledgment are sometimes a difficult barrier to overcome but in Africa this is made a lot easier by the spirit of Ubuntu, collectivism, and community that characterizes most of African society.

Given the unique challenges presented in developmental contexts, especially in regard to a chronic lack of resources and capacities, it should come as no surprise that MIT research is delivering such exciting results in South Africa and in many other developing nations.

Developing New Cohorts of Researchers

One of the key challenges for research in developing contexts is the limited number of researchers being produced. This is exacerbated by the flight of many qualified researchers to the developed nations, for reasons that range from political whimsy, a lack of resources, nonsupportive work environments, and in many instances, antipathy or a lack of support for women in research. If research is to be taken seriously in developmental contexts, then all of these must be addressed.

Understanding the need and urgency to address these inhibiting factors, a growing number of governments and universities, especially in South Africa, are putting in place dedicated strategies, and making resources available to incentivize and grow new, young researchers who will remain in their institutions or on the continent and contribute to national and continental growth and development. Most, if not all these emerging researchers will have had first-hand experience and understanding of their geo- social, economic, and political challenges, possibly lending much needed nuanced appreciation and depth to the contextualization of their research and the ranking and focus of their research endeavors.

Underpinning all of these strategies remain the globally sanctioned and practiced commitments to integrity, quality, rigor, and ethics in research; the intention to ensure high-quality researchers and research capacities; the cultivation and promotion of institutional ethos, intellectual cultures, and research experiences that are conducive to critical discourse, intellectual curiosity, tolerance, and a diversity of views; contributing to society by producing Master's and Doctoral graduates of sound character, versatile ability, and knowledge; and meeting the research needs of the globally competitive society by nurturing collaborative relationships with its stakeholders and other partners.

Thus, many universities now have strategies and plans in place to grow researchers, increase research outputs, employ more effective and relevant research methodologies, and practices, devise focus areas or themes that harness their "natural" strengths, including those linked to their locations and the biological and agricultural resources (See Table 10.4 above) and most importantly, a dedicated program to support and incentivize the development of academics as researchers. Some of these initiatives include:

Table 10.4 Research focus/themes in (South) African universities, indicating geo-environmental and indigenous foci and developmental priorities

Research focus/themes in (South) African universities, indicating geo-environmental and indigenous foci and developmental priorities						
University of Pretoria (University of Pretoria. https://www.up.ac.za/en/research-innovation/article/257889/research-focus-areas)	*University of Cape Town (University of Cape Town. https://www.uct.ac.za/sites/default/files/image_tool/images/328/research/publications/reports/UCT%20Research%20Strategy%2015%20November%202014.pdf\)*	*University of the Witwatersrand (Wits University. http://www.wits.ac.za/research/research-a%2D%2D-z/)*	*Stellenbosch University (Stellenbosch University. http://www.sun.ac.za/english/research-innovation)*	*University of Johannesburg (University of Johannesburg. https://www.uj.ac.za/research/)*	*American University of Cairo (American University of Cairo. https://www.aucegypt.edu/research/research-centers)*	*University of South Africa. (An ODeL University) (University of South Africa. Research & Innovation Strategic Plan. 2019–2020. University of South Africa. Not for public consumption)*
Translational medicine (human and animal disease)	Minerals to Metals	Health	Social Justice and development	African Art	Yousef Jameel Science and Technology Research Center	Knowledge generation and human capital development in response to the needs of South Africa and the African continent
African Wildlife Health and Management	Drug Development	Food	Health and human security	Artificial intelligence and machine learning	Prince Alwaleed Bin Talal Alsaud Centre for American Studies and Research	The promotion of democracy, human rights and responsible citizenship

Pathobiology of Disease	Brain-Behaviour Initiative (BBI)	Sustainable water management: agriculture, effluent management, filtration, and water in society	Systems and technologies for the future	Astronomy and Cosmology	Cynthia Nelson Institute for Gender and Women's Studies	Innovation and capacity building in science and technology
Sustainable livelihoods and Well-being	Marine Research Institute (MA-RE),	Engineering	Human creativity and social innovation	Cities	Access to Knowledge for Development Centre (A2K4D)	Economic and environmental sustainability
	Cities in Africa	Microbiology	The natural environment	Communicable diseases	The Centre for Translation Studies (CTS)	ODeL
		Polymer science and agriculture		Data Science	Middle East Studies Centre (MESC)	

(*continued*)

Table 10.4 (continued)

Research focus/themes in (South) African universities, indicating geo-environmental and indigenous foci and developmental priorities						
University of Pretoria (University of Pretoria. https://www.up.ac.za/en/research-innovation/article/257889/research-focus-areas)	*University of Cape Town (University of Cape Town. https://www.uct.ac.za/sites/default/files/image_tool/images/328/research/publications/reports/UCT%20Research%20Strategy%2015%20November%202014.pdf\)*	*University of the Witwatersrand (Wits University. http://www.wits.ac.za/research/research-a%2D%2D-z/)*	*Stellenbosch University (Stellenbosch University. http://www.sun.ac.za/english/research-innovation)*	*University of Johannesburg (University of Johannesburg. https://www.uj.ac.za/research/)*	*American University of Cairo (American University of Cairo. ‚m)*	*University of South Africa. (An ODeL University) (University of South Africa. Research & Innovation Strategic Plan. 2019–2020. University of South Africa. Not for public consumption)*
		Conservation ecology		Drug delivery	Kamal Adham Centre for Television and Digital Journalism	
		Private law		Equality studies in the Global South setting	Centre for Migration and Refugee Studies (CMRS)	
		Health sciences		Global change and sustainability	John D. Gerhart Centre for Philanthropy and Civic Engagement and Responsible Business	

Philosophy	Mathematics and mathematical educated	El Khazendar Business Research and Case Centre
	Geoscience and mining engineering	Social Research Centre
	Noncommunicable diseases	AUC Forum
	Paleoanthropology, Paleontology and Palynology	Centre for Applied Research on the Environment and Sustainability
	Refugee and migrant studies	
	Material science and engineering	

- Research opportunities extended beyond the academy to include professional and academic staff. This is particularly relevant in ODeL where the pedagogical enterprise is totally contingent on the transactional and operational environments.
- Aggressive development of PhD students and (rated) researchers through writing workshops, mentoring, exposure to conferences and the delivery of conference papers, support in applications for rankings and aligned to that, individual research plans to ensure progression in publication and rankings.
- Acknowledgments and incentivization for excellence in research through research awards dinners, financial awards, generous research grants and awards, and ad hominem promotions for research productivity and progress.
- Programs to increase the number of doctoral staff, for example, through fully paid "sabbaticals" with job retention, conditional on the successful completion of the PhD in the allotted time.
- Regular National Research Youth Conferences; institutional research weeks aimed at showcasing and sharing with peers, research progress, developments, achievements and innovations; research symposia and workshops in collaboration with other institutions and government, all of which are aimed at growing and retaining the cohort of researchers. For example, The South African Tertiary Network recently partnered with the Department of Higher Education and Training to launch a Staff PhD Capacity Enhancement Programme designed to raise the number and quality of PhDs coming out of universities of technology and previously disadvantaged universities in South Africa. The program aims to give 50 aspiring PhD students across 11 South African Universities of Technology and previously disadvantaged universities the opportunity to complete their studies with the help of top lecturers and professors in the country and abroad. The program aims to reduce the completion times and dropout rates of PhD candidates in South Africa, which is currently an estimated 60%.
- A commitment to advancing women in research, and especially black women, through targeted support and incentivization including in regard to career progression and placement.

Fundamental to this approach is a commitment to excellence and support for early career researchers, emerging research leaders, and researchers from previously disadvantaged designated groups**.** Given the urgent need for the development of researchers if we are to meet and overcome the challenges posed by developmental states and the SDGs and the imperative for genuine and lasting transformation, this approach to research development is, quite simply, the most pragmatic and ethical thing to do.

There is already evidence that this approach is bearing fruit. In a recent keynote address to the Unisa research community, Dr David Green (Unisa 2018), Digital Resources Director of the Taylor & Francis Group, stated the following:

> Based on total Web of Science papers, there were four times as many articles by African authors in 2016 compared to 2000, and a 280% increase in the number of South African authors in this timeframe…[Green said] the continent's share of global research had increased from 2.31% in 2010 to 3.24% in 2016…."South Africa is now on 0.99%," [adding that] after Egypt, the country was the biggest contributor in Africa, followed by Algeria, Nigeria and Kenya….

However, where South Africa is coming into its own is in the number of citations its researchers receive—citations being "a rough proxy" for quality content. In 2016, the global average for citations per article was just over 1.1. South Africa is a fraction away from this, and ahead of China, Japan, Brazil, India, and Russia. "South Africa is very close to the world average and you will soon overtake that, I am sure. However black female researchers remain underrepresented at only 14% of the current research cohort."

Referring to the impact of technology on research publications, Green referred to the growing phenomenon of online, open access formats stating [that] "In the United Kingdom, 37% of research is now open access and China is up to 40%; around 25% of South African research is now published open access—the global average." (2018).

Conclusion

It remains somehow ironic that research, as a transformative force for socioeconomic development and the good of ordinary citizens, continues to be underappreciated and underresourced in many developing contexts. It has been demonstrated though, that by focusing on the three key strategic areas for research development in developmental contexts, outlines above, demonstrable progress can be made in ensuring its relevance and impact and in lending impetus to genuine transformation for good.

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