

INNOVATE
DURBAN

THE STATE OF
INNOVATION
IN KWAZULU-NATAL

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ABOUT

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

Nurture, coordinate 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 small, medium and micro enterprises.

ABOUT THE INNOVATION PUBLICATION

As part of Innovate Durban's objective to celebrate innovation, this Innovation Publication was developed. 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 KwaZulu-Natal (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 third edition of the innovation publication, 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.**

FOREWORD

This third edition of the Innovation Publication is published in the midst of the Covid-19 pandemic. South Africa has not yet escaped the negative economic impact of Covid-19 - despite Gross Domestic Product rising by 1.1% in the first quarter of 2021, giving an annualised growth rate of 4.6%.

The need for innovation has never been as urgent as businesses adapt to respond to these unusual times and requirements. The retrenchment of skilled personnel has led to increased home innovation and startups, and the rapid transition toward virtual methods to conduct business is continuing to provide opportunities for innovation. See Section 4, 'Impact of Covid-19 on Innovation' for further insights on how the pandemic has impacted innovators in KZN.

This edition contains 35 indicators, of which five have been introduced this year. This year sees the introduction of design patents, film copyrights, patent grants, companies registered, and companies expected to submit taxes (on a national level). In addition, a Covid-19 Impact Survey was conducted, which aims to provide reference for the overall impact of Covid-19 on innovators in KZN and South Africa. Also included in the report, is a brief overview of the state of grassroots innovation in KZN.

KZN remains a top performer in the number of enrolments and graduates across the maths and science fields at secondary schools. The University of KwaZulu-Natal is ranked first in South Africa for the number of PhD graduates and publication outputs, and has the second highest SET enrolments in the country. The Durban University of Technology has made marked improvements, specifically in Doctoral enrolment and ranking. All KZN universities show an upward trend in publication outputs. KZN also boasts the highest completion rate for TVET N6 Engineering Studies (shared with Limpopo province).

Despite growth in some areas, there has been a general decline in performance across several indicators between 2018 and 2019. While improvements were seen in the overall R&D expenditure of the country, KZN faced reduced expenditure in 2019, prior to Covid-19. It is concerning that R&D expenditure and venture capital investment in KZN still remains significantly lower than in Gauteng and the Western Cape. The substantial reduction in investments has negatively impacted the KZN Innovation Growth Index, with a significantly large fall from 12 in 2018, to -21 in 2019. Furthermore, the number of KZN households that have internet access is below the national average of 63.3%, at 55.7% (a reduction from the previous period).

Through numerous programmes aimed at providing support and funding to startups, as well as penetrating low-income areas through innovation labs, Innovate Durban aims to make a positive impact on these indicators and hopes to see growth in coming years.

Innovate Durban is proud to showcase five new innovators in this edition and encourages innovators to take note of their advice and learn from their experiences. Some common advice from innovators includes the importance of staying true to one's identity and purpose, while practising authenticity and honesty, and the significance of building a strong foundation with originality.

¹ StatsSA (2020) 'GDP rises in the first quarter of 2021'

² Assessment based on a Covid-Impact survey conducted by Innovate Durban in KZN, and various 3rd party reports.



WHAT THE STUDY COVERS



PEOPLE

Relates to the human capital and knowledge generated that enables and accelerates innovation and creativity.



INVESTMENT

Describes the amount of investment in terms of rand value that is directed towards innovation, research and development in various sectors.



INFRASTRUCTURE

Measures internet access in KZN in comparison to other provinces in South Africa.



ECOSYSTEM

Relates to the environment within which innovation takes place and includes events and funding instruments.



IMPACT

Measures the benefits of innovation across various areas including revenue, employment and economy.


The table below is a summary of all indicators used to measure innovation:

Category	Sub-category	Indicator
People	High school education	National Senior Certificate Performance in Mathematics (2017-2020)
		National Senior Certificate Performance in Physical Sciences (2017-2020)
	TVET education	Students who completed N3 Engineering Studies (2019)
		Students who completed N6 Engineering Studies (2019)
	Public university education	Higher Education institutions enrolment (2017-2019), SET
		Higher Education institutions graduates (2017-2019), SET
		Ranking of 26 universities in South Africa for SET enrolment and graduation
		Doctoral enrolment (2017-2019), all degrees
		Doctoral graduates (2017-2019), all degrees
		Ranking of 26 universities in South Africa for Doctoral enrolment and graduation
		UNISA enrolment (2017-2019), SET & Doctoral degrees

		UNISA graduates (2017-2019), SET & Doctoral degrees
	Knowledge generation	Overall publication output units (2016-2019)
		Ranking of 25 universities in South Africa for research publications
		Patents lodged in South Africa (2016/17-2019/20)
		Patent grants in South Africa (2010-2020)
		Design patents lodged in South Africa (2015/16-2019/20)
		Film copyrights lodged in South Africa (2015/16-2019/20)
		Trademark applications in South Africa (2016-2019)
Investment	Research & development expenditure	R&D expenditure by province (2008/9-2018/19)
		KZN R&D expenditure by source (2008/9-2018/19)
		GERD as a % of GDP by province (2009/10-2018/19)
		BERD as a % of GDP by province (2009/10-2018/19)
	Venture capital	Value contribution by type of fund (2018-2019)
		Number of investments (2010-2019)
		Value of investments (2009-2019)
		Value contribution by stage of deal (2017-2019)
		Value contribution by location of investee head office (2017-2019)
	Infrastructure	Internet access
Ecosystem		Number of innovation events held in KZN (2019-2021)
		Number of funds towards innovation in KZN (2019-2021)
Impact		Employment in the telecommunications sector (2015-2020)
		Company registrations in South Africa (2015/16-2019/20)
		Registered businesses with taxable earnings in SA (2016-2020)
		Overall (growth) innovation index (2018-2019)

HIGHLIGHTS

From a **people** perspective, it has been a year of mixed success for innovation in KZN. Although most indicators have decreased in 2019/20, KZN is still performing relatively well in comparison to other provinces.



KZN had the highest number of students passing maths (18,869) and science (18,570) with 40% or more in 2020, when compared to other provinces. Maths passes rose by 9%, while Science passes declined by 8% in 2020.

In 2019, KZN TVET colleges had the second highest number of students to complete N3 Engineering Studies (6,970), and the third highest number of students to complete N6 Engineering Studies (4,283), when compared to other provinces.

Across the four universities in KZN, Durban University of Technology (DUT), Mangosutho University of Technology (MUT), University of KwaZulu-Natal (UKZN), and University of Zululand (UniZulu) in 2019:



Enrolment and graduation for Science, Engineering and Technology (SET) degrees increased to 47,503 and 9,514 respectively. DUT showed significant improvement with an increase of 27% in doctoral enrolments in 2019.




Enrolment and graduation for all Doctoral degrees increased to 4,168 and decreased to 527 respectively.



Publication outputs increased by 10% to 2,941. Additionally, KZN universities show an upward trend in publication outputs.

Nationally, **resident patent applications fell by 8% to 2,205 in 2019/20; resident patent grants fell by 14% from 2018 to 2019; resident trademark applications fell by 4% to 22,003 in 2019; and film copyright applications declined by 44% in 2019/20. Local design patent applications rose by 7% to 982.**

The value of **investment** decreased across most indicators in the year of review and still remains significantly lower than Gauteng and the Western Cape.



KZN R&D expenditure was R4.07 billion in 2018/19, down by 2% from 2017/18. Most of this expenditure was in the business and higher education sectors.

KZN GERD as a percentage of GDP decreased by 0.04% to 0.5% in 2018/19, compared to South Africa's GERD as a percentage of GDP which was 0.75% for the same period, and against a national target of 1.5%.

Investment by venture capitalists into businesses with head offices in KZN decreased from 6.8% in 2018 to 2% in 2019, when compared to other provinces.



In terms of a national perspective on investment contribution (value) by fund type, angel investors contributed 5.7% to all deals, captive other, captive corporate, captive government and independent funds contributed 10.2%, 15.9%, 30.1% and 38.1%, respectively.

The primary **infrastructure** indicator is internet access, 55.7% of KZN households in 2019 have internet access compared to the national average of 63.3%. This has decreased from 59.4% in 2018.

Indicators of the innovation **ecosystem** include the number of innovation events and funding instruments.



There were 24 innovation events in KZN in 2021, down from 40 in 2020.



There are 404 innovation funding instruments with medium-high relevance to the Innovate Durban community.

The KZN Innovation Growth Index for 2019 is -21%, reflective of decreasing investment in innovation in KZN.

From an **impact** perspective, employment in the telecommunications sector in South Africa increased from 33,782 in 2019 to 34,329 in 2020. Furthermore, only 37% of those employed are female, which is 6% higher than 2019. The two new impact indicators reflecting the number of new businesses in South Africa both declined in 2019, showing a decrease in business health.

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ACRONYMS

4IR	Fourth Industrial Revolution
BERD	Business Expenditure on Research and Development
CIPC	Companies and Intellectual Property Commission
DTI	Department of Trade, Industry and Competition
DUT	Durban University of Technology
EDTEA	Department of Economic Development, Tourism and Environmental Affairs
GDP	Gross Domestic Product
GERD	Gross Domestic Expenditure on Research and Development
KZN	KwaZulu-Natal
MUT	Mangosuthu University of Technology
NMMM	Nelson Mandela Metropolitan Municipality
R&D	Research and Development
SARS	South African Revenue Service
SBI	Small Business Institute
SET	Science, Engineering and Technology
STEM	Science, Technology, Engineering and Mathematics
TIA	Technology Innovation Agency
TVET	Technical and vocational educational training
UCT	University of Cape Town
UKZN	University of KwaZulu-Natal
UNISA	University of South Africa
UP	University of Pretoria
Wits	University of Witwatersrand
UniZulu	University of Zululand

1. INTRODUCTION

The annual Innovation Publication is published by Innovate Durban in response to a demand from **government stakeholders** who are showcasing KwaZulu-Natal (KZN) as an investment destination and developing strategic interventions, **investors** who are scoping investment locations and looking for a healthy innovation ecosystem, and **innovators** who are trying to understand the environment they are operating in and looking to learn from fellow innovators.

The Innovation Publication is one of several research outputs published by Innovate Durban in order to achieve our desired impact to increase employment, create businesses and ignite investment, through growing the innovation ecosystem in KZN.

1.1 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”**. 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. There are different types of innovation (not mutually exclusive): social innovations (which meet a social need), commercial innovations (which lead to improved business success and profits) and grassroots innovations (which are community-led solutions). Innovation goes beyond science, technology, engineering and mathematics (STEM). 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.”

³ Other outputs include the Funding Map, Ecosystem Map, and Events Calendar

<https://ecosystems.andeglobal.org/snapshot/durban-south-africa/2019/>

<https://www.innovate.durban/funding-map/>

<https://www.innovate.durban/events-calendar/>

⁴ Gault, F. (2016). Defining and Measuring Innovation in all Sectors of the Economy: Policy

Relevance. From: <https://www.oecd.org/sti/008%20-%20BS3%202016%20GAULT%20Extending%20the%20measurement%20of%20innovation%20.pdf>

⁵ Isaacson, W. (2014). Why Innovation Needs Both Art and Science. From:

<https://www.weforum.org/agenda/2014/10/walter-isaacson-innovation-humanities-sciences/>

1.2 MEASURING INNOVATION

The varied nature of innovation makes it difficult to measure, however it is essential that it is being measured. There are various publications and organisations that have been working on measuring innovation (see the acknowledgements) and we have drawn on these to identify the indicators used in this report, categorised as: people, investment, infrastructure, ecosystem and impact.

This third iteration of the report attempts to address some of the shortcomings identified in the previous version, for example:

- The Moses Kotane Institute (MKI) developed a research piece on grassroots innovation, and a summary of this is included as section 5.
- Design and film patent applications are included this year to highlight the importance of art in innovation.
- Impact indicators have grown to include the number of new businesses registered and submitting taxes.

Of greatest concern with the data, is the lack of availability of data at a provincial level. Essential indicators, such as the number of startup businesses and the number of patents registered are not available for KZN. We are continuously working to improve indicators each year and welcome any feedback on how we can better measure innovation.

1.3 REPORT STRUCTURE

This report first provides innovation indicators under the categories of people, investment, infrastructure, ecosystem and impact. It then showcases five local innovations (SA Rebuilders, Hydra Power Pty Ltd, Get2Natural Beauty, Bioplastics and Biobricks, and Greenheart Energy). It provides research briefs on the impact of Covid-19 on innovation, and the state of grassroots innovation in KZN. The conclusion provides recommendations for future research, and is followed by the acknowledgements.

This report and its data are freely available and we encourage it to be used and shared widely.

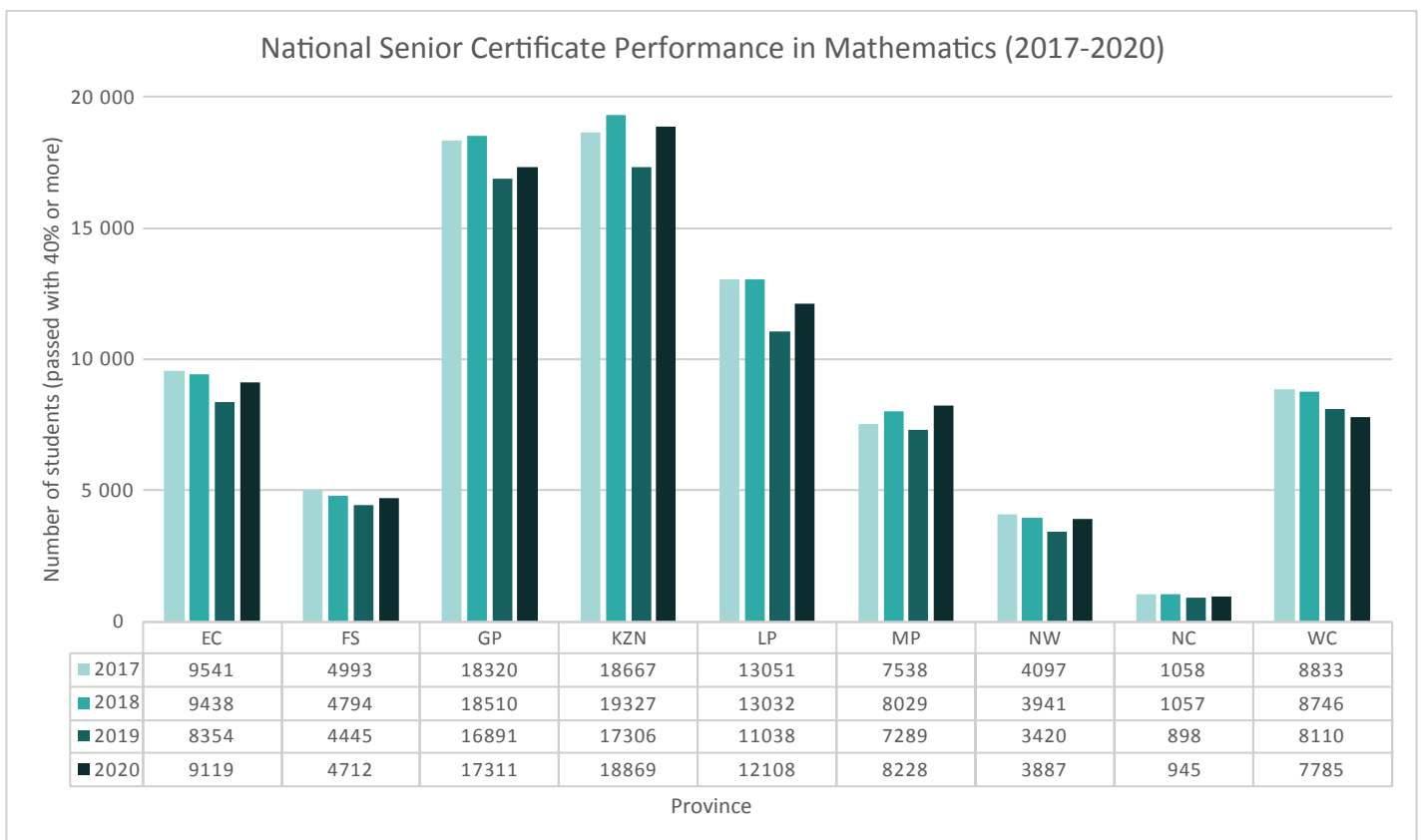
2. THE STATE OF INNOVATION IN KZN

2.1 PEOPLE

2.1.1 HIGH SCHOOL EDUCATION

The charts below show the performance of matriculants in Mathematics (maths) and Physical Sciences (science) which are key subjects impacting the future health of the innovation ecosystem.

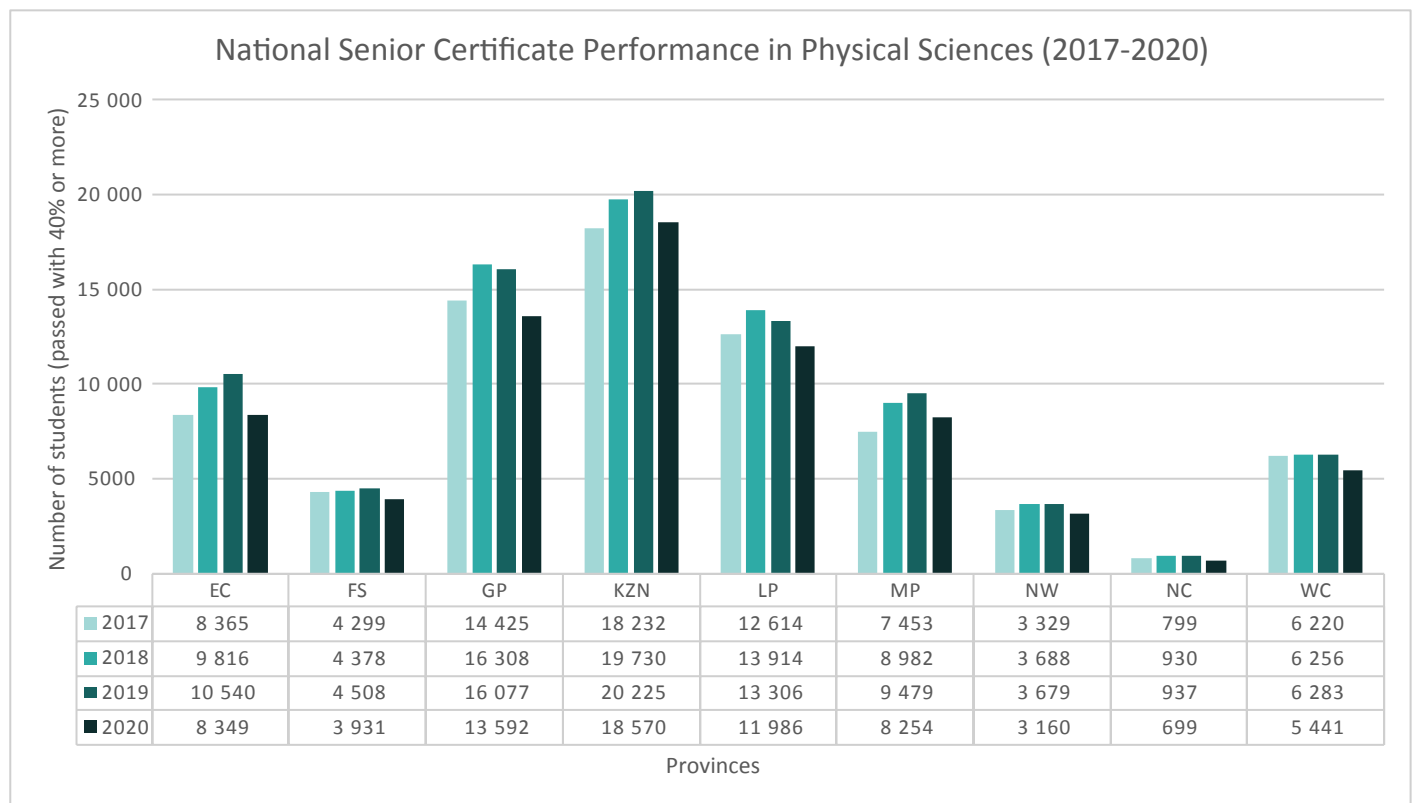
Figure 1. National Senior Certificate Performance in Mathematics (2017-2020)



Source: Department of Basic Education (2019; 2020)

The chart above shows the number of matriculants who passed the maths subject with a pass mark of 40% and above, between 2017 and 2020. The chart demonstrates that KZN has the highest number of maths graduates (18,869) across all three years (11% of the national pass rate in 2020). The number of students in KZN who passed maths in 2020 was 9% higher than in 2019. This trend aligns with an increased national student pass rate of 6.7% in 2020. Western Cape has the highest provincial pass rate for maths at 54.4%, despite having fewer graduates (5% of the national pass rate in 2020).

Figure 2. National Senior Certificate Performance in Physical Sciences (2017-2020)



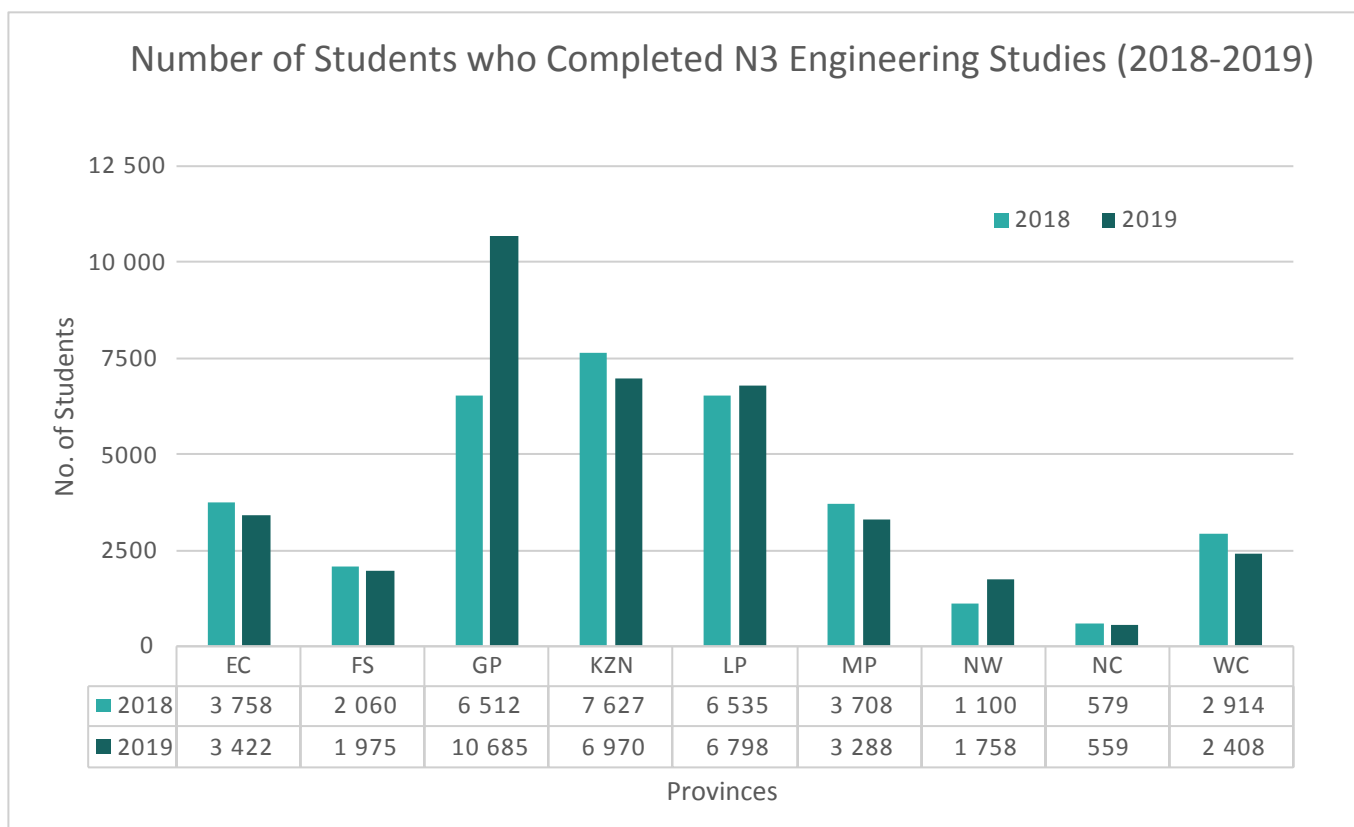
Source: Department of Basic Education (2020)

The chart above shows the number of matriculants who passed Science with a pass mark of 40% and above, between 2017 and 2020. As with Maths, KZN has the highest number of science students who passed (18,570 or 11% of total students who passed in SA) in 2020. Unlike the Maths statistics, the number of students who have graduated has decreased from 2019 to 2020. The general trend in pass rates shows a decline across all provinces over the two-year period. KZN performance in science is at 46%, slightly higher than the national average of 42.4%. Western Cape obtained the highest pass rate for Science in 2020, at 57.5%

2.1.2 TVET EDUCATION

The charts below show performance in Engineering Studies for students in TVET colleges. The exit points which are reported below are N3 level, which is a Grade 12 equivalent, and N6, which is a post-matriculation qualification.

Figure 3. Students who completed N3 Engineering Studies (2018-2019)

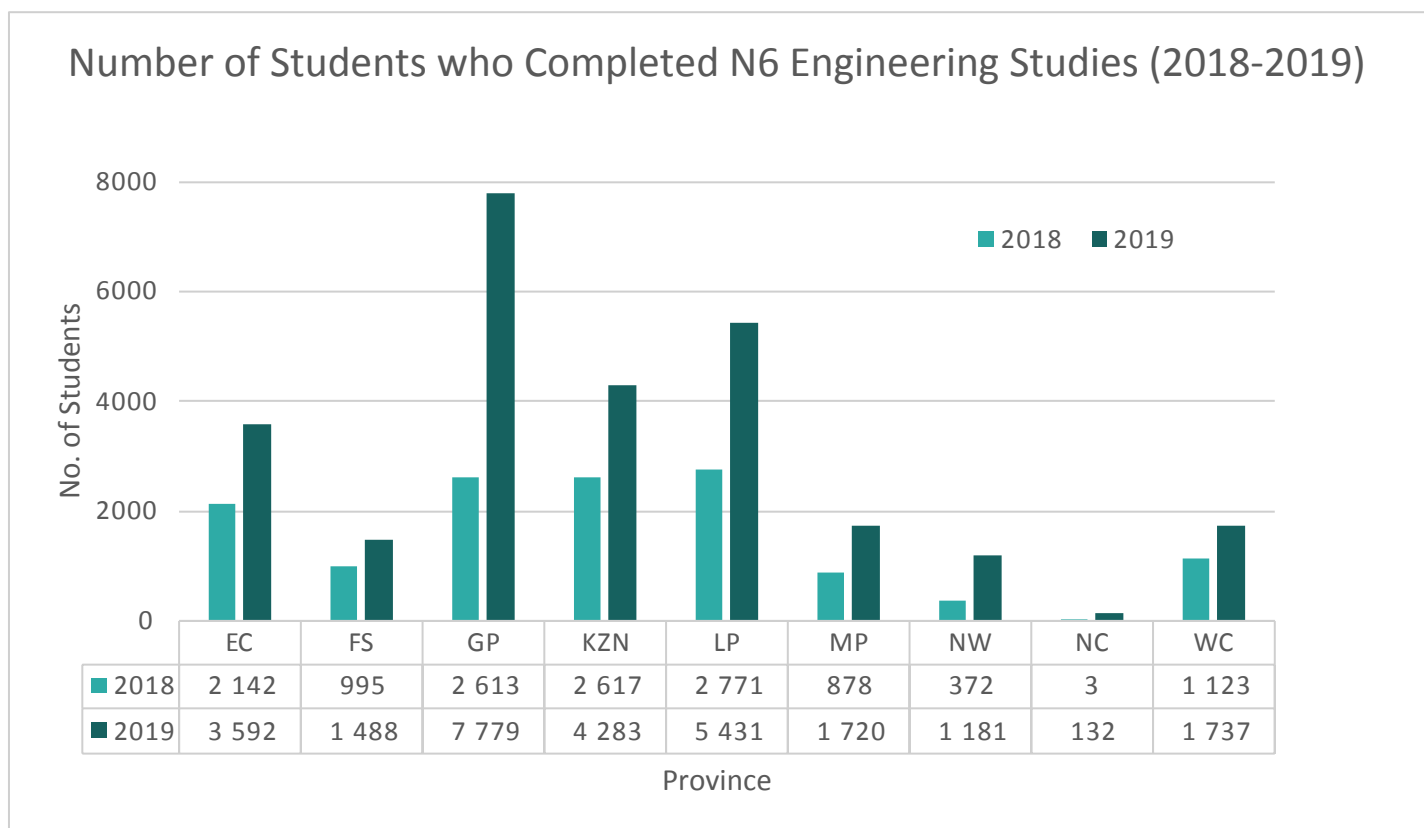


Source: Department of Higher Education and Training (2020)

The charts above show that Gauteng TVET colleges had the highest number of students who completed N3 Engineering Studies (10.685) in 2019, followed by KZN (6,970) and Limpopo (6,798). In terms of completion rate⁶, students in Gauteng experienced the highest completion rate (71%). The overall rate of completion declined from 2018 to 2019 across all provinces, with KZN (65%) experiencing a 20% drop in the rate of completion.

⁶ Completion rate is the number of students who finish and pass a specific subject per matric year, as a percentage of the total number of students enrolled in the same subject.

Figure 4. Students who Completed N6 Engineering Studies (2018-2019)



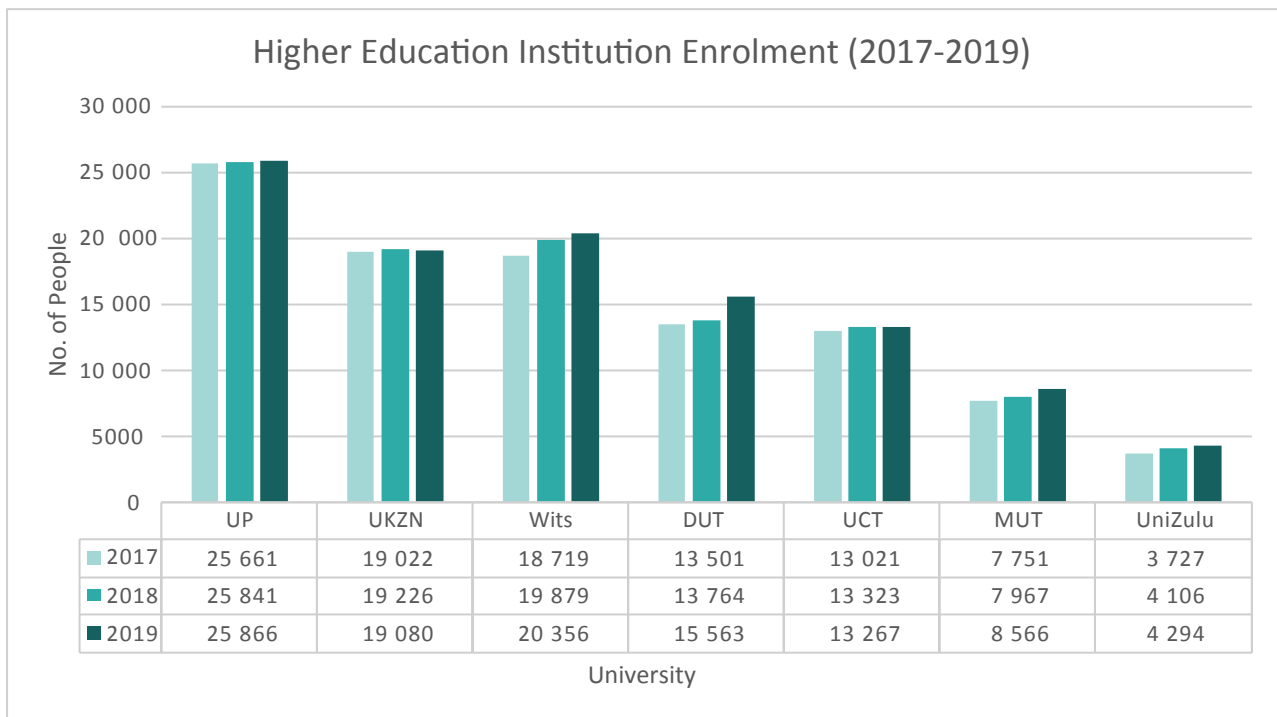
Source: Department of Higher Education and Training (2020)

The charts above illustrate that Gauteng, Limpopo and KZN had the highest number of students who completed N6 level Engineering Studies with 7,779, 5,431 and 4,283 students, respectively. The completion rates for N6 level in Engineering Studies was highest amongst students in Limpopo (94%), KZN (94%) and the Eastern Cape (93%), followed closely by North-West (92%) and Free State (92%). Completion rates are above 80% across all nine provinces, with seven provinces boasting rates above 90%.

2.1.3 PUBLIC UNIVERSITY EDUCATION

The following charts explore enrolment and graduation from higher education institutions in KZN for Science, Engineering and Technology (SET) courses, as well as all Doctoral degrees, in comparison to some selected universities in South Africa.

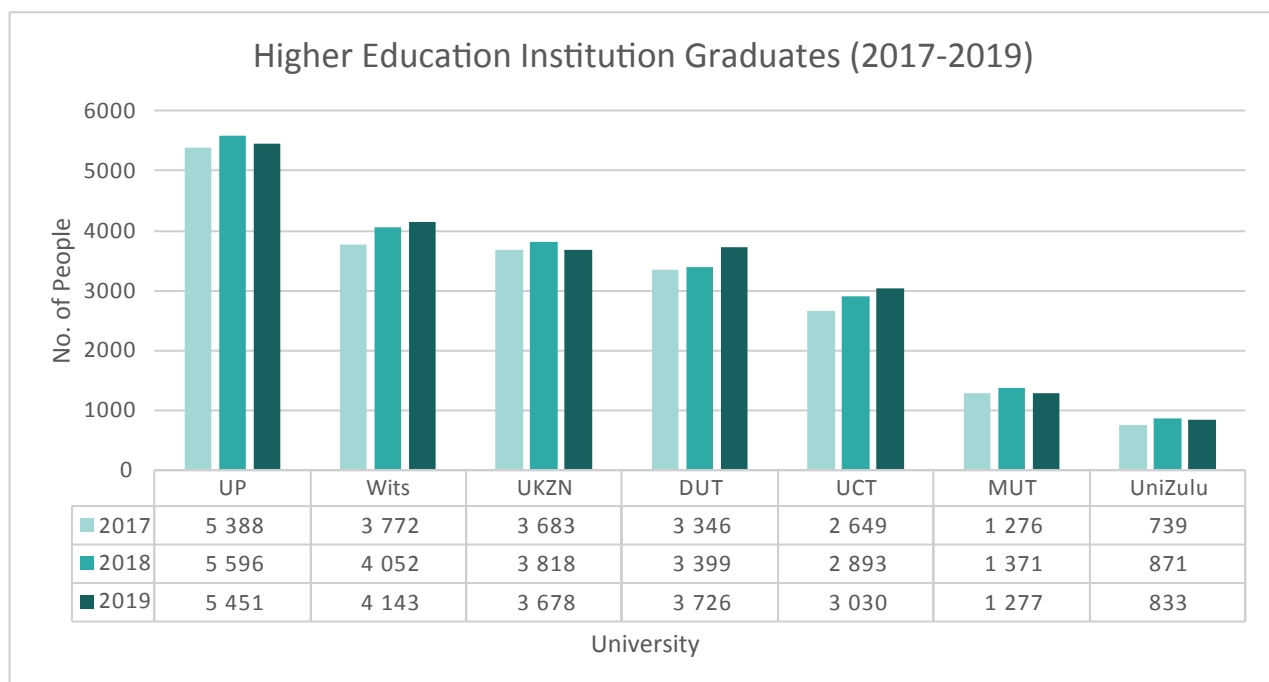
Figure 5. Higher Education Institutions Enrolment (2017-2019)



Source: Department of Higher Education and Training (2019; 2020)

The chart shows higher overall enrolment numbers in 2019 than 2018 for SET degrees at all universities, with the exception of a decline in enrolments for the University of KwaZulu-Natal (UKZN) and the University of Cape Town (UCT). The Durban University of Technology (DUT) had the highest number of new enrolments compared to the previous year, with 1,536 more students enrolled than in 2018.

Figure 6. Higher Education Institutions Graduates (2017-2019)



Source: Department of Higher Education and Training (2019; 2020)

The chart above shows the number of students who graduated from SET degrees in 2017, 2018 and 2019 for selected universities. The University of Pretoria (UP) had the highest total number of students who graduated from SET degrees in 2019 (5,451), followed by the University of the Witwatersrand (Wits) (4,143) and then DUT (3,726). While graduates from UKZN, Mangosuthu University of Technology (MUT) and the University of Zululand (UniZulu) all declined in 2019, DUT had the greatest increase in graduations in 2019, when compared to 2018.

The table below shows the ranking of 26 universities in South Africa for SET enrolment and graduation.

Table 1.1. Ranking out of 26 universities in South Africa for SET enrolment

University	2017	2018	2019	2019 Movement
UKZN	4	5	5	-
DUT	9	9	7	↑
MUT	19	19	18	↑
UniZulu	23	23	21	↑
UP	2	2	3	↓
Wits	5	4	4	-
UCT	10	10	10	-
UNISA	1	1	1	-

Table 1.2. Ranking of 26 universities in South Africa for SET graduation

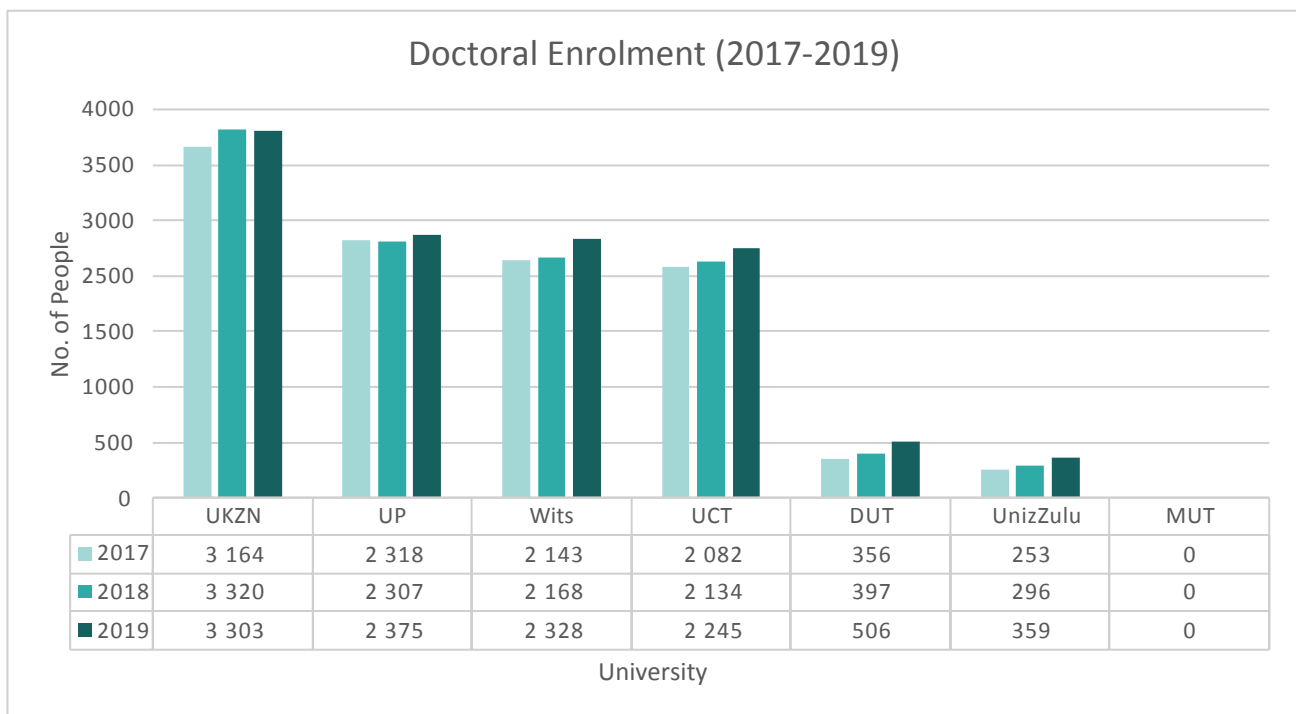
University	2017	2018	2019	2019 Movement
UKZN	6	7	9	↓
DUT	9	9	6	↑
MUT	19	19	19	-
UniZulu	24	23	21	↑
UP	1	1	2	↓
Wits	4	5	4	↑
UCT	11	10	10	-
UNISA	7	4	8	↓

Source: Department of Higher Education and Training (2019; 2020)

The University of South Africa (UNISA) maintained its number one position in terms of enrolment in 2019, while UP dropped to third place. Wits and UKZN also maintained their rankings in the fourth and fifth position, respectively. DUT, MUT and UniZulu all improved their rankings from 2018-2019.

In terms of graduates, improvement in overall rankings can be seen for DUT which moved from ninth to sixth place, Wits which moved from fifth to fourth place, and UniZulu which moved from twenty-third to twenty-first place. UKZN fell to ninth position in 2019 from seventh position in 2018, while UP was knocked from first position to second. UNISA experienced the biggest fall, from fourth place in 2018 to eighth place in 2019.

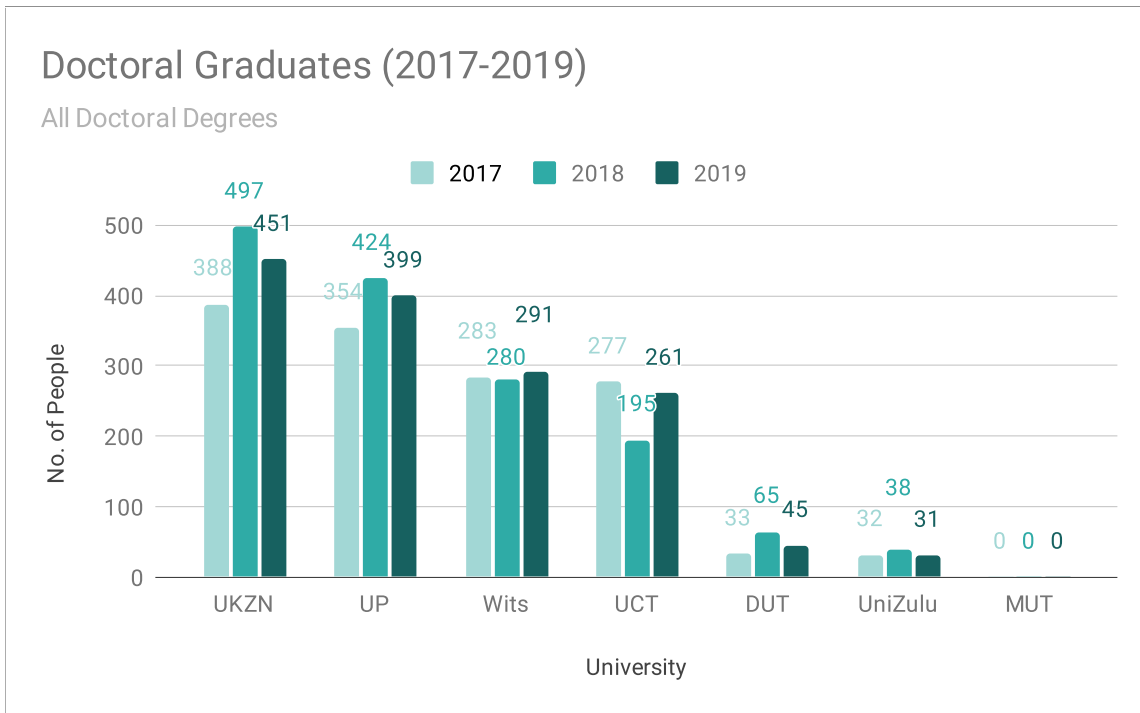
Figure 7. Doctoral Enrolment (2017-2019)



Source: Department of Higher Education and Training (2019; 2020)

The chart above shows enrolment into Doctoral degree programmes in selected universities. Doctoral degree enrolments declined at UKZN from 3,320 in 2018 to 3,303 in 2019. DUT, once again, shows significant improvements with an increase of 27% in Doctoral enrolments in 2019. All other universities in the chart show higher enrolment except MUT. MUT had no Doctoral enrolments in both 2018 and 2019.

Figure 8. Doctoral Graduates (2017-2019)



Source: Department of Higher Education and Training (2019; 2020)

The chart above shows higher graduation numbers in 2019 for Wits and UCT compared to 2018 for Doctoral degrees, whereas UKZN, UP, DUT and UniZulu show lower graduation numbers in 2019.

Table 2.1. Ranking of 26 universities in South Africa for Doctoral enrolment

University	2017	2018	2019	2019 Movement
UKZN	1	1	1	-
DUT	15	16	14	↑
MUT	24*	24*	24*	-
UniZulu	19	18	17	↑
UP	2	3	3	-
Wits	4	4	4	-
UCT	5	5	5	-
UNISA	3	2	2	-

Table 2.2. Ranking of 26 universities in South Africa for Doctoral graduates

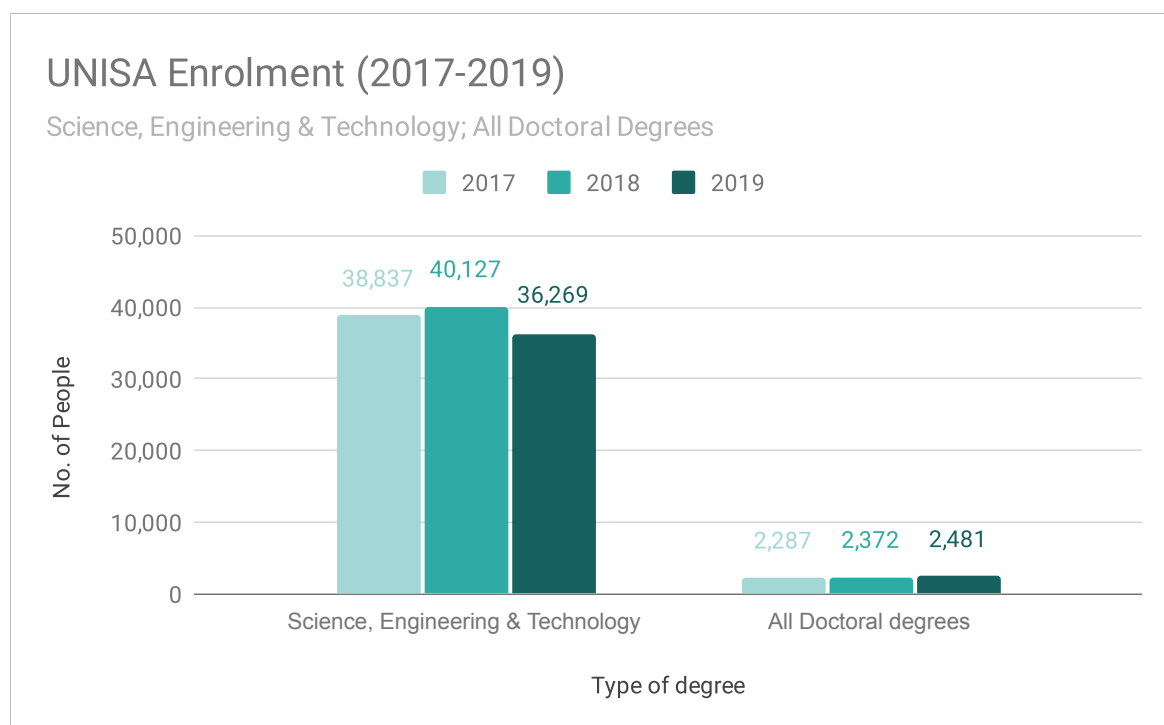
University	2017	2018	2019	2019 Movement
UKZN	1	1	1	-
DUT	13	14	15	↓
MUT	24*	24*	24*	-
UniZulu	17	17	19	↓
UP	2	2	2	-
Wits	5	5	6	↓
UCT	6	7	7	-
UNISA	4	3	4	↓

Source: Department of Higher Education and Training (2019; 2020)

UKZN remains in first place for both Doctoral degree enrolment and graduation in South Africa in 2019. DUT and UniZulu improved in the national doctoral enrolment rankings from 2018 to 2019. Rankings for Doctoral degree graduations declined for DUT, UniZulu, Wits and UNISA in 2019.

The following charts consider enrolment and graduation at UNISA separately since UNISA includes students from every province.

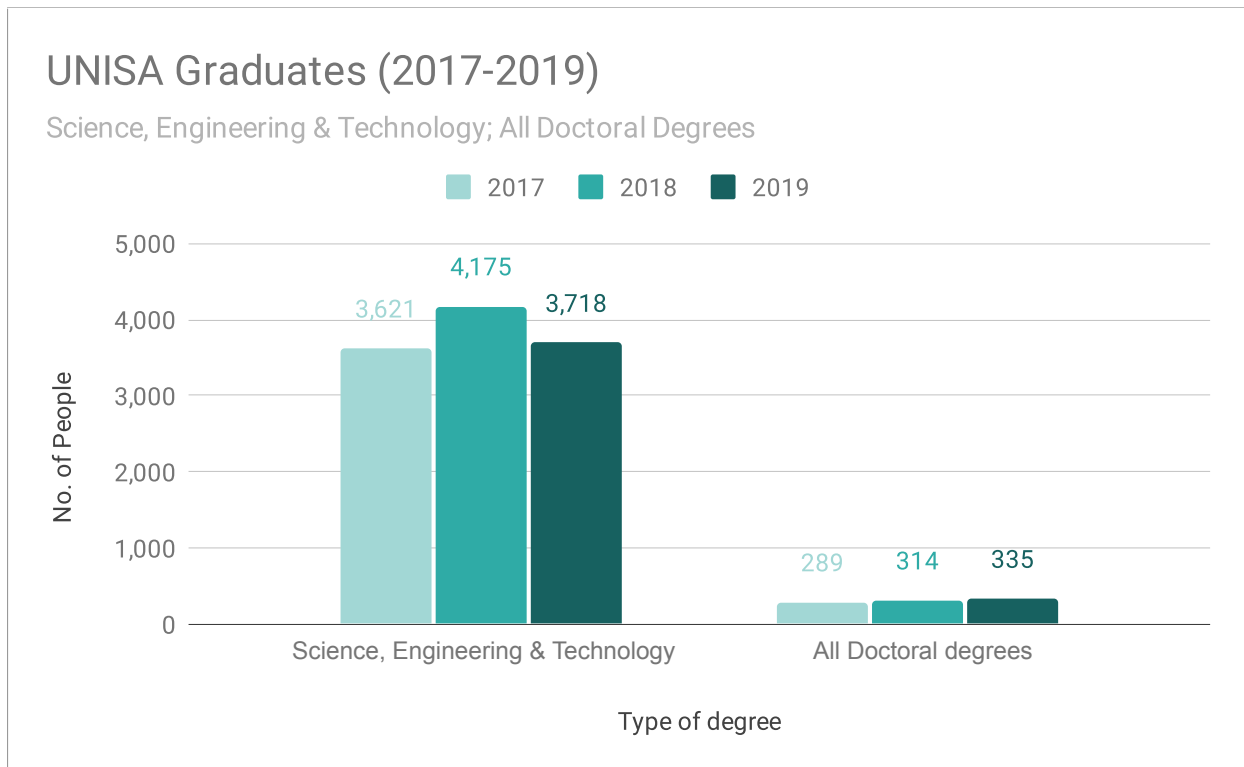
Figure 9. UNISA Enrolment (2017-2019)



Source: Department of Higher Education and Training (2019; 2020)

The chart above shows that enrolment for SET degrees declined between 2018 and 2019, while enrolment in Doctoral degree programmes increased from 2,372 in 2018, to 2,481 in 2019.

Figure 10. UNISA Graduates (2017-2019)



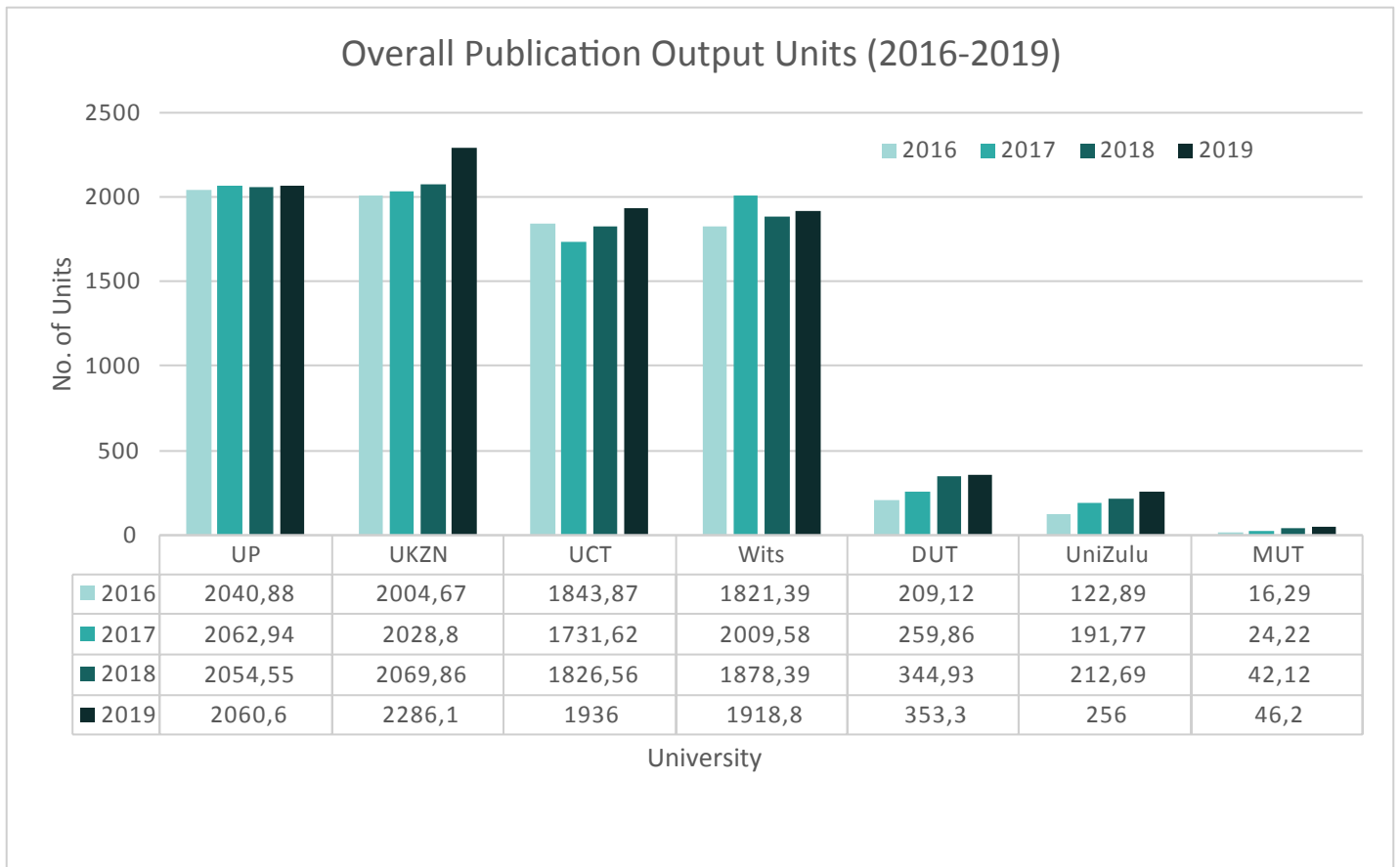
Source: Department of Higher Education and Training (2019; 2020)

The chart above shows that SET graduates at UNISA decreased from 4,175 in 2018 to 3,178 in 2019. However, doctoral degree graduates increased to 335 in 2019, from 314 the previous year.

2.1.4 KNOWLEDGE GENERATION

Publication units measure the amount of new knowledge generated through research at academic institutions. The following charts compare overall publication units from selected universities as well as showing a national ranking of 26 universities.

Figure 11. Overall Publication Output Units (2016-2019)



Source: Department of Higher Education & Training (2020)

Between 2016 and 2019, KZN universities show an upward trend in publication outputs. Furthermore, UKZN produced the highest overall publication outputs in 2018 and 2019.

Table 3. Ranking of 25 universities in South Africa for research publications

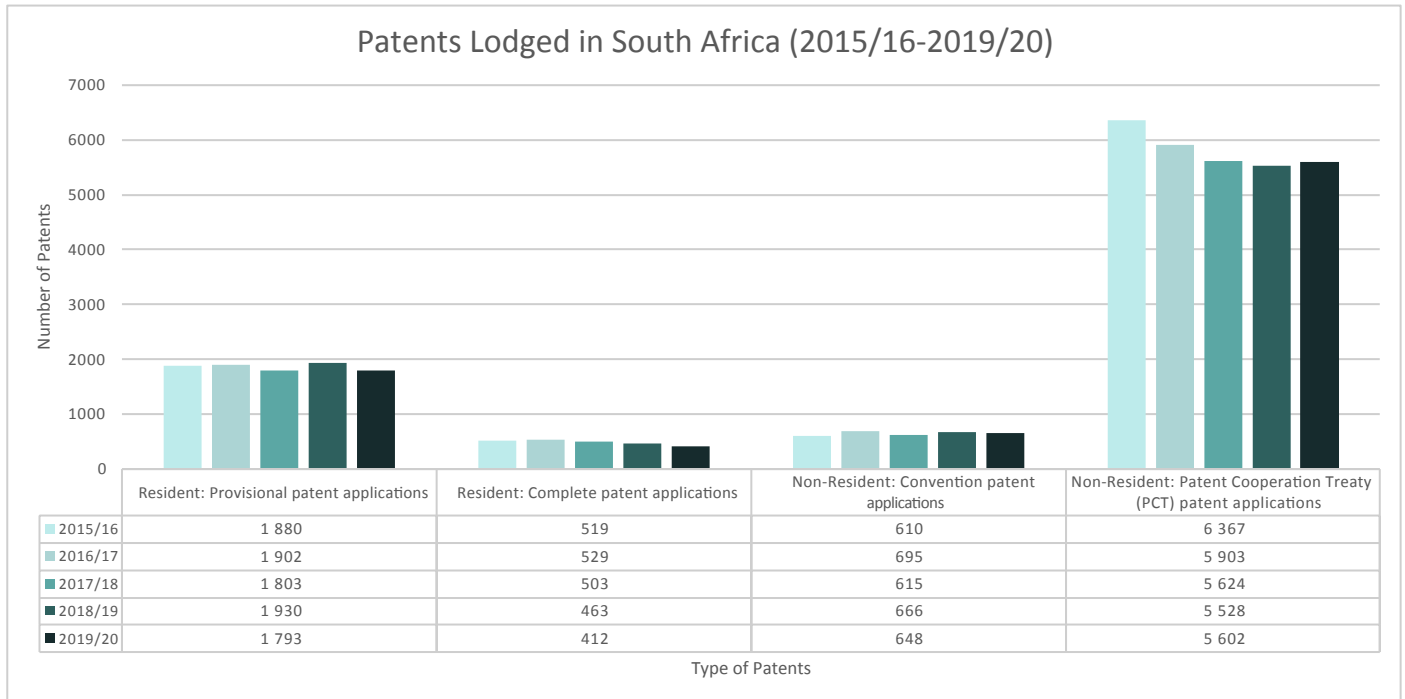
University	2016	2017	2018	2019	Change
UP	1	1	2	3	
UKZN	2	2	1	1	-
UCT	3	6	5	5	-
Wits	4	3	4	6	↓
DUT	17	16	13	16	↓
UniZulu	19	18	18	17	↑
MUT	25	24	25	25	-

Source: Department of Higher Education & Training (2020)

The overall national rankings across 26 universities show that in 2019, UKZN remained at first place, with UP falling to third position. Wits dropped by two spots in 2019, while DUT fell by three places. UCT and MUT remained at fifth and twenty-fifth place, respectively, from 2018 to 2019.

The following charts focus on intellectual property in the form of patents, trademarks, designs and film copyrights lodged and granted annually between 2016/17 and 2019/20.

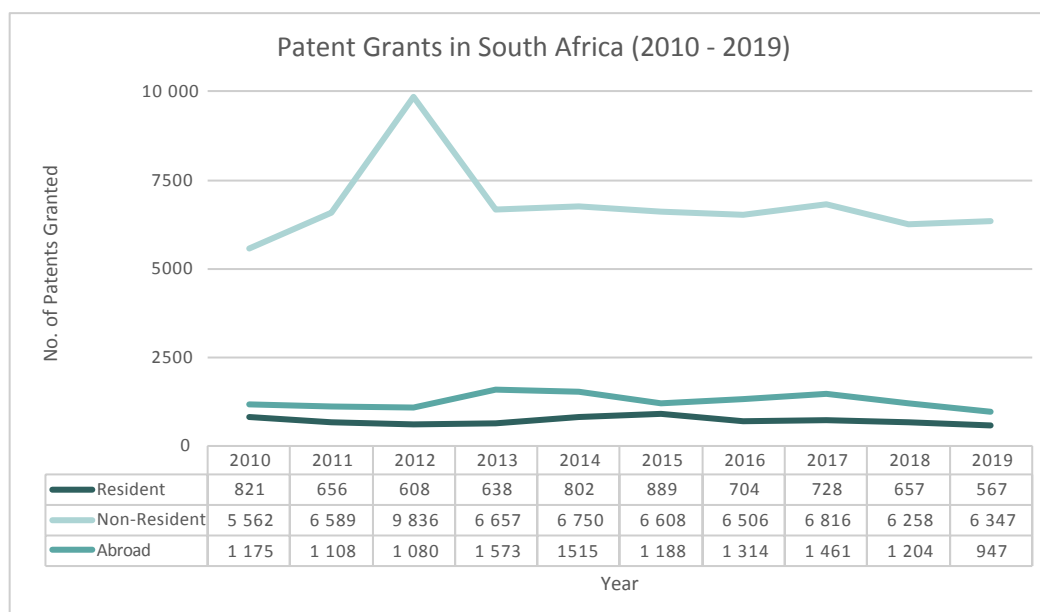
Figure 12. Patents Lodged in South Africa (2016/17-2019/20)



Source: Companies and Intellectual Property Commission (CIPC) (2017/18; 2019/20)

Provisional patent and complete patent applications constitute the total local patent applications submitted. Convention patent and PCT patent applications constitute the total foreign patent applications filed. In 2019/20 the total local filings amounted to 2,205, showing a decrease compared to 2018/19 which saw a total of 2,393 local applications. Conversely, foreign applications for patents have risen between 2018/19 and 2019/20. Local applications remain significantly lower than foreign applications. In 2019/20, foreign patent applications totalled 6,250 whereas local patent applications were 2,205.

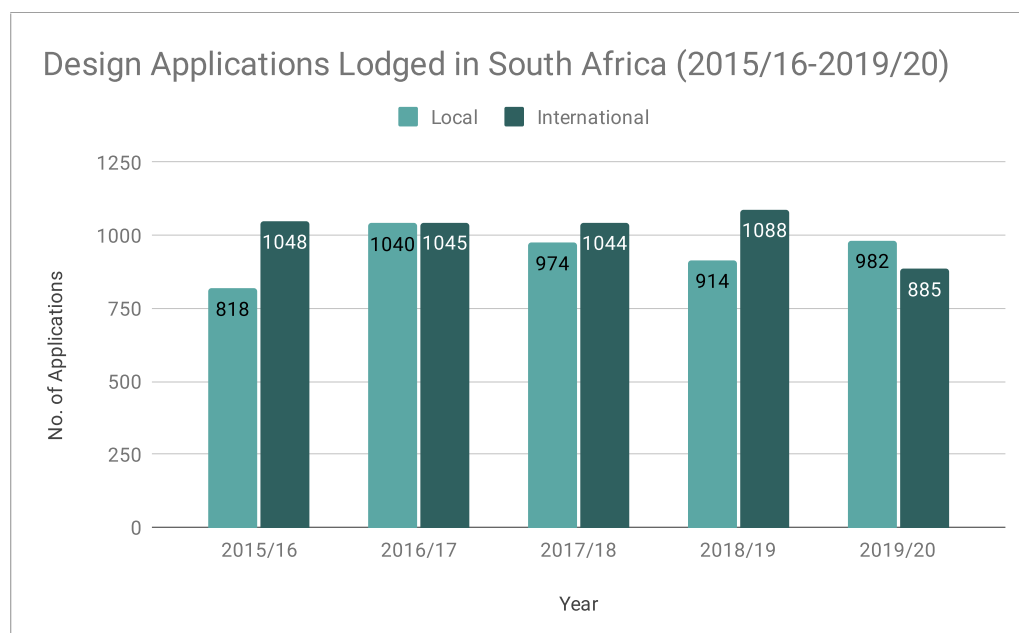
Figure 13. Patent Grants in South Africa (2010-2019)



Source: WIPO (2021)

The chart above shows that resident⁷ patent grants and abroad grants have declined by 14% and 21% respectively from 2018 to 2019, however non-resident grants have risen by 1.4% in the same period. Overall, resident patent grants have decreased over the past nine years, while non-resident grants have gradually risen.

Figure 14. Design Patents Lodged in South Africa (2016-2019)

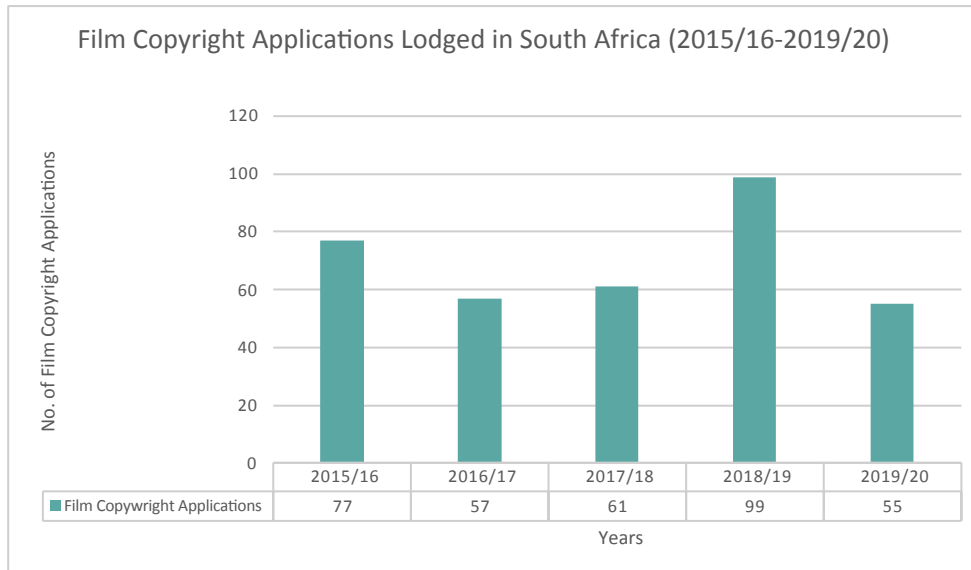


Source: CIPC (2019/20)

⁷ A resident filing refers to an application filed in the country by its own resident; a non-resident filing refers to the one filed by a foreign applicant. An abroad filing refers to an application filed by this country's resident at a foreign office.

The chart above indicates that local applications for design patents was 7.4% higher in 2019/20 compared to 2018/19, while international applications decreased by 18.7% in 2019/20 compared to 2018/19. There has been a gradual overall decline in total patent design applications over the past three years.

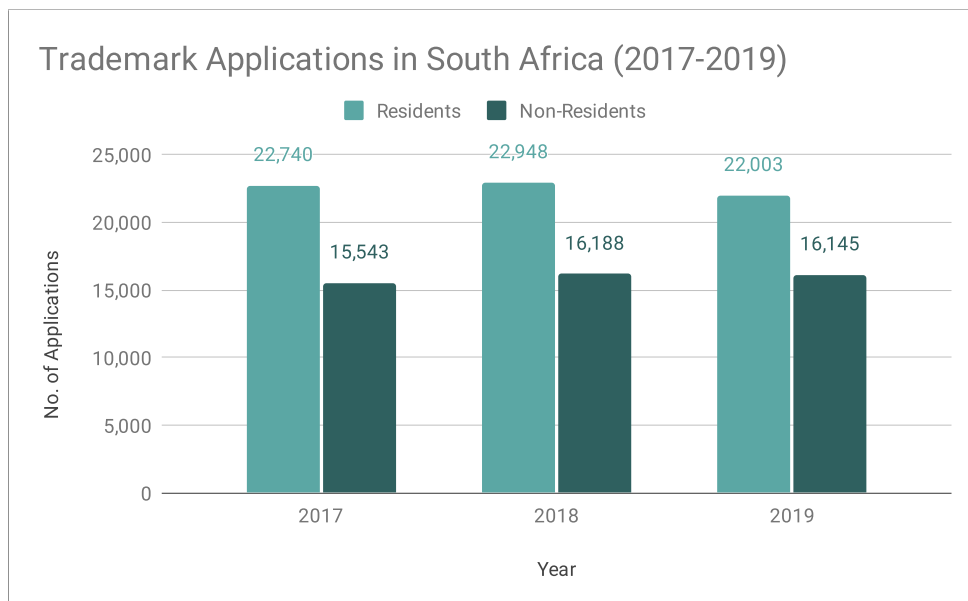
Figure 15. Film Copyright Applications Lodged in South Africa (2015/16-2019/20)



Source: CIPC (2019/20)

The chart above indicates that the number of film copyright applications lodged in 2019/20 was 44% lower than in 2018/19. There is an overall decline in the number of film copyright applications between 2015/16 and 2019/20, with the highest volume (99) being in the 2018/19 period.

Figure 16. Trademark Applications in South Africa (2016-2019)



Source: CIPC (2019/20)

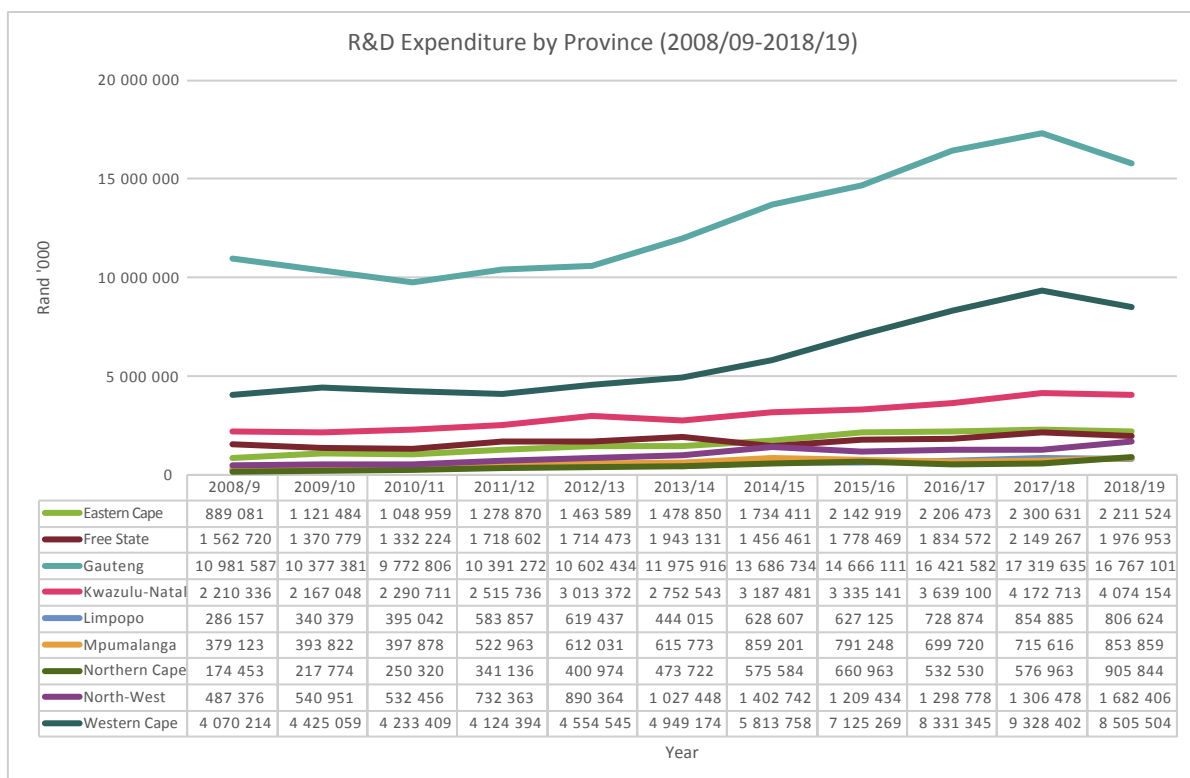
The chart above shows that trademark applications by South African residents decreased from 2018 to 2019. In 2019, trademark applications totalled 22,003 compared to 22,948 in 2018 - showing a comparative decline of 945 applications for 2019. Trademark applications by non-residents in 2019 (16,145) fell only slightly from the previous year (16,188).

2.2 INVESTMENT

2.2.1 RESEARCH AND DEVELOPMENT EXPENDITURE

The following charts reflect the investments into Research and Development as well as investment made to support innovations. Provincial R&D is made up of Business Expenditure, Government Expenditure, expenditure by the higher education sector, science councils and the not-for-profit sector. The main indicators that will be discussed in this section are Gross Expenditure on R&D (GERD) and Business Expenditure on R&D (BERD) as a percentage of Gross Domestic Product (GDP), as well as the value and number of investments made by venture capitalists.⁸

Figure 17. R&D Expenditure by Province (2008/9-2018/19)



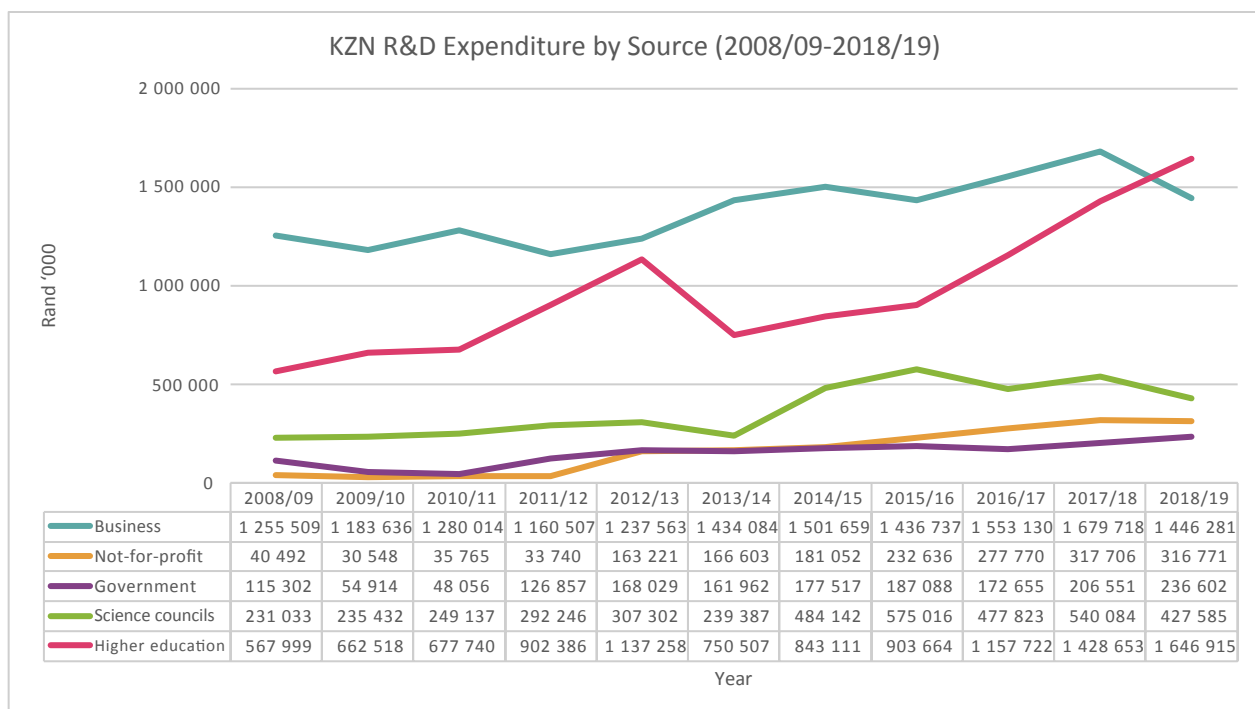
Source: Department of Science & Technology (2018/19)

⁸ Calculations for GERD as a % of GDP are based on R&D expenditure for financial years whereas GDP is based on calendar years.

The figure above shows R&D expenditure in value (rands) for each province from 2008/9 to 2018/19. There is an overall decline in R&D expenditure across the country, with only three provinces showing increases. Gauteng R&D expenditure was down by 9% in 2018/19, but remains the highest of all the provinces. R&D expenditure in the Western Cape is the second highest in comparison to other provinces and also shows a decrease of 9% in 2018/19. KZN R&D expenditure, the third highest in South Africa, was R4.07 billion in 2018/19, which is down by 2.4% from 2017/18.

R&D expenditure in KZN in 2018/19, comprises five major sources of funds. These are represented in the chart below.

Figure 18. KZN R&D Expenditure by Source (2008/9-2018/19)



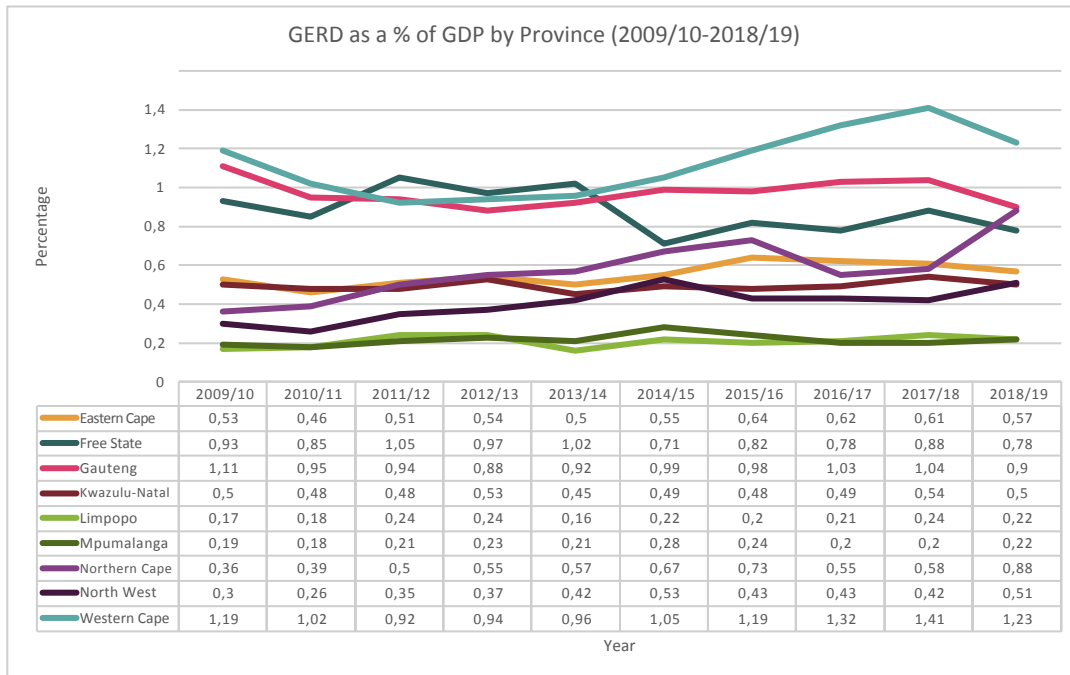
Source: Department of Science & Technology (2018/19)

Higher education sector contributions make up the largest share of R&D expenditure (40%), followed by the business sector (35%), the science councils sector (11%), the not-for-profit sector (8%) and lastly the government sector (6%). Only the government and higher education sectors increased the amount invested in R&D in 2018/19, while the business, not-for-profit, and science councils sectors decreased from 2017/18 to 2018/19.

The chart below shows GERD as a percentage of GDP by province. The national target for GERD as a percentage of GDP is 1.5%, which is in line with other upper-middle income countries.⁹ In 2017/18, South Africa’s GERD as a percentage of GDP was under the target at 0.83% and in 2018/19 it fell even further to 0.75%.

⁹ National Advisory Council on Innovation. (2021). South African Science and Technology and Innovation Indicators.

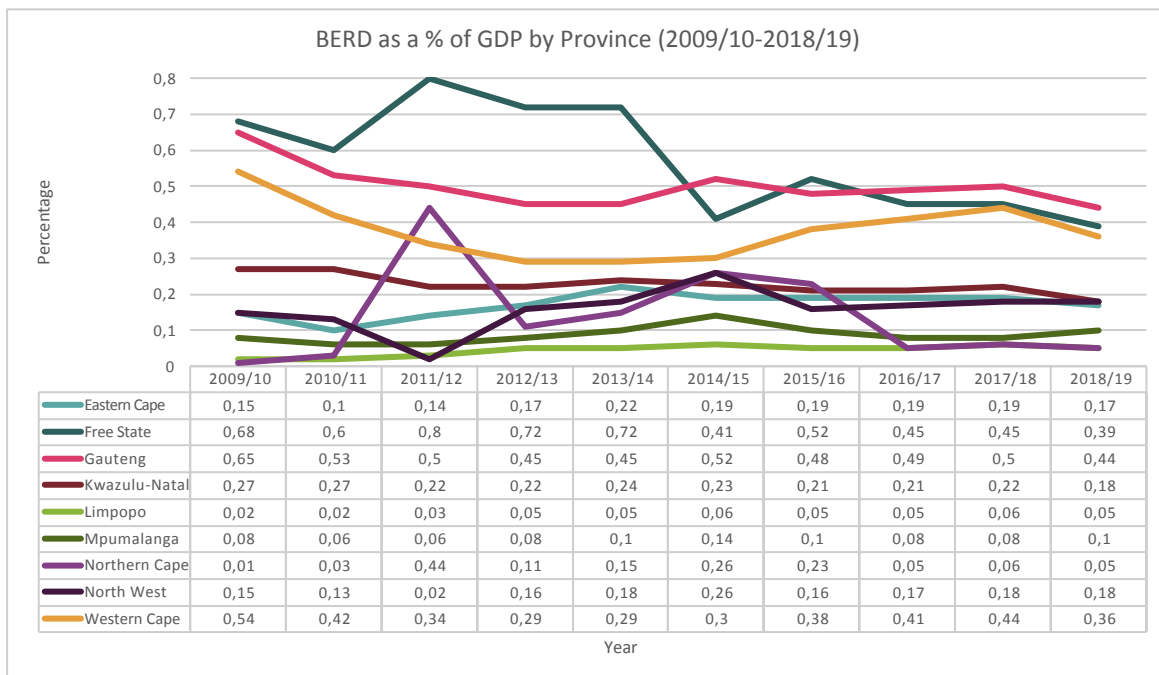
Figure 19. GERD as a % of GDP by Province (2009/10-2018/19)



Source: Department of Science & Technology (2018/19); Stats SA (2020)

In 2018/19, KZN GERD as a percentage of GDP was 0.50%, a decrease of 0.04% from 2017/18, and is currently the 7th out of the nine provinces (down from 6th position in 2017/18). GERD as a percentage of GDP was highest in the Western Cape at 1.23%, however this is a decrease of 0.18% from the Eastern Cape in the previous year. Gauteng follows with 0.9% in 2018/19, which is a decline of 0.14% from 2017/18.

Figure 20. BERD as a % of GDP by Province (2009/10-2018/19)



Source: Department of Science & Technology (2018/19); Stats SA (2020)

Business expenditure on Research and Development as a percentage of GDP was 0.27% for KZN in 2009/10 and has decreased to 0.18% in 2018/19. Gauteng's BERD as a percentage of GDP was the highest at 0.44% (down from 0.50% in 2017/18), followed by the Free State at 0.39% (down from 0.45% in 2017/18) and Western Cape at 0.36% (down from 0.44% in 2017/18). There is an overall trend of decreasing business expenditure on R&D in South Africa, which is concerning.

2.2.2 VENTURE CAPITAL

The following series of charts focus on investments made by venture capitalists, according to the Southern Africa Venture Capital and Private Equity Association (SAVCA).¹⁰

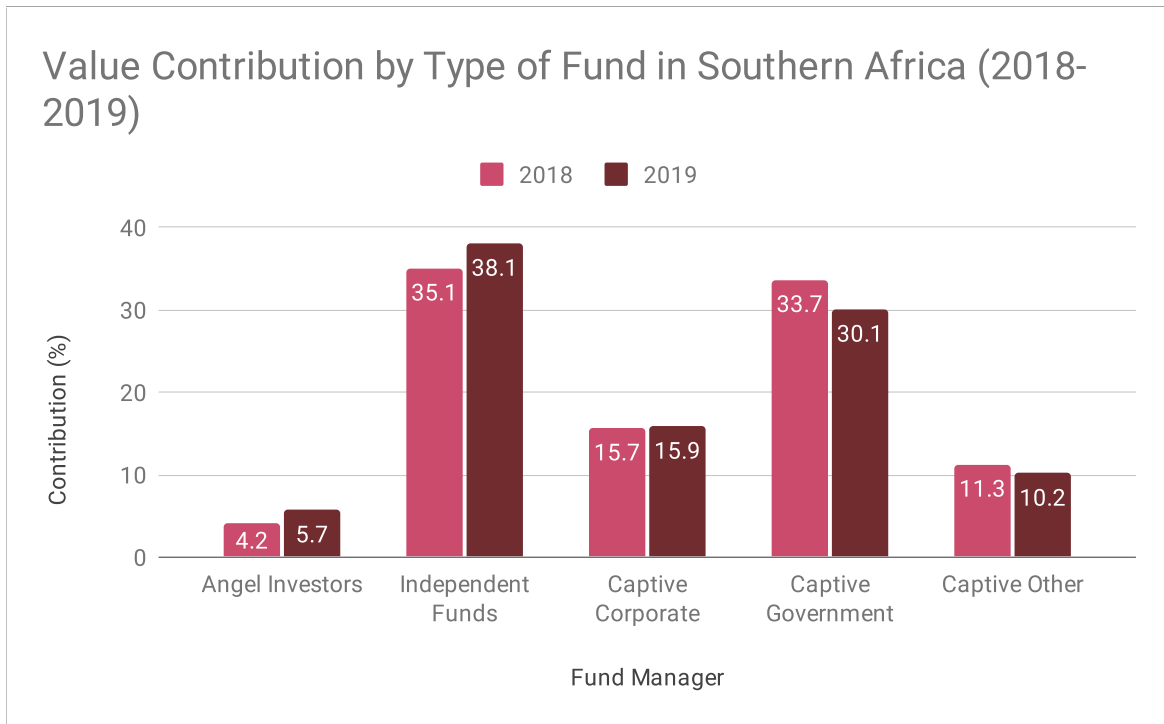
The chart below shows the value of investments by type of fund. The type of funds included are angel investors, captive funds (including captive government, captive corporate and captive other) and independent funds. Angel investors are individuals who invest in start-up businesses in return for equity or convertible debt. Captive funds describe funds which cannot be traded publicly. In other words, the fund shares can only be sold back to the fund. Captive government funds are mainly sourced from government agencies or public bodies. Captive corporate funds are mainly sourced from corporations. Captive other funds are obtained from family offices. Independent funds are funds "in which third parties are the main source of capital and in which no one investor holds a majority stake".

¹⁰ The annual SAVCA Venture Capital Survey analyses deal activity of venture capital and similar early stage investments into mainly South African businesses. SAVCA members represent about R185 billion in assets under management through 170 members that form part of the private equity and venture capital ecosystem.

¹¹ Investopedia. (2020). Captive Fund.

¹² SAVCA. (2020). Venture Capital Industry Survey.

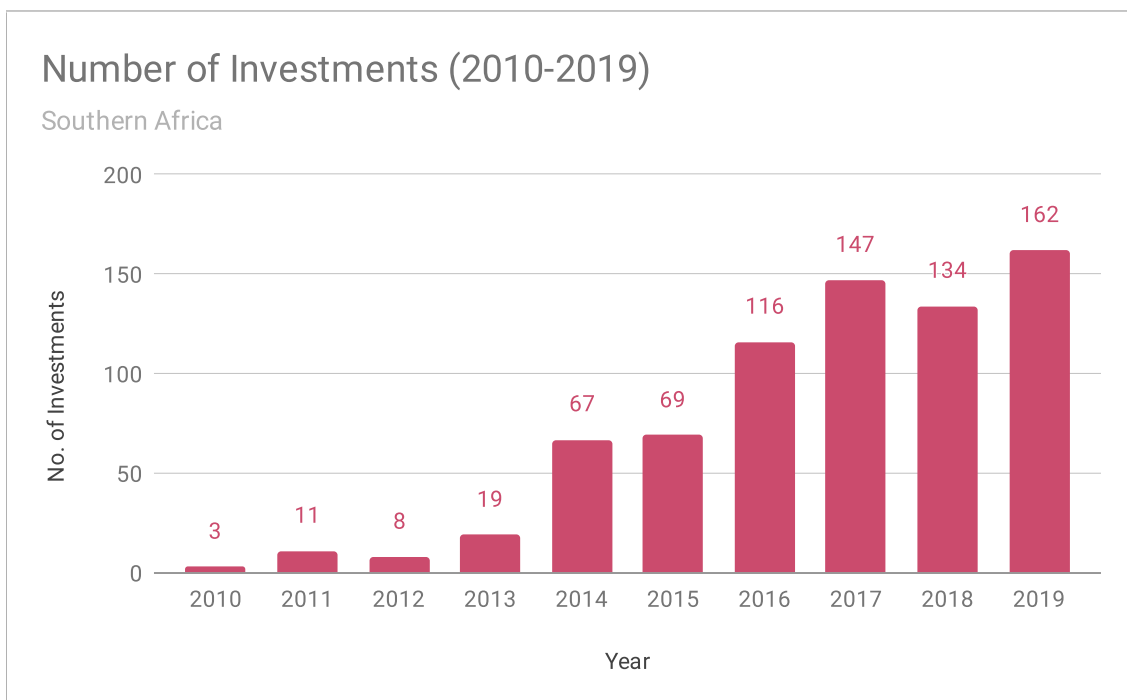
Figure 21. Value Contribution by Type of Fund (2020)



Source: SAVCA (2020)

The chart above shows that in 2019, the profile of funds that were managed by venture capitalists were made up mostly of independent funds (38.1%), followed by Captive Government funds (30.1%). Angel Investors, who are critical for early stage investment made up 5.7% of funds. Independent Funds were 3% higher in 2019 than in 2018, while the Captive Government funds were 3.6% lower in 2019 than 2018.

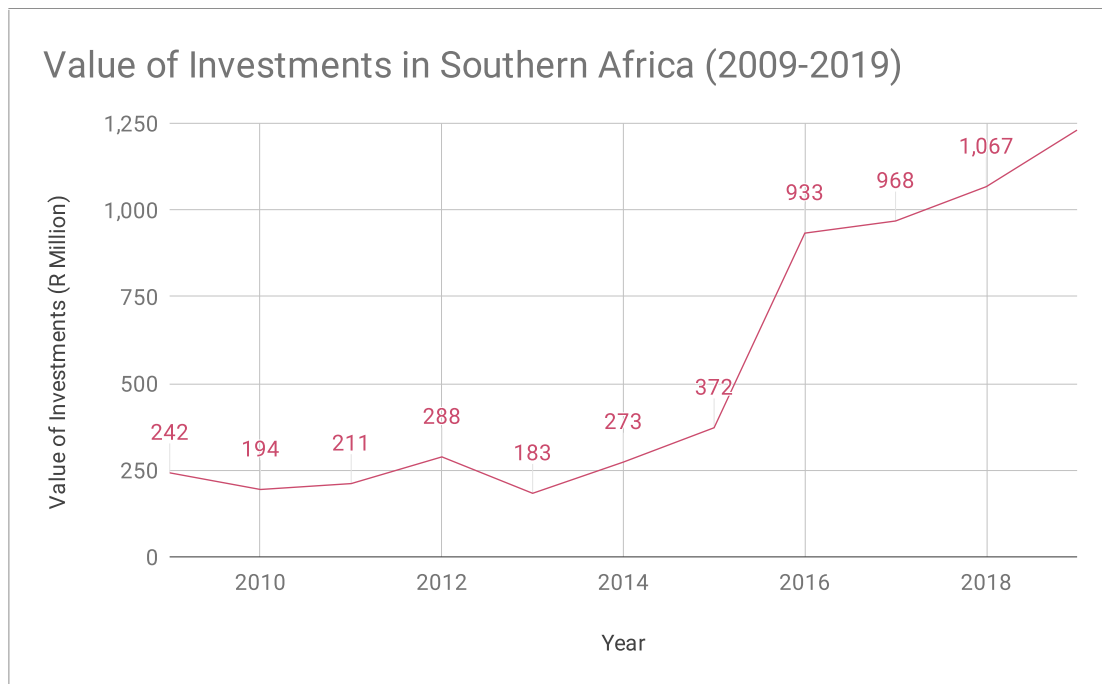
Figure 22. Number of Investments (2008-2019)



Source: SAVCA (2020)

The chart shows that, throughout Southern Africa, there has been an overall upward trend in the number of investments since 2010. At the end of 2019 there were 162 investment deals, up by 28 deals from 2018, which suggests increased confidence and interest in Southern African industries. In contrast, there was a drastic decline in the number and value of investments in KZN, with only 1 deal being concluded at the value of R4m in 2019 (see Figure 25 below).

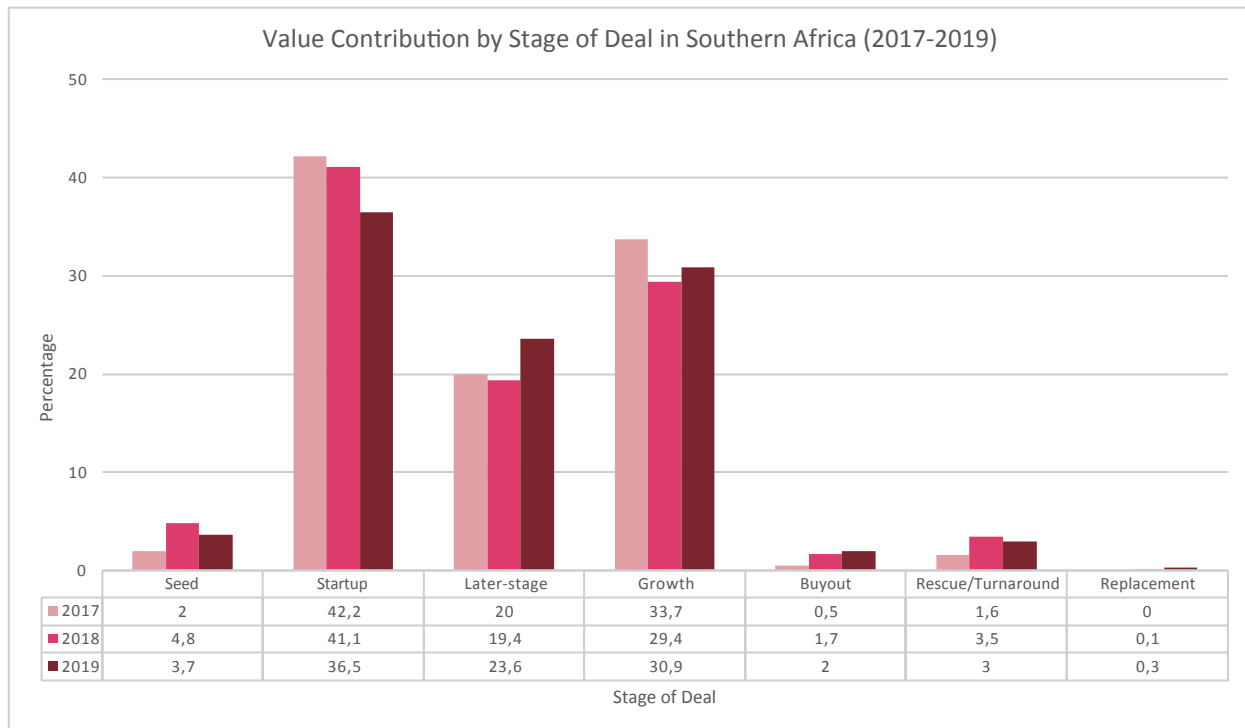
Figure 23. Value of Investments (2009-2019)



Source: SAVCA (2020)

The chart above shows an upward trend in the value of investments since 2013. In 2019 the total value of investments was R1,230 million which is an increase of 15.28% from 2018. More than 40% of the total investment value for 2019 went toward the manufacturing, food and beverage, business products and services, and medical devices and equipment sectors.

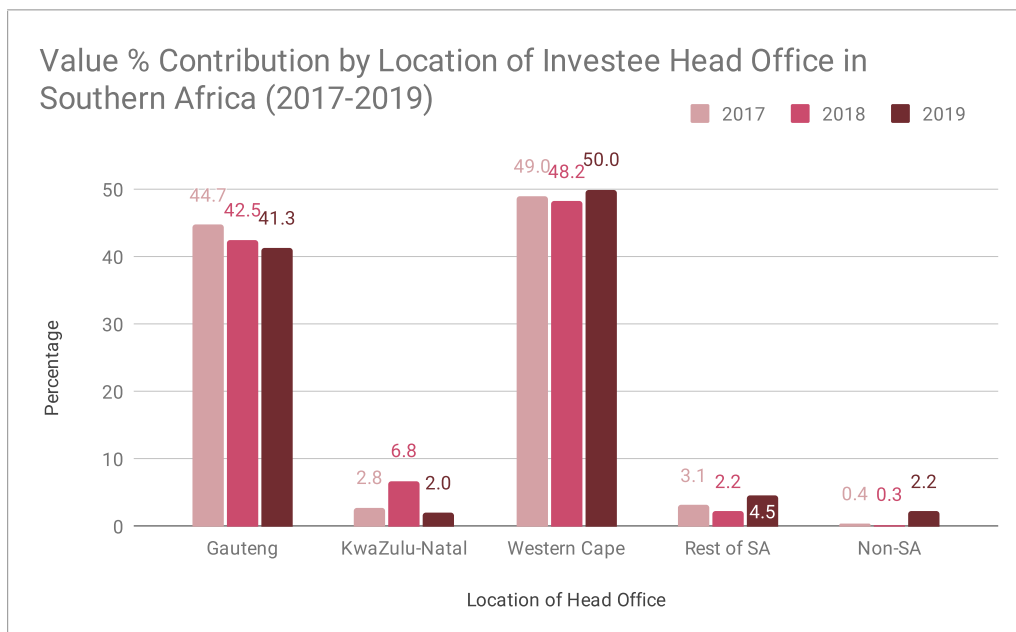
Figure 24. Value Contribution by Stage of Deal, 2017 - 2019



Source: SAVCA (2020)

The chart above is a national overview of the spread of investment value according to the stage of the deal. The chart shows that in 2019, the majority of investment deals in terms of value (36.5%), went towards the start-up phase. This was followed by 30.9% share invested in the growth stage and 23.6% share in later-stage deals. The contributions for these the startup stage of deals has declined since 2017, whereas the contributions toward the growth and later stages have grown from 2018 to 2019. The share of investments towards buyout and replacement increased in 2019, while the share of seed and rescue/turnaround declined in 2019.

Figure 25. Value Contribution by Location of Investee Head Office (2017 - 2019)



Source: SAVCA (2020)

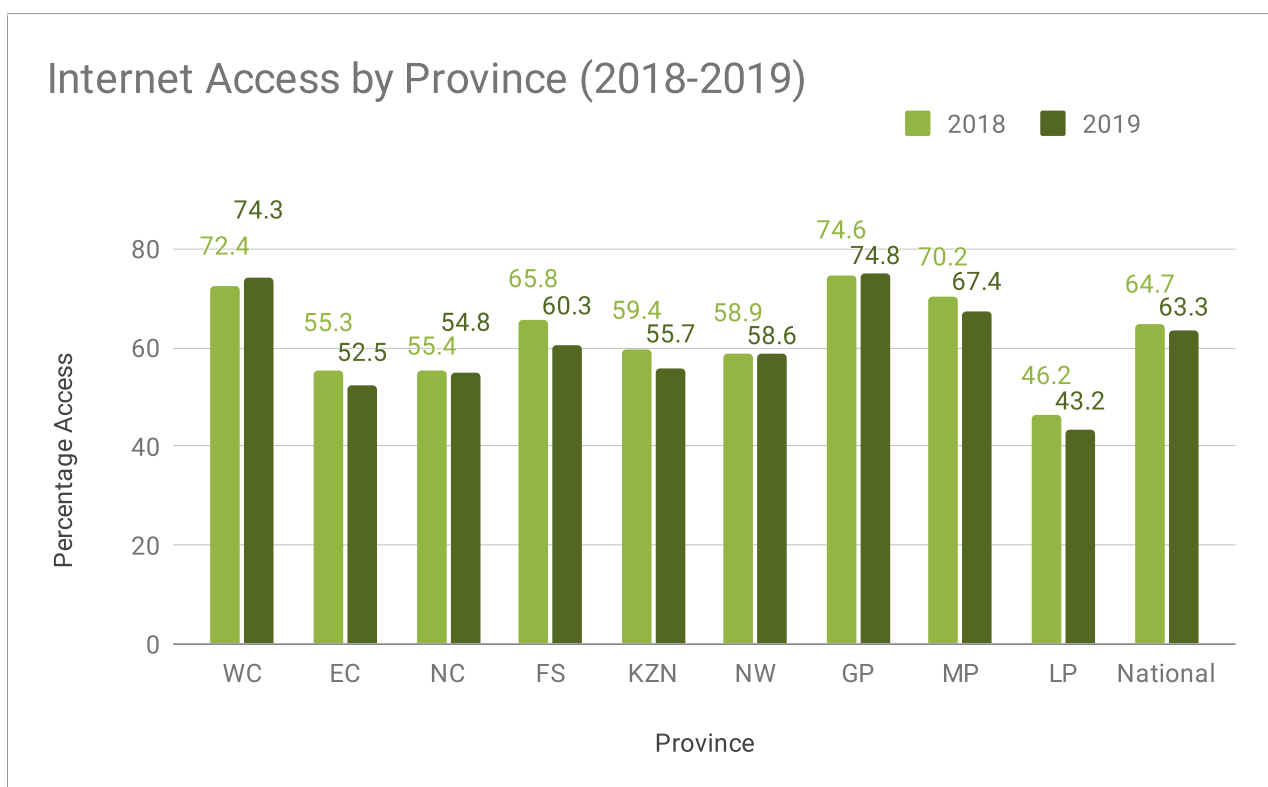
The chart above shows that in 2019, the majority share of investment (value) went to investees with head offices in the Western Cape (50%). Investees with head offices in Gauteng received 41.3% of the share of investment, which is down by 1.2% from 2018. Investees with head offices in KZN received a significantly lower share of investment at 2%, which fell by 4.8% (the largest change shown) compared to the previous year. The adjustment (compared to prior reports) is due to a change noted by SAVCA in the survey instrument which, as of 2020, accounts for different types of risk.

2.3 INFRASTRUCTURE

2.3.1 INTERNET ACCESS

Internet access is the indicator used to measure infrastructure that enables innovation. Internet access includes access at home, at work, through a mobile phone and via an internet café or educational facility.

Figure 26. Internet Access by Province (2019)

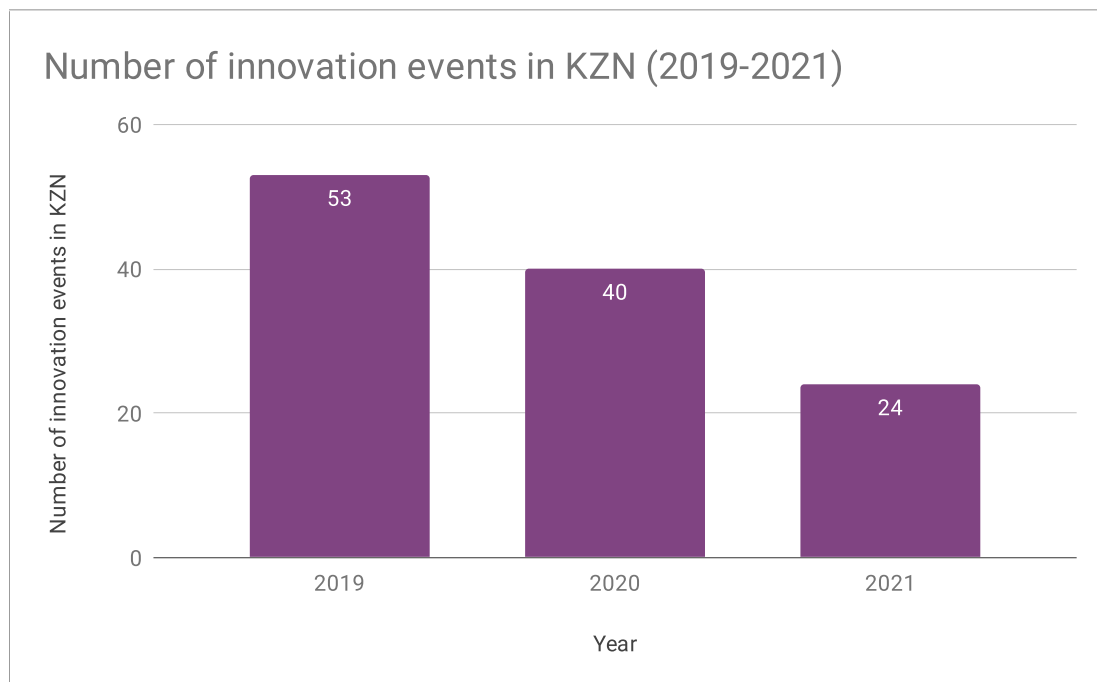


Source: Stats SA General Household Survey (2019)

The chart shows that Gauteng households have the most access to internet connectivity (74.8%), followed by the Western Cape (74.3%) and Mpumalanga (67.4%). Internet access for KZN households (55.7%) was below the national average (63.3%) in 2019. Seven of the nine provinces, including KZN, show a decline in internet access between 2018 and 2019, while access increased only in the Western Cape and Gauteng.

2.4 ECOSYSTEM

Figure 27. Number of innovation events held in KZN (including virtual)

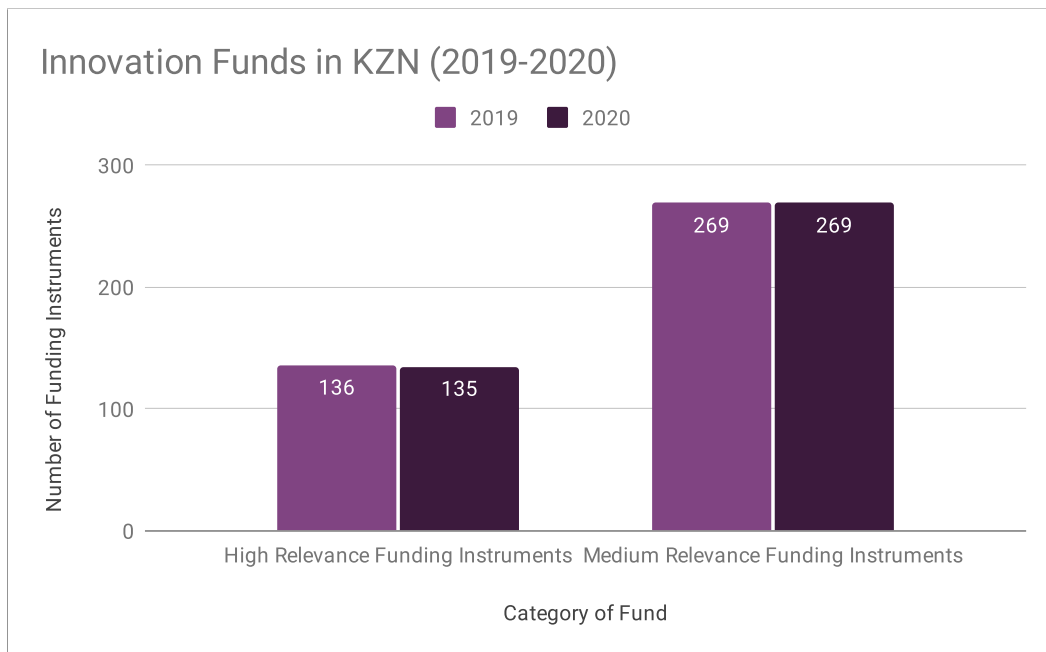


Source: Innovate Durban Own Research

The number of innovation events in 2021 within the KZN province were affected by the Covid-19 pandemic, and many events transitioned into the virtual space. A total of 24 events took place in 2021 compared to 40 in 2020.

The chart below shows the number of funding instruments that are relevant to innovators within the Innovate Durban community. The information below has been extracted from Innovate Durban's Funding Map, which was developed in 2019. The Funding Map includes a variety of fund types such as debt funding, equity investment, grants and incubators.

Figure 28. Number of funds towards innovation in KZN

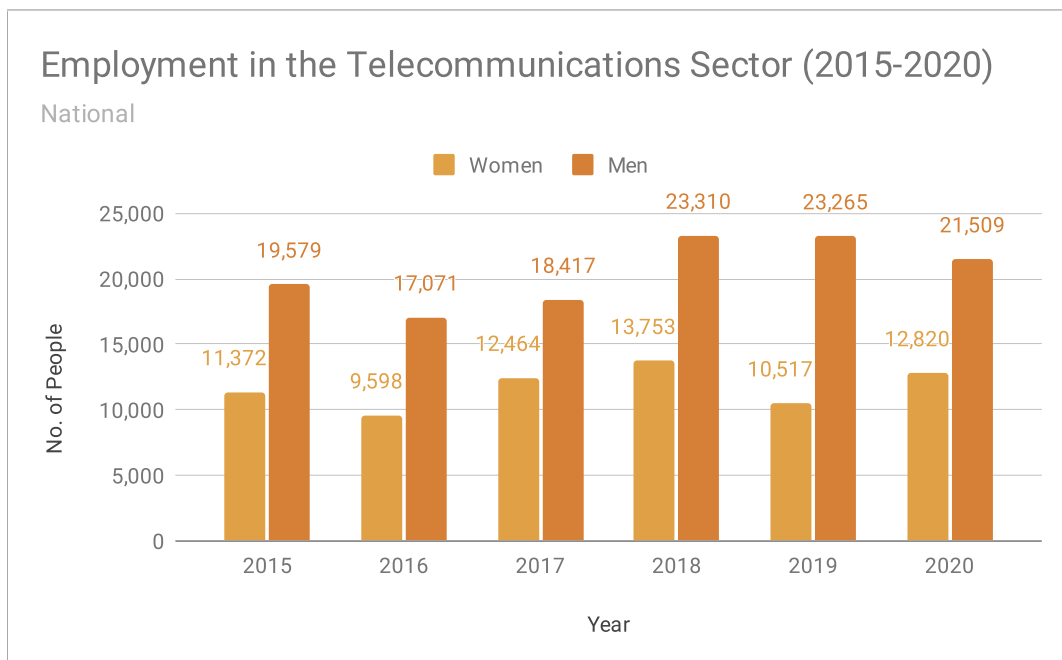


Source: Innovate Durban Own Research

2.5 IMPACT

2.5.1 EMPLOYMENT

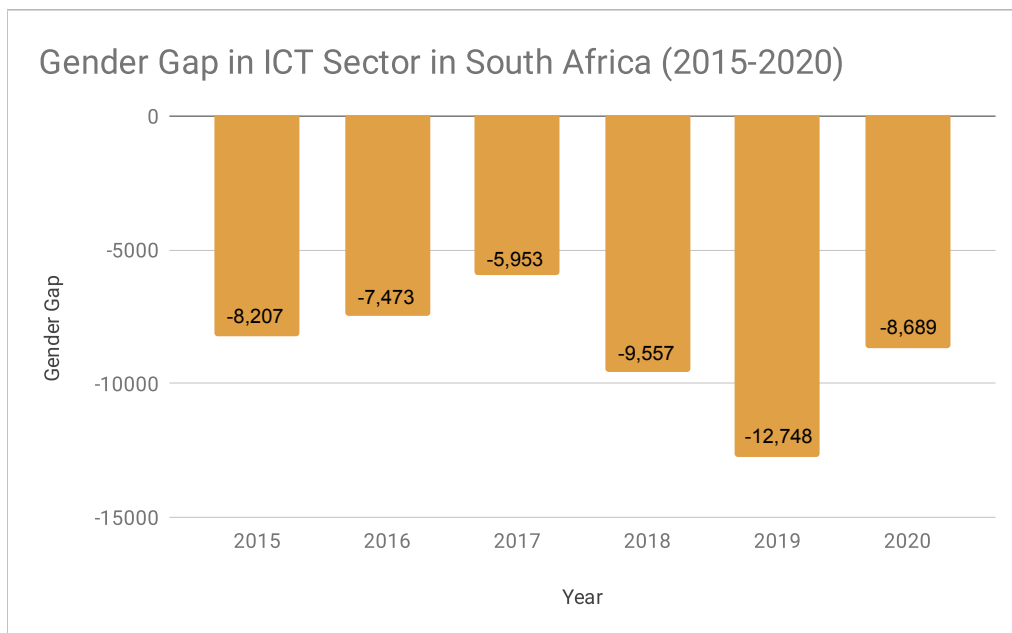
Figure 29.1. Employment in the Telecommunications Sector in SA (2015-2020)



Source: ICASA (2020)

The chart above shows employment in the telecommunications sector between 2015 and 2020. The sector grew in 2020 compared to 2015, by 3,378 jobs. The peak of employment in the sector was in 2018 which had a total employment of 37,063. There has been a 7.5% decline in total employment between 2019 and 2020.

Figure 29.2. Employment Gender Gap in the Telecommunications Sector in SA

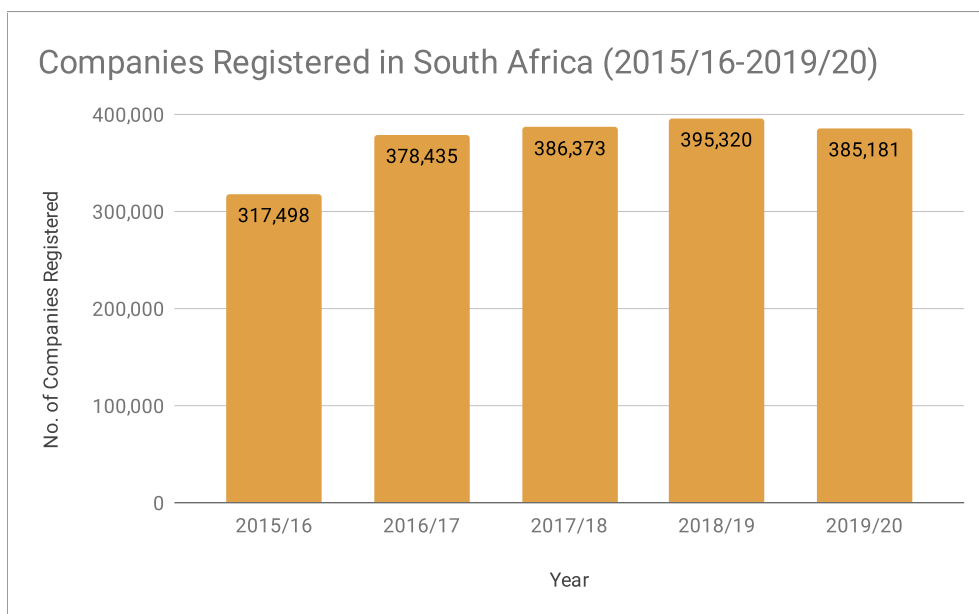


Source: ICASA (2020)

The chart above shows the gender gap in the telecommunications sector between 2015 and 2020. The sector is dominated by men, however the employment gap between men and women has diminished between 2019 and 2020 compared to the previous period.

2.5.2 COMPANY REGISTRATIONS

Figure 30. Companies Registered in South Africa



Source: CIPC (2019/20)

The chart above shows that the number of new company registrations in South Africa increased from 2015/16 to 2018/19, however has declined for the first time in five years over the most recent period 2019/20 (according to the CIPC register). There has been a 2.6% reduction in the registration of companies for the most recent period recorded (2019/20). Meanwhile, the active cases¹³ of business rescue proceedings have increased from 349 in 2018/19 to 369 in 2019/20.

¹³ CIPC Annual Report; Table B. 4: CIPC Key Services-Volume. From: http://www.cipc.co.za/index.php/download_file/view/81173/157/

2.5.3. BUSINESSES EXPECTED TO SUBMIT TAXES

Figure 31. Businesses¹⁴ with Taxable Earnings in South Africa



Source: South African Revenue Service (SARS_ (2020)

The chart above shows that the number of registered businesses with taxable earnings in South Africa¹⁵ has been gradually declining since 2016. There is a drop of 11% (106,785 net reduction) between 2018 and 2019. In this case, a 'year' refers to a South African financial/tax year, not a calendar year.

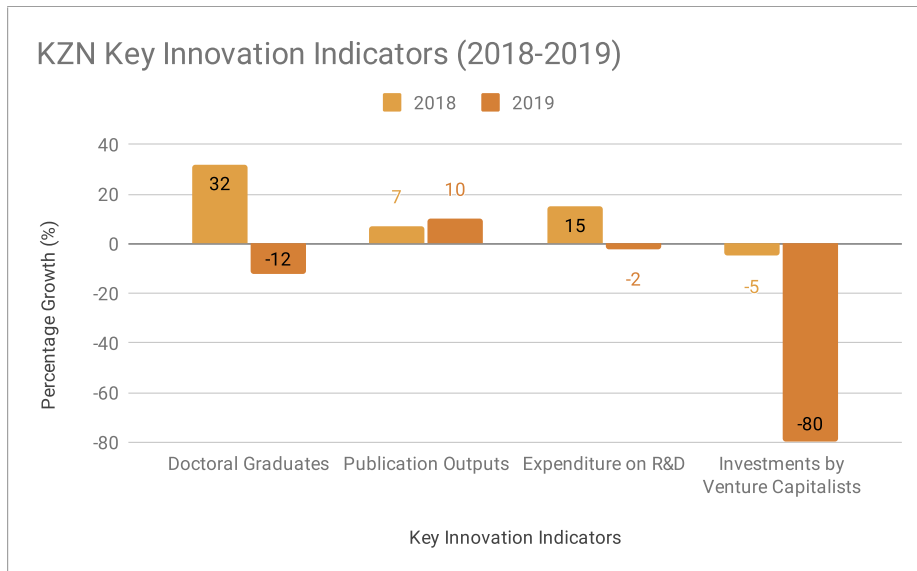
2.5.4 INNOVATION GROWTH INDEX

The Innovation Growth Index measures the growth of key innovation indicators for the most recent years for which data is available (in this case, 2017-2018 and 2018-2019). The index requires KZN-specific data, data availability for the 2018 and 2019 years, and data that represents a raw number (as opposed to a ratio or percentage). Only indicators within the 'people' and 'investment' categories met these requirements. The two highest impact indicators from each category were selected. The limited number of indicators used in the index is a limitation, however, the index will grow and improve as data quality and availability improves each year.

¹⁴ These are companies that are active and not dormant. An active company is one that is currently operating in business activities or receiving income. A dormant company is one that is not conducting or participating in any business activities, or does not receive any form of income.

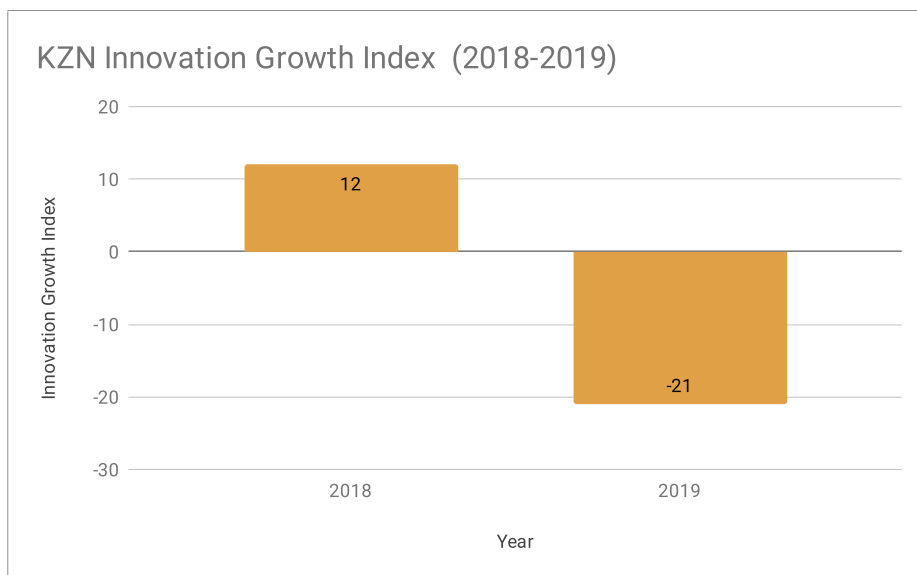
¹⁵ The number of returns expected for a particular tax year is determined by the number of companies that have been assessed for that tax year, plus the number of companies with an "active" status that were assessed in respect of either of the two tax years prior to the relevant tax year, but have not yet been assessed for the tax year in question.

Figure 32.1 KZN Key Innovation Indicators (2018-2019)



Three out of the four indicators used to determine the index declined in 2019, with only publication outputs at KZN universities increasing. This results in a negative growth index, as reflected in Figure 30.2 below.

Figure 32.2 KZN Innovation Growth Index (2018-2019)



The Growth Index represents the average growth of the four selected indicators. The Growth Index for 2019 (-21) shows significant decline compared to 2018 (12). It should be noted that the 2018 index had to be adjusted from 50 to 12 due to a change in the base data relating to ‘investments by venture capitalists’¹⁶ in 2018.

¹⁶ The adjustment (compared to prior reports) is due to a change noted by SAVCA in the survey instrument which, as of 2020, accounts for different types of risk.

3. KZN INNOVATORS

3.1 SA REBUILDERS

INNOVATOR: DR MARYAM AMRA JORDAAN



Maryam is originally from Kimberley. During her youth, Maryam volunteered at various children's homes in Kimberley, and there saw first-hand how severely children were affected by the HIV pandemic. This concerned her so much that she felt that she had to do something to help. Maryam secured a bursary from De Beers in 2001 and started her journey to specialise in chemistry. Although Maryam came from a previously disadvantaged background, this did not deter her from entering an academic environment which was rife with both gender and racial inequalities at the time. Women are still, to a large extent, under-represented in this field of study and she experienced discrimination and had to overcome many hurdles personally and professionally due to this. Maryam persevered nonetheless and received her PhD in Chemistry in 2013. Maryam currently works in Research Administration and Management and the Mangosuthu University of Technology. In 2016, Maryam and her husband, Yasar Amra founded a company called SA Rebuilders, with the sole intention of serving humanity by using science and technology to solve societal problems.

SA Rebuilders is a multidisciplinary R&D company focusing on solving societal problems using science and technology. They have two projects currently underway namely:

AN ARV MEDIPATCH

Although oral ARVs are the main treatment for HIV, there is a 40% mortality rate observed in children due to issues related to toxicity and patient adherence. The World Health Organisation attributes this to the lag in the development of simplified drugs for children. To solve this issue SA Rebuilders is developing an ARV medi-patch with novel nanosized co-crystals for use in HIV-infected children. This product reduces toxicity associated with the oral ARV therapy generally used. In addition, the ease of application results in patient adherence, subsequently reducing the potential of drug resistance.

RECYCLED 3D PRINTING FILAMENT

Both plastic and bio-waste pollution are pervasive environmental issues, particularly with Africa having limited upcycling capability. As one of the five winners in the Scale Out for Impact (SOFI) programme facilitated by the Technology Innovation Agency (TIA), SA Rebuilders has formed a partnership with the United Kingdom non-governmental organisation, Tech-forTrade, to establish operations in Durban with the view to provide recycled plastic (rPET) filament to the 3D printing sector.

By providing cheaper, robust 3D filament and products from recycled PET and bagasse SA Rebuilders can provide socio-economic and environmental benefit to South Africa.

SA Rebuilders has received numerous national and international awards which include the Leaders in Innovation Fellowship (LIF) pitch held in London in 2020, the TIA Global Cleantech Innovation Programme (GCIP) best women-led team in the medical device category, the TIA Female Investees winner for social impact and they were one of the five winners in the SOFI programme alongside SA Rebuilders' UK partner TechforTrade.

Over the years, financial restraints have been the biggest issue faced by Maryam and SA Rebuilders, as well as developing the appropriate partnerships in regards to the pre-clinical and clinical data needed for the ARV innovation. Maryam noted that the GCIP business accelerator program and Leaders in Innovation Fellowships facilitated by TIA had definitely assisted them in improving their business plan and the presentation of their business ideas to potential investors.

When asked what advice Maryam had for budding innovators she stressed the need to remain persistent even during adversity, and to own their identity and never fear what others think of them, as this allows one to be authentic and honest and sets one apart from the rest.

3.2 HYDRA POWER PTY LTD

INNOVATOR: SAMEER KHAN

Sameer grew up in Reservoir Hills and has always been keen on solving the problems facing his community and country. He decided to take a leap of faith and start his own company, in his words to **“risk the unusual in order to not settle for the ordinary.”** After noticing a problem that is negatively impacting our country he decided to try and do something about it. It has taken him five years to get to the point of commercialisation and to help alleviate the symptoms of the water and electricity issues.



Hydra Power aims to help alleviate the symptoms of load shedding and water scarcity. To do this they have invented a system that saves water lost by buildings and works to reuse this water and generate electricity from this loss.

When asked what advice Sameer would give to those starting out on their innovation journey he stressed that for things to change, you have to change, and that it all starts with you. He also noted that trust and meeting the right people are key to an innovation and innovator's success. Along the way he found that many individuals took an interest in what he was doing but most wanted something in return, and their intentions were not always honest.

Over the years Hydra Power has struggled in particular to obtain the necessary funding to commercialise or gain market access or entry, as the market Hydra Power is currently in is a very monopolised market. Despite this, Hydra Power aims to become an established entity in South Africa and to start entering the global market in the next five years. Aiding these efforts, Hydra Power has received support from Innovate Durban, who has assisted in various ways, including access to funding, prototype development and mentorship, as well as the Durban University of Technology, who has assisted with legal funding and market exposure.



3.3 GET2NATURAL BEAUTY

INNOVATOR: NOSIHLE DLAMINI

Nosihle grew up in Mayville, in an environment where, as she puts it, success was rare and education often frowned upon. However, she was fortunate to have a mother who believed in education so much that she wasn't allowed to perform any chores in order to have time to study. Her mom's approach paid off and Nosihle received a scholarship, which enabled her to study all the way through to her Masters in Biotechnology.



As Nosihle and her co-founder, PK, started their hair journey, in the beginning they used a lot of local and international recommended brands, but often they failed to achieve their goals as one product would work for PK but not for Nosihle and vice versa. It was only after they discovered that no two heads are the same, regardless of ethnicity, that they identified what they view as the most important factor, 'porosity', which is a measure of how well an individual's hair absorbs moisture. It was then that they came up with their innovation - porosity specific oils. This marked the beginning of Get2Natural Beauty.

Get2Natural Beauty develops and sells a range of porosity specific oils and conditioners based on hair thickness, developed specifically for African hair, which can often be challenging to manage, with a lot of modern products and processes that damage the hair. To combat this, Get2Natural Beauty developed a series of products that restores the natural beauty and health to any hair type.

Their current challenge involves market access and the challenge of being trusted in the market. They have reached this point however through extensive refining and updating of the existing formulations used in their products in order to be compliant with South Africa's cosmetic standards.

"You can't put the cart before the horse. Creating a firm foundation is important, take the time to get this foundation solid. The strength of that foundation will determine how tall an empire you can build."

Nosihle acknowledges the immense support she has received on her innovation journey, including support from DUT's Entrepreneurial Support Desk & Centre, and the Centre for Social Entrepreneurship, as well as the Department of Economic Development, Tourism and Environmental Affairs (EDTEA) who afforded them support in refining their products.

Get2Natural Beauty is also supported by Chemin (The South African Chemical Technology Incubator). Chemin is specifically focused on the chemicals industry and as a result they are currently supporting Get2Natural Beauty in refining their face brand formulations. Get2Natural Beauty has also received further support from Trade & Investment KwaZulu-Natal and were selected as one of five businesses in KZN to be trained and groomed for exporting.



3.4 BIOPLASTICS AND BIOBRICKS

INNOVATOR: LINDA ZIKHONA LINGANISO

Linda grew up in the Transkei area of the Eastern Cape. Her passion is to solve the world's perplexing problems scientifically, and she is driven by the need to make the world a better place. Linda's area of expertise is the bio-economy (waste-to-profit). She has published a series of books on Waste-to-Profit.



Linda is based at the Durban University of Technology (DUT) and is working on different innovations, such as bioplastics, as well as biobricks and bioenergy.

BIOPLASTICS

Plastic waste is produced in large volumes, and ends up leaking into the ocean system, destroying our ecosystems and biodiversity. Recycling of plastic wastes reduces the carbon footprint and protects the environment while the production of robust materials from recycled plastics assists the world to meet the local demands in robust materials. Linda has partnered with an Evergreen industry in Slovenia, and has been able to secure direct foreign investments for a start-up in Bioplastics in KwaZulu-Natal.

BIOBRICKS AND BIOENERGY

Made from waste generated from sugar milling industries in KZN. The South African sugar industry is one of the most important agricultural sectors of the national economy, and is a very important part of the KZN provincial economy. Linda has partnered with both Tongaat Hulett sugar milling industries at Empangeni and Durban as well as Illovo Sugar, and is working towards translating different waste streams such as fly ash and plant effluent to robust building materials and bioenergy to help the world to transition towards low carbon energy systems and to support the world waste economy strategy. In addition to this, the innovation works to decouple economic growth from carbon growth to reinforce the circular economy.

Linda noted that one of the biggest lessons she has learnt along her journey is the fact that not every scientist is an innovator. Linda stressed that innovation is the successful introduction of a new idea to the marketplace, and often this transition can take longer than anticipated.

When asked what advice she would give herself if she could travel back in time, she highlighted the need to **keep your head up, be influential, courageous and remain strong with determination to rule in your domain**, and to maintain strong visibility and a sense of individuality - to dare to be authentic and original.

Linda has received support from various organisation throughout her journey, including the Technology Innovation Agency (TIA), who support her Bioplastics and Biobricks projects, EDTEA, who funded the purchasing of equipment for the bioplastics project, the Department of Trade, Industry and Competition (dti) who supported in human capital development, and DUT who are partnering on the biobricks project.

3.5 GREENHEART ENERGY

INNOVATOR: THUTHUKA MBATHA

Thuthuka grew up in Soweto and moved to KZN in 2003. She met her mentor, Mike Eyre, in 2014, when they developed the concept of the SolaPac. Thuthuka's passion and ambition in life is to make a difference in people's lives, especially women living in rural areas. This drove her ambition to develop and promote innovations like the SolaPac.



Greenheart Energy aims to provide 'grid-quality' renewable energy power and quality water to rural communities using the SolaPac. The SolaPac is an innovative and sustainable approach to solving the challenges of providing clean, sustainable, low cost, and dependable energy and filtered water to remote areas, where these are not readily available.

The SolaPac is certified by the United Nations Development Programme, and has received support from the dti, where they were a finalist for the Cleantech SME Accelerator and won a cash prize, and The Energy Institute (based in the UK), where they were the winner of the Environmental Award in 2017. Locally they have received support from Thabile Engineering who has recommended the SolaPac for various government renewable energy projects; Master Power, who is assisting them with building a demo unit which has been installed along the Gautrain station in Sandton; and MCS who provided installation support.



4. IMPACT OF COVID-19 ON INNOVATION

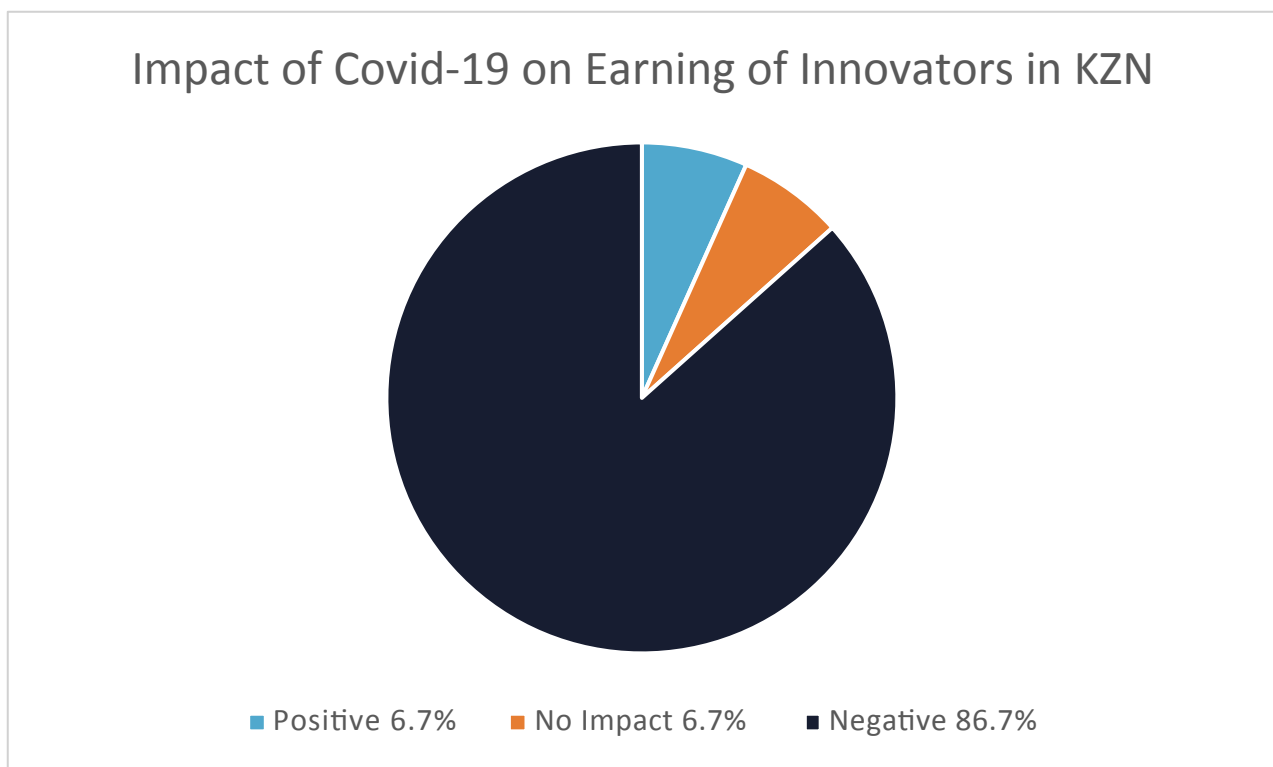
The impact of Covid-19 is assessed through the following areas:

- Covid-19 Impact Survey Results for KZN
- Impact on SMEs in South Africa
- Impact of Covid-19 on South African Innovation

COVID-19 IMPACT ON INNOVATORS IN KZN

Innovate Durban conducted an impact assessment survey to gauge the effect of Covid-19 on innovators in KZN. The survey aimed to assess the level of positive or negative impact on the earnings of innovators, as well as specific innovation impacts faced as a direct result of Covid-19. The total number of respondents who took the survey was 15, consisting of 14 males and 1 female.

Figure 33. Impact of Covid-19 on Earnings of Innovators in KZN



The chart shows that 86.6% of respondents¹⁷ experienced a negative impact on their earning prospects or income as a result of Covid-19 during 2020/21. The results indicate that the effect of the hard lockdown was mostly detrimental to the earning capacity and expected revenue of the innovators in the survey sample.

The table below shows the percentage of innovators that were affected by specific impacts as a direct result of the pandemic. These impact areas include sales, customer retention, product development, and ease of innovation:

Table 4. Impact on Innovation as a result of Covid-19

Impact on Innovation	Respondents Impacted (%)
Unable to pilot their system	6.7
Stagnant growth of prototype	6.7
Forced to pivot to another industry	6.7
Developed a new product in response to Covid-19	26.7
Loss of customers/clients	26.7
Decreased channels for assistance and funding	46.7
Halted production and loss of sales	53.3

The survey results show that 53.3% of respondents were forced to stop production and lost sales during at least one period in 2020/21, while 26.7% have lost customers and clients due to restrictions imposed as a result of the pandemic. The channels for assistance and funding within the innovation space were fewer during 2020/21 for 46.7% of innovators that responded to the survey.

Similar findings were presented in an analysis of how the lockdown impacted the South African innovation ecosystem (conducted by AfriLabs¹⁸). It was found that significant funding from the government and ecosystem support organisations were almost immediately rerouted to feeding schemes and the provision of food parcels to the poorest groups. This meant that innovators had far less funds available, especially for the early-stage startups. Furthermore, many businesses were forced to redirect away from growth strategies towards newly defined ‘survival strategies’ resulting in less opportunities for the innovators, entrepreneurs and SMEs to access institutional funding.

¹⁷ A total of 15 innovators responded to the survey

¹⁸ Sourced from “The Impact of Covid-19 on the South African Innovation Ecosystem - KTN Global Alliance and AfriLabs” From: <https://ktn-uk.org/perspectives/the-impact-of-covid-19-on-the-south-african-innovation-ecosystem-afrilabs/>

This is also in line with a report¹⁹ presented by the Small Business Institute (SBI), which raises concerns for SME business owners. According to media and parliamentary reports, only a fraction of small businesses received loan relief promised by the government. Many SBI survey respondents did not apply for relief out of fear that they did not meet the criteria to qualify. Informal traders and township businesses who were unable to trade for months in the hard lockdown stages, were required to obtain a licence to operate from the local municipality, register with the CIPC, SARS, and the Unemployment Insurance Fund. These processes are time consuming and difficult to achieve under normal circumstances, proving near impossible in a hard lockdown.

Further results from the Covid-19 Innovation Impact Survey show that while 6.7% of innovators had to pivot to another industry to cope, only 26.7% of innovator respondents benefited through the development of a new product in response to Covid-19. This means that the majority of impacts experienced by innovators were overwhelmingly negative, with a small percentage being able to benefit from the circumstances.

According to SBI, the disruption caused by Covid-19 has positively accelerated the adoption of technology and new digital innovations in some sectors. During the lockdown, the reduced consumer usage of physical stores led 37% of South African consumers to increase online shopping activities, according to Nielsen. Rand Merchant Bank (RMB) estimates there are now around 5,000 businesses online in South Africa.

Several SMEs adapted to the new environment by using smartphone technology. Some new innovations include apps facilitating township deliveries and mapping; a company providing both lighting (solar) and internet access (WiFi) in rural areas and townships; the sharing economy extending into an 'Uber' for tractors; and a new recruitment platform that matches jobs anywhere in the world with African data scientists. AfriLabs highlighted that, although the South African innovation landscape was adversely impacted by the Covid-19 pandemic, some sectors like education and health managed to adapt quickly, resulting in digital education systems (for a small portion of the market) and a drive towards healthcare equipment in the manufacturing sector. Various innovative SMEs and entrepreneurs that were able to adjust their business models and pivot their services to a full or partial digital offering managed to survive.

AfriLabs further noted some key shortcomings identified by stakeholders, which include a lack of funding (particularly for early stage and pivot innovations), lack of access to digital channels (resulting from a lack of access to affordable internet and data), lack of digital literacy and lack of accessible business mentorship and support. This emphasises the key role and importance of Innovate Durban in this space, where there is opportunity to provide assistance, training, digital resources and funding to innovators who are not currently receiving sufficient support.

¹⁹ Highlights extracted from "Reflections on the impact of COVID-19 on small businesses (SMEs) in South Africa", September 2020. From: <https://www.smallbusinessinstitute.co.za/wp-content/uploads/2019/02/Reflections-on-the-Impact-of-Covid-19-on-SMEs-in-South-Africa.pdf>

5. STATE OF GRASSROOTS INNOVATION IN KZN

Grassroots innovation occurs at a local level, and is characterised by ingenious solutions continually developed locally to improve living standards and promote sustainability. A study²⁰ conducted by the Moses Kotane Institute examines the state of grassroots innovation in the province of KwaZulu-Natal. It draws on the information from 67 respondents consisting of 55 grassroots innovators and 12 institutions that provide support to grassroots innovators in the province.

The majority of the grassroots innovators in this study sample are within the services sector (30%); followed by information and communications technology (ICT) (25%); and construction and agriculture (15%). This is a critical finding because these constitute key strategic sectors within the province of KwaZulu-Natal; this shows that with the appropriate supportive mechanisms, grassroots innovators have the potential to revive the economy and contribute significantly to the broader economic development strategies of the province.

RESULTS OF THE SURVEY

1

THE SOCIAL AND ECONOMIC IMPACT OF GRASSROOTS INNOVATION

The key defining feature of grassroots innovation is that they are tailored towards innovative bottom-up solutions that respond to the social and economic needs of the local communities. When asked if their innovation products/services addressed broader social and economic needs, 58% of the respondents responded yes.

OWNERSHIP OF PATENT

Patenting plays an increasingly important role in innovation and economic performance. Only 40% of the study participants indicated that they own the patents for their innovation, 60% indicated that they do not. Literature suggests that there remains a lack of adequate mechanisms to protect the intellectual property of grassroots innovators. This can be attributed to the lack of access to funding mechanisms, lack of access to information and restrictive administrative requirements.

2

3

PROPOSED SUPPORT MECHANISMS

Participants were asked to identify support mechanisms that they require, and funding, assistance with commercialisation, capacity building, product development and access to information for patent application were some of the mechanisms proposed by the innovators.

²⁰ Summarised from “Report: Examining the State of Grassroots Innovation in the Province of KwaZulu-Natal”, Study conducted by the Moses Kotane Institute, August 2021.

CHALLENGES IN PRODUCT DEVELOPMENT AND COMMERCIALISATION

Participants were asked if they have received any form of support from the government, and only 13% indicated that they have received support, while 87% indicated that they have not received any adequate support. Although the government has had several supportive mechanisms for grassroots innovation, it is evident that these mechanisms are not reaching innovators at a larger scale. The majority of the participants (58%) indicated that they have experienced challenges in developing and commercialising their innovation.

4

INDUSTRY SUPPORT FOR GRASSROOTS INNOVATORS

5

The study sought to identify the existing support mechanisms for innovators in the province. 83% of the institutions that provide support to grassroots innovators in the province indicated that they provide capacity building as part of their mechanisms to support innovators. 58% indicated that they provide funding, 50% indicated that they provide patent assistance and 43% indicated that they provide product development assistance.

THE EXTENT TO WHICH INNOVATORS BENEFIT FROM THE SUPPORT PROVIDED

The participants were asked whether the support they provide to innovators has been beneficial, 80% indicated that they believe that the support provided to innovators has benefited them.

6

FOSTERING PARTNERSHIPS AND COLLABORATIONS

7

There are several grassroots innovation initiatives taking place in the province, however, collaboration and partnerships remain weak. The lack of strong collaboration results in deficiencies in knowledge and technology, technological infrastructure, digital technologies, and social networks.

INVESTMENT IN RESOURCES (FINANCIAL RESOURCES, PHYSICAL INFRASTRUCTURE, CONNECTIVITY)

Lack of access to adequate resources restricts grassroots innovators from necessary support including financial assistance and market information for opportunity recognition, commercialisation, and mechanisms to protect intellectual property.

8

6. CONCLUSION

6.1 CONCLUDING REMARKS

This report offers a measurement of innovation in KZN for the 2019-2020 period. It applies a unique, KZN-focussed measure of innovation, indicating progress with trend data (where available) and comparisons with other South African provinces (where available). This provides an updated evidence base from which to plan interventions targeted at innovation growth in KZN. It aids understanding with regard to which areas are considered enablers for innovation growth in the literature, and which areas require attention and resources according to current data. Policy makers, business leaders, industry associations, funders and academia can use this report's analysis of trends and patterns of innovation to consider how existing policy instruments and funding mechanisms can better promote, support and facilitate innovation in South Africa.

The South African, provincial and municipal government, industry leaders, funders, civil society and academia have made some advances towards growing innovation in the year under review, however there has certainly been a decline in overall performance. Core indicators, including doctoral graduates, expenditure on R&D and investments by venture capitalists, all show a general decline over the period, with the exception of growth seen in publication outputs. Support for basics such as education, employment and ICT services (e.g. internet connectivity) remain essential for continued growth. Innovate Durban will continue to work with stakeholders to build the KZN innovation ecosystem, facilitate effective innovator support programmes and produce research content, in order to achieve impact.

6.2 RECOMMENDATIONS FOR FUTURE RESEARCH

Measuring innovation is a growing field of study and new studies on this topic are being released more frequently. It is clear when referencing international documents that there are gaps in data availability in South Africa. In addition, there is a gap in bespoke indicators suited to a country with the economic characteristics of South Africa. The following areas of research are recommended to grow and improve the measurement of innovation in South Africa and KZN.

- Quantifying grassroots/community innovation. While valuable baseline research has been conducted by MKI, there needs to be a more consistent methodology applied in order to quantify a trend for the following indicators:
 - Number of organisations supporting grassroots innovation
 - Number of innovators categorised as grassroots
 - Value of funding supporting grassroots innovation

- Number of businesses incorporating PhD findings and graduates into their businesses. What are the main mechanisms being used to commercialise PhD findings? This is a question we hope can be picked up as part of the Business Innovation Survey administered by the HSRC. This is especially important given KZN's strength in the production of publications and PhD graduates.
- We know that the arts and creative sectors in general are critical for Industry 4.0 and for innovation and these should be included in our measure of innovation. This year 'number of film copyright applications' was added as an indicator but it is important to grow our measure of innovation in this space.
- Better measuring impact, as opposed to output indicators. This year, two new impact indicators were added that reflect the number of new businesses and active businesses in South Africa. It is important that we are able to understand this figure for the KZN province in future.
- Working with CIPC to release disaggregated data on business license and trademark applications, including provincial and sectoral data. This year we managed to have conversations with CIPC on this issue. They noted that several applications are made by lawyers and the legal firm's address is used, making it difficult to provide disaggregated data. This is something they are going to work towards, however.
- Working with the Department of Small Business Development, SARS and CIPC to understand startup culture in KZN, including how many businesses are registering, after how long are they generating income, how many are making it to three years etc.
- Working with StatsSA to gather credible disaggregated data on employment per sector at a provincial level.
- Understanding the relationship between innovation and smart city measurement.
- Working with organisations such as the Department of Higher Education, to collect more gender-specific data, e.g. the participation of women in SET, female enrolment and graduation statistics.
- Investigating areas and cases of disruptive innovation in KZN. This could be done in collaboration with the HSRC on the Business Innovation Survey.
- The Cities Support Programme and the HSRC have produced the City Spatialised Economic Data report and will do so annually in future. Data panels on firms will be available from October 2021 at the metro level and indicators derived from this data will be incorporated in future reports.

ACKNOWLEDGEMENTS

The indicators used in this report were identified through an extensive literature review of local and global bodies that measure innovation. Several reports compiled by the **International Organisation for Standardisation**, and the **European Innovation Commission's European Innovation Scorecard 2020: Methodology Report** were used to compare global standards for measuring innovation. The innovation growth score was developed for KZN using the methodology identified in the **South African Innovation Scorecard Framework (2016)** by **Professor Anastassios Pouri**.

The indicators would not have been possible if not for the following organisations collecting and releasing data:

- The Department of Basic Education: National Senior Certificate Examination Report
- The Department of Higher Education and Training: Statistics on Post School Education and Training and Report on the Evaluation of the 2019 Universities' Research Output
- Companies and Intellectual Property Commission: Annual Report
- Department of Science and Technology: Statistical Report
- Southern African Venture Capital and Private Equity Association: Venture Capital Industry Survey
- Statistics South Africa, General Household Survey data
- Independent Communications Authority of South Africa: State of the ICT Sector Report
- World Intellectual Property Organization (WIPO): Statistical Country Profiles - South Africa
- The South African Revenue Service (SARS): 2020 Tax Statistics

We would like to extend thanks to innovators from KZN who agreed to share their innovations and their journey and insights - they are Dr Maryam Amra Jordaan, Sameer Khan, Nosihle Dlamini, Linda Zikhona Linganiso, and Thuthuka Mbatha.

Further recommended reading includes:

- WIPO's Global Innovation Index 2020: South Africa Country Profile
- Centre for Science, Technology and Innovation Indicators (CeSTII)'s Innovation performance in South African businesses
- The National Advisory Council on Innovation's South African Science, Technology and Innovation Indicators
- Department of Higher Education's Gender Fact Sheet for the Post School Education and Training System
- HSRC and CeSTII's Innovation in the South African Informal Sector Survey - Statistical Report: Baseline Survey in Sweetwaters, KwaZulu-Natal (2017-2018)
- The National Treasury's CSP City Spatialised Economic Data: Metro Level eThekweni report 2021 (first complete release expected in October 2021)

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