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Dominating Industries on Business Sector R&D in the Western Cape, Gauteng and KwaZulu Natal Provinces of South Africa

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Background of the Paper

- ❑ Research and Experimental Development (R&D) plays a crucial role in transforming the economy
- ❑ Investment on R&D largely depends on the location of fundamentally skilled HR, infrastructure, equipment and governance
- ❑ The concentration of business R&D in South Africa is intensely distributed across Gauteng, Western Cape and KwaZulu-Natal as they're mostly identified as catalysts for innovation hub and business investment
- ❑ The business sector is the highest R&D performer in terms of R&D expenditure:
 - In 2016/17 the private sector R&D expenditure was 41.4% of GERD and has been increasing for the past five years
 - Increased from 10 571 million rand in 2012/13 to 14 781 million rand in 2016/17
 - The business expenditure in R&D (BERD) is funded largely by private enterprises (67.62%) but also by the government (3.1%) and foreign sources (9.1%)
 - Applied research (57%) represents the bulk of BERD (Stats Report, 2017)
- ❑ The business sector shows a strong emphasis in areas of engineering sciences (25%) and ICTs (18%), much of which is due to companies that do research and development in mining and energy related-resources, which are richly located in the three provinces with high-technology, human and financial resources

Problem Statement and Objective

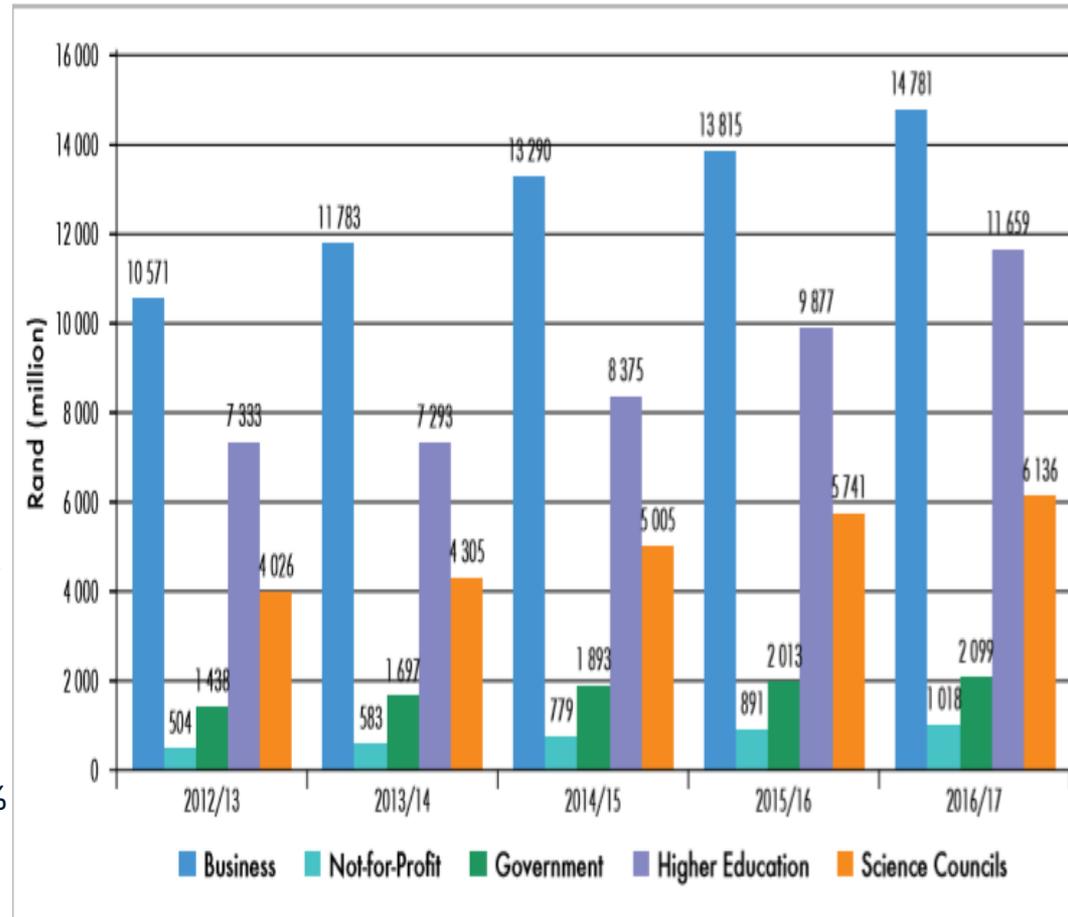
The assumption put forward in this paper is that regions are indeed relevant spaces to realise national policy implementation, not only with regard to economic development but also to promote global technological competitiveness and innovation capacity and the creation of employment opportunities for citizens

- ❑ South Africa requires a well-established financial, communication, energy and transport support with modernised infrastructure.
- ❑ However, unemployment, poverty and inequality remains high and deteriorated infrastructure impedes the efforts of government to achieve its developmental goal stated out in the National Development Plan vision 2030
- ❑ However, not every region in a country has high-tech equipment with leading-edge technology and resources to undertake complex, creative and systematic work and remain competitive in the industry
- ❑ In the case of South Africa, Gauteng, Western Cape and KwaZulu-Natal are the strong technological competitors. On the other hand, many other regions have not yet fully utilised the potential to carry out R&D activities
- ❑ The paper narrows the dominating sectors and R&D activities within dominating industries

Business sector Expenditure on R&D (BERD) in South Africa

The value of R&D performed by the Business Sector between the years appears to have increased over the years of R&D survey cycles

- ❑ BERD is the highest expenditure on R&D compared to other institutional sectors which is amounted to R14. 781 billion for latest survey cycle
- ❑ Business Sector receives less funds from the government compared to other institutional sectors
- ❑ Government funded the largest proportion of R&D in South Africa for all periods of R&D survey cycle in which its funding mostly went to the Higher Education institutions
- ❑ Where they received 56% and the other 40.2% went to Government Sector institutions; and the business sector and non-profit organisations were the smallest recipients of government funding



Linkages in R&D Spending and Socio-Economic Growth

- ❑ There is a beneficial impact of R&D spending on economic growth in developing countries (Inekwe, 2014)
- ❑ R&D expenditure contributes to economic growth through the creation of new technologies and the speed of adoption of new technologies that enhance productivity (Akcal & Sismanoglu, 2015)
- ❑ The investment and expenditure on R&D contributes to knowledge spillovers
- ❑ Knowledge-based theories indicate that it is possible for a firm to improve their effectiveness through innovation development while integrating local knowledge which can be attained through knowledge transfer processes among other local firms (Genc, et al, 2010)

Linkages between Science, Technology and Innovation (STI) and Sustainable Development Goals (SDG)

- ❑ Investment and expenditure on R&D contributes to skills development. It has been demonstrated that R&D activities promotes knowledge and skill transfer (Anzoategui, et al, 2017)
- ❑ STI have been recognised as one of the main drivers behind productivity increases and a key long-term lever for economic growth and prosperity:
 - This is in line with SDG 8, which aims to promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all
 - As well as SDG 11, that seeks to ensure sustainable consumption and production patterns
- ❑ Further, fostering STI is part of the SDG 9 related to resilient infrastructure and inclusive, sustainable industrialisation
 - In particular, Target 9.5 that seeks to elevate the role of research and innovation policy well beyond STI as one of the means of implementation
- ❑ Supporting innovation and technology development in collaboration with low- and middle income countries also enhance the realisation of sustainable agriculture and food security through the introduction of new and modern technologies to improve agricultural productivity.
 - This contribute to the realisation of sustainable goals 1 and 2 to end poverty and to achieve food security (European Commission, 2015)

Research Methodology

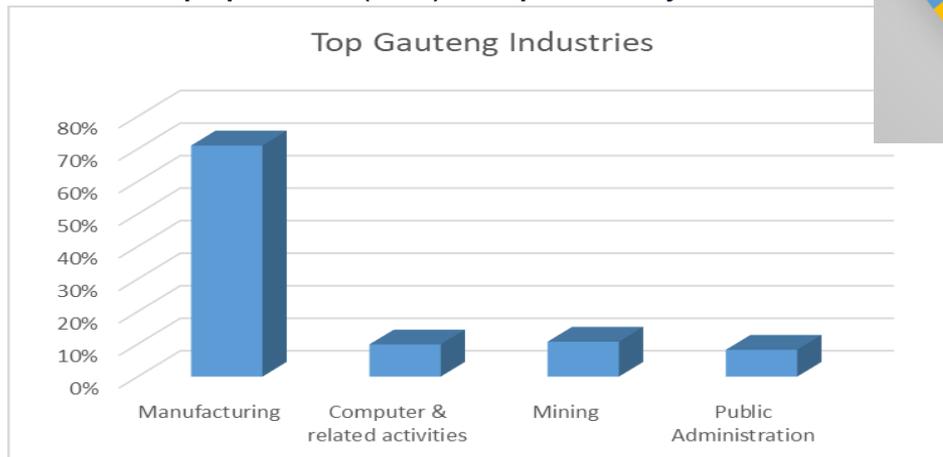
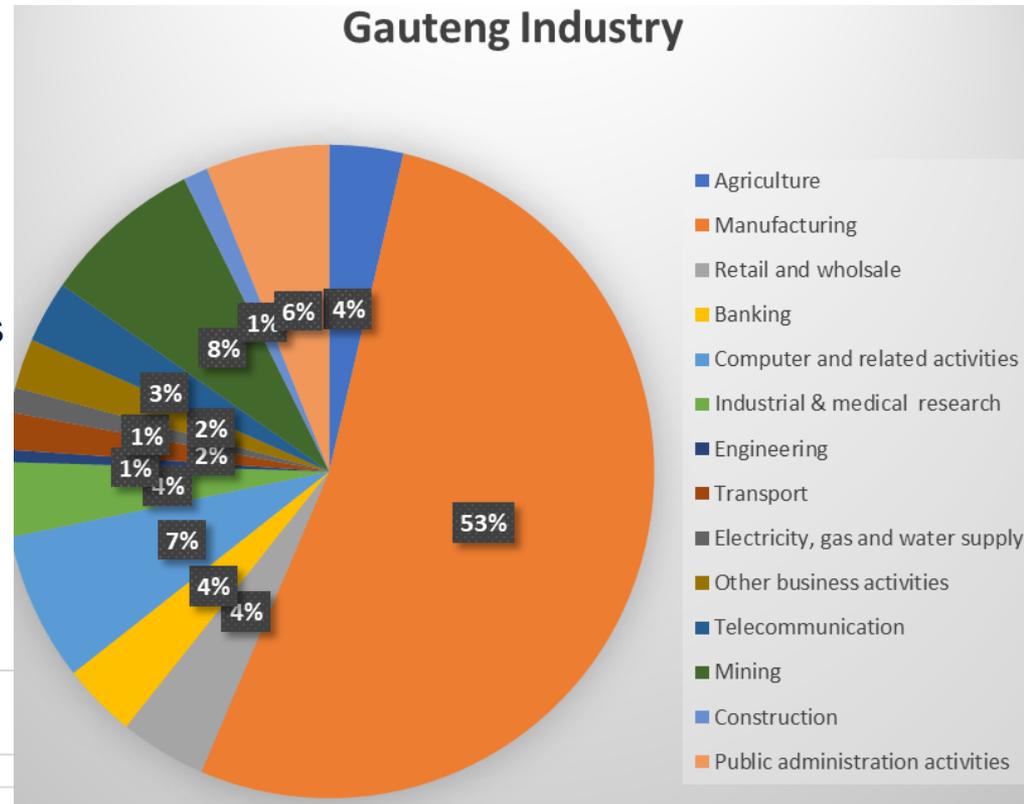
- ❑ South African Research and Experimental Development (R&D) Survey
- ❑ Covers the period from 2012/13 to 2016/17 and focuses on the business sector
- ❑ Data on each firm's R&D expenditure and Standard Industrial Classification (SIC) codes for R&D
- ❑ Another important point is that all the variables or SICs are distributed according to the province in which the companies operates
- ❑ The assumption is that, if a firm has 30% of its R&D expenditures in a particular province, it will also have 30% of its industry there. It seems to be a reasonable assumption, especially since only about 7% of the firms in the business services sector operate in more than one province, which means that their effect on our conclusions about those variables is insignificant

Findings: Dominating Industries on Business Sector R&D in the Western Cape

Industries Dominating R&D in the Western Cape	Tally	Most Dominating Activities in these Industries and their Standard Industrial Classification (SIC) Codes
Manufacturing	42	Basic Metals (35000), Electrical Machinery (36600), Pharmaceuticals (33530)
Computer and Related Activities	16	Software consultancy (86200)
Banking	14	Insurance and pension funding(82000), Housing and Commercial Banking (81121)
Agriculture	11	Ocean and coastal fishing (13100), Agricultural and livestock research (87120), Growing of vegetables and horticultural specialties and nursery products (811120)
Retail and Wholesale	5	Retail trade of in Pharmaceutical and medical goods (62310), Wholesale and commission except motor vehicles and motor cycles (61000)
Electricity, Gas and Water	4	Steam and water supply (41300), Petrol, fuel oil, lubricating oils and greases, primarily from natural gas (33230)
Industrial & medical research	3	Medical and veterinary research (87130)
Transport	3	Railway transport (71100)
Other Business Activities	3	Other Business Activities N.E.C. (88999)
Engineering	1	Consulting Engineering Activities (88211)
Human Health	1	Human Health Activities(93100)
Renting of Machinery and Equipment	1	Renting Of Personal And Household Goods N.E.C. (85300)
Telecommunications	1	Telecommunication (75200)

Dominating Industries on Business Sector R&D in Gauteng

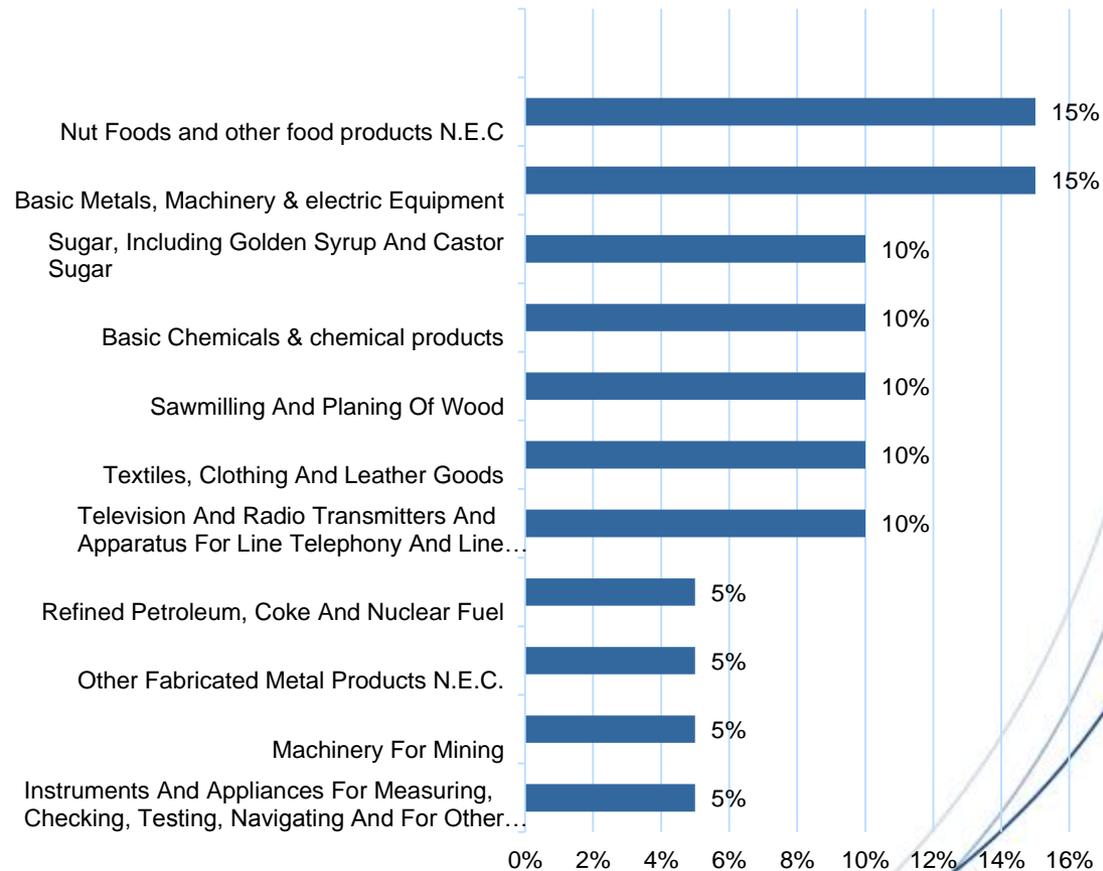
- This study found that the manufacturing sector was the dominant sector during this reference period.
- The top R&D performing activity was related to the manufacturing of pharmaceuticals, medicinal chemicals and botanical products industries at 10%
- It was followed by aircraft manufacturing and navigating instruments (8%) and other electrical equipment (6%) respectively



Dominating Industries on Business Sector R&D in KwaZulu Natal

- KwaZulu-Natal spent over R1.5 billion, which equates to 10.5% of the total business sector R&D expenditure R14 781 billion in 2016/17, showing an increase from R1.4 billion in 2015/16

Manufacturing industry in KwaZulu-Natal



Assessment of SIC Concentration between Western Cape, KwaZulu Natal & Gauteng

- ❑ The Western Cape is the most performing province in agricultural R&D, with 55% compared to KZN and Gauteng provinces
- ❑ Gauteng provinces is the most performing province in manufacturing R&D, with 58% compared to KZN and Western Cape provinces
- ❑ Western Cape provinces is the most performing province in Banking R&D, with 68% compared to KZN and Gauteng provinces
- ❑ Gauteng provinces is the most performing province in retail and wholesale R&D, with 50% compared to KZN and Western Cape provinces
- ❑ Overall, the analysis reveals that Gauteng province is the best performing province on R&D in most SIC between the three provinces followed by Western Cape Province

Table 1: Industries Dominating on Business Sector R&D in Three Provinces

Summary of Dominating Industries	Gauteng %	Western Cape %	KwaZulu-Natal %
Agriculture	0,30	0,55	0,15
Manufacturing	0,58	0,28	0,14
Retail and wholesale	0,50	0,36	0,14
Banking	0,29	0,67	0,05
Hardware and software	0,41	0,55	0,03
Industrial & medical research	0,60	0,30	0,10
Engineering	0,33	0,33	0,33
Transportation	0,50	0,50	0,00
Electricity, gas and water supply	0,33	0,67	0,00
Other business activities	0,57	0,43	0,00
Telecommunication	0,83	0,17	0,00
Mining	1,00	0,00	0,00
Construction	1,00	0,00	0,00
Public administration activities	1,00	0,00	0,00
Human health	0,00	0,50	0,50
Renting of machinery and equipment	0,00	1,00	0,00

Conclusion

- Most dominating industries for Business Sector R&D include agriculture, manufacturing and banking in which agricultural Business R&D is mostly performed in the Western Cape with 55% compared to KZN and Gauteng provinces.
- Manufacturing business R&D is mostly performed by the Gauteng province with 58% compared to other provinces.
- Banking R&D is mostly performed by the Western Cape with 68%.

Conclusion *cont*

- The overall, the paper revealed that Gauteng province is the best performing province on R&D in most SIC between the three provinces followed by Western Cape Province.
- The assumption put forward in this paper is that industries within the three provinces are indeed relevant spaces to realise national policy implementation for Business Sector R&D, not only with regard to economic development but also to promote global technological competitiveness and innovation capacity and the creation of employment opportunities for citizens.

Future Work

- Potential future work might include
 - GIS location within selected provinces
 - Private-public sector cooperation i.e. local government within the provinces
 - Effects of R&D location on social mobility