SESSION BRIEFING: STI INVESTMENT AND INCENTIVE SCHEMES ANALYSIS ON BUSINESS INVESTMENT IN R&D AND ITS IMPACTS

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Sections of the Report

- Inputs

BERD, Personnel, Share, Others

- Outputs

Technology: Patents, BP receipts

Economic: Output, Employment, Exports

- Observations, Further Research, Policy Implications

R&D Expenditure by the Business Sector:

2010/11 – 2019/20

	BERD (R' 000, constant 2015 Rand values)	Year on Year % Change
2010/11	13 081 666	-14.9
2011/12	12 894 165	-1.4
2012/13	12 442 685	-3,5
2013/14	13 103 667	5.3
2014/15	14 028 004	7.1
2015/16	13 814 995	-1.5
2016/17	13 820 449	0.0
2017/18	14 058 812	1.7
2018/19	12 320 234	-12.4
2019/20	8 735 099	-29.1

R&D Personnel Full Time Equivalents in the Business Sector:

2010/11 – 2019/20

	Number of Business Sector R&D Personnel (FTE)
2010/11	10 205
2011/12	9 895
2012/13	11 322
2013/14	11 877
2014/15	12 928
2015/16	12 458
2016/17	12 549
2017/18	12 952
2018/19	11 691
2019/20	9 301

Source: HSRC and DSI's National Survey of Research and Experimental Development. -Table C.31

Business Sector R&D Expenditure as % of GERD:

2010/11 – 2019/20

	BERD as % of GERD
2010/11	49.7
2011/12	47.1
2012/13	44.3
2013/14	45.9
2014/15	45.3
2015/16	42.7
2016/17	41.4
2017/18	41.0
2018/19	39.3
2019/20	31.0

Source: HSRC and DSI's National Survey of Research and Experimental Development.C-3.

Other indicators

- Business Sector funding of R&D in other sectors - declining
- Ability to attract foreign funding - declining
- Share of foreign funding – declining

- Sectoral composition – decreasing share of manufacturing
- Technology composition (manufacturing) – increasing share of low technology

No indication of any sub-sectors where there is significant and sustained growth

A Caution as to the Latest Data

- Treat with caution. May well have been overstated??
- Decline is evident for some while – approx. Since 2015/16
- COVID and Business Sector R&D – is a decline inevitable?

New Technology Based Start-ups

- Venture Capital Investments
  - Increasing. But, may not be a good indicator
  - 12J
- Differing estimates of the number of start-ups. No clear data on growth
- Regional concentration. Eco-system.

Outputs – Technology: Patents

South African Utility Patent Grants at the USPTO

Year	Total	South Africa (count)	South Africa (%)
2015	298 407	166	0.056
2016	303 051	181	0.060
2017	318 829	182	0.057
2018	307 760	145	0.047
2019	354 430	182	0.051
2020	352 010	155	0.044

BRICS by Number of Utility Patents at USPTO

	Number of Foreign Utility Patents		Percentage Share	
	2019	2020	2019	2020
BRICS	25 816	28 162	13.8	15.0
China	19 209	21 428	10.3	11.4
India	5 378	5 861	2.9	3.1
Russia	622	677	0.3	0.4
Brazil	425	494	0.2	0.3
South Africa	182	152	0.09	0.08

Charges for the Use of Intellectual Property

	Payments ($ billion)	Receipts ($ 000)
2010	1.941	113 985
2011	2.118	139 891
2012	2.017	135 297
2013	1.937	135 485
2014	1.732	136 803
2015	1.641	126 114
2016	1.831	139 258
2017	1.883	157 684
2018	1.540	182 504
2019	1.356	150 760
2020	1.198	126 359

Charges for the Use of Intellectual Property Receipts, South Africa and Selected Countries

	2015	2016	2017	2018	2019	2020
	Current USD					
Brazil	581 080 500	650 833 689	642 157 301	825 475 487	641 114 074	634 291 803
Argentina	161 745 947	168 807 424	354 498 296	321 051 040	289 164 966	219 524 980
South Africa	126 114 070	139 258 220	157 684 448	182 504 287	150 760 778	126 359 274
Middle Income ($000s)	4 252	4 278	8 752	10 263	11 278	13 674
South Africa share of Middle Income (%)	3.0	3.2	1.8	1.7	1.3	0.9

Economic impacts

- Output
- Employment
- Exports

Manufacturing, Medium and High Technology Manufacturing Output (Gross Value Added)

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
	Million R (Constant 2015 prices)										
Manufacturing	527 128	541 829	552 595	558 021	554 420	553 392	555 880	554 833	565 926	559 294	490 290
MHT	155 586	157 731	157 117	158 051	157 823	157 937	159 868	155 966	154 860	152 771	122 812
MHT excl. motor vehicles	136 441	138 046	136 739	137 019	136 459	13 024	138 400	134 757	132 021	130 003	106 222
MHT %	29.52	29.11	28.43	28.32	28.47	28.54	28.76	28.11	27.36	27.31	25.05
MHT excl. motor vehicles %	25.88	25.48	24.74	24.55	24.61	24.58	24.90	24.29	23.33	23.25	21.67

Share of Medium and High Technology Manufacturing Employment

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Manufacturing employment ('000)	1 177	1 168	1 167	1 168	1 161	1 174	1 188	1 200	1 221	1 220	1 135
MHT employment ('000)	339	348	353	360	355	354	365	369	384	385	360
Share of MHT employment (%)	28.8	29.8	30.3	30.8	30.6	30.2	30.7	30.7	31.4	31.5	31.8
MHT employment excl. motor vehicles ('000)	298	306	310	316	312	310	318	320	335	335	315
Share of MHT employment excl. motor vehicles (%)	25.3	26.2	26.6	27.0	26.9	26.4	26.8	26.7	27.4	27.4	27.8

Exports as measure of innovation

Why we should consider exports as a/the key indicator of innovation.

Product innovation

- New exporters
- New products
- New markets

Process innovation

- Increasing export volumes of existing products

Medium and High Technology (MHT) Exports as a Share of Manufacturing Exports

MHT %	43.34	45.76	47.65	46.83	47.40	48.99	48.70	47.76	47.80	49.25	47.98
MHT excl. motor vehicles %	32.05	34.04	34.80	34.36	33.72	32.99	33.27	32.66	32.31	33.63	36.27

South Africa and Brazil High Technology E

	South Africa	Brazil	South Africa%	Brazil%
	Value (US$ billion)		% Share of manufactured exports	
2010	2.5	8.8	6.2	12.3
2011	2.8	9.2	6.2	10.9
2012	2.9	9.5	6.9	11.5
2013	2.7	9.1	6.8	10.7
2014	2.8	8.8	6.7	11.7
2015	2.9	9.5	7.7	13.6
2016	2.4	10.4	6.7	14.8
2017	2.2	10.7	5.7	13.9
2018	2.1	11.1	5.3	13.4
2019	1.8	9.4	4.9	13.3
2020	1.8	5.9	5.6	11.4

Benchmarking South African High-technology Exports as % of Manufactured Exports

	Percentage
Malaysia	53.8
China	31.3
World	22.2
Middle Income Countries	23.4
Mexico	21.5
Brazil	11.4
Russian Federation	9.2
Chile	15.8
Portugal	7.1
Argentina	6.1
South Africa	5.6

Total Exports (Excluding Gold) Characteristics

	Value (US$)	Number of Exporters	Number of Products	Number of Destinations	Number of Transactions
2010	75 015 618 849	32 666	4 247	218	856 857
2011	89 519 158 028	33 503	4 243	223	944 653
2012	81 477 002 781	39 377	4 234	218	1 036 806
2013	80 379 627 154	41 199	4 216	220	1057254
2014	77 538 185 918	41 328	4 219	226	1 089 767
2015	66 293 493 448	41 877	4 222	219	1 106 222
2016	62 266 265 394	42 172	4 217	220	1 111 175
2017	72 954 412 473	40 384	4 202	225	1 111 973
2018	77 320 210 944	37 428	4 199	223	1 091 335
2019	73 465 477 368	35 326	4 192	225	1 050 492
2020	71 297 209 036	35 666	4 178	218	961 052

Manufacturing Exports Characteristics

	Value (US$)	Number of Exporters	Number of Products	Number of Destinations	Number of Transactions
2010	39 638 889 313	30 555	3 529	217	773 097
2011	44 134 116 198	31 415	3 527	220	857 596
2012	41 754 205 817	36 629	3 518	215	935 223
2013	39 904 941 879	38 384	3 502	214	954 040
2014	40 808 339 551	38 586	3 505	221	985 647
2015	35 567 695 016	39 123	3 506	214	1 001 709
2016	32 535 154 836	39 269	3 501	216	1 006 221
2017	35 673 876 620	37 566	3 488	222	1 007 803
2018	38 090 094 108	34 874	3 487	218	990 581
2019	35 048 542 712	32 986	3 484	222	953 657
2020	31 868 009 041	33 321	3 470	217	868 767

Decomposition of Change in Total Exports: Extensive and Intensive Margin

	Extensive	Intensive	Total
2010-2011	3.4	14.2	17.6
2011-2012	1.4	-10.8	-9.4
2012-2013	-1.3	-2.6	-1.4
2013-2014	2.6	-6.2	-3.6
2014-2015	-1.2	-14.4	-15.6
2015-2016	-0.4	-5.8	-6.3
2016-2017	3.1	12.7	15.8
2017-2018	-1.0	6.8	5.8
2018-2019	-1.6	-3.5	-5.1
2019-2020	-0.7	-2.3	-3.0

Overall summary of the data

- Consistent picture of decline in both inputs and outputs
- Slow growth to approximately 2015/16 and a decline thereafter
- Latest data suggest that the rate of decline is accelerating

Knowledge gaps

Lack of knowledge about both established firms and start-ups

What accounts for:

- Strong performance of start-ups
- Heterogeneity among established firms

New sources of evidence/data:

- South African Revenue Service and National Treasury Firm-Level Panel (SARS-NT panel) data

Policy implications

Twin challenge:

- Established firms: enhance innovation
- Start-ups: scale-up

Enhancing innovation

Other channels for enhancing innovation

- access to foreign technology
- FDI

Enhance the returns to innovation

- efficiency of the NSI

Complementary changes

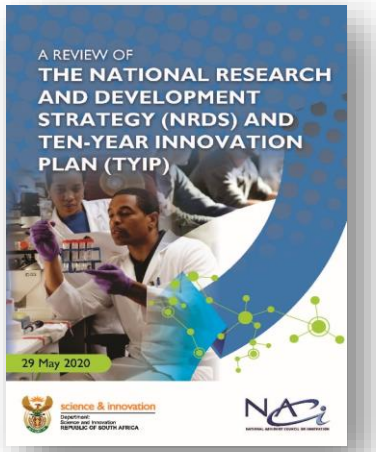
- trade policy
- localisation

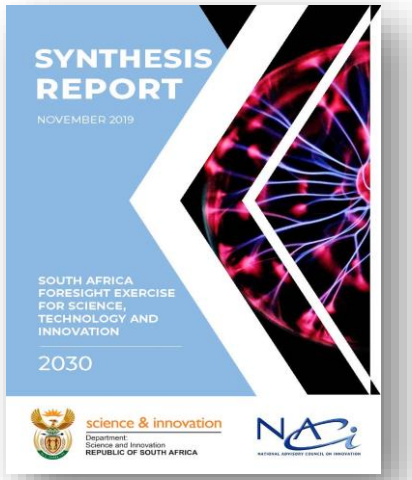
Lower the costs of innovation

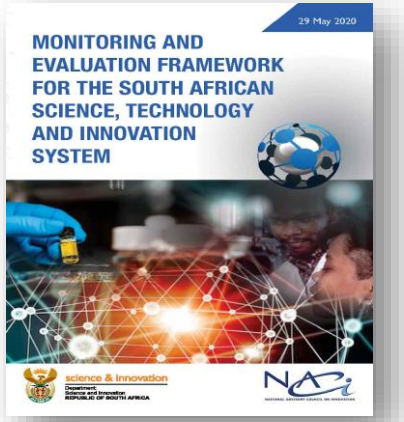
- skills shortage

Enhancing Business Sector innovation as a goal of government policy

- Innovation led exports as the key objective of government growth policy
- Industrial policy: industry masterplans
- DSI and DTI to coordinate policy







Enkosi

Ha khensa

Re a leboga

Ro livhuwa

Siyabonga

Siyathokoza

Thank you

Dankie

Obrigado

Спасибо

धन्यवाद

谢谢

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