



iNnovation: THE STATE OF INNOVATION IN KZN

2019



ABOUT TRANSNET PORT TERMINALS

Transnet Port Terminals (TPT) is South Africa’s leading terminal operator responsible for loading and offloading cargo aboard vessels calling the seven South African ports. The cargo targets four major market sectors namely: automotive, containers, bulk and break bulk which are handled across 16 sea-bound cargo terminal facilities and three inland terminals. TPT customers include the shipping industry, vehicle manufacturers, agriculture, timber and forest products’ producers, the mining industry and exporters of minerals and metals. Innovation has seen TPT develop the General Cargo Operating System (GCOS) in-house as a tool for managing terminal operations in Africa where it also provides terminal management services (Benin).

SECTORS

BULK



- Maydon Wharf**
(1.4 mtpa)
- Port Elizabeth**
(5.0 mtpa)
- Saldanha Bay**
(58.0 mtpa)
- Richards Bay**
(25.5 mtpa)

CONTAINERS



- Durban**
(2.0m TEUs)
- MPT's**
(432k TEUs)
- Port Elizabeth**
(400k TEUs)
- Cape town**
(1.0m TEUs)
- Ngqura**
(1.3m TEUs)

AUTOMOTIVE



- Durban**
(520 000 FBUs)
- Port Elizabeth**
(150 000 FBUs)
- East London**
(135 000 FBUs)

BREAK BULK



- Durban**
(1.7 mtpa)
- Saldanha**
(8.7 mtpa)
- Port Elizabeth**
(2.0 mtpa)
- Cape Town**
(0.6 mtpa)
- East London**
(0.2 mtpa)
- Richards Bay**
(8.7 mtpa)



An average of **195** vessels handled per month TPT wide.



An average of **52 278** trucks per month.



An average of **430** trains per month



A total number of **9555** skilled resources



Transnet Port Terminals/@tpt_transnet

FOREWORD

As part of Innovate Durban's objective to celebrate innovation, an initiative was undertaken, to develop an Innovation Publication. The objective of this publication, which will be published annually, is to provide information to all stakeholders, including innovators and investors, on the state of innovation in KZN, and to keep them abreast of the latest thinking and trends within the innovation space.

Furthermore, it is an opportunity to celebrate and showcase the success of innovators within our province. The publication will also be hosted on the Innovate Durban Innovation Dashboard, a living mechanism aimed at showcasing the data, celebrating innovation, connecting stakeholders, enabling collaboration, and creating new partnerships and possibilities.

We, as Innovate Durban, are proud to present the inaugural innovation publication, iNnovation: The State of Innovation in KZN, and look forward to celebrating innovation in Durban and beyond.

**Every effort made to ensure that all information was accurate at time of print*

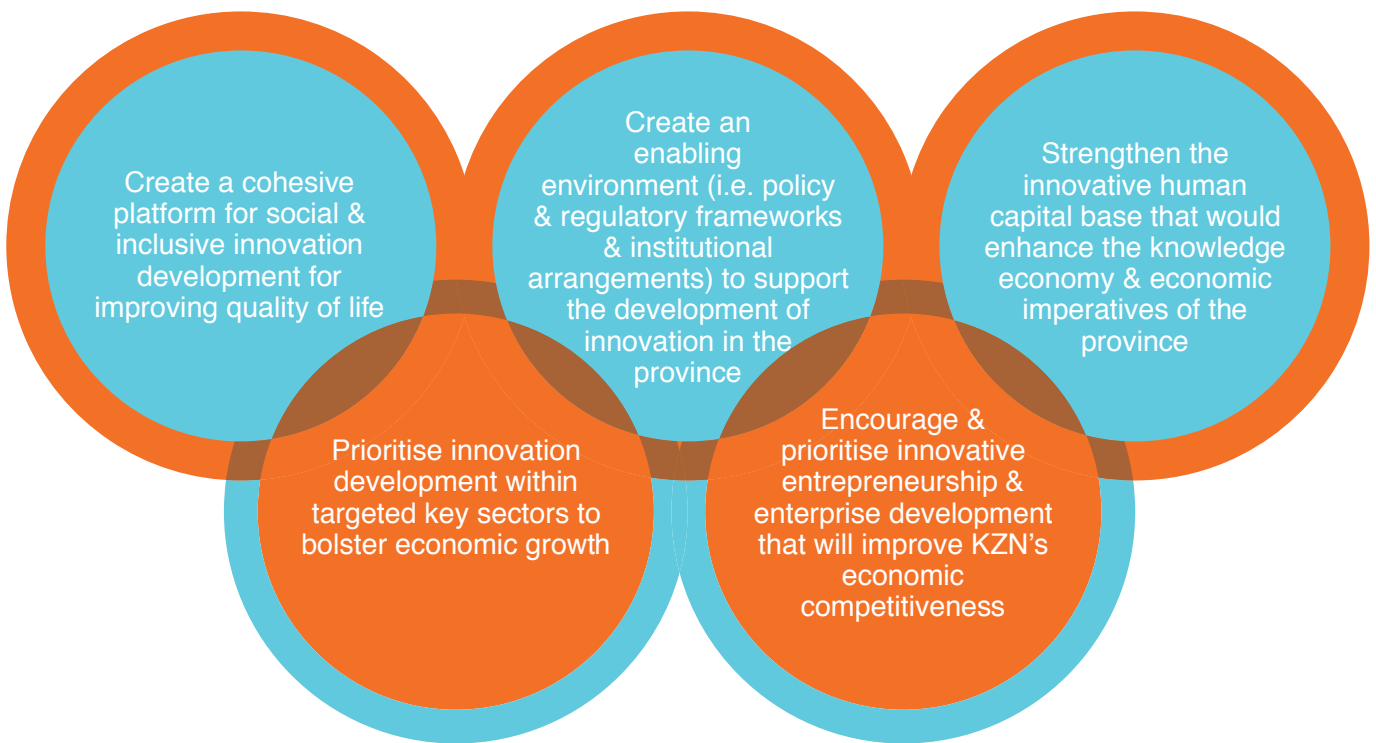
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1 INTRODUCTION

The objective of this innovation publication is to provide information to all stakeholders in the innovation ecosystem in KwaZulu-Natal (KZN) and keep them abreast of the latest thinking and trends within the area of innovation. Additionally, the publication will be used as a tool to celebrate and showcase the success of innovators in the

KZN Province. It is worth noting the key strategic objectives for KZN as outlined in the Province's Innovation Strategy for 2017-2027 to ensure continuous alignment with the framework of KZN Provincial policies. Therefore, the key objectives of the Strategy are to:

KEY OBJECTIVES



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2 DEFINING INNOVATION

There are numerous definitions for innovation, however, the definition offered by Gault (2016) appears to encompass a more holistic view of innovation citing that: “An innovation is the implementation of a new or significantly changed product or process. A product is a good or a service. Process includes production or delivery, organisation, or marketing processes”.¹ Gault (2016) goes on to say that a product has been implemented when potential users are able to access it, and a process has been implemented when it has been operationalised.

Due to the complex nature of defining innovation, three definitions of innovations have been highlighted as focus areas for this and future publications. These are social innovations, commercial innovations and grassroots innovations. However, only social and commercial innovations are showcased in this publication.

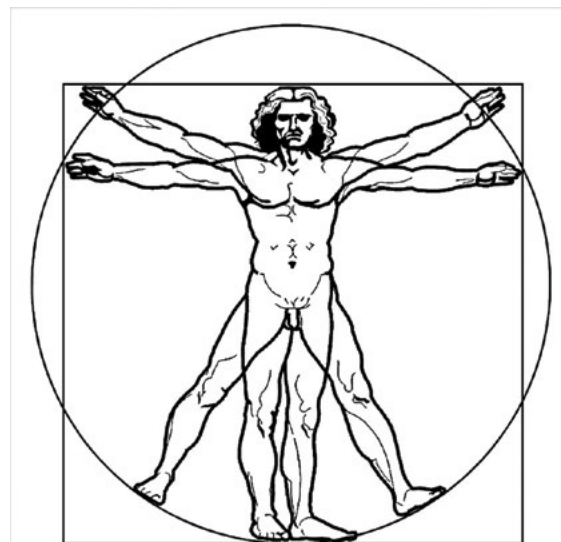
- Social innovation is defined as “new solutions (products, services, models, markets, processes etc.) that simultaneously meet a social need (more effectively than existing solutions) and lead to new or improved capabilities and relationships and better use of assets and resources. In other words, social innovations are both good for society and enhance society’s capacity to act”.² Social innovation is driven by the value of creating solutions that have a positive, socioeconomic and or environmental impact on society.
- Grassroots innovations are “a diverse set of activities in which networks of neighbours, community groups, and activists work with people to generate bottom-up solutions for sustainable developments”.³ Grassroots innovations are community-led solutions which encourage autonomy from community members because they are usually involved in the process and outcomes.
- Commercial innovation is embedded in the business world and seeks to improve products, processes, models and markets. Commercial innovations offer new and improved ways of achieving business success. For the customer,

commercial innovation finds a better way to satisfy customer needs by improving the value proposition.

INNOVATION AND THE ARTS

2.1

Many authors and innovators agree that innovation goes beyond science, technology, engineering and mathematics (STEM). For example, Isaacson (2014) suggests that the most creative innovations of the 20th and 21st centuries (i.e. the digital age) were created by individuals who were able to marry the arts and sciences, such as those of Steve Jobs.⁴ This is echoed by Rodríguez-Pose (2015) who suggests that a thriving creative industry tends to be particularly good at generating new ideas because creative industries are innately innovative. He goes on to say that bigger cities with designers, artists and the like stimulate innovative firms and attract innovators too due to the resulting environment.⁵ A timeless example of the intersection between the arts and science is Leonardo da Vinci’s Vitruvian Man. The Vitruvian man is a drawing of a man in two positions captured within a circle and a square. The drawing uses the human body and its proportions to answer a mathematical problem.⁶ Isaacson argues that “the next phase of the digital revolution will bring a true fusion of technology with the creative industries, such as media, fashion, music, entertainment, education, literature and the arts...this innovation will come from people who are able to link beauty to engineering, humanity to technology, and poetry to processors.”⁷



LOCAL EXPERTS

2.1.1

From a KZN perspective, those working in the creative industries also recognise the role that the arts play in shaping and reshaping communities, societies and mindsets. The first local expert suggests that creatives innovate by looking at how to help communities and individuals define their identity, generate an income, build social cohesion and encourage sustainability. She goes on to say that innovation within the arts is achieved either through new techniques or through systemic change. A local example of systemic change is Durban's 'First Thursdays' – a concept that increased access to previously exclusive spaces (i.e. art galleries and theatres) to a larger demographic allowing for greater community engagement, broader access to the arts and enhanced social cohesion.

Likewise, the second local expert suggests that art is about creating meaning and generating new knowledge. Additionally, art has been important to scientists, anthropologists, historians and the like because it not only frames a historical context, but also enables people to re-imagine the world and imagine new futures through the process of meaning-making and knowledge creation. In this way, the local expert suggests that "art is loyal to the futures". He argues that innovation in the arts happens in two ways: art as a medium (practice) and as a pedagogy (theory). He argues that innovation and arts are synonymous, in that one cannot be removed from the other. However, he points out that more time needs to be spent to appropriately define innovation in the arts, as well as to interrogate what it means in a South African and African context.

MEASURING INNOVATION

2.2

Measuring innovation is a complex task and there is no established global standard or a set of agreed standards against which to measure it. For example, the Global Innovation Index uses 80 indicators to measure innovativeness of countries, whereas, the Innovation Cities Index

utilises 162 different indicators to obtain a measure of innovation⁸. Measuring innovation is generally company-specific, city-specific or country-specific. The World Economic Forum (WEF) evaluated 14 leading innovation reports, surveys and indexes within which there were numerous areas of overlap in terms of the indicators used. The evaluation also highlighted several recurring areas of concern across the indexes, surveys and reports, which were⁹:

- Many of the indicators were mainly focused on innovation inputs (e.g. patents and research and development [R&D] expenditure) rather than outputs (new product/service introductions and royalties)
- There is no mention of the outcomes, intended or otherwise, of innovation
- A lack of diversity in the types of indicators used, particularly in the indexes that were evaluated, suggesting that innovation is one dimensional. For example, most indicators were related to patents, educational level and R&D expenditure. The shortcomings presented by WEF are also evident in the indicators used in this issue of the innovation publication. While attempts were made to address the narrowness of innovation measures, there were challenges in this regard. The inclusion of the arts in the discussion of innovation in the following section of the report is an attempt to expand the measurement of innovation. The table below shows the list of 11 indicators that were used to measure innovation in KwaZulu-Natal (KZN).

Countries leading in innovation such as Switzerland, Finland and Israel share numerous traits which generally fall within the categories of knowledge generated through people (human capital), investment and infrastructure. The KZN Innovation Strategy (2017-2027) suggests that countries which achieve high levels of innovation are able to do this due to high company investment in research and development, a skilled labour force made of scientists and engineers, strong linkages between universities and industry as well as high-quality research institutions.¹⁰

CATEGORY	INDICATOR
INCLUDED INDICATORS	
People	People enrolled in Science, Technology, Engineering and Mathematics (STEM) courses/degrees
	Doctorates
	Patents issued annually
	Papers published annually
	Number of innovation events in KZN
Investment	Annual R&D budget as a percentage of GDP
	Annual R&D expenditure (comparable locally)
	Value of Innovation Funding
	Number of funded innovations (private)
	Value of funded innovations (private)
Infrastructure	Broadband rollout / internet access / coverage

3 THE STATE OF INNOVATION IN KWAZULU-NATAL

SITUATIONAL ANALYSIS

3.1

The following sections show the state of innovation in KZN as measured by the indicators outlined in the previous section. The level of innovation in KZN has been categorised under people, investment and infrastructure.

PEOPLE

3.2

‘People’ relates to the human capital and knowledge generated that enables and accelerates innovation and creativity. Critical skills such as those learned and honed in science, technology, engineering and mathematics (STEM) courses are vital for

industrialisation and economic growth. Knowledge also measures new ideas in the form of patents, as well as new research produced by researchers and doctoral students. There are five indicators which have been used to establish the nature and extent of knowledge generated in KwaZulu-Natal (KZN). These indicators are:

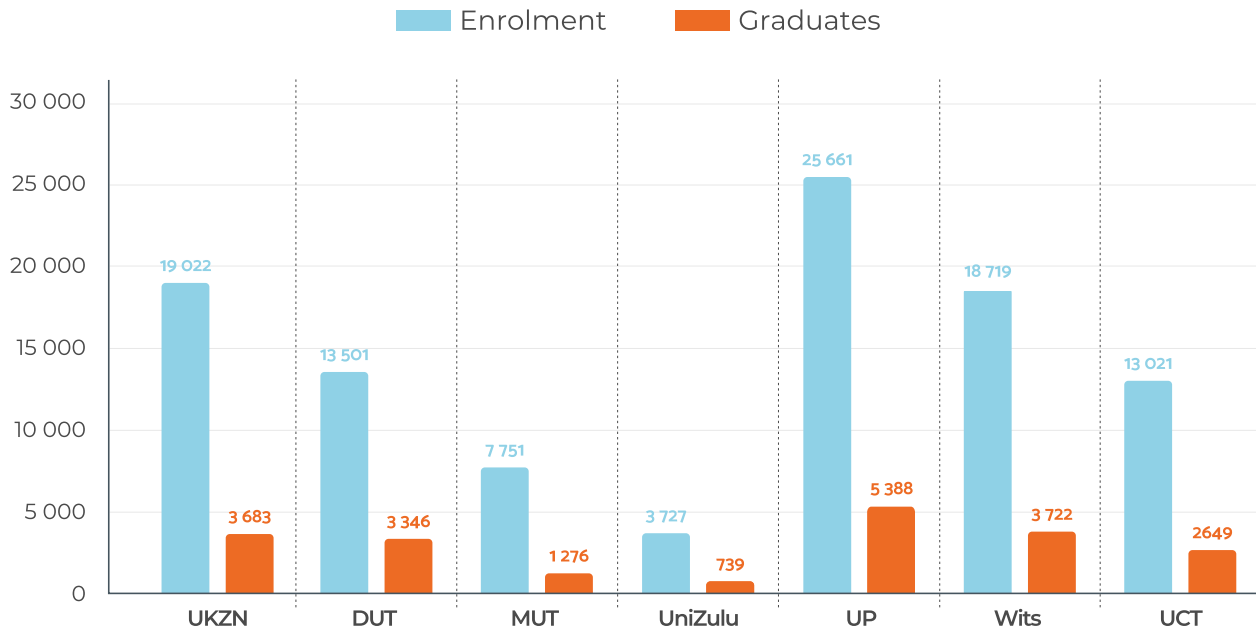
1. People enrolled in STEM courses/degrees and graduates from such courses/degrees¹¹.
2. Doctorate enrolment and graduates.
3. Research papers published annually.
4. Patents issued annually.
5. Number of innovation events held in the Province.

These indicators are expanded upon below.

The section below discusses the number of people who enrolled and graduated from STEM-related courses:

HIGHER EDUCATION INSTITUTIONS ENROLMENT & GRADUATES

Science, Engineering & Technology (2017)



SOURCE: Department of Higher Education and Training

The figure above shows the number of students in KZN higher education institutions, namely UKZN, DUT, Mangosuthu University of Technology (MUT) and University of Zululand (UniZulu), who enrolled and graduated in degrees related to Science, Engineering and Technology (SET) in 2017.¹² According to the Department of Higher Education and Training, UKZN had the highest SET degrees enrolment (19 022) in 2017 while UniZulu had the

lowest enrolment (3 727). UKZN achieved the highest number of graduates from SET courses in KZN with 3 683. In comparison with other major universities identified in this publication, UKZN performed better than both the University of Witwatersrand (Wits) and the University of Cape Town (UCT) in terms of enrolment. Whereas in terms of SET graduation, UKZN performed better than UCT only.

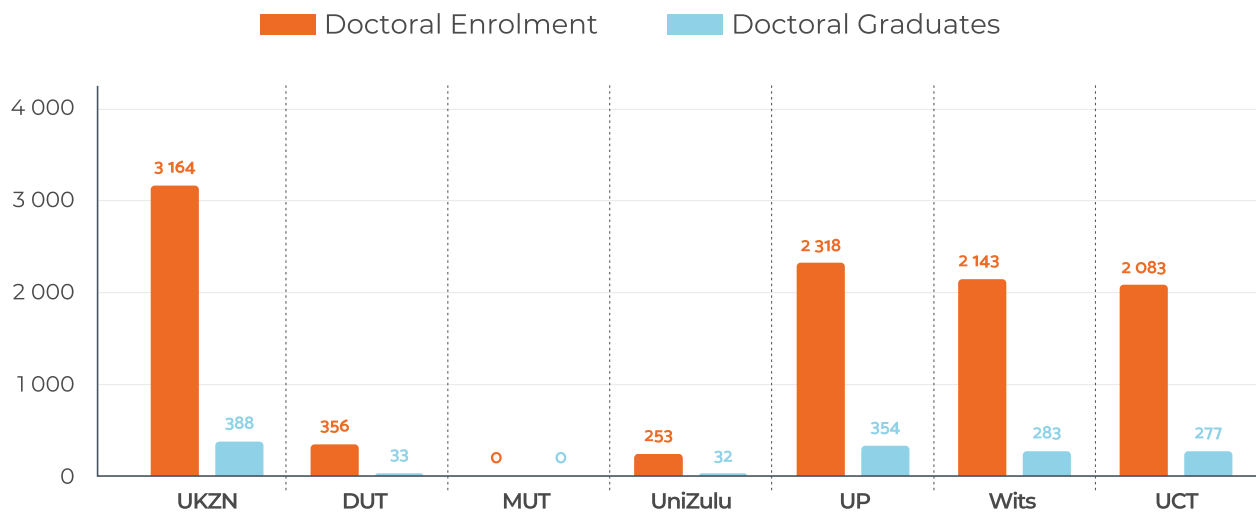
UNIVERSITY	ENROLMENT RANKING (SET)	GRADUATES RANKING (SET)
UKZN	4	6
DUT	9	9
MUT	19	19
UNIZULU	23	24
UP	2	1
WITS	5	4
UCT	10	11
UNISA	1	7

The table above summarises the ranking of the four higher education institutions in KZN. The ranking is out of a total of 26 universities throughout South Africa. The University of South Africa (UNISA) has been included in the ranking as it incorporates all provinces, including KZN.¹³ According to 2017 data, UKZN ranked highest in KZN but 4th in the country for enrolment in SET degrees, whereas at a national level, MUT and UniZulu were towards the lower end of the ranking. UP ranked 2nd in the country, whilst Wits ranked 5th and UCT ranked

10th for SET enrolment. UNISA received the highest enrolment for SET courses in 2017 but were ranked 7th in terms of the number of graduates. Ranking in terms of the number of graduates for each university shows that UKZN was first again in the Province but was 6th in the country. UP received the highest number of SET graduates in the country, Wits ranked 4th and UCT ranked 11th. The following section focuses on the number of people who enrolled in doctoral degrees and the number of doctoral degree graduates:

DOCTORAL DEGREE GRADUATES

All Doctoral Degrees (2017)



SOURCE: Department of Higher Education and Training

The figure above shows the number of individuals who enrolled for doctoral degrees and the doctoral degree graduates from higher education institutions in KZN as well the major universities in the country, namely UP, Wits and UCT. In 2017, UKZN enrolled the highest number of doctoral degree students (3 164)¹⁴ and produced the highest number of

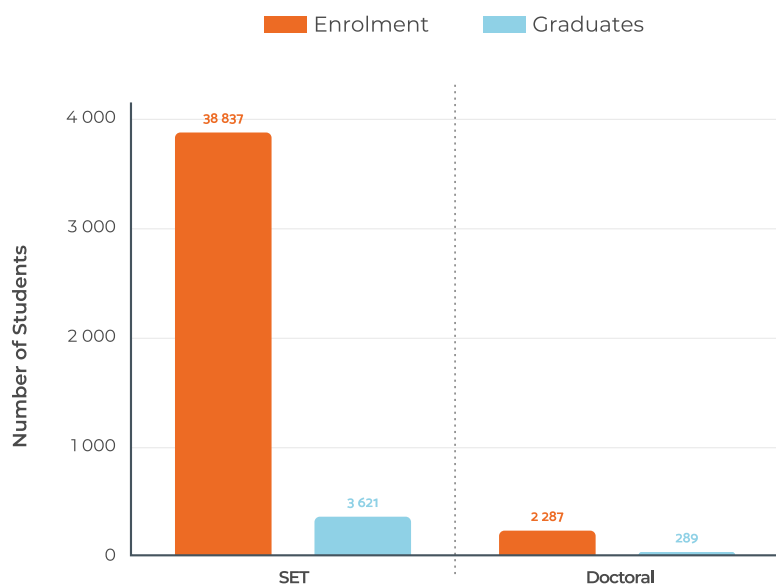
doctoral degree graduates in the country (388 or 12.7% of national doctoral degree graduates)¹⁵. UKZN ranks first in the country for the number of doctoral graduates as well doctoral degree enrolment in 2017. Whereas, MUT, along with the 2 other universities, were in last place with no doctoral degree enrolment or graduates in 2017.

UNIVERSITY	DOCTORAL ENROLMENT	DOCTORAL GRADUATES RANKING
UKZN	1	1
DUT	15	13
MUT	24*	24*
UNIZULU	19	17
UP	2	2
WITS	4	5
UCT	5	6
UNISA	3	4

The table above shows that UP ranked second in the country for both doctoral degree enrolment and graduates. UNISA, Wits and UCT ranked 3rd, 4th and 5th for enrolment, respectively. For doctoral degree graduates nationally, UNISA, Wits and UCT ranked 4th, 5th and 6th, respectively.

The chart below focuses only on UNISA and is representative of students in all 9 South African provinces.

UNISA ENROLMENT AND GRADUATES Science, Engineering & Technology, All Doctorates (2017)



SOURCE: Department of Higher Education and Training

The chart above suggests that enrolment for SET courses was very high at UNISA (38 837) in 2017, however, the university produced significantly lower SET graduates (3 621) compared to its enrolment and compared to graduation rates of other universities. In terms of doctoral degrees, enrolment is 2 287 and doctoral degree graduates in 2017 totalled 289, which ranks 4th out of 26 universities across the country.

The following section highlights publication trends for universities in KZN:

Overall publication output measures weighted research outputs in the form of journal publications, book publications and conference proceedings in 2016 for all disciplines. See appendix 1 for more detail on the number of units and ranking of the three components of overall publication output units.

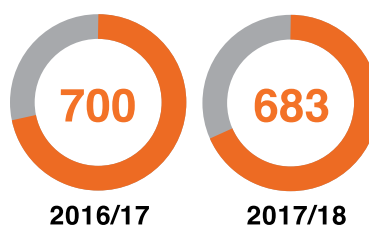
OVERALL PUBLICATION OUTPUT UNITS (2016)		
University	Units	Ranking
DUT	209.12	17
UKZN	2004.67	2
MUT	16.29	25
UNIZULU	122.89	19
UP	2040.88	1
WITS	1821.39	4
UCT	1843.87	3

The table above shows the units and ranking of overall national publication outputs for the 4 higher education institutions in KZN and major universities in the country, namely UP, Wits and UCT. Out of 25 universities in South Africa, UKZN ranked second in overall publication units in 2016 and UP was first, whilst DUT and UniZulu were towards the middle to lower end of the ranks, and MUT was last. UCT and Wits ranked 3rd and 4th, respectively.

Patents are indicative of the amount of new knowledge and ideas that are generated. According to the South African Companies and Intellectual Property Commission (CIPC), the number of local patent applications for all sectors in 2017/18 was 683 compared to 2016/17 in which there were 700 local applications.

The table below shows national patent activity in 2017/18:

LOCAL PATENT APPLICATIONS



PATENTS LODGED	2016/17	2017/18
Local applications	700	683
Provisional applications	1917	1806
International applications	6503	6231

The last indicator under the ‘people’ category is the number of innovation events in KZN. These were drawn from Innovate Durban’s calendar. The total number of innovation events taking place in KZN in 2019 is 53 (see appendix 2 for more detail on these events).

The ‘People’ category of measuring innovation sought to provide an overview of the state of knowledge generation as well as the performance of students enrolled in STEM-related courses at higher education institutions who will ultimately enter the critical skills sectors on which much innovation and future economic growth relies, along with the number of patents lodged and events around innovation held.

INVESTMENT

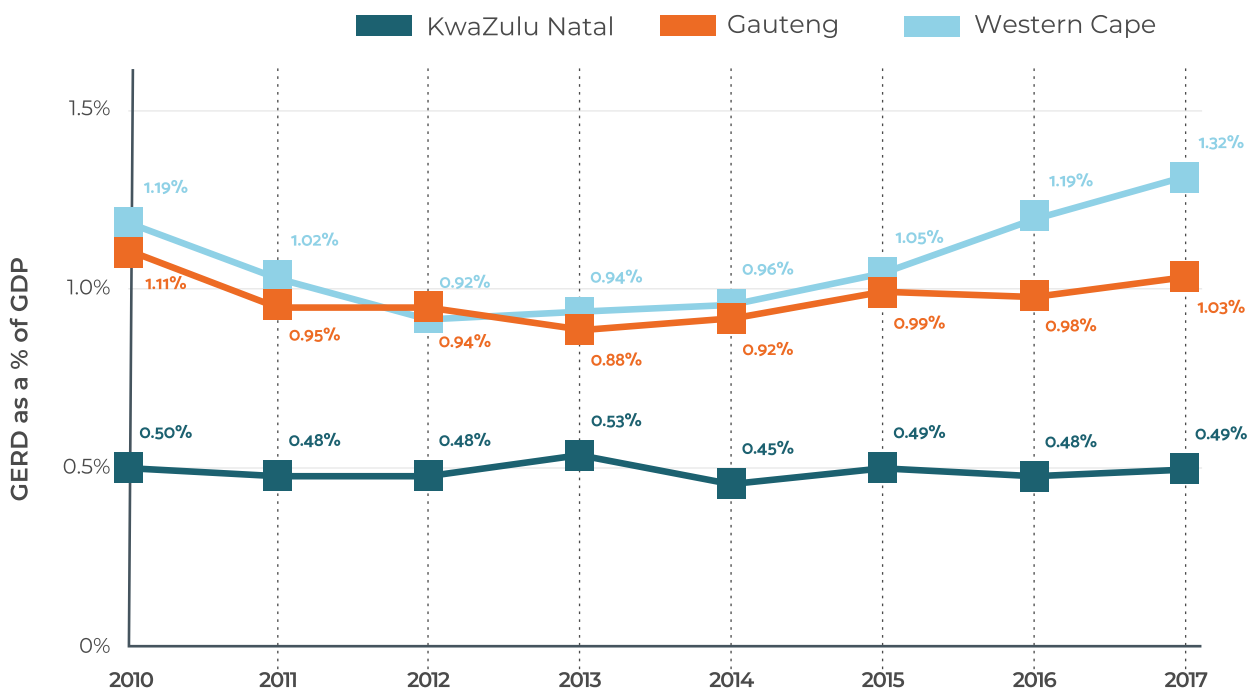
3.1.2

Investment is measured by three indicators which include:

1. Gross domestic expenditure on R&D as a percentage of gross domestic product (GDP).
2. Annual R&D expenditure by province and source.
3. Value of funds towards research, development and innovation.

Gross expenditure on research and experimental development (GERD) measures all national expenditure on research and development for a particular year.

GROSS DOMESTIC EXPENDITURE ON R&D AS A % OF GDP (2010-2017)



SOURCE: Department of Higher Education and Training

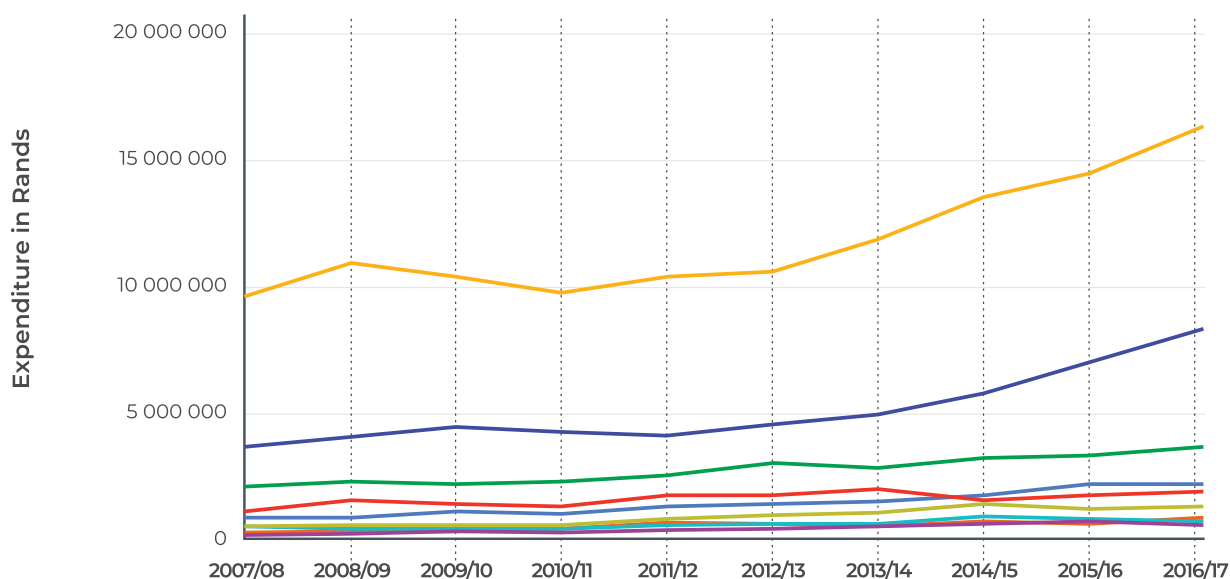
The following section focuses on R&D expenditure from a national and provincial perspective: The figure above shows GERD as a percentage of GDP for KZN, Gauteng Province (GP) and the Western Cape (WC). The figure illustrates that for KZN, GERD as a percentage of GDP has oscillated between 0.45% and 0.53% for the past

8 years (2010-2017).¹⁶ This is lower than national R&D expenditure as a percentage of GDP which was 0.82% in 2016/17.¹⁷ However, both GP and WC had higher rates in 2016/17. WC had higher expenditure rates than both KZN and GP in 2016/17 at 1.32%.

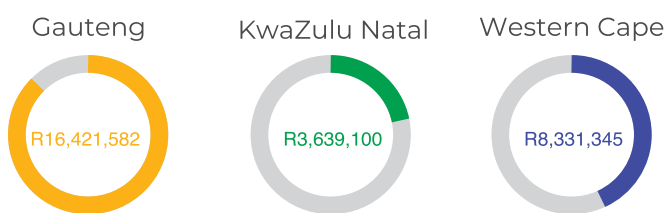
R&D EXPENDITURE BY PROVINCE

(2007/08 to 2016/17)

Legend: Eastern Cape (blue), Free State (red), Gauteng (yellow), KwaZulu Natal (green), Limpopo (orange), Mpumalanga (cyan), Northern Cape (purple), North West (olive), Western Cape (dark blue).



SOURCE: Department of Higher Education and Training



R&D EXPENDITURE FIGURES (2016/17)

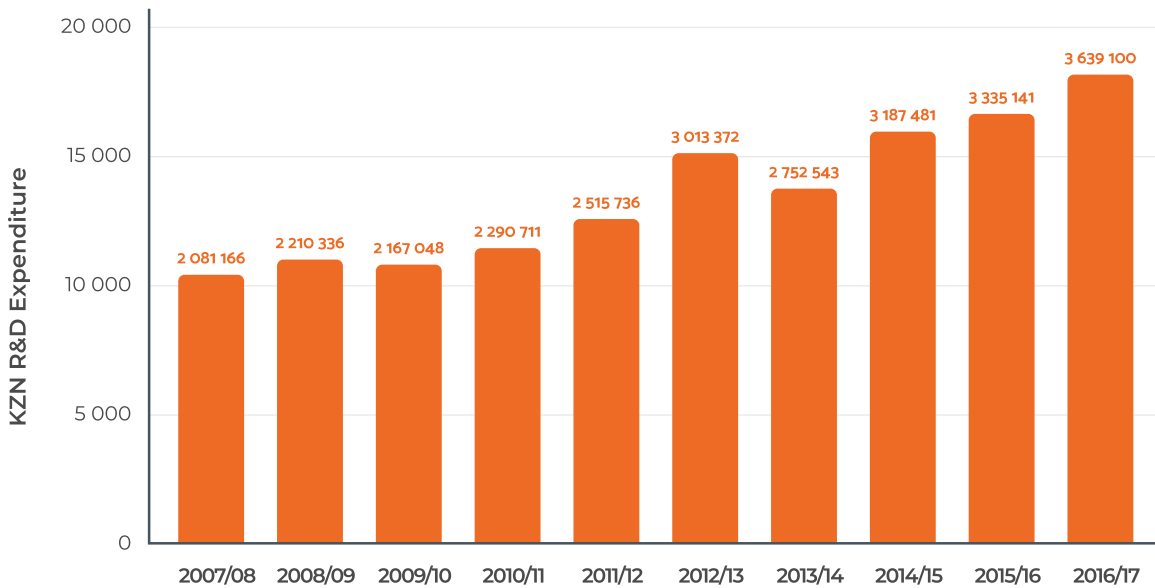
The figure above shows the annual R&D expenditure in rands for each of the 9 provinces in South Africa. The evidence from the table shows that Gauteng spends the most on R&D, followed by the Western Cape and KwaZulu-Natal. The figure suggests a general trend of increased nominal expenditure on R&D between 2007/08 and 2016/17 for the three top spending provinces. According to Stats SA, a comparison of provincial share of GDP shows that in 2016/17, Gauteng contributed 34% of total GDP, KZN contributed 16% and Western Cape

contributed 14%.¹⁸ Whereas, the proportional R&D expenditure shows that Gauteng made up 46% in 2016/17, Western Cape made up 23.3% and KZN made up 10.2%. This suggests that Gauteng and Western Cape place a stronger emphasis on prioritising R&D and innovation.

The following three figures will take a closer look at KZN in terms of the rand value and the sources of R&D expenditure.

KZN R&D EXPENDITURE

(2007/08 to 2016/17)



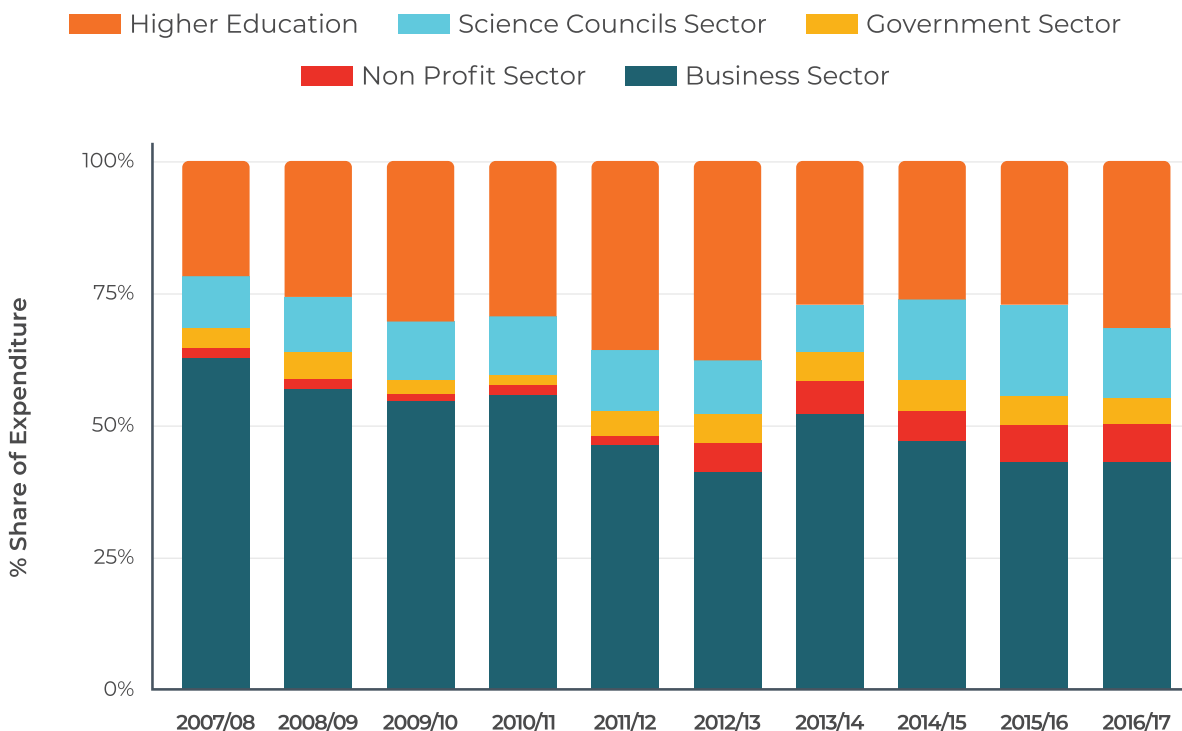
SOURCE: Department of Higher Education and Training

The figure above shows that R&D expenditure in KZN has gradually increased over time. The figure above shows that at the end of 2016/17 financial year, KZN spent a total of R3 639 100, which is

74.9% growth on the expenditure in 2007/08, compared to total GERD growth of 91.7% at a national level.

KZN R&D EXPENDITURE BY SOURCE

(2007/08 to 2016/17)



SOURCE: Department of Higher Education and Training

Within the 2016/17 financial year, the major source of R&D expenditure in KZN was the business sector (including state-owned enterprises) with 42.7% share which has declined from 62.6% in 2007/08. The higher education sector contributed 31.8% of R&D expenditure in KZN in 2016/17 which increased from 22.1% in 2007/08. The science councils sector contributed 13.1% to overall KZN R&D expenditure in 2016/17 which is an increase from 9.7% in 2007/08. The nonprofit sector contributed 7.6% to R&D expenditure in 2016/17 which increased from 2.0% in 2007/08. Lastly, the government sector contributed 4.7% to KZN R&D expenditure in 2016/17, which is an increase from the 3.7% share in 2007/8.

In terms of how much funding is going towards research, development and innovation, the major government funders are the DST and the dti as well as private funds through the Southern Africa Venture Capital and Private Equity Association. The rand value of innovation was requested from the dti and the Industrial Development Corporation of South Africa, however, this data was not able to be obtained.

The section below discusses the value of innovation funding as well as the number of innovations that are funded by a few major investors:

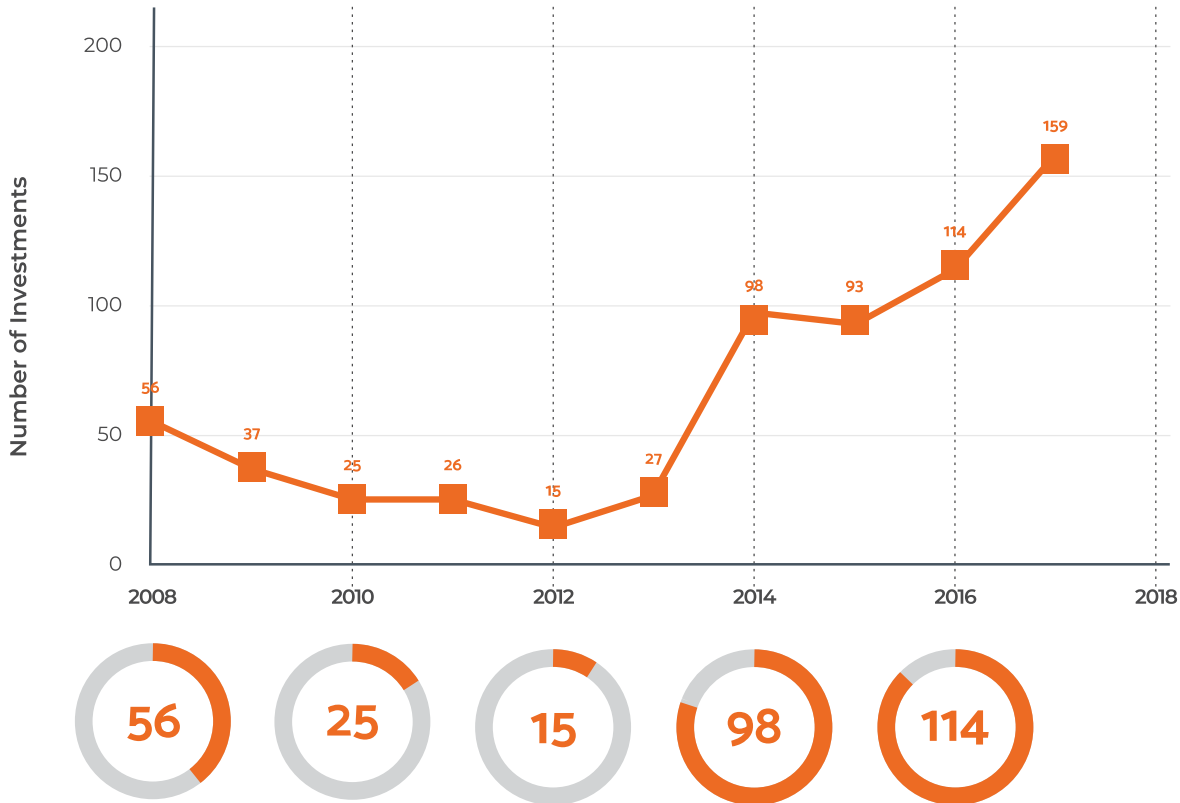
ORGANISATION	TYPE (NATIONAL)	EXPENDITURE 2016/17	EXPENDITURE 2017/18	% CHANGE
Department of Science and Technology	Technology Innovation	959,978,000	1,061,616,000	10.59%
	Research Development and Support	4,104,263,000	4,246,237,000	3.46%
	Socio-economic Innovation Partnerships	1,717,336,000	1,567,261,000	-8.74%
SAVCA	All Investment	872,000,000	1,160,000,000	33.03%

The table above shows that there was a 33.03% increase in expenditure from private investors between 2016 and 2017. The table also shows increased expenditure from DST for both technology innovation and research development and a decrease in expenditure for socioeconomic innovation partnerships.

The following three charts delve deeper into private investment towards innovations in terms of the number of innovations funded over time, which stage of funding received the most investment and location of the investee.¹⁹

NUMBER OF INVESTMENTS PER YEAR.

SAVCA (2008 to 2017)

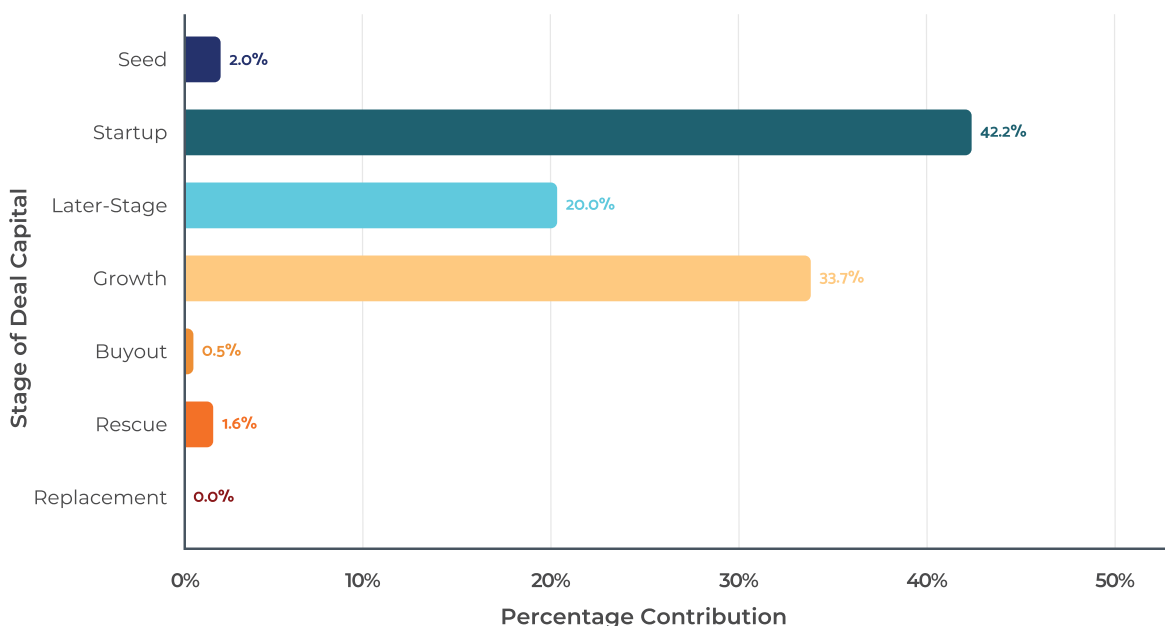


SOURCE: Department of Higher Education and Training

The figure above shows that after 2008, the number of funded innovations declined considerably from 56 to its lowest point of 15 investments in 2012. However, after this point the number of investments increased and is at 159 at the end of 2017.

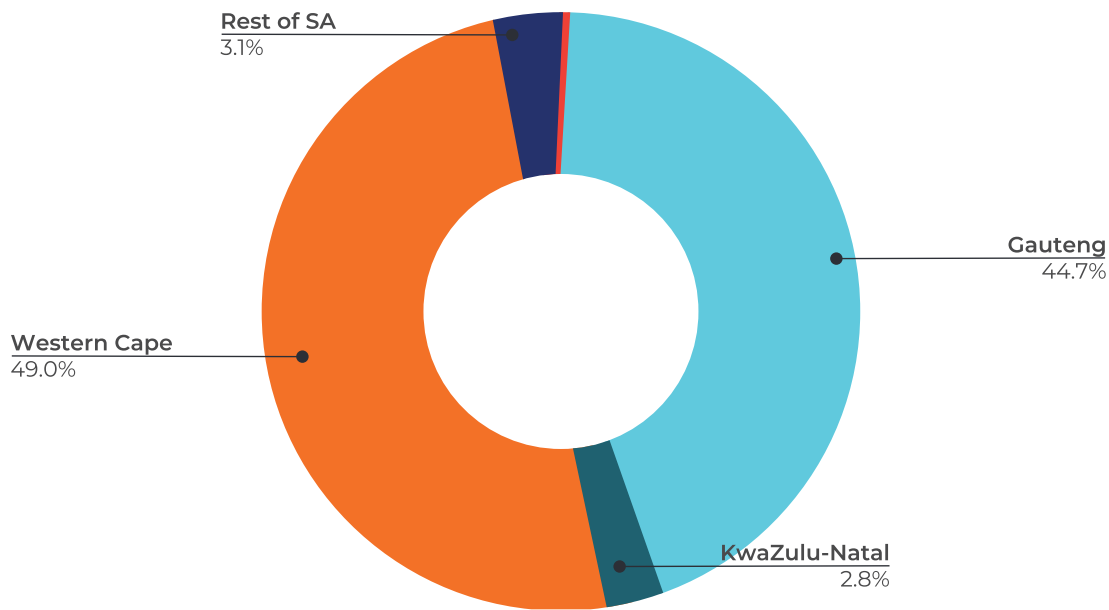
The figure above shows that most private funds are invested in the start-up phase (42.2%) followed by the growth phase (33.7%).

VALUE CONTRIBUTION BY STAGE OF DEAL, 2017



SOURCE: SAVCA (2018). Available upon request.

VALUE CONTRIBUTION LOCATION OF INVESTEE HEAD OFFICE, 2017



SOURCE: SAVCA (2018) Available upon request.

The chart above shows that Western Cape had the largest share of investment in terms of the location of the investee head office, closely followed by Gauteng, with KZN only contributing a 2.8% share. Non-SA investment was 0.4% (not labelled on the image). In terms of value, Gauteng received the highest value of investment.

The investment category sought to examine the level of investment that is directed towards R&D and innovation in the province. There is a general trend suggesting an improvement in the level of funds prioritised by KZN towards R&D and innovation. However, this is lower than that of national expenditure, proportionally. Private

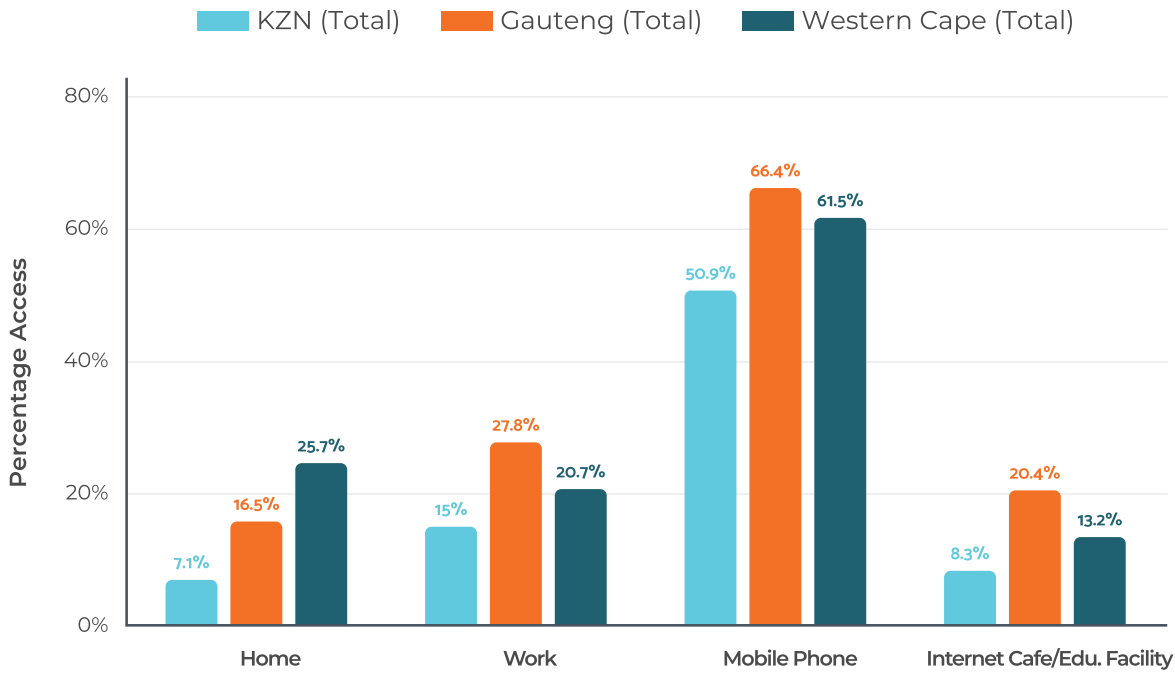
investment on the other hand, shows the greatest disparity in investment. Private investors display considerable bias in favour of Gauteng and Western Cape.

INFRASTRUCTURE

3.1.3

The main indicator in infrastructure is internet access. This section will explore how individuals access the internet and compare Gauteng (GP), Western Cape (WC) and KZN according to the General Household Survey (2017)²⁰.

HOUSEHOLD INTERNET ACCESS COMPARISON, 2017

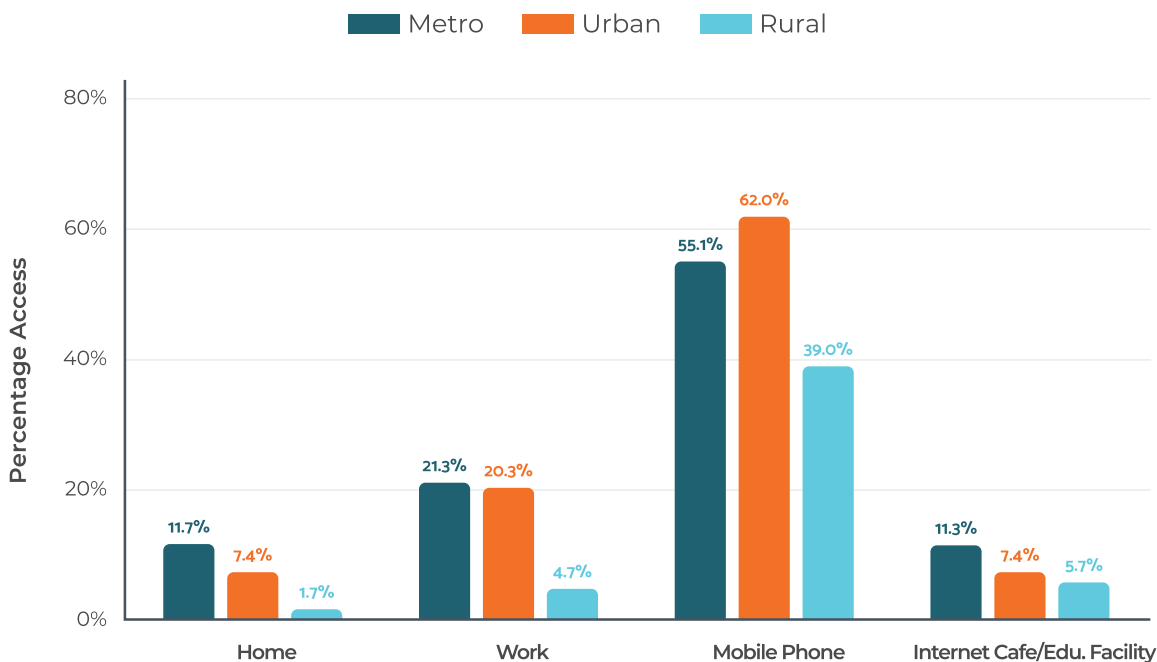


SOURCE: General Household Survey (2017). Available upon request.

The figure above shows that the level of internet access that each household in KZN, Gauteng Province (GP) and the Western Cape (WC) has at home, at work, through a mobile phone and via an internet café or educational facility. In KZN, most households access the internet through their mobile devices (50.9%) whereas only 7.1% of households have internet access at home. In GP, 66.4% of households access the internet through their mobile

phones. The lowest access point for households in GP is at home where 16.5% of households have internet access at home. The trend continues in the WC, where most households (61.5%) access the internet through their mobile phones. A significant share of households have internet access at home (25.7%) in WC, and the least number of households are accessing the internet through an internet café or educational facility.

KZN HOUSEHOLD INTERNET ACCESS BY GEOTYPE, 2017



SOURCE: General Household Survey (2017). Available upon request.

REVIEW OF INNOVATION SUPPORT MECHANISMS IN KWAZULU-NATAL

3.2

The figure above shows that in 2017, trends within the KZN Province suggest that most households across all geotypes (metro, urban, rural) accessed the internet via mobile phones. Additionally, internet access through an internet café or educational facility is more prevalent in rural households than access at work and at home. Whereas households in metro and urban areas show higher access at work than at home or at an internet cafe/educational facility.

It is apparent that South Africans in general experience low levels of internet access. This is even more evident for the KZN Province and those living in rural communities within KZN.

There are numerous, largely publicly funded initiatives, which focus on establishing the necessary infrastructure to support and drive innovation throughout South Africa. The institutions and organisations highlighted in this publication are not intended to be an exhaustive list of support mechanisms in KZN, however, the list does point to the major stakeholders in the arena of research, development and innovation within the province. The table below shows various support mechanisms which shape the innovation ecosystem in the province.

ORGANISATION	KEY SUPPORT MECHANISMS
<p>Innovate Durban +27 87 365 3131 http://www.innovate.durban</p>	<p>Innovate Durban is a central innovation support agency in KwaZulu-Natal supporting innovators in the region from concept to commercialisation. Its core function is to develop the regional ecosystem by providing support and ensuring collaboration. Its objectives are to create, connect, collaborate and celebrate innovation. It runs a number of programmes and projects aimed at stimulating innovation in the region and plays a core role as a catalyst. Innovate Durban provides mentorship, capacity development, business development, design thinking and other critical services to innovators.</p>
<p>Technology Innovation Agency (TIA) KZN Regional Office Switchboard: +27 (0) 31 220 3100 https://www.tia.org.za/</p>	<p>TIA is a public entity that focuses primarily on technology development and provides support from proof-of-concept to pre-commercialisation through 3 funds:</p> <ol style="list-style-type: none"> 1. The Seed Fund 2. The Technology Development Fund 3. Commercialisation Support Fund <p>Additionally, TIA provides non-financial support through their Innovation Skills Development unit.</p>
<p>Invotech Business Incubator +27(0)31 201 4788 https://www.invotech.org/</p>	<p>Invotech is a non-profit innovation technology business incubator that accelerates the development of technologically based start-up enterprises throughout KZN by providing them with equipment, financial, legal, advisory and information services.</p>

ORGANISATION	KEY SUPPORT MECHANISMS
<p>Smart Xchange +27 31 307-1988 www.smartxchange.co.za/</p>	<p>Smart Xchange is an incubator whose core mandate is to provide enterprise development services to small, medium and micro enterprises in the Media, Information Communication Technology and Electronics sector. Smart Xchange services include:</p> <ol style="list-style-type: none"> 1. Funding 2. Organisational development 3. Business processes 4. Customer/stakeholder development
<p>Department of Science and Technology: Technology Localisation and Implementation Unit (TLIU) www.tliu.co.za/welcome</p>	<p>The TLIU serves to increase productivity, capacity and capabilities of local businesses. The TLIU is implemented by the Council for Scientific and Industrial Research (CSIR) and enables industry in the following ways:</p> <ol style="list-style-type: none"> 1. Benchmarking and technology capability evaluation services 2. Access to technology platforms or shared technology facilities 3. Access to technical expertise 4. High-end technical skills development programmes
<p>Tourism KwaZulu-Natal Incubator Programme</p>	<p>The programme focuses on leisure tourism SMMEs operating as tour operators, travel agents and accommodation establishments and now has an enhanced strategy directly aimed at helping these emerging businesses survive during the start-up phase, in which the enterprises are the most vulnerable.</p>
<p>Furniture Technology Centre Trust (Furntech)</p>	<p>Furntech offers comprehensive business incubation services. Their objectives are to:</p> <ol style="list-style-type: none"> 1. Create an enabling environment for small and micro enterprises (SMEs) in the furniture and wood products industries to grow through business technology incubation 2. Develop business and production skills through skills development and technology demonstration 3. Establish centres of excellence in key locations nationally 4. Serve as a vehicle to enhance the ability of the sector to become globally competitive

Higher education institutions also play a crucial role in fostering research that translates into innovation that has an impact on industry and economic growth. The table below shows the

involvement of universities in supporting innovation, entrepreneurship and technology develop into commercially viable products.

INSTITUTION	KEY SUPPORT MECHANISMS
<p>Durban University of Technology: Technology Transfer and Innovation (TTI) Unit www.dut.ac.za/technology_transfer_and_innovation/</p>	<p>The TTI unit facilitates the transition between the institution, industry and community by ensuring proper commercialisation of the intellectual property. The TTI unit achieves this by making available the materials, infrastructure and resources required in the generation of technology and offers legal, technical and business-related advice and support.</p>
<p>Durban University of Technology: Centre for Social Entrepreneurship (CSE) +27 31 373 60622 cseri.co.za/</p>	<p>The CSE is a rapid business incubator that provides support to students and community enterprises and is located at the Durban University of Technology. The CSE helps individuals and business from the idea phase through to commercialisation. Services offered by the CSE include:</p>
<p>UKZN InQubate +27 31 260 4320 inqubate.ukzn.ac.za/</p>	<p>UKZN InQubate is the technology transfer office of UKZN, promoting innovation, commercialisation and entrepreneurship. UKZN InQubate helps researchers to through the innovation process from the invention to protecting the intellectual property and supports the innovator to commercialise their invention.</p>
<p>KZN Research Innovation & Sequencing Platform (KRISP): +27 31 260 4898 www.krisp.org.za/</p>	<p>KRISP is based at the Nelson R Mandela School of Medicine at UKZN. KRISP focuses on health sciences research and new diagnostic development. Main services at KRISP include incubation and training on commercialisation for innovators from all over South Africa.</p>
<p>Chemin (Westville Campus) +27 10 594 9842 www.chemin.co.za/</p>	<p>The South African Chemical Technology Incubator is a non-profit business incubator, under the Small Enterprise Development Agency’s incubation program. Their focus is on supporting and developing early stage businesses in the chemical sector.</p>

Other support mechanisms which are either privately funded or funded by both private and public entities include:

INSTITUTION	KEY SUPPORT MECHANISMS
Cisco Edge Incubation Centre	This incubation hub was recently launched at the Dube TradePort. It was built to develop and grow SMMEs and accelerate their entry into the digital marketplace by providing access to state-of-the-art technology, amongst other things.
Downstream Aluminium Centre for Technology (Manufacturing) - (DACT)	DACT provides a training and incubation facility where entrepreneurs in the aluminium casting industry can successfully grow to independence. DACT also provides mentorship support and access to markets.

SPOTLIGHT: THEMAKERSPACE



theMakerSpace focuses on bringing together people, technology and creativity by lowering the barriers of entry for people to express their creativity in a physical way. Amongst other things, theMakerSpace has a start-up incubator as well as disruptive technology training services. They also train learners, through their Maker Academy, on the principles of design thinking, product design, in laser cutting, computer-aided design, 3D printing, electronics as well as marketing, finance and leadership.

Director/CEO of the theMakerSpace, Stephen Gray, started to develop the concept of what is now theMakerSpace in 2013, driven by the desire to develop people and work collaboratively with technology in a creative environment. The idea was to test the theory that people would pay to make things. This began through ad hoc

technology events, two 3D printers and a laser cutter and grew into the physical space located on Station Drive in Durban which has built its values on respecting people, respecting the environment and respecting equipment. Success for theMakerSpace is determined by the impact it is able to have by increasing access and bridging the gap between potential to create and technology, the innovativeness they are able to foster and the scale they are able to reach.

While the concept of makerspaces is not new, theMakerSpace in Durban was able to offer a unique and innovative proposition that had a distinct social impact and won them US\$125,000 in the 2018 Google Impact Challenge South Africa. The application that was packaged for the Google Impact Challenge was ‘Project Kwenza’, which means ‘do’ or ‘does’ in IsiZulu.

In the short term, theMakerSpace is determined to expand its reach by establishing another ‘Space’ within a township community in eThekweni Municipality. However, in the long term, theMakerSpace aims to have 250 makerspaces by 2025 in Southern Africa, thereby, enabling Africans to create solutions that have a global impact.

SCIENCE AND ENGINEERING FACILITIES

3.2.1

One of the ways in which the Department of Science and Technology (DST) aims to build science, technology, engineering and mathematics (STEM) awareness is through partnerships with science centres. The goals for the science centres include:

1. To promote science & technology literacy among young people and the general public.
2. To contribute to the enhancement of learner participation and performance in STEM.
3. To identify and nurture youth talent and potential in STEM.
4. To provide career education in STEM-based discipline.

The table below shows the various science centres in KZN Province and where they are located.

NAME	LOCATION
DST's Science Centre	
ArcelorMittal Science Centre Newcastle	Newcastle
Isibusiso Esihle Science Discovery Centre	Manguzi
Olwazini Science Centre	Pietermaritzburg
Science and Technology Education Centre-UKZN Science	Durban
The KZN Science Centre	Durban
Unizulu Science Centre	Richards Bay
Other Science and Engineering Facilities	
CSIR Biorefinery Industry Development Facility	Durban
Sappi Skills Centres	Umkomaas
Africa Health Research Institute	Durban and Mtubatuba
South African National Biodiversity Institute	Durban
DST's Technology Station in Chemicals	Durban (MUT)
DST's Reinforced and Moulded Plastics Technology Station	Durban (DUT)
KZN Technology Hub	Richards Bay
Moses Kotane Institute	Westville

4 SHOWCASING KZN INNOVATORS

SELF-SUSTAINING ENERGY AND WATER CONSERVATION SYSTEM

4.1



The self-sustaining energy and water conservation system (SSEWCS) is a project owned by Electricoal Technologies (ECT), with lead innovator Mfanelo S'phelele Calvin Ndlovu. The innovation extracts methane gas from biomass and converts this energy into electricity. There are 2 streams of biomass used by the system which includes faecal matter from pit latrines and animals, as well as organic waste such as banana and orange peels. ECT sought to address the issue of unreliable electricity supply to rural communities through the generation of renewable energy, which simultaneously works to conserve the environment. While the targeted beneficiaries are rural municipalities without electricity throughout the KwaZulu-Natal Province, later, this will be expanded to communities throughout South Africa and the rest of Africa. The pilot project for the self-sustaining energy and water conservation system will be implemented at Joel Primary School in Maphumulo Local Municipality in iLembe District. The funding for the pilot has been secured. The next phase is to procure all the necessary elements to construct the system at the school.

Partnerships, collaboration and support from various entities has led to the success and progress achieved by ECT. They received notable support from Invotech and CVC Africa through

incubation, as well as the Technology Innovation Agency which has been a crucial funder since 2015. Collaboration with universities has also been critical to the success of the innovation in terms of conducting research and improving product design and technology efficiencies. ECT notes that the biggest lesson for them in their innovation journey has been the importance of partnerships that helped them broaden their networks, and access skills to improve their product and themselves as a business.

Through commercialisation and scaling of the SSEWCS units, ECT aims to generate enough electricity for community schools to be self-sufficient and to enable schools to sell electricity to their local municipalities who will, in turn, be positioned to increase rural homes' access to electricity. Additionally, the growth of this project will create numerous new engineering and casual jobs for youth through manufacturing, installation and maintenance of the SSEWCS units.

MOBI-AIR

4.2



SAMAC Engineering Solutions identified a gap in the market through observations and personal experience. They noticed that many events hosted in structures such as marquees and tents tend to become very hot and there are no cost-effective mobile air-cooling solutions to address this challenge, as mobile air conditioners currently on the market require three-phase generators which make them expensive. This led SAMAC Engineering Solutions to develop Mobi-Air, an affordable mobile air conditioner. Mobi-Air is a

hybrid system which uses thermal energy storage as its medium of cooling. Water or a liquid substance is frozen using a refrigeration condensing unit with a single-phase plug (normal domestic power that we use in our households) at night, when electricity is at its cheapest, to a set temperature and the energy stored in that liquid substance will be used to cool the tent or marquee during the day for a given number of hours, without any electrical connection. This results in huge energy savings and convenience for the user.

Mpumzi Swana and his team have received support from a number of organisations and institutions in various forms. Invotech and the Technology Innovation Agency facilitated the development of Mobi-Air from concept to product development, through seed and prototype funding. Institutions such as the Durban Chamber of Commerce, Small Enterprise Development Agency, and eThekweni Municipality's Business Support Unit have supported SAMAC Engineering in terms of improving businesses practices and connection to the private sector.

The relationship with Mangosuthu University of Technology has given SAMAC Engineering a channel within which to test their prototype for commercial buildings.

SAMAC Engineering noted that funding/financing models that currently exist create a barrier for new products which are trying to enter the market for commercialisation. Funding for commercialisation favours enterprises that are already up and running as they are able to generate projections based on sales history. For future innovations, SAMAC intend to build in commercialisation aspects during the product design phase in order to accelerate and make the transition to commercialisation considerably easier.



GreenGold Technology sought to address the problems that exist with traditional fish farming, which include high chemical usage and waste levels. This waste can cause serious harm to the environment and natural ecosystems. Therefore, GreenGold Technology developed a farming methodology that is environmentally sustainable based on a closed loop system. In this system, there exists a symbiotic relationship between fish and phytoplankton (a microorganism) where one tank contains fish which produce harmful waste products such as carbon dioxide and ammonia and in the other tank phytoplankton that convert carbon dioxide to oxygen and convert the ammonia into biomass. The water is now free of harmful waste which makes it suitable for the fish to survive.

As an innovator with a background in science, the Erasmus Mundus Inspire Scholarship and a scholarship awarded by JP Morgan, equipped Joash Govindsamy with the necessary skills to be successful in business and improved his knowledge in the subject area of sustainable, clean and environmental technology. Coupled with this is what Joash believes has been key to his progress so far, which is the need to be consistent and set goals that are specific, measurable, assignable, relevant and time-based (SMART).

In terms of funding, GreenGold Technology received prize money from winning the Innovate Durban Youth Innovation Challenge, from the International Labour Organisation and received seed funding from Invotech. The toughest challenge for GreenGold Technology thus far has

been developing the business acumen to help move the innovation towards a viable business.

In the next 5 years, GreenGold Technologies plans to secure funding to expand its activities to meet demand and move into commercialisation in order to supply its final product to individuals, small shops, supermarkets, restaurants and fish markets in South Africa and internationally.

RETRACTABLE BACKPACK

4.4



The innovation developed by Sipiwe Zuma is a retractable backpack umbrella that protects an individual from the rain or harmful UV rays. The innovation is currently in its second round of prototyping under his company, Anathoth Solutions. As a student with a disability, he experienced the problem of always getting wet from the rain because he could not use an umbrella while he was using his crutches to move around between home and Durban University of Technology (DUT) campus, as well as between classes while on campus.

Sipiwe sought to solve his own problem, and in order to realise this innovation, support was received from Innovate Durban through their Youth Innovation Challenge as well as tremendous support from the DUT's Centre for Social Enterprise which has enabled him to develop the prototypes. Part of the prototyping process involved testing the innovation with different types of users, including people who use crutches, wheelchairs, and a person who is blind and uses a support cane. The challenge of moving from the concept of a retractable backpack to the physical product was

tested during this phase and there were various obstacles that needed to be overcome and needs that had to be addressed. Ultimately, the straps of the backpack will contain a mechanism that will allow you to pull the straps and open the umbrella, adjust its height to the user's preference and close and retract the umbrella back into the backpack.

One of Sipiwe's biggest lessons thus far has been that as an innovator you should not put all your efforts into one single funder because they can let you down completely by not delivering on the promise of funding which can derail your plans. In other cases, funders can delay the innovation process due to their own internal processes.

In order to ensure access to this innovation, Anathoth Solutions will work with universities to develop a scheme linked with assisted living support that is received by students with disabilities. At its core, the innovation is targeting students with disabilities on all South African higher education campuses, however, there has been interest from parents with children because children lose their umbrellas, as well as other able-bodied individuals.

RESPO MOBILE APP

4.5



Respo is a mobile app solution which is aimed at reducing the time it takes for an ambulance to reach a patient, resulting in more lives saved during medical emergencies. This solution uses GPS technology to find the exact location of the patient and also notifies the next of kin when an emergency occurs. Blessing Nzuzo, the creator of Respo, was inspired to develop this innovation

after he witnessed a person getting stabbed on the Durban beachfront and seeing that it took over thirty minutes for an ambulance to arrive to take the injured person to a hospital that was approximately 1km away. Eventually, an Uber was called to take the injured individual to the hospital. In researching the problem further, the team at Respo Technology found that the main problem is that the right information does not reach the relevant people at the right time.

Respo mobile app is currently in its prototype phase. In order to get to this point, Respo Technology received seed funding from Smart Xchange and the Technology Innovation Agency and won R250,000 in business support from Ithala business awards after Respo Technology came in first place for the Inkunz'Isematholeni Youth in Business category.

The toughest challenge for Respo Technology to overcome to date has been raising funding for commercialisation. Their biggest lesson has been the importance of getting the right team with complementary skills to propel the project and maintain consistency in order to get the job done. When looking back on his innovation journey, Blessing recognises the importance of emotional intelligence because in business you deal with many different types of personalities and it is important to understand how to navigate these differences in a constructive manner.

In the next 5 years, Respo Technology intends to grow in a number of ways. Firstly, they will introduce new technologies and features to improve their service offering, such as developing new products that will enable customers to request emergency services in the absence of a smartphone. Secondly, Respo Technology hopes to expand into other sectors such as the private and home security sector. Lastly, they will work to get new partners and team members in order to expand their distribution channels beyond South African borders.

5 FUTURE RESEARCH

There are numerous areas within which future research on innovation can be undertaken. Obtaining data for the indicators which were intended to form part of this research but were

excluded due to lack of data accessibility or reliability, would be beneficial. These include researching: employment in critical STEM sectors, successful critical skills businesses in KZN vs previous years; start-ups that reached the 3-year mark; innovation incubators in KZN; co-working and start-up office spaces available in KZN; galleries and theatres; and innovations submitted to identified innovation awards.

Additionally, the following research questions and data points may be considered as areas for future research:

- What is the definition of innovation in an African context?
 - What is the role of the arts in innovation and how can this be measured?
 - Who are KZN's grassroots innovators? How can they be identified and supported?
 - How can the definition of innovation be expanded to include outcome indicators? Outcome indicators include the number of successful start-ups/entrepreneurial activity as a result of an innovation, as well as measuring the improvement in people's lives as a result of innovation.
 - Total funding or the value of funded innovations from both the public and private sector.
 - Total funding at each phase of the pipeline per year for public and private funds.
 - A collective database of innovators who have received funding from the major investors and funding institutions in South Africa, including the demographics of innovators.
- Lastly, obtaining data for innovation can be a time-consuming task. Therefore, it is important to:
- Establish and nurture relationships with data providers in order to improve the efficiency of the data collection process. For instance, while some information on patents was retrieved from CIPC, it was extremely limited which means that it was ineffective in adding value to the measurement of innovation.
 - Furthermore, innovators are an important source of data with valuable insights for others who wish to innovate. A consideration might be to create a platform for innovators to share their stories, thereby utilising innovators as a resource to improve services for other innovators and potential innovators.

JOURNAL PUBLICATION OUTPUT UNITS (2016)		
University	Units	Ranking
DUT	176.87	16
UKZN	1,668.17	2
MUT	12.09	25
UNIZULU	111.44	20
UP	1707.06	1
WITS	1500.73	4
UCT	1516.37	3

BOOK PUBLICATION OUTPUT UNITS (2016)		
University	Units	Ranking
DUT	23.77	13
UKZN	275.47	2
MUT	1.33	22
UNIZULU	5.17	19
UP	195.24	7
WITS	241.68	3
UCT	223.56	6

CONFERENCE PROCEEDING OUTPUT UNITS (2016)		
University	Units	Ranking
DUT	8.48	20
UKZN	61.03	9
MUT	2.87	22
UNIZULU	6.28	21
UP	138.58	2
WITS	78.98	8
UCT	103.94	4

APPENDIX 6.2: INNOVATION EVENTS IN DURBAN

CATEGORY	EVENT NAME	LOCATION	ORGANISER	WHEN
Business	SMME Business Forum			-
Business, Environment,	Ocean's Economy Workshop	Durban Chamber Of Commerce And Industry	Durban Chamber of Commerce and	-
Civil	Complimentary Residency & Citizenship Solutions Seminar	Protea Hotel by Marriott Durban Umhlanga	Durban Chamber of Commerce and	-
Environment	Environmental Affairs Business Forum	Norton Rose Fulbright, La Lucia Ridge	Latitude World	-
Manufacturing	Manufacturing forum and Northern Forum	Norton Rose Fulbright, La Lucia Ridge	Durban Chamber of Commerce and	-
Data	Afrobarometer 2018 Survey 3rd South Africa data release	Southern Sun Elangeni & Maharani	Durban Chamber of Commerce and	-
Technology	An understanding to Artificial Intelligence	Minara Chamber of Commerce	Sthabiso Mdledle-Democracy	-
Social Development	Social Engagement Facilitation (SEF)	Durban, South Africa	Minara Chamber of Commerce	-
Technology	Introduction to Virtual Reality Training for Beginners in Durban	-	Sthabiso Mdledle-Democracy Development Program	-
Business, Technology	Putting Women and Youth at the Centre of the 4th Industrial Revolution	Durban ICC	Virtual Reality Technologies	-
Technology	Silicon Durbs Innovation Session	Innovate Durban Offices	-	-
Technology	4th Industrial Revolution Workshop	University of KwaZulu Natal, Howard College Campus, Innovation Centre	Silicon Durbs	-
-	2019 CESA Infrastructure Indaba	Durban ICC	UKZN Extended Learning	-
Business	Franchise & Entrepreneurs Expo	11 Walnut Road, 4001 Durban, KwaZulu-Natal	Consulting Engineers South Africa	-

CATEGORY	EVENT NAME	LOCATION	ORGANISER	WHEN
Technology	Fourth Industrial Revolution Summit for Economic Development	Durban ICC	FASA: Franchise Association of South Africa and Sparesboyz Durban	-
-	Beach Cleanup	uShaka Beach	Moses Kotane Institute	-
Data, Technology	Open Data Day	Innovation Centre, Gate 9, Rick Turner Road, UKZN	Living Eco	-
-	4th Annual Smart Procurement World KZN Conference and Expo	Durban ICC	Open Data South Africa	-
-	African Ports and Rail Evolution	Durban ICC	Smart Procurement World	-
-	SA AIDS Conference	Durban ICC	-	-
Industrial	Kwazulu-Natal Industrial Technology Exhibition	Durban Exhibition Centre	-	-
-	Bio Africa Convention	Durban ICC	KZN Industrial Technology Expo and Specialised Exhibitions	-
-	Social Media Week Durban	Hilton Durban	-	-
-	NAACAM Show	Durban ICC	-	-
-	IDC South Africa CIO Summit	Fairmont Zimbali resorts, Durban, South Africa	-	-
-	Saga Conference & Exhibition	Southern Sun Elangeni & Maharani, Durban, South Africa	IDC	-
-	Social Media Conference - Durban	Durban, South Africa	-	-
-	Leading Women Summit	Durban ICC	-	-

CATEGORY	EVENT NAME	LOCATION	ORGANISER	WHEN
-	Tomorrow's Leaders in Training	65 Masabalala Yengwa Avenue, Durban	-	-
Technology	Google Cloud Study Jam	DUT Ritson Campus, 6 Winterton Walk	-	-
Technology	Azure Global Bootcamp - Durban 2019	2 Maryvale Rd, Dawncliffe, Westville, 3629	Google Developer Group	-
Technology	Fourth Industrial Revolution Summit for Economic Development	Durban ICC	Azure Transform	Q2
Technology	Social Media Week Durban	Hilton Durban	-	Q2
Technology	Azure Global Bootcamp - Durban 2019	2 Maryvale Rd, Dawncliffe, Westville, 3629	Azure Transform	Q2
Technology	Sharepoint Saturday	Derivco	Derivco	Q2
Entrepreneurship	4th Annual Smart Procurement World KZN Conference and Expo	Durban ICC	Smart Procurement World	Q2
Entrepreneurship	Silicon Durbs Innovation Session	Innovate Durban Offices	Silicon Durbs	Q2
Investment	IDC South Africa CIO Summit	Fairmont Zimbali resorts, Durban, South Africa	-	Q2
Technology	4th Annual Smart Procurement World KZN Conference and Expo	Durban ICC	Smart Procurement World	Q3
Technology	KZN Industrial Technology 2019	Durban Exhibition Centre	KZN Industrial	Q3
Technology	Social Media Week Durban	Hilton Durban	TBC	Q3
Entrepreneurship	African Ports and Rail Evolution	Durban ICC	-	Q3

CATEGORY	EVENT NAME	LOCATION	ORGANISER	WHEN
Entrepreneurship	Kwazulu-Natal Industrial Technology Exhibition	Durban Exhibition Centre	KZN Industrial Technology Expo and Specialised Exhibitions	Q3
Entrepreneurship	KZN Music Imbizo	Moses Mabhida Stadium	KZN Music Imbizo	Q3
Entrepreneurship	Durban Business Fair	Various locations	BSU	Q3
Entrepreneurship	Manufacturing Indaba	Durban ICC	Durban ICC	Q3
Investment	SA AIDS Conference	Durban ICC	-	Q3
Investment	IDC South Africa CIO Summit	Fairmont Zimbali resorts, Durban, South Africa	-	Q3
Investment	Digital Investor Relations	Online/Sandton	JSE	Q3
Entrepreneurship	African Ports and Rail Evolution	Durban ICC	DMG Events	Q4
Entrepreneurship	Saga Conference & Exhibition	Southern Sun Elangeni & Maharani, Durban, South Africa	Saga Events	Q4
Entrepreneurship	Social Media Conference - Durban	Durban ICC	TBC	Q4
Entrepreneurship	Global Entrepreneurship Week	Various locations across Durban	Various	Q4

APPENDIX 6.3: RESEARCH CITATIONS

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² Ibid.

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⁸ <https://www.innovation-cities.com/innovation-cities-index-2018-city-rankings-faq/13948/>

⁹ World Economic Forum. (2016). Global Agenda Council on the Economics of Innovation: Evaluation of Leading Indicators of Innovation. From: http://www3.weforum.org/docs/WEF_GAC_on_Economics_Innovation.pdf

¹⁰ KZN EDTEA. (2017). KwaZulu-Natal Innovation Strategy 2017-2027.

¹¹ For the purposes of this Innovation Publication, the link to innovation has been defined within the parameters of courses in STEM.

¹² SET courses include majors in Engineering, Health Sciences, Life Sciences, Physical Sciences, Computer Sciences and Mathematical Sciences.

¹³ Specific disaggregated KZN information was not available in the source document.

¹⁴ <http://www.dhet.gov.za/DHET%20Statistics%20Publication/Statistics%20on%20Post-School%20Education%20and%20Training%20in%20South%20Africa%20%202017.pdf>

¹⁵ <http://www.dhet.gov.za/DHET%20Statistics%20Publication/Statistics%20on%20Post-School%20Education%20and%20Training%20in%20South%20Africa%20%202017.pdf>

¹⁶ Calculations based on R&D expenditure for financial years whereas GDP is based on calendar years

¹⁷ Department of Science and Technology. (2017). South African National Survey of Research and Experimental Development. From: https://www.dst.gov.za/images/2018/SA-RD-SURVEY-STATISTICAL-REPORT-201617_WEB.pdf

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¹⁹ SAVCA. (2018). SAVCA 2018 Venture Capital Industry Survey: Covering the 2017 Calendar Year.

²⁰ Internet access based on at least one person in the household accessing the internet through each of the access mediums

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Mangosuthu University of Technology

TECHNOLOGY STATION IN CHEMICALS

The Mangosuthu University of Technology - Technology Station in Chemicals (MUT-TSC) is situated in Umlazi, and provides technological support and promotes innovation for Small Medium Enterprises in the Manufacturing and Chemical sector.

TECHNOLOGY COMPETENCIES AND OFFERINGS

Pilot Batch Processing Unit

Process Design and Development

Product Design, Development and Improvement

Setting Product Quality Standards

Technology Audits

Technology Information Support

Training

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ABOUT INNOVATE DURBAN

Innovate Durban is a non-profit company (NPC) aimed at stimulating innovation within Durban. Its focus is to support and promote innovation by creating platforms that will build and develop the innovation ecosystem in Durban.

VISION

To be a leading innovation agency that transforms the region into a dynamic and inclusive innovation ecosystem.

MISSION

Innovate Durban will nurture, co-ordinate and facilitate an inclusive innovation ecosystem through utilising the 4th industrial revolution for economic growth and job creation, with a focus on industry, spatially excluded or marginalised persons, the public sector and SMMEs

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