



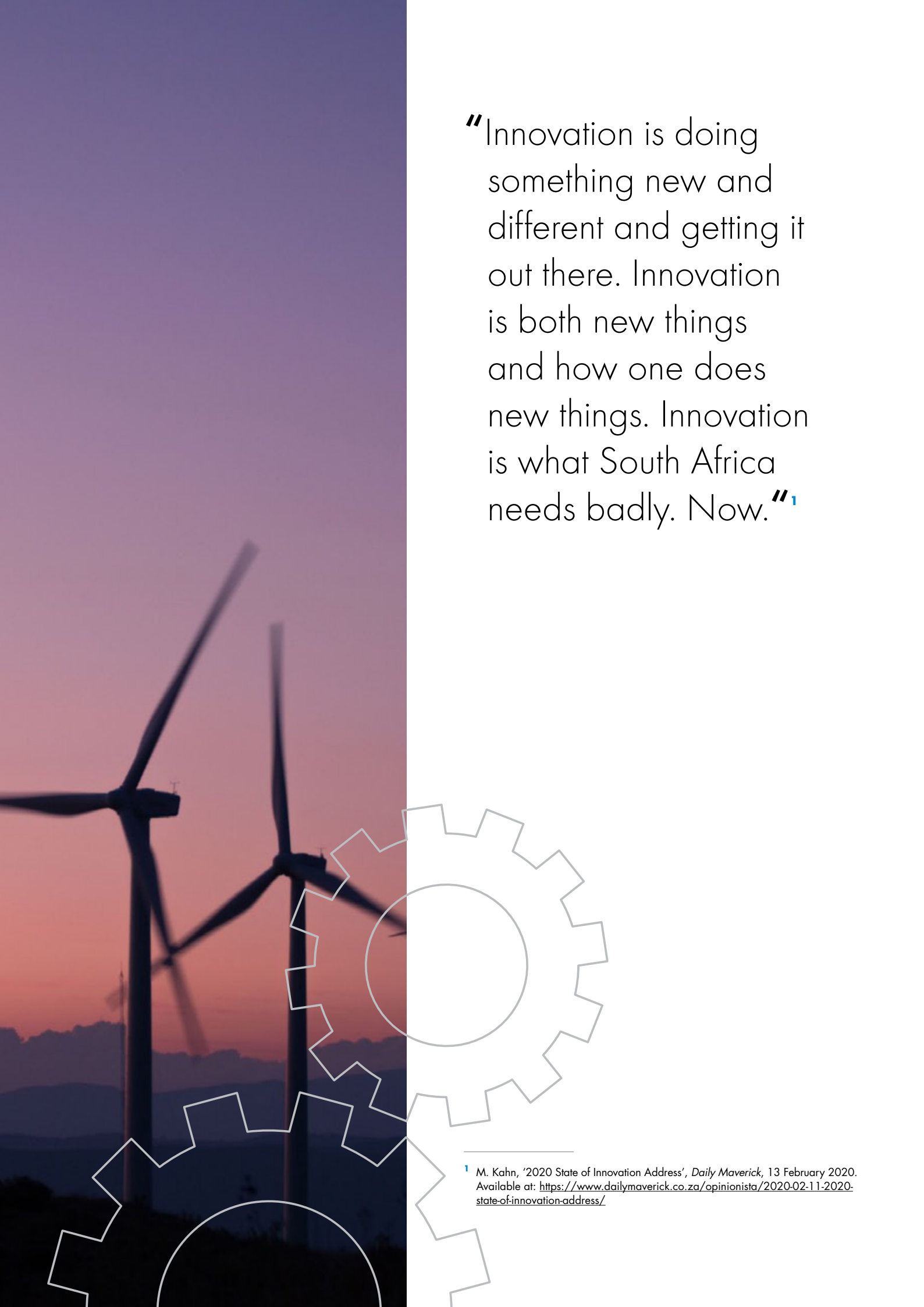
**BUSINESS INNOVATION
SURVEY 2014 - 2016**

FOR A MORE INNOVATIVE SOUTH AFRICA

**INNOVATION PERFORMANCE
IN SOUTH AFRICAN BUSINESSES,
2014-2016**



Activities, Outcomes, Enablers, Constraints



“Innovation is doing something new and different and getting it out there. Innovation is both new things and how one does new things. Innovation is what South Africa needs badly. Now.”¹

¹ M. Kahn, '2020 State of Innovation Address', *Daily Maverick*, 13 February 2020. Available at: <https://www.dailymaverick.co.za/opinionista/2020-02-11-2020-state-of-innovation-address/>

WHAT THE RESULTS COVER

SURVEY REFERENCE PERIOD:



BUSINESS SECTORS:*

INDUSTRY



Mining & Quarrying
("Mining")



Manufacturing



Electricity, Gas & Water Supply
("Utilities")

SERVICES



Wholesale & Retail Trade
("Trade")



Transport, Storage & Communication
("Logistics")



Financial Intermediation
("Finance")



Computer & Related Activities



Research & Development



Architectural & Engineering



Technical Testing

("Engineering & Tech")

TOTAL NUMBER OF BUSINESSES:



41 535

INDUSTRY: 15 517 | SERVICES: 26 018

TOTAL NUMBER OF PEOPLE EMPLOYED:



5 281 342

INDUSTRY: 2 909 633 | SERVICES: 2 371 709

BUSINESS SIZES:**



LARGE



MEDIUM



SMALL



VERY SMALL

TYPES OF INNOVATION:



PRODUCT
PROCESS
MARKETING

ORGANISATIONAL

NOVELTY LEVELS:



NEW TO THE FIRM
NEW TO THE MARKET
NEW TO THE WORLD

* Terms in quote marks are shorthand terms adopted by the authors of this report to aid readability. Shorthand terms are used judiciously and should be read as directly interchangeable with the expanded terms.

** See Table 17 (page 59) for turnover sizes by sector.

EXECUTIVE SUMMARY

What are the factors that drive business innovation activities? How, and when, do businesses benefit from innovation? What are the barriers that constrain innovation? What are the sources of information businesses draw on when they innovate? A national innovation survey helps to answer these—and other—critical questions that business leaders, industry groups, and government policy-makers face.

10 key results from the South African Business Innovation Survey, 2014-2016

1 Innovation was pervasive across all sectors, but especially in engineering and tech, manufacturing, and trade.

- More than two thirds (69.9%) of South African businesses were innovation-active. They took some scientific, technological, organisational, financial, or commercial steps, during 2014-2016, towards the implementation of an innovation.
- Nearly all (96%) of the innovation-active businesses in the country also introduced an innovation to their firms or markets in 2014-2016.
- Innovative South African businesses engaged in the four types of innovation measured in almost equal shares: product innovation (48.2%), organisational innovation (42.0%), marketing innovation (41.7%), and process innovation (34.6%).
- The engineering and tech, manufacturing, and trade sectors reported the greatest concentrations of innovation in 2014-2016.

2 South African businesses invested in innovation activities that helped them—and their workforces—to prepare for technological and organisational change.

- South African businesses geared for technological change by training their workforces and investing in new information technology. The business innovation activities reported by the largest share of companies were training (59.3%), acquisition of computer software (58.3%), and acquisition of computer hardware (57.2%).
- For both the industrial and services sectors, the biggest-ticket innovation expenditure item during 2014-2016 was the acquisition of machinery and equipment.

3 Innovation was less likely to have an immediate impact on turnover, and far more likely to be incremental than radical.

- Low proportions of returns on innovation investment accounted for turnover of innovative businesses in the 2014-2016 period, for a product that was *new to the market* (10.8%), *new to the business* (7.0%), or *new to the world* (1.8%). By contrast, 80.5% of innovative business turnover was generated by goods and services that were unchanged or marginally modified.

4 More innovation-active South African businesses accessed national and global markets than their counterparts with no innovation activity.

- Businesses with innovation activity were more likely to have sold their goods and services on national markets (58.1%), when compared to non-innovation-active businesses (37.7%). More non-innovation active firms accessed selected provincial markets (57.4%) than any other market.
- In addition, more innovation-active businesses accessed global markets, including markets in the rest of Africa, Europe, Asia, and other countries, than non-innovation-active businesses.

5 Quality improvement was the top-rated innovation outcome for innovation-active businesses.

- Improved quality of goods and services was considered by 38.0% of product and process innovators as a highly successful outcome of innovation, followed by increased revenue (31.8%) and improved profit margins (30.9%). Similarly, for 49.5% of organisational innovators, improved quality was the most highly rated innovation outcome.
- Improved health and safety (27.0%) or reduction in environmental impacts (23.3%) were reported by a significant number of product and process innovators when compared to financial or quality outcomes.
- Entering new export markets or increased export market share as a highly successful innovation outcome was reported by only 7.5% of product and process innovators.

6 Very few businesses protected—or profited from—their intellectual property rights.

- Very few businesses used one or more of the suite of intellectual property (IP) rights protection strategies to safeguard, or generate revenue, from their innovations. The most preferred strategies were trade secrets or confidentiality agreements (innovation-active businesses: 16.5%; non-innovation-active businesses: 4.7%) and trademark registration (innovation-active businesses: 12.4%; non-innovation-active businesses: 3.9%). Only 14.8% of businesses reported increased IP revenue as a highly successful outcome of their innovation activity, while only 5.1% of innovation-active businesses granted a licence on any intellectual property resulting from an innovation.
- Only a few businesses viewed IP rights as a barrier to innovation (innovation-active businesses: 4.3%; non-innovation-active businesses: 6.2%).

7 Innovation was not a widely connected phenomenon.

- Only about one-fifth (20.8%) of innovation-active businesses reported collaboration activities as part of the development of their innovations. The five most widely reported reasons to collaborate were accessing information, accessing R&D, accessing expertise, cost sharing, and accessing new markets.
- External partners highly valued by innovative businesses included suppliers of equipment, materials, components or software (19.2%), followed by clients or customers (16.6%), and then competitors (14.6%). Less than 10.0% of innovative businesses partnered with government research institutes (8.0%), universities (6.8%), or private research institutions (4.9%) to develop their innovations during 2014-2016.
- Internal sources of information within a business group (45.6%) were most highly valued, followed by clients or customers (37.8%), and then suppliers (30.8%). External knowledge producers, such as universities or government laboratories, were not strongly indicated as among the highly important sources of information for business innovation in 2014-2016: private research institutes and government research institutes were sources of information for only 7.8% and 7.4% of innovative businesses respectively, while universities and higher education institutions were used as a source of information by only 2.8% of innovative businesses.

8 Major obstacles to innovation included mostly financial but also some market factors.

- Barriers that innovation-active businesses identified as most important concerned financial and market factors. Eight widely reported obstacles included: lack of funds from within the business or business group (31.5%) or from external sources (25.0%); the excessive cost of innovation (22.5%); lack of credit or private equity (24.8%); difficulty in accessing government grants (21.5%); uncertainty about demand for innovations (19.3%); market competition (16.4%); and lack of customer demand (8.6%).
- For non-innovation-active businesses, the most widely reported barrier to innovation was a lack of demand for innovations (20%).

9 Businesses were aware of government support for innovation, but innovation was not linked to public sector procurement.

- One third of businesses that engaged in innovation activities (33.6%) were aware of government financial support for innovation. By contrast, only one tenth of non-innovation-active businesses (10.1%) were cognisant of the support available.
- The vast majority of innovation-active businesses relied on their own funds to innovate (77.0%). Only 1.7% of these businesses reported government as a source of funds for innovation.
- Approximately one fifth (21.9%) of businesses had procurement contracts with public sector organisations, and nearly all of these were South African contracts. However, only 32.3% of these contracts required innovation.

10 A range of new technologies—including green technologies—were used by businesses to execute their innovation activities.

- A substantial number of innovation-active businesses reported their use of new technologies to innovate. The five capabilities most reported included computerised design and engineering (44.1%), materials handling, supply chain and logistics technologies (31.6%), business intelligence technologies (25.4%), green technologies (23.4%), and advanced information control technologies (20.7%).
- Non-innovation-active businesses reported very little use of new technologies (approximately 10.0% or less for all technology types measured).

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SEARCH RESULTS BY KEY QUESTION

What types of innovation did businesses implement?

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Were there distinct patterns of business innovation in different sectors?

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Who was responsible for the development of product and process innovations?

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What were the different ways businesses implemented and invested in innovation?

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Where were the markets for innovation-active businesses?

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To what extent did businesses use technology and knowledge assets?

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What new technological capabilities enhanced business innovation?

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What sources of information did businesses draw on to innovate?

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How, and why, did businesses cooperate with other businesses, customers, or research institutions?

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Did businesses know about financial support from government for innovation?

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Where did business source their innovation funding from?

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Did businesses have procurement contracts in place to promote innovation to provide goods or services to public sector organisations?

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INTRODUCTION

South Africa's key priorities are to accelerate inclusive economic growth, create jobs, and reduce inequality.² Whether to drive product exports in key sectors, meet local demand for new services, or expand opportunity to new entrepreneurs and small businesses, innovation is an essential ingredient of prosperous economies. In the context of immediate local and global challenges, and disruptive technologies, innovation is also the engine of our collective future well-being. In this report we showcase results and trends from the South African Business Innovation Survey, 2014-16—a critical national research effort to inform innovation discussions in South Africa and internationally.³

We have made a deliberate effort to deliver these results in plain language, to maximise the use and uptake of research findings. We would consider our job done if you recommended this report to a colleague, shared it in your business, or posted it on your platforms. You can also get in touch with us on Twitter, LinkedIn, Facebook and Instagram to let us know your thoughts.

Why we measure innovation

Evidence is required to inform decision-making and policy, whether in government or in business. This report provides new empirical evidence to answer questions like:

- What proportion of South African businesses are innovative?
- What types of innovation do businesses in key economic sectors undertake?
- What are the different ways businesses invest in, and implement, innovation?
- To what extent are businesses using technology and knowledge as assets?

But just how can this evidence be used by government and business actors? Critically, if government is to encourage, promote and enable more innovation in more businesses, it needs to understand businesses' experiences of innovation. It also needs to know how many businesses are aware of—and actually access—existing sources of government support for innovation. Equally, businesses and industry groups can benefit from sector-specific and national innovation indicators to: benchmark their innovation data, sectorally and nationally; reflect on their innovation performance internationally; and learn more about government support for innovation. For these reasons, a reliable innovation data set is a valuable public good.

² National Development Plan 2030: Our future—make it work. National Planning Commission.

³ Review business innovation data from other countries for the same reference period at OECD online: <http://www.oecd.org/innovation/inno/inno-stats.htm>

NOTES TO GUIDE READERS



The SA Business Innovation Survey, 2014-2016, report and data set

This report points to high level results and trends. Accompanying this report is the full aggregate data set, which is downloadable as a Microsoft Excel spreadsheet:

<http://www.hsrc.ac.za/en/departments/cestii/latest-results>

Data tables are cross-referenced for each table and chart as "Appendix Table A#". For any data-related enquiries in this report or in the report's appendix tables, write to innovation@hsrc.ac.za.

Important definitions

In this report, we use the term “innovation” very specifically.

The definition of innovation used in the South African Business Innovation Survey, 2014-2016, comes from the OECD’s *Oslo Manual* (2005).



INNOVATION:

The introduction to market of a new or significantly improved product (good or service) or the use of new or significantly improved process (methods for the production or supply of goods and services).

It covers a range of activities, but only if they occurred during the survey period.

It is important to note that innovation is an outcome of various combinations of activity, but not all innovation activity results in an innovation.



INNOVATION ACTIVITY:

Includes all **scientific, technological, organisational, financial, and commercial steps**, which actually lead, or are intended to lead, to the implementation of innovations. Some of these activities may be innovative in their own right, while others are not novel but are necessary to implementation (OECD, 2005, par. 40).

In this report, therefore, we distinguish between three types of business:

1. **Innovation-active business**
2. **Non-innovation-active business**
3. **Innovative business**



INNOVATION-ACTIVE BUSINESS:

A business with **innovation activities** in 2014-2016, including ongoing and abandoned activities (i.e. it does not matter if the activity resulted in the implementation of an innovation or not) (OECD, 2005, par. 215).



NON-INNOVATION-ACTIVE BUSINESS:

A business without any innovation activities.



INNOVATIVE BUSINESS:

A business that implemented an innovation in 2014-2016 (OECD, 2005, par. 152)

CHARACTERISTICS OF COMPANIES IN THE SA BUSINESS INNOVATION SURVEY, 2014-2016

Innovation survey data can provide a unique lens into the characteristics displayed by innovative firms. For example, analysis of data on the types of innovation activity carried out by innovative firms, or the contribution of innovation to turnover, reflects the patterns and trends that were particular to the South African business environment in 2014-2016.

What was the profile of South Africa's innovation-active businesses?

Innovation activity

More than two thirds (69.9%) of South African businesses had some form of innovation activity (Figure 1).⁴ These businesses were **innovation-active** in 2014-2016. Nearly all innovation-active businesses (96%) implemented one or more innovations, whether product, process, marketing and/or organisational, which, by definition, classifies most innovation-active businesses as *innovative* during this period. Conversely, only 4% of innovation-active businesses had all their innovation activities either abandoned or ongoing. Just below one third (30.1%) of South African businesses did not report any innovation activities in 2014-2016.

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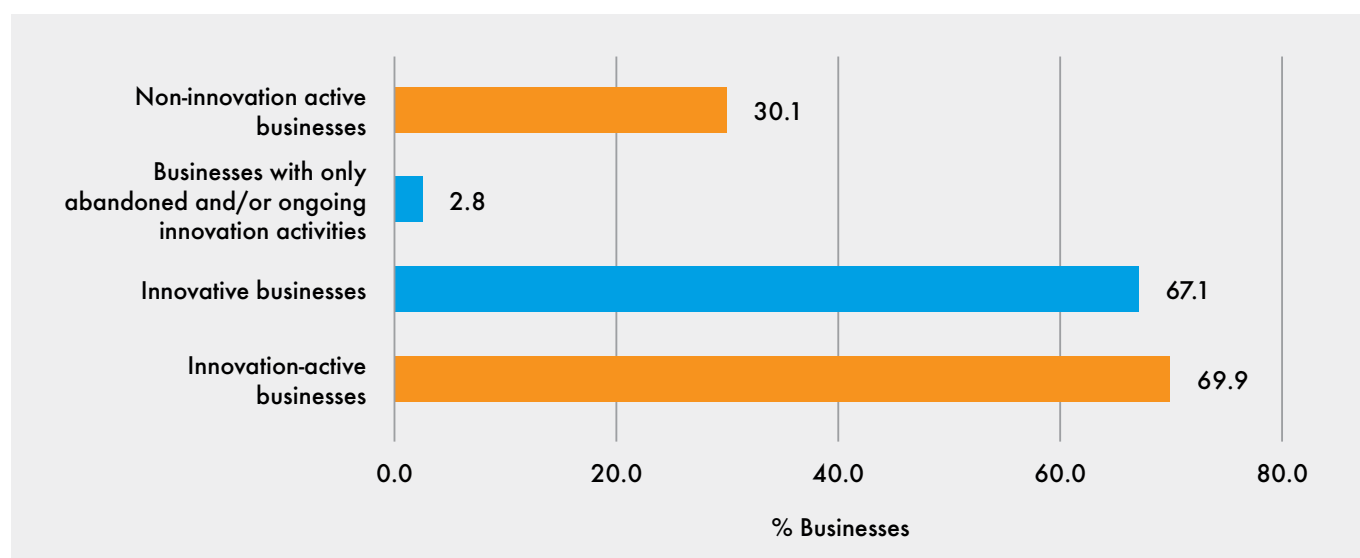


Examples of innovation activity

- Performing R&D
- Sourcing patent rights
- Buying or leasing equipment, software, hardware, or buildings
- Training
- Design or engineering activities

To see what businesses spent on each activity, see Appendix Table 17.1.

Figure 1: Split of innovation-active and non-innovation-active businesses



Source: Appendix Tables A1.1 and A1.2

⁴ Using a weighting calculation, survey data has been statistically adjusted to be representative of the entire South African business population within the chosen sectors.

Employment

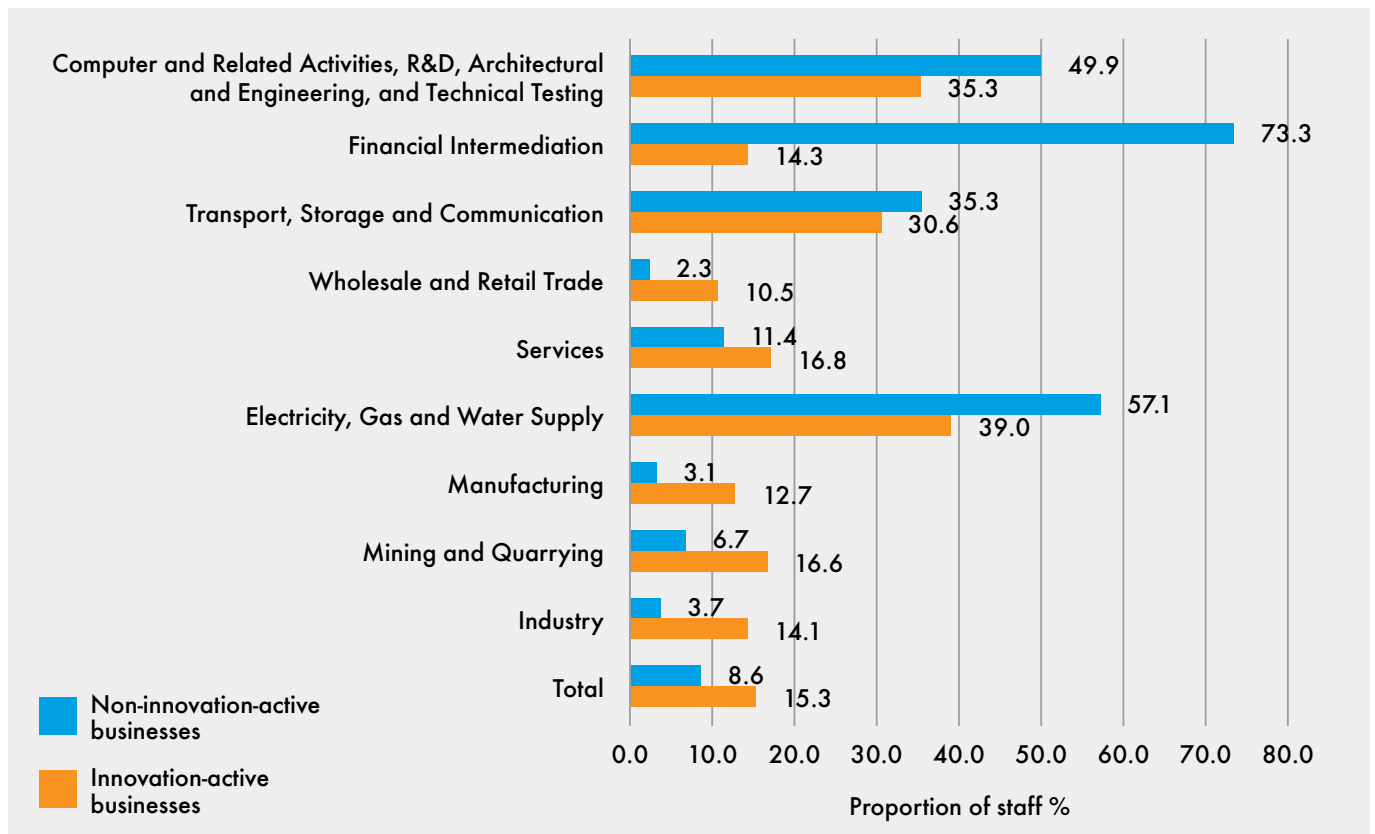
A total of 85.6% of employees across industry and services were employed by innovation-active businesses (Table 1). In these businesses, 15.3% of employees held a university degree or diploma, as compared to businesses without innovation activity (8.6%) (Figure 2).

Table 1: Innovation-active businesses and employment

	Total	Industry	Services
Total number of businesses	41 535	15 517	26 018
Innovation-active businesses	29 034	10 965	18 069
Innovation-active businesses (as a % of all businesses)	69.9%	70.7%	69.4%
Number of employees in all businesses	5 281 342	2 909 633	2 371 709
Number of employees in innovation-active businesses	4 518 704	2 629 741	1 888 963
Number of employees in innovation-active businesses (as a % of employees in all businesses)	85.6%	90.4%	79.6%

Source: Appendix Tables A1.1, A1.2 and A2

Figure 2: Employees with a degree or diploma in innovation-active and non-innovation-active businesses (2016 only)



Source: Appendix Table A3



Business ownership

One fifth (20.1%) of all businesses surveyed were part of a larger group. By sector, of the 15 517 businesses in industry, 29.1% indicated that their business formed part of a larger group; whereas only 14.7% of the 26 018 businesses in the services sector formed part of a larger group (Table 2). Notably, 23.4% of all businesses that formed part of a group merged with, or took over, another business during 2014-2016, with 30.4% of services sector businesses reporting a merger or acquisition. Conversely, 17.1% of industry sector businesses that were part of a group sold, closed, or outsourced part of their business.⁵

Table 2: Ownership of businesses (as a % of all businesses)

	Total	Industry	Services
Part of a larger group	20.1	29.1	14.7
Not part of a larger group	79.9	70.9	85.3
If part of a larger group:			
<i>Merged or took over another enterprise</i>	23.4	17.4	30.4
<i>Sold, closed or outsourced part of the enterprise</i>	11.1	17.1	4.1
<i>Established new subsidiaries in other African countries</i>	4.9	3.3	6.8
<i>Established new subsidiaries outside of Africa</i>	3.2	4.0	2.3

Source: Appendix Table A4

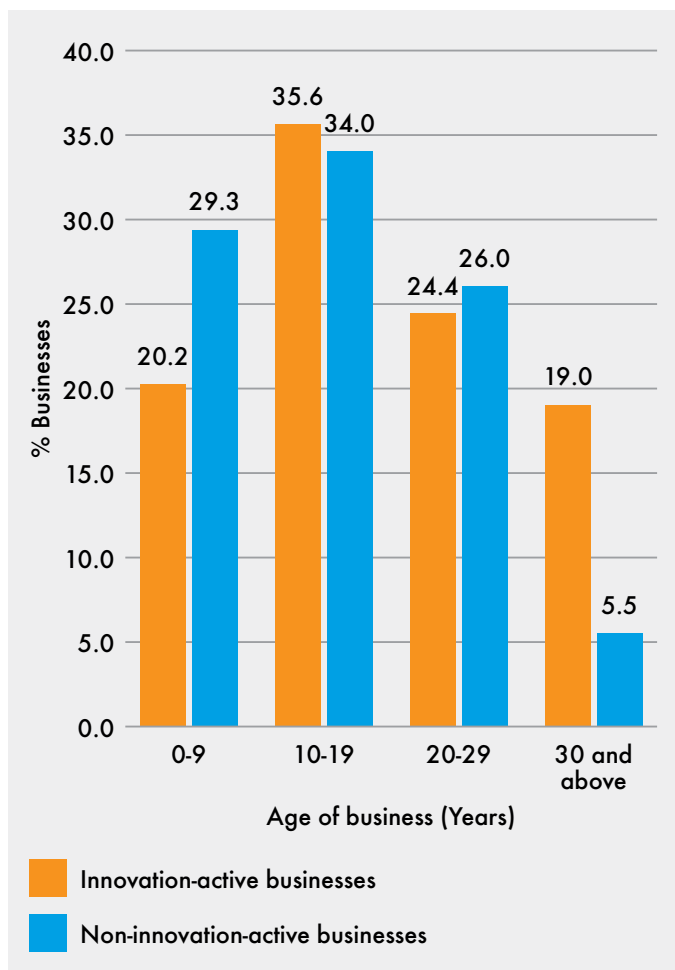
⁵ This mostly occurred for businesses in the mining sector. See Appendix Table A4.



Company age

As shown in Figure 3, during 2014-2016 there were lower proportions of “young” businesses (0-9 years) and “old” businesses (30 and above years), while there were higher proportions of businesses in the “middle” age groups (10-19 and 20-29 years). This normal curve pattern is reflected in the data for both innovation-active and non-innovation-active firms.

Figure 3: Age of innovation-active and non-innovation-active businesses



Source: Appendix Table A5

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The normal curve

The pattern displayed in Figure 3 depicts a natural phenomenon that is statistically explained using the normal curve. What factors might explain this pattern? Young firms (0-9 years) may have been less likely to have sufficient financial and human resources to innovate, and this could explain the lower proportion of innovation-active (20.2%) than non-innovation-active firms (29.3%) in this age range. On the other hand, old firms (30 and above years) may have been more likely to engage in innovation activities to remain business competitive. The pattern in Figure 3 confirms this, with a higher proportion of innovation-active firms (19.0%) than non-innovation-active firms (5.5%).



Turnover

Table 3 shows that total turnover of all businesses in the 2014-2016 period was R5.6 trillion, with 81.3% (R4.6 trillion) generated by innovation-active businesses. In the services sector, innovation-active businesses were responsible for 88.1% of R3.3 trillion in turnover. In the industrial sector, innovation-active businesses contributed 71.6% of R2.3 trillion in turnover.

Table 3: Sectoral comparison of turnover for businesses with innovation activities

	Total	Industry	Services
No. of businesses	41 535	15 517	26 018
Turnover (R billion)	5 644	2 350	3 294
Turnover of innovation-active businesses (R billion)	4 586	1 683	2 903
Contribution of innovation-active businesses' turnover to total turnover	81.3%	71.6%	88.1%

Source: Appendix Tables A1.1 and A6.

Note: Due to rounding, numbers do not always total exactly.

INNOVATION ACTIVITIES

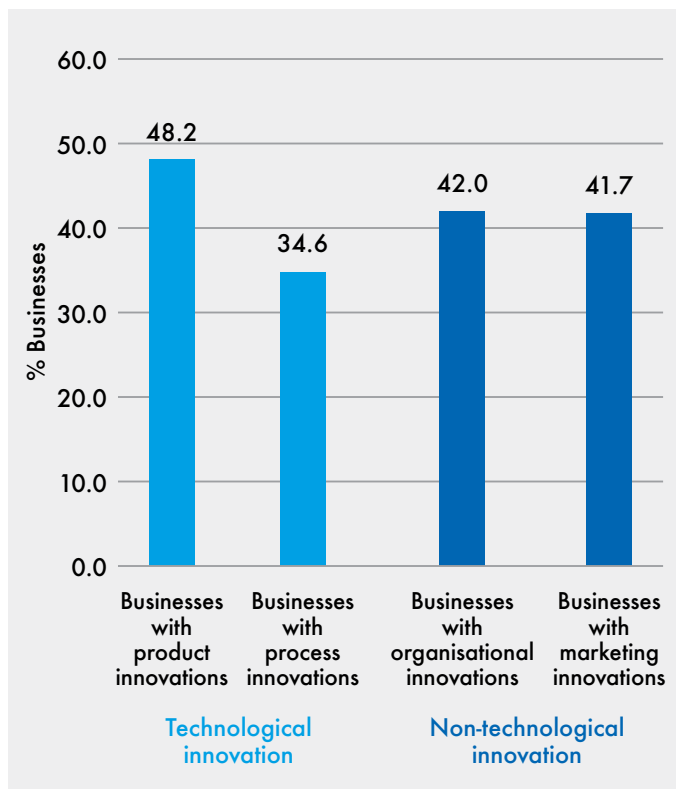


More than two thirds of South African businesses across industry and services innovated during 2014-2016. But what was the nature of this innovation? And what activities underpinned it?

What types of innovation did businesses implement?

Innovation surveys typically measure four types of innovation—product, process, organisational and marketing—that businesses may engage in simultaneously. During the analysis of survey data, the four types of innovation can be grouped into technological and non-technological innovation to provide an indication of technological capability development at a national or sectoral level. As shown in Figure 4, during 2014-2016 product innovation was reported by more businesses than any other type of innovation. However, the levels of technological and non-technological innovation were similarly distributed in this period.

Figure 4: Split of businesses with technological and non-technological innovation



Source: Appendix Table A9

Note: Businesses may be involved in multiple types of innovation at the same time. As a result, there may be an overlap in the number of businesses reported, and percentages may not add up to 100%.

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Technological vs. Non-technological innovation

Technological innovation:

When a business introduces to the market, or brings into use within the firm, a new or significantly improved product or process.

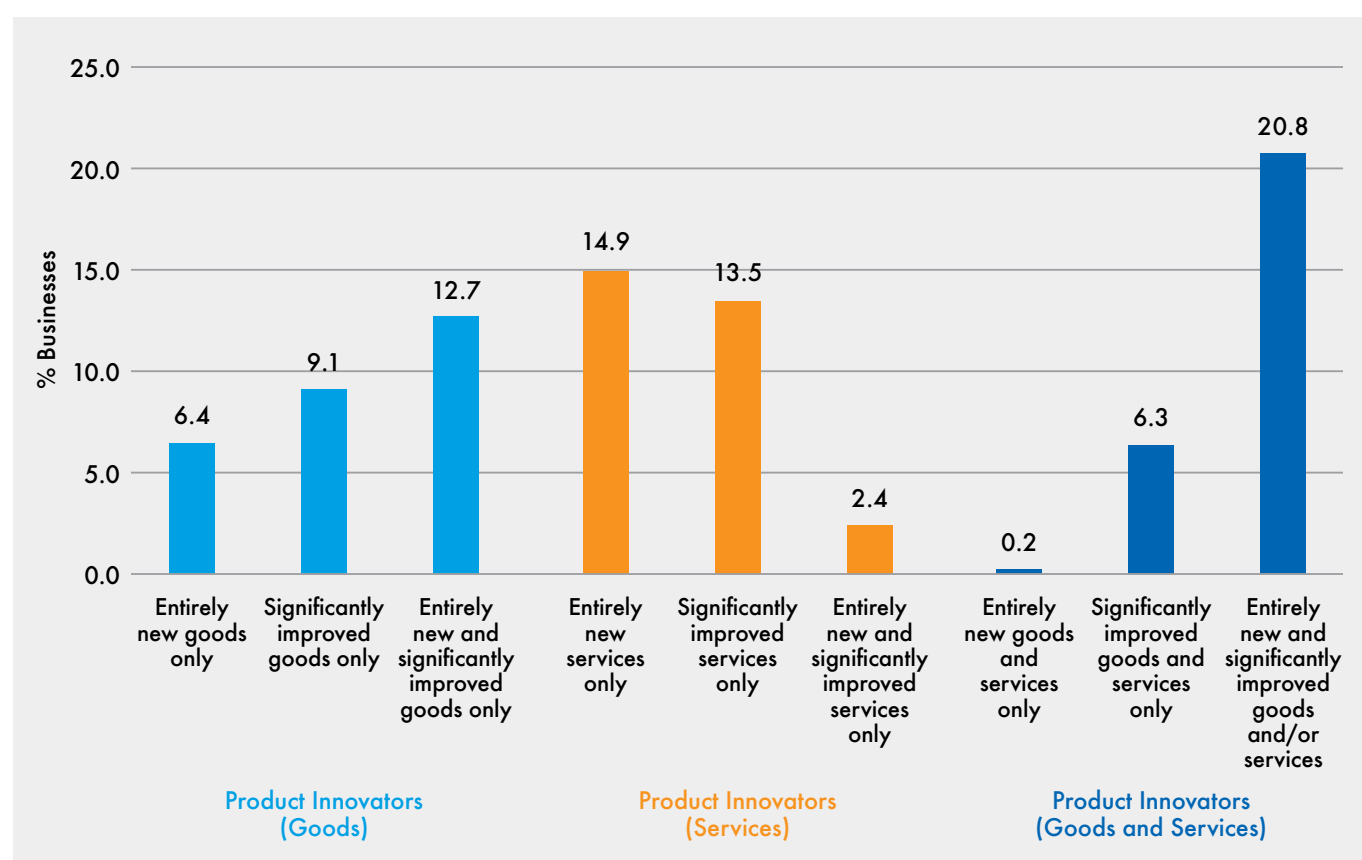
Non-technological innovation:

When a business introduces a new or significantly improved marketing or organisational method.

For analysis purposes, businesses with product innovations (“product innovators”) can be broken down into three groups: goods innovators, services innovators, and goods and services innovators (Figure 5). For product innovators, measurement of the degree of novelty of innovations is vital. This is because they may display combinations of entirely new, and significantly improved, goods and/or services—and therefore have different support or investment requirements.

The figure shows that, during 2014-2016, more businesses had entirely new and significantly improved goods (12.7%) than businesses that had only entirely new (6.4%) or only significantly improved (9.1%) goods. The opposite is true for the services product innovators. Around 15.0% introduced entirely new services only while only 2.4% introduced entirely new and significantly improved services only. Product innovators that were both goods and service innovators reported the highest proportion of entirely new and significantly improved goods and/or services (20.8%), as shown.

Figure 5: Product innovation



Source: Appendix Table A8.2

Note: There are businesses that engaged in various combinations of product (goods and services) innovation. These may include combinations of both entirely new and significantly improved goods and/or services. (Data not shown in Figure 6).

Process innovation is the use of new or significantly improved methods for the production or supply of goods and services. A process innovation must be new to the business but does not need to be new to the industry or market. Table 4 showcases the types of process innovations most reported by businesses during 2014-2016.

Table 4: Businesses with specific process innovations (as % of all process innovators)

Types of process innovation	Total	Industry	Services
Methods of manufacturing or production of goods and services	55.1	73.0	43.1
Delivery or distribution methods for inputs, goods or services	44.1	66.2	29.4
Supporting activities (e.g. operating systems for purchasing, accounting or computing)	73.0	75.6	71.2

Source: Appendix Table A10

Businesses that introduced organisational innovations in 2014-2016 mostly introduced new or significantly improved business practices (Table 5). Fewer businesses indicated changes to the organisation of work—such as changes in the management structure or integrating different departments or activities—inside their enterprise as an important innovation. As shown in the table, even fewer introduced new or significant changes to their external relations with other businesses or public institutions, such as through alliances, partnerships, outsourcing or sub-contracting.

NOTES TO GUIDE READERS



Examples of new or significantly improved business practices

- Knowledge management
- Systems to better use or exchange information, knowledge and skills within the business
- First time use of supply chain equipment
- Business re-engineering
- Lean production
- Quality management

Table 5: Organisational innovation

	Total	Industry	Services
All businesses with organisational innovations (%)			
New or significantly improved business practice	78.9	72.7	83.7
Major changes to the organisation of work within your enterprise	43.2	50.0	37.9
New or significant changes in your external relations with other businesses or public institutions	35.6	37.8	34.0
Businesses with organisational innovations <u>only</u> (%)			
New or significantly improved business practice	7.8	7.0	8.5
Major changes to the organisation of work within your enterprise	1.5	1.9	1.2
New or significant changes in your external relations with other businesses or public institutions	4.2	0.2	7.2
Businesses with organisational <u>and</u> other types of innovation (%)			
New or significantly improved business practice	71.2	65.7	75.2
Major changes to the organisation of work within your enterprise	41.6	48.1	36.7
New or significant changes in your external relations with other businesses or public institutions	31.5	37.6	26.8

Source: Appendix Table A11.2

Table 6 shows that businesses that introduced marketing innovations mostly introduced new media or techniques for goods or service promotion (71.9%), such as a new brand image, introduction of loyalty cards, or first time use of a new advertising media. This is evident in both the industry (55.3%) and services (82.3%) sectors, as shown in the table. Significant changes to the design or packaging of a good or service (i.e. excluding routine/seasonal changes) was the next most reported marketing innovation (53.4%), followed by new or significantly improved sales or distribution methods (45.2%). Notably, very few businesses engaged in marketing innovations only.

Table 6: Marketing innovation

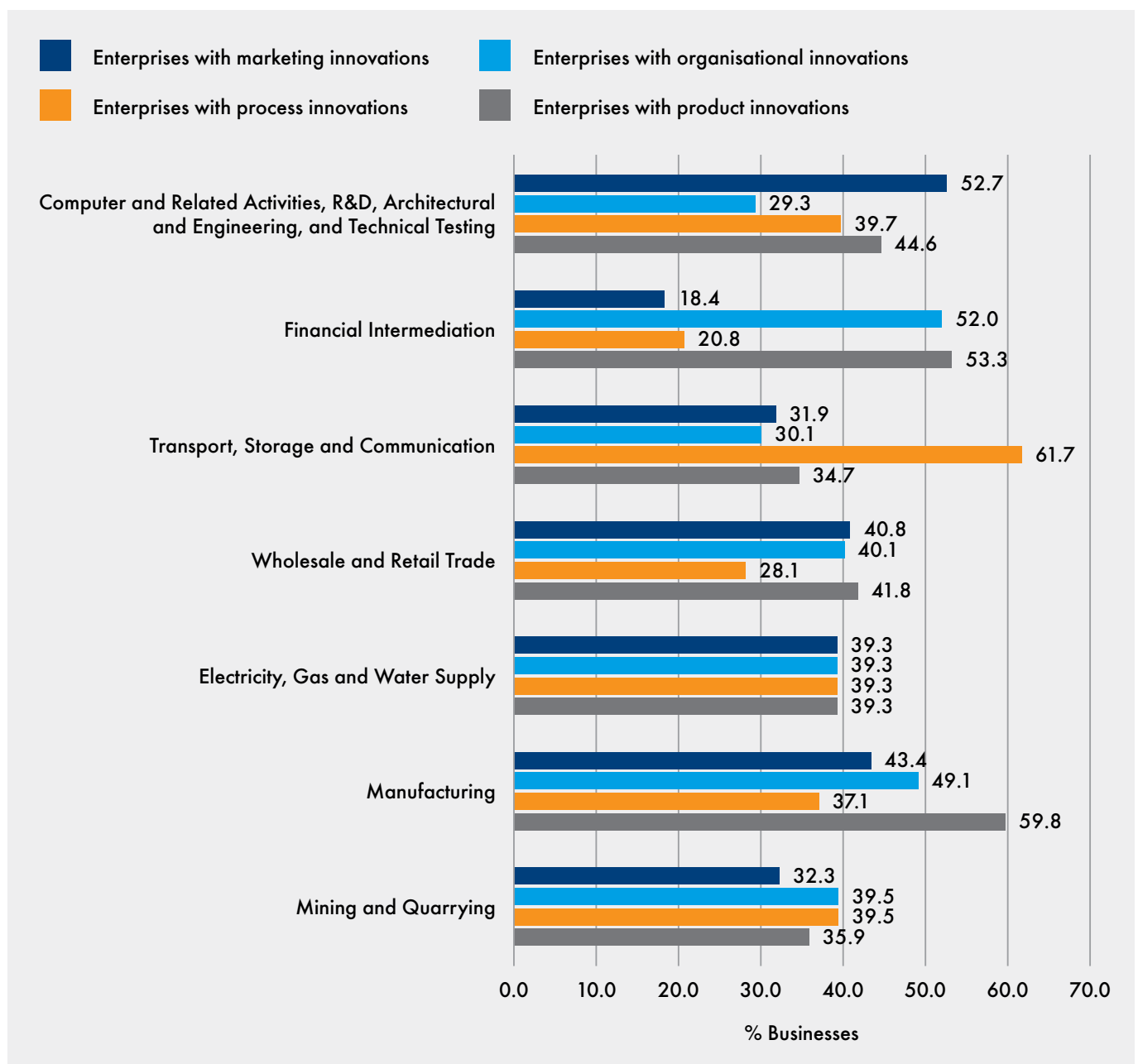
	Total	Industry	Services
All businesses with marketing innovations (%)			
Significant changes to the design or packaging of a good or services	53.4	43.4	59.7
New or significantly changed sales or distribution methods	45.2	34.3	52.1
New media or techniques for good or service promotion	71.9	55.3	82.3
New methods for good or service placement	37.1	33.3	39.5
New methods of pricing goods or services	34.8	42.4	30.0
Businesses with marketing innovations <u>only</u> (%)			
Significant changes to the design or packaging of a good or services	0.1	0.2	0.1
New or significantly changed sales or distribution methods	0.2	0.1	0.2
New media or techniques for good or service promotion	0.4	0.3	0.4
New methods for good or service placement	0.2	0.3	0.2
New methods of pricing goods or services	0.2	0.1	0.2
Businesses with marketing <u>and</u> other innovations (%)			
Significant changes to the design or packaging of a good or services	53.3	43.2	59.7
New or significantly changed sales or distribution methods	45.0	34.2	51.8
New media or techniques for good or service promotion	71.5	55.0	81.9
New methods for good or service placement	36.8	33.0	39.3
New methods of pricing goods or services	34.6	42.3	29.8

Source: Appendix Table A12.2

Were there distinct patterns of business innovation in different sectors?

From the analysis of data in Figure 6, mining and utilities businesses stand out for low levels of innovation across the board in 2014-2016. By contrast, manufacturing had the largest proportion of businesses with product innovation (59.8%) and marketing innovation (43.4%). As shown, process innovation was most prominent in logistics businesses (61.7%). More finance (52.0%) and manufacturing (49.1%) businesses reported organisational innovations than businesses in any other sector.

Figure 6: Types of innovation by sector



Source: Appendix Table A9

Who was responsible for the development of product and process innovations?

Almost 50.0% of product innovators did not provide survey responses on innovation development and, as a result, survey results on this particular question are not conclusive. What the available data does show is that both product innovations and process innovations were mainly developed within businesses. Process innovators were, however, more likely to have developed their own innovations (54.6%) than product innovators (26.6%).

This trend that we observe from survey data—of businesses innovating independently—links with survey data on collaboration discussed below. Indeed, Table 13 shows that only 20.8% of innovation-active enterprises indicated any form of collaboration in their innovation development. Additionally, as Figure 7 illustrates, very few product and process innovators reported that they adapted or modified products originally developed by other enterprises (3.7% and 8.8% respectively) and only marginally more product and process innovators jointly developed innovations with other enterprises (6.6% and 18.1% respectively). When compared to sources of information businesses used to innovate (see Table 11 below), customers (37.8%), suppliers (30.8%), trade fairs (22.2%), and competitors (17.4%) were indicated as most important.

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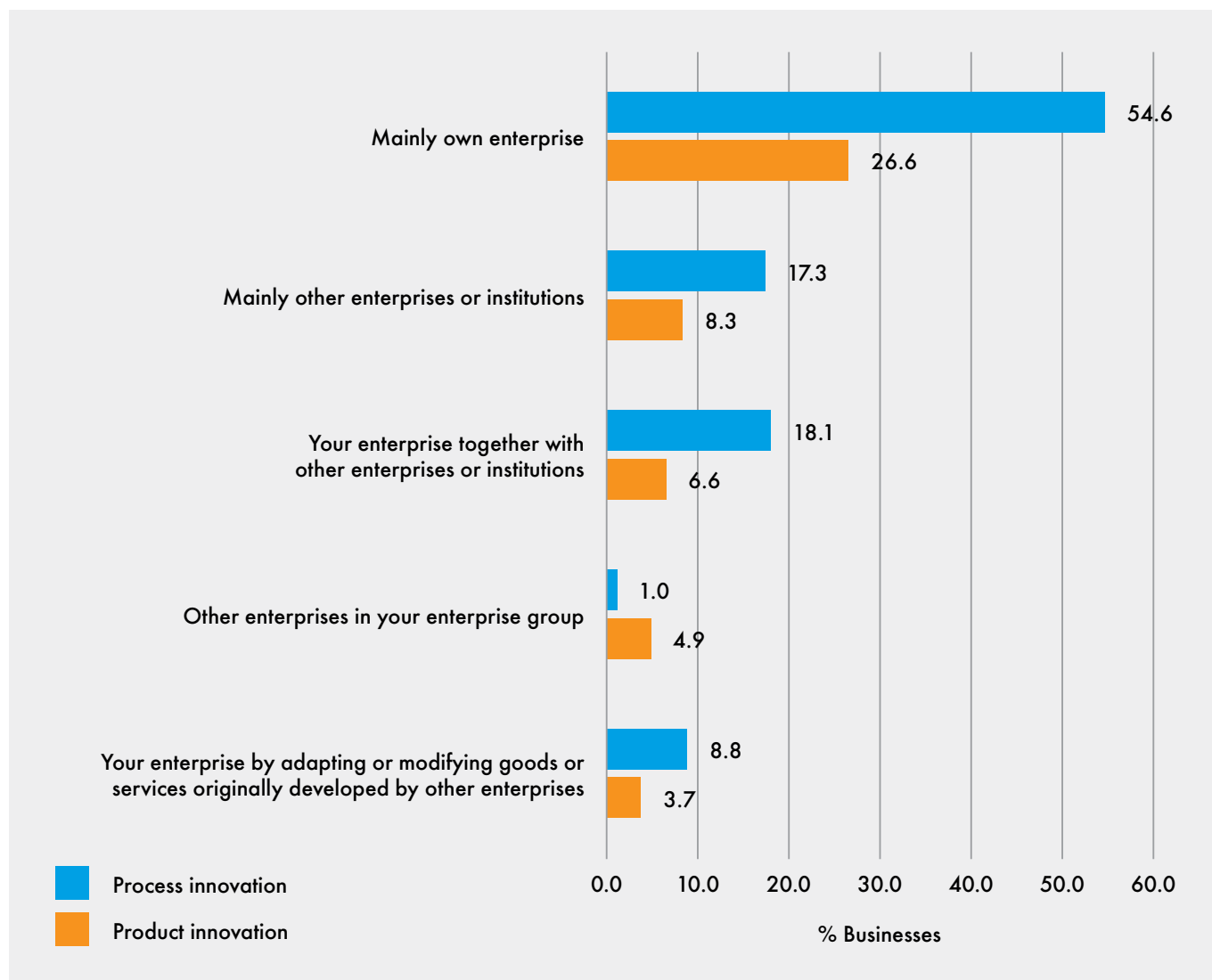


Innovation development

Innovations can be developed in different ways, including through collaboration. Innovations can also be developed in-country or abroad. Some innovation development collaboration arrangements include:

- A company working alone
- A company working as part of a group of companies
- A company working with other companies or institutions, such as universities
- A company adapting or modifying goods and/or services originally developed by another company

Figure 7: Development of product and process innovations



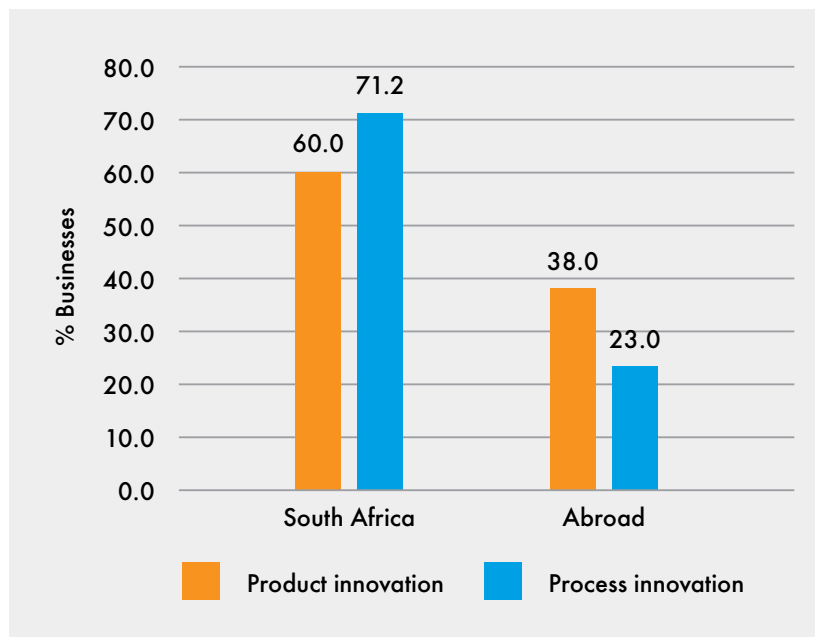
Source: Appendix Tables A13, A15

Note: Proportions were calculated as a percentage of product and/or process innovation-active businesses. This is because the corresponding survey question only applied to this group of businesses.

Innovative firms reported that most of their innovations originated in South Africa: 60.0% for product innovators and 71.2% for process innovators. However, as indicated in Figure 8, product innovators were more likely to source innovation abroad (38.0%) than process innovators (23.0%).

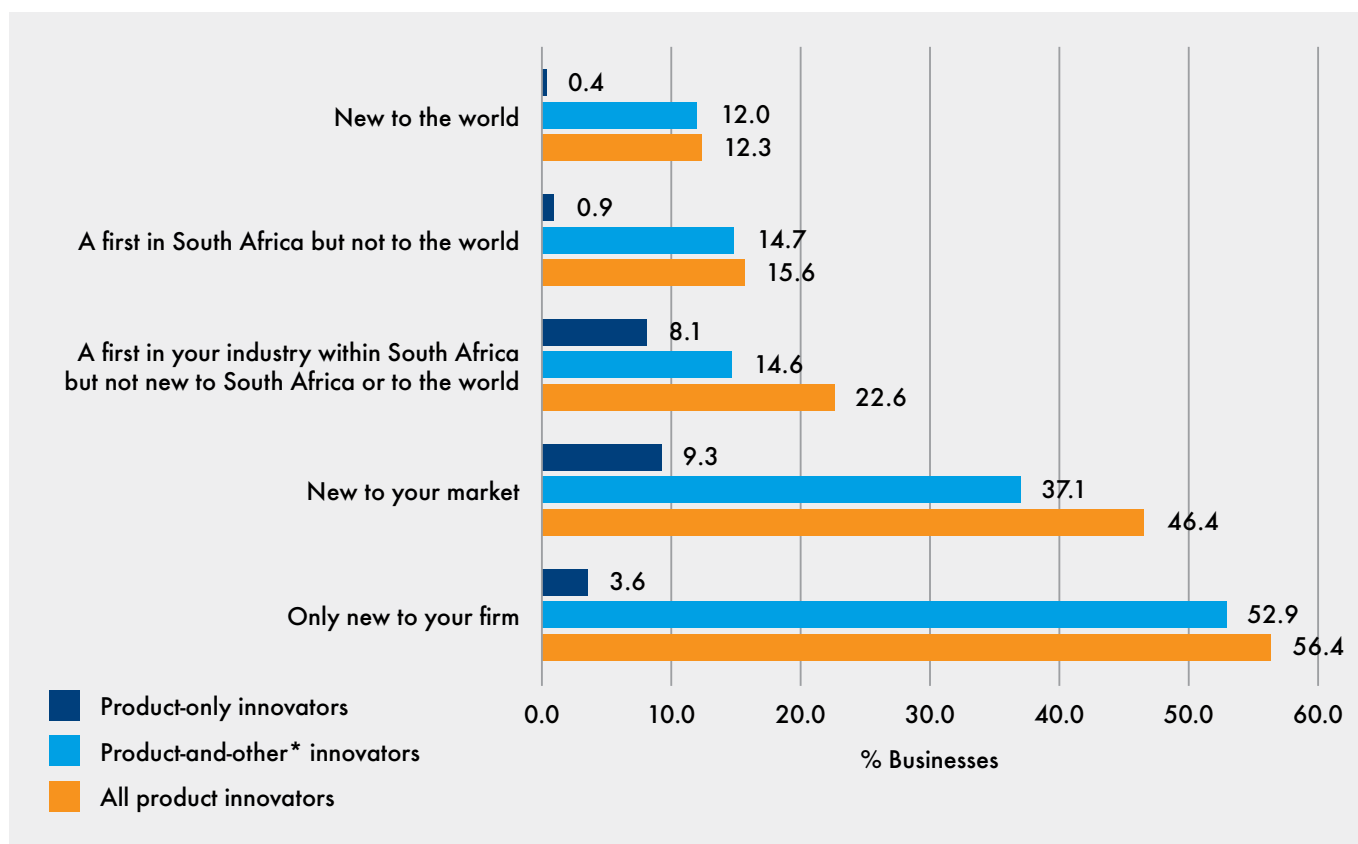
In addition, Figure 9 demonstrates that product innovators were more likely to develop innovations that were new to the firm (56.4%), followed by innovations that were new to the market (46.4%), and then new to the world (12.3%). New to South African industry product innovations were developed by a larger share of businesses than product innovations that were new to the country or the world. Data for product-only innovators as well as product-and-other innovators exhibit similar patterns.

Figure 8: Origin of product and process innovations



Source: Appendix Tables A14, A16

Figure 9: Novelty of product innovations



Source: Appendix Table 18.4

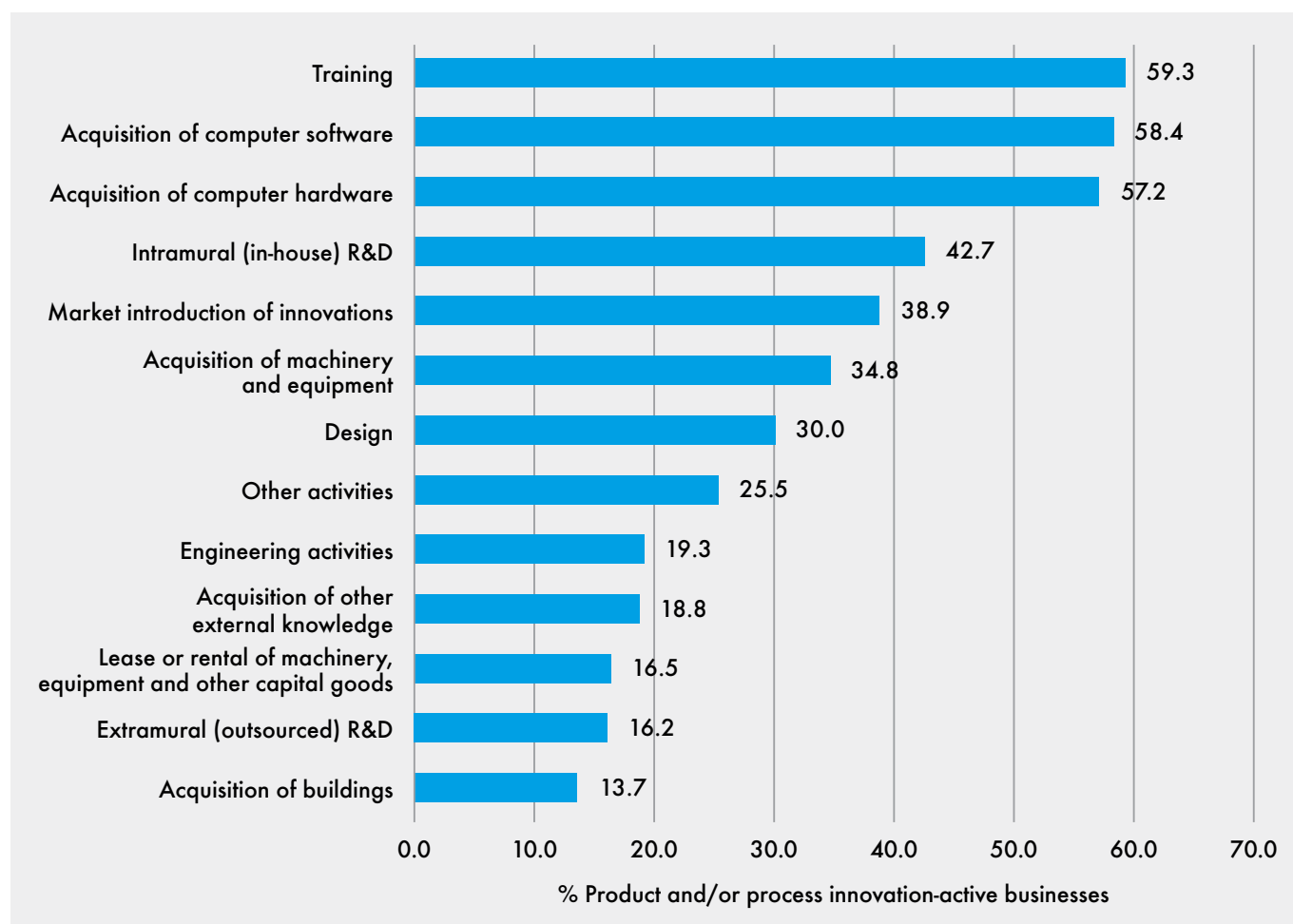
Note: *Other refers to process, organisational and marketing innovations

What were the different ways businesses implemented and invested in innovation?

Innovation activities, as highlighted earlier, include all scientific, technological, organisational, financial, and commercial steps, which actually lead, or are intended to lead, to the implementation of innovations. Some of these activities may be innovative in their own right, while others are not novel but are necessary to implementation. As shown in Figure 10, training (59.3%), the acquisition of computer software (58.4%), and the acquisition of computer hardware (57.2%) were the innovation activities that most businesses implemented. For commentators and analysts, this result may serve as one indication of a shift within the economy to more digitalised business practices. However, even though relatively fewer businesses reported acquisition of machinery and equipment (34.8%) as part of their innovation activities, this was the biggest-ticket item when it came to expenditure on innovation activity (see also Table 8 below).

Important, too, was that in-house R&D conducted by the enterprise itself (42.7%) was more frequently reported than outsourced R&D (16.2%). Investment in the market introduction of innovations was reported by slightly more businesses (38.9%) than design (30.0%). Rental of machinery, equipment and other capital goods (16.5%), and acquisition of buildings (13.7%) were among the lowest-reported innovation activities.

Figure 10: Specific innovation activities



Source: Appendix Table A17.2

Note: The proportions were calculated as a percentage of product and/or process innovation-active enterprises, as the corresponding question applied to this group of enterprises.

Businesses did not just undertake one type of innovation activity in isolation; combinations of activities were widespread. As shown in Table 7, just below two-thirds of the innovation-active businesses (60.7%) acquired both computer hardware *and* computer software to assist in their innovation development. Similarly, 59.1% of innovation-active businesses acquired software, hardware, and training to advance their innovation development.

Sectorally, businesses in industry most frequently used the combination of computer hardware and software acquisition to execute innovation activities (58.0%), while services businesses most frequently focussed more on acquisition of computer software and hardware and training (69.9%). Further in-depth analysis of these trends may yield a clearer picture of how combinations of various activities could facilitate innovation.

Table 7: Widespread innovation activity combinations

Combination (% of businesses)	Total	Industry	Services
Acquisition of computer software <u>and</u> computer hardware	60.7	58.0	62.4
Acquisition of computer software <u>and</u> training	59.7	43.4	69.8
Acquisition of computer hardware <u>and</u> training	57.5	43.2	66.4
Acquisition of computer software and hardware <u>and</u> training	59.1	41.9	69.9

Source: Appendix Table A17.2

A fuller picture of how businesses across the industrial and services sectors invest in innovation can be seen when we analyse the split of investment by type of innovation activity (Table 8). Notably, businesses spent R111 billion on innovation activities in 2016. Acquisition of machinery and in-house R&D accounted for just over half (51.2%) of this expenditure. By contrast, combined expenditure on the acquisition of computer hardware, software, and training made up 11.3% of total expenditure; an interesting result given that these three items were the largest-reported innovation activities (see Table 7).

Further disaggregation shows that the lion's share of expenditure on acquisition of machinery and equipment was by businesses in the industrial sector (R32.5 billion). Other big-ticket items included in-house R&D (R11.3 billion) and acquisition of other external knowledge (R10.3 billion). The services sector's innovation spend, although far lower, followed a similar pattern: acquisition of machinery and equipment (R7.6 billion), acquisition of buildings (R7.5 billion) and in-house R&D (R5.5 billion).

Table 8: Expenditure by type of innovation activity (2016 only)

Innovation activity (R million)	Total	Industry	Services
Acquisition of machinery and equipment*	40 082	32 519	7 564
Intramural (in-house) R&D	16 760	11 298	5 462
Marketing	14 913	9 515	5 399
Acquisition of buildings	10 912	3 445	7 467
Acquisition of other external knowledge	10 738	10 328	411
Acquisition of computer software	4 996	2 860	2 135
Acquisition of computer hardware	3 791	2 173	1 617
Training	3 720	1 988	1 732
Purchase or acquisition of extramural or outsourced R&D	2 916	2 106	810
All other innovation activities including design, and other relevant activities	2 234	1 795	440
Total expenditure	111 062	78 025	33 037

Source: Appendix Tables A17.1

*Note: Excludes acquisition of equipment for R&D.

OUTCOMES OF INNOVATION

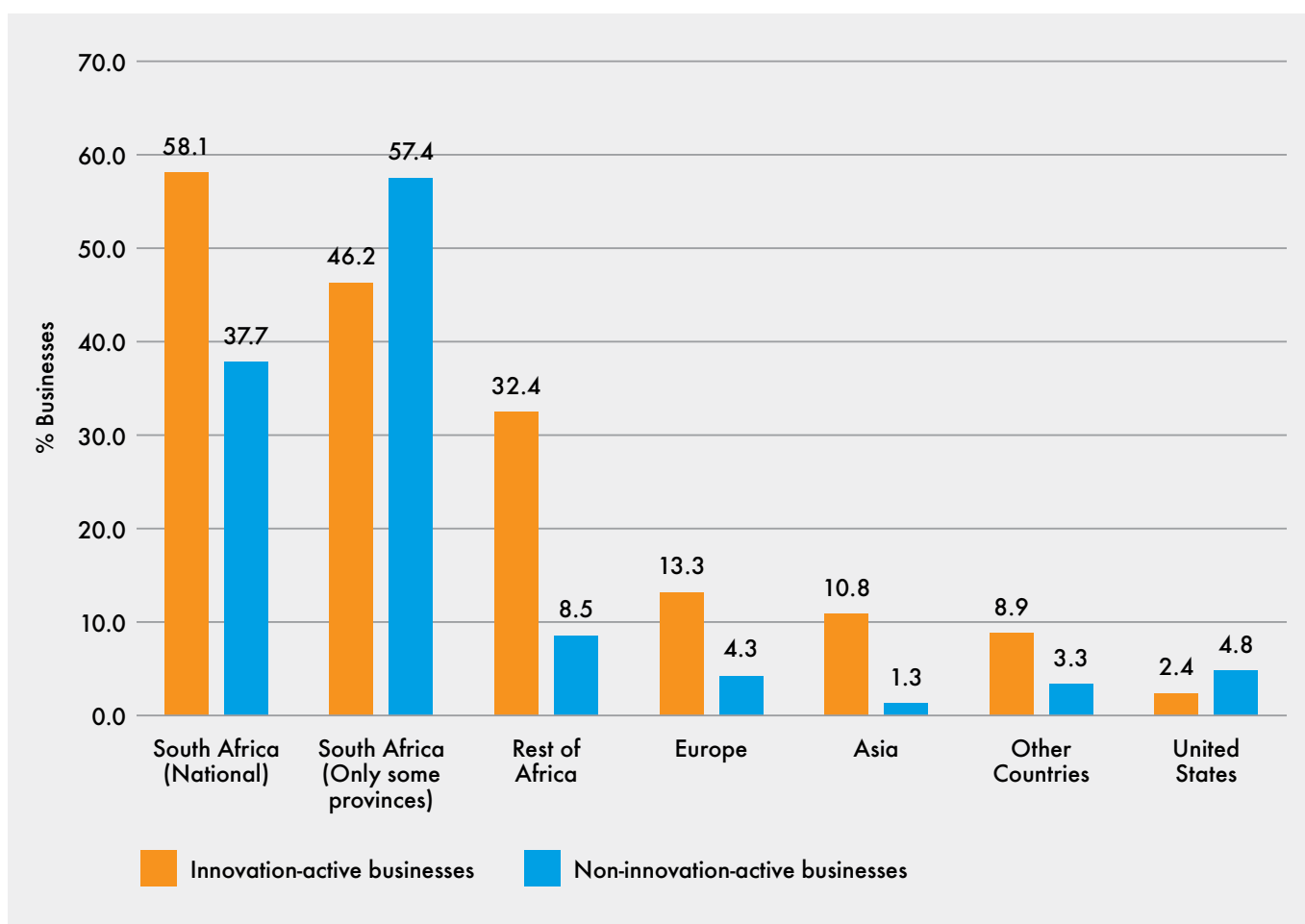
South African businesses used a combination of key activities to drive their innovation development. But what were the outcomes of these activities for businesses during 2014-2016? Where—and how—did these efforts bear fruit?



Where were the markets for innovation-active businesses?

The extent to which innovation activity enables businesses to access national and/or global markets is a key concern for business leaders and policy makers alike. In 2014-2016, almost two thirds of businesses with innovation activity (58.1%) sold goods or services on local markets *nationally*. The majority of businesses without innovation activity (57.4%) accessed markets only in some provinces. Overall, more innovation-active than non-innovation active enterprises accessed global (i.e. non-South African) markets, except for the United States market, where non-innovation active firms had a slight edge over innovation active enterprises (Figure 11).

Figure 11: Geographic distribution of goods and services sold by businesses with and without innovation activity



Source: Appendix Table A7.2

What was the turnover from sales of products that were new to the market and new to the firm?

Innovations with high degrees of novelty, such as new to the market or world products, did not have a strong effect on the turnover of the businesses that reported product innovations. By contrast, products that were unchanged or marginally modified, including goods and services purchased for re-sale, generated 80.5% of the turnover of all product innovators in 2016 (Table 9). Only 1.8% of the turnover was generated by innovations that were new to the world. New to the market innovations accounted for 10.8% of total turnover, while new to the firm innovations accounted for 7.0% of total enterprise turnover. This data could indicate that the “impact” of innovation has a much longer time horizon than the survey reference period, and may only be felt years down the line.

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Degrees of novelty

Two novelty scales were used in the SA Business Innovation Survey, 2014-2016 (see also Figure 8).

Degrees of novelty specific to South Africa:

- New to the world
- A first in South Africa but not the world
- An industry first within South Africa, but not new to South Africa or the world

Degrees of novelty in general:

- New to the world
- New to a business' market
- New to a business

Table 9: Turnover by product innovation type (2016 only)

Novelty (% of total turnover)	Total	Industry	Services
Innovations new to the world	1.8	0.9	2.3
Innovations new to the market	10.8	3.4	15.0
Innovations new to the business	7.0	7.8	6.5
Unchanged or marginally modified (including the resale of goods or services purchased from other businesses)	80.5	87.8	76.2

Source: Appendix Table A18.2

What were the outcomes of innovation?

As the data above suggest, innovation may have more long-term financial effects on businesses than short-term or medium-term effects. But the effects or outcomes of innovation extend beyond financial considerations. Table 10 reflects the wide range of innovation outcomes reported by companies for the 2014-2016 period. These have been grouped specifically for product and process innovation-active businesses, and the data reflect the relative intensity of 'highly successful outcomes' of innovation against product, strategic/marketing, process, financial and other objectives.

Significantly, both product and process innovation-active businesses reported that improved quality of goods and services was the most important outcome of innovation (38.0%). As shown, an increase in the *range* of goods and services was an important product outcome (30.6%). Overall, South Africa's innovation-active businesses also benefitted by increasing their revenue (31.8%), as well as improving their profit margins (30.9%). Other important outcomes included meeting government regulations (30.5%) and improved health and safety (27.0%). Only 14.8% of businesses cited revenue from intellectual property as an important outcome of innovation, an issue we examine in more detail below.

Sectorally, proportionally more businesses in the industrial sector (44.6%) reported improved quality of goods and services as successful outcomes than in the services sector (33.8%). Financial outcomes were rated as successful by a larger share of businesses in the services sector than in the industrial sector. Increased revenue was rated a successful outcome by 33% of service sector businesses, whilst 29.8% of industry sector businesses reported this as a successful outcome of innovation. Proportionally more services businesses (35.0%) rated the innovation outcome of profit margin increases than industry businesses (24.5%).

Table 10: Highly successful outcomes for product and process innovation-active businesses

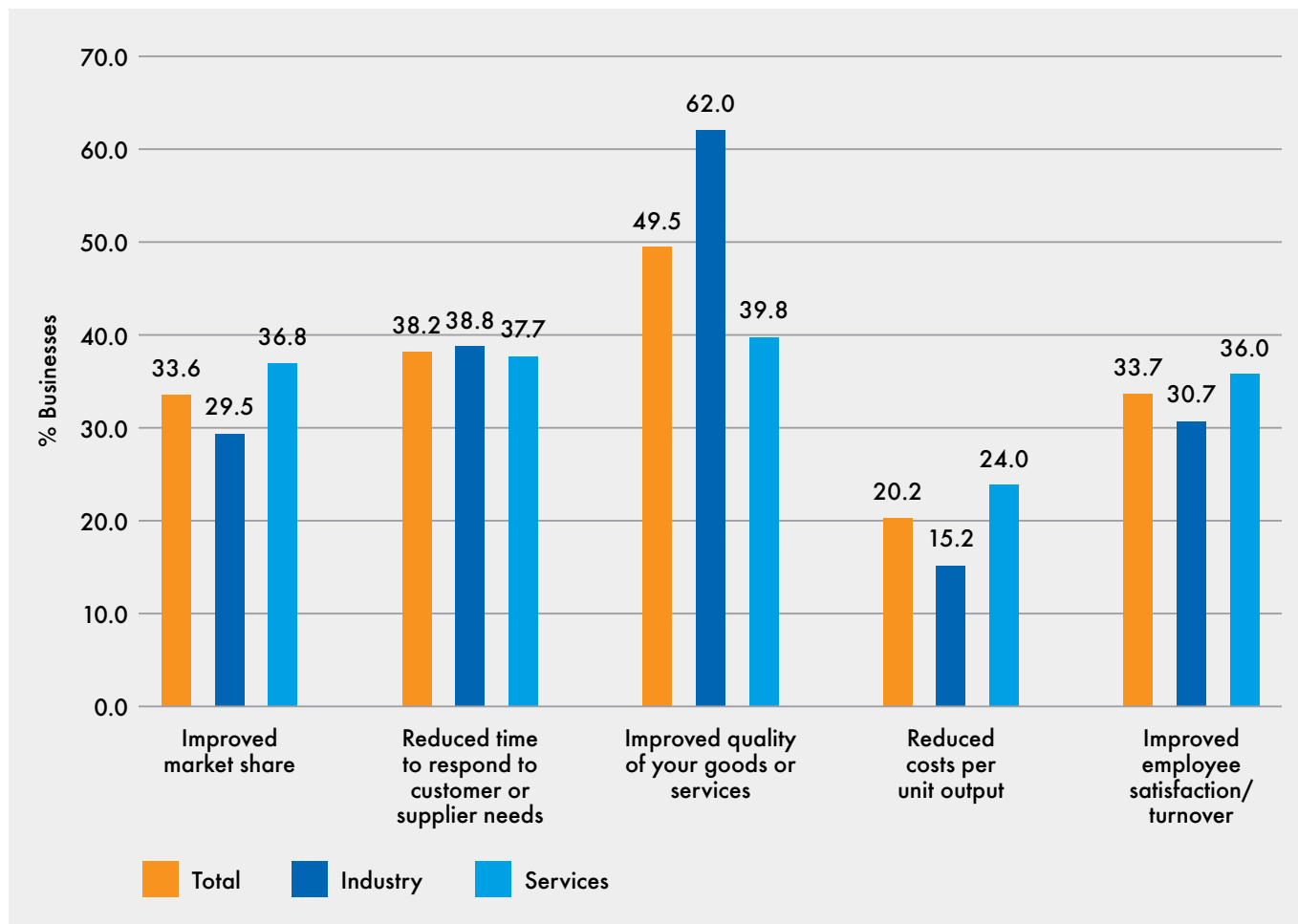
Outcomes of innovation (% of innovation-active businesses)	Total	Industry	Services
Product outcomes			
Improved quality of goods or services	38.0	44.6	33.8
Increased range of goods and services	30.6	37.6	26.3
Strategic/Marketing outcomes			
Entered new local markets or increased local share	24.9	28.8	22.4
Increased the intellectual property portfolio	11.8	18.8	7.4
Entered new export markets or increased export market share	7.5	10.8	5.4
Process outcomes			
Improved flexibility of production or service provision	30.6	29.4	31.3
Increased capacity of production or service provision	27.4	24.6	29.1
Reduced lead times	25.4	25.8	25.2
Reduced materials and energy per unit output	17.7	10.0	22.5
Reduced labour costs per unit output	16.4	10.8	19.9
Financial outcomes			
Increased revenue	31.8	29.8	33.0
Improved profitability	30.9	24.5	35.0
Reduced unit production costs	22.6	22.0	22.9
Increased IP revenue	14.8	12.6	16.2
Other outcomes			
Met governmental regulatory requirements	30.5	35.1	27.6
Improved health and safety	27.0	36.2	21.3
Reduced environmental impacts	23.3	26.7	21.1

Source: Appendix Table A19.2

Note: The proportions were calculated as a percentage of product and/or process innovation-active businesses, as the corresponding question applied to this group of businesses.

Figure 12 demonstrates that 49.5% of organisational innovators reported improved quality of goods and services as a highly important outcome of their innovation activities. It was also important for organisational innovators to reduce their timeframes for responding to customer and supplier needs (38.2%). For 33.7% of organisational innovators, improved employee satisfaction/turnover was an important outcome of their business innovations. The results shown in Figure 12 suggest that direct financial benefit in terms of reduced costs was a less important outcome of innovation.

Figure 12: Important outcomes for organisational innovators



Source: Appendix Table A20

ENABLERS OF INNOVATION

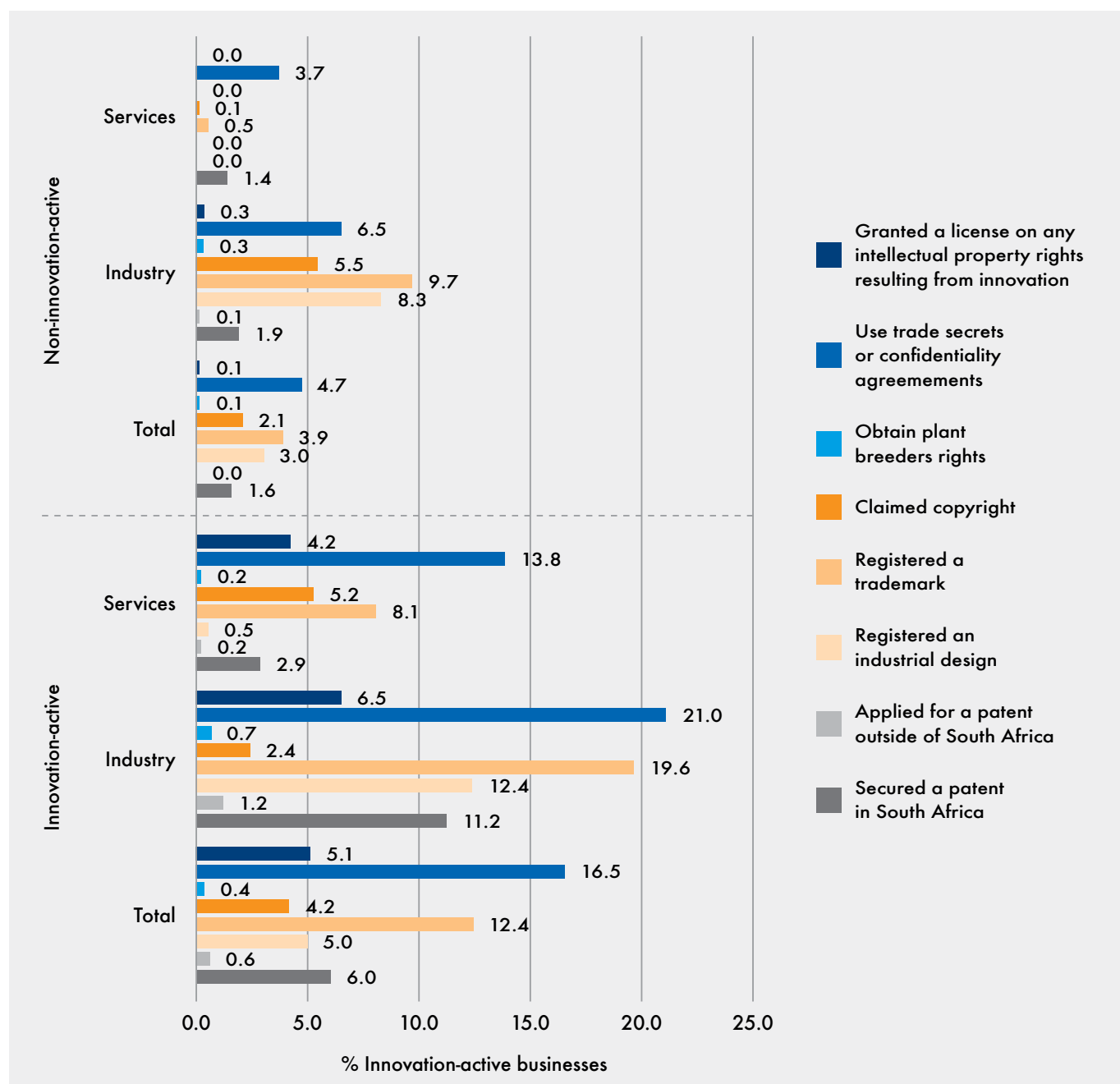
South African businesses benefitted from innovation in different ways, from increasing the quality of products and services and ensuring greater productive capacity, to increasing profitability and adhering to regulations. What factors enabled the innovation that led to these outcomes?

To what extent did businesses use technology and knowledge assets?

In a globally interconnected—and digitalising—economy, it is vital to understand the ways in which businesses use intellectual property rights to innovate. Of all the innovation-active enterprises in South Africa, 16.5% used trade secrets or confidentiality agreements, while 12.4% registered a trademark (Figure 13). A total of 6% of innovation-active businesses secured a patent in South Africa, while only 0.6% used patent applications outside South Africa as a business tool, and only 0.4% of enterprises with innovation activity obtained plant breeder rights.

By contrast, businesses without innovation activities during 2014-2016 also used some forms of intellectual property rights for growth: about 1.6% of non-innovation-active businesses secured a patent in South Africa during the period under review, trade secrets and confidentiality agreements were used by 4.7% of non-innovation-active businesses, and 3.9% registered a trademark.

Figure 13: Innovation-active businesses that made use of intellectual property rights, 2014-2016



Source: Appendix Tables A21.2 and A22.2

What new technological capabilities enhanced business innovation?

A substantial number of innovation-active businesses reported their use or development of new technologies as part of their innovation development. As shown in Figure 14, a large number of businesses in both the services and industry sectors used or developed computerised design and engineering (46.0% and 40.8% respectively). Services sector businesses also used or developed material handling, supply chain, and logistics technologies (36.2%) as well as business intelligence technologies (31.7%). Green technologies were used or developed by 24.5% of services businesses and 21.7% of industry businesses.

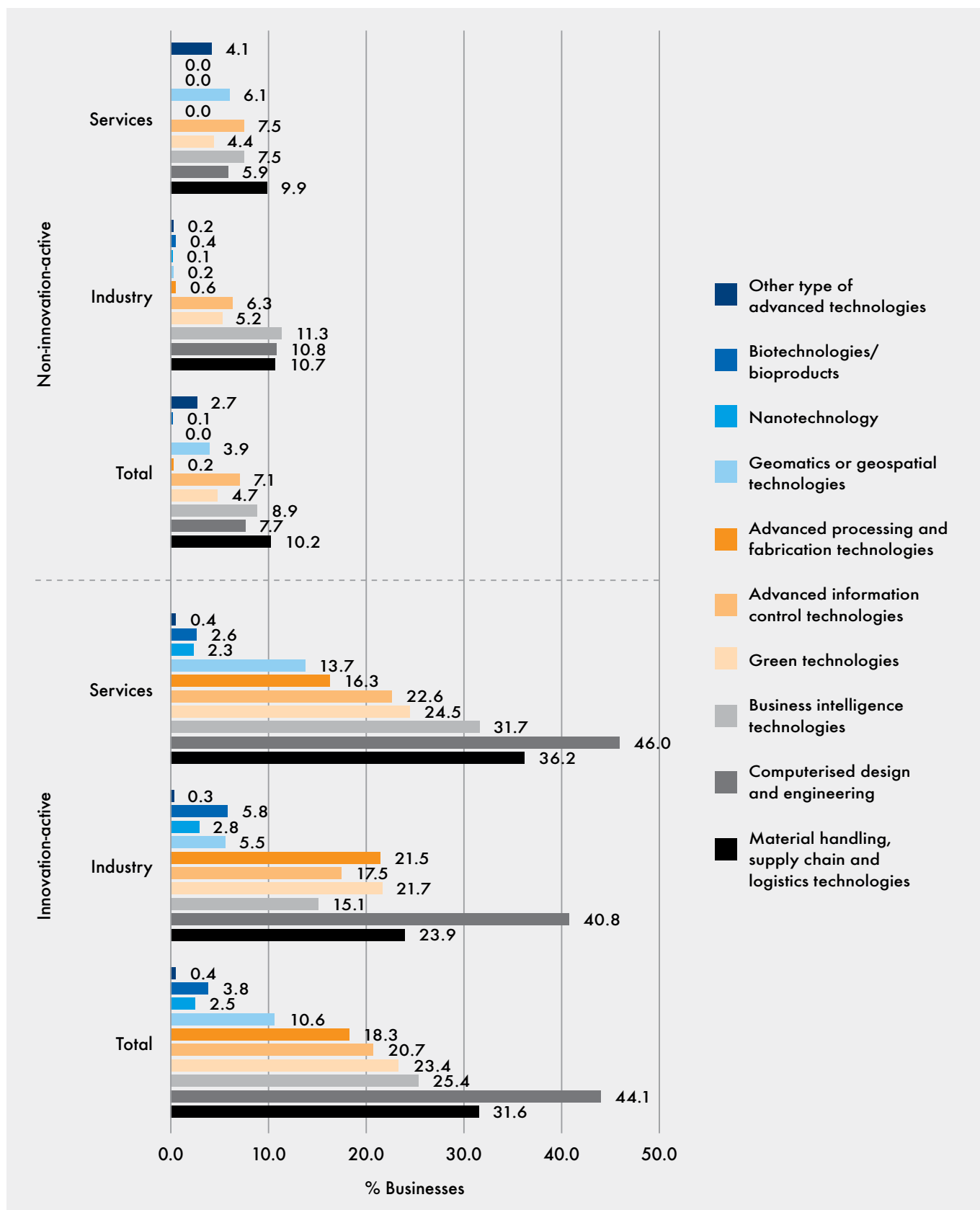
NOTES TO GUIDE READERS



Business capabilities

Business capabilities, as defined in the SA Business Innovation Survey, 2014-2016, included a list of advanced technologies, such as nanotechnology, biotechnology, business intelligence technologies, or green technologies. Respondents were asked to indicate if any of these technologies were used or developed during the reference period.

Figure 14: Development and use of advanced technologies for innovation



Source: Appendix Table A29.2

What sources of information did businesses draw on to innovate?

Innovative businesses—that is businesses with not just innovation activities but businesses that introduced an innovation to their markets or to the world—relied on a wide range of information sources to get to this point. However, these information sources tended to be within the business, or those very closely linked to the business, such as suppliers or clients.

As shown in Table 11 below, 45.6% of innovative businesses rated internal sources within their own business or group as highly important to innovation. This finding correlates with the data in Figure 7 above, which shows that both product and process innovators were largely responsible for their own innovations. Where businesses did turn to external sources of information, it was most likely to be those directly involved in their value chains, primarily clients or customers (37.8%) and suppliers of equipment, materials and software (30.8%), conferences, trade fairs and exhibitions (22.2%) as well as professional and industry associations (16.5%). Government and public research institutions were not highly rated as sources of information (i.e. by only 7.4% of innovative businesses).

Furthermore, universities and higher education institutions were ranked as the least important sources of information, with only 2.8% of innovative businesses rating them as highly important.⁶ These data suggest a weak degree of interaction between businesses and the formal knowledge producers in the South African national system of innovation.

⁶ According to the *African Innovation Outlook 2019*, other African countries have also reported that their businesses rate the importance of information on innovation from universities and public research institutions as low. These countries include Angola, Carbo Verde, Egypt, Eswatini, Ethiopia, Kenya, Lesotho, Namibia, Seychelles and Uganda. The *African Innovation Outlook 2019*, as well as earlier editions, are available online from the African Union and NEPAD websites.

Table 11: Highly important sources of information for innovative businesses

Innovative businesses (%)*	Total	Industry	Services
Internal sources			
Sources within your business or business group	45.6	48.6	43.7
External - Market resources			
Suppliers of equipment, materials, components or software	30.8	25.7	34.1
Clients or customers	37.8	49.8	30.3
Competitors or other enterprises in your sector	17.4	23.3	13.8
Consultants, commercial labs or private R&D institutes	11.5	9.0	13.1
External - Institutional sources			
Universities/higher education institutions	2.8	1.7	3.5
Government and public research institutes	7.4	1.5	11.1
Private research institutes	7.8	1.2	11.9
External - Other sources			
Conferences, trade fairs, exhibitions	22.2	22.9	21.8
Scientific journals and trade/technical publications	7.2	6.8	7.4
Professional and industry associations	16.5	15.1	17.4

Source: Appendix Table A23.2

*Note: The proportions were calculated as a percentage of product and/or process innovation-active businesses, as the corresponding question applied to this group of businesses.

How, and why, did businesses cooperate with other businesses, customers, or research institutions?

Research shows that businesses are motivated to collaborate with external partners, in various ways, to support their innovation activities. Collaboration leads to knowledge flows, which in turn promotes innovation. Table 12 shows the reasons innovation-active businesses collaborated, as well as the extent to which they did so. As shown, accessing critical skills was cited by 15.6% of innovation-active businesses as an important motivation for collaboration, as was sharing the cost of developing innovations (14.4%). This corresponds with the finding that “lack of funds” is cited as one of the major barriers to innovation (Table 15 below). In terms of the commercialisation of innovations, it was seen as important to collaborate to enable businesses to access new markets (12.8% of innovation-active businesses) and to access new distribution channels (9.1%).

Sectorally, for industry, accessing information (15.1%), accessing R&D (13.9%) and accessing critical expertise/skills (13.9), and cost sharing (13.1%) were the most-reported reasons to collaborate. The reasons to collaborate were similarly reported for services businesses.

Table 12: Reasons to collaborate

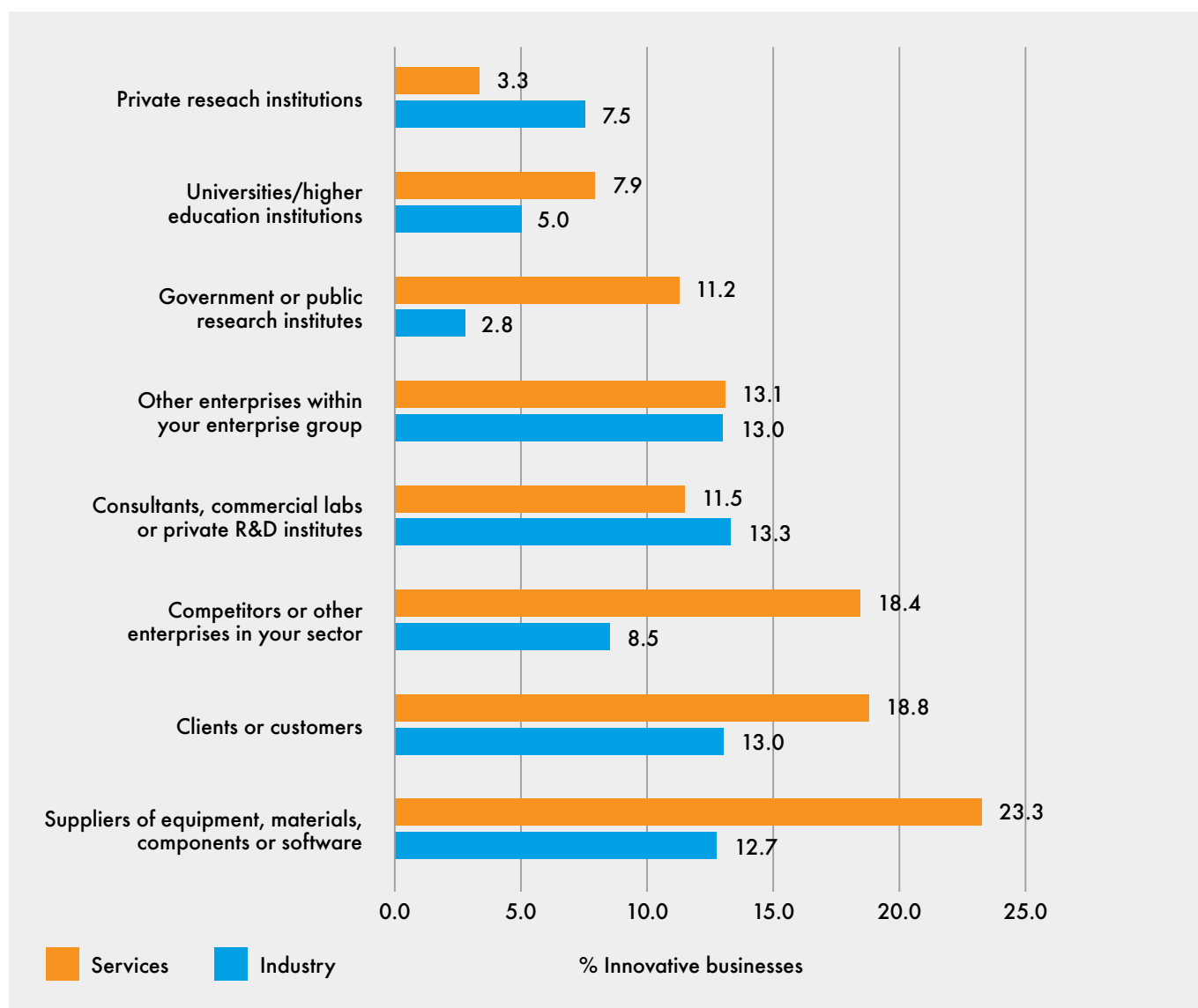
Percentage of businesses (%)*	Total	Industry	Services
Businesses with collaborations	20.8	16.2	23.6
Reason for collaboration			
Sharing the cost of developing innovations	14.4	13.1	15.1
Accessing research and development (R&D)	16.0	13.9	17.3
Accessing information	16.1	15.1	16.7
Accessing critical expertise/skills	15.6	13.9	16.6
Prototype development	10.5	8.3	11.9
Scaling up production processes	6.7	2.4	9.4
Accessing new markets	12.8	11.1	13.9
Accessing new distribution channels	9.1	5.5	11.3

Source: Appendix Table A24.4

Note: *The proportions were calculated as a percentage of product and/or process innovation-active businesses, as the corresponding question applied to this group of businesses.

Figure 15 shows the type of partner engaged in the collaborative partnerships of the country's innovation-active businesses, reflecting different patterns in the services and industry sectors. Only 12.7% of innovation-active businesses in industry indicated that they formed collaborative partnerships with their suppliers, while a similar proportion, 13.0% of innovation-active businesses, identified clients or customers as important collaborators for their innovation activities. In the services sector 23.3% of innovation-active businesses indicated collaboration with suppliers, whilst 18.8% indicated that they had collaborative agreements with clients or customers. Government and public research institutes were reported as collaborative partners by about 11.2% of businesses in the services sector, but a mere 2.8% of innovation-active businesses in industry. The business environment remains highly competitive, as only 8.5% of innovation-active businesses in industry and 18.4% of innovation-active businesses in services reported collaboration with competitors.

Figure 15: Collaboration on innovation activities



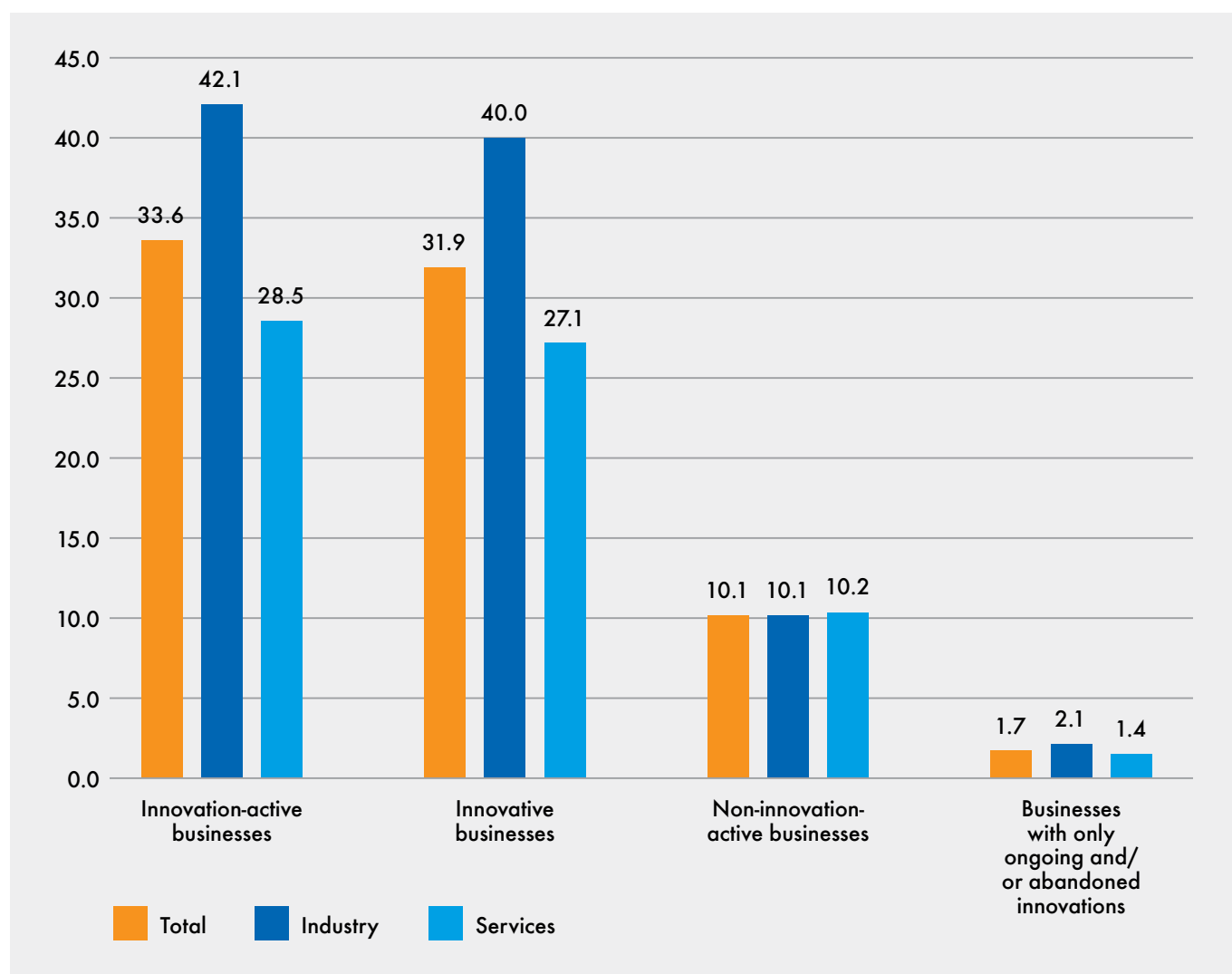
Source: Appendix Table A24.1

Note: The proportions were calculated as a percentage of product and/or process innovation-active businesses, as the corresponding question applied to this group of businesses.

Did businesses know about financial support from government for innovation?

Government support for innovation, in 2014-2016, consisted of different financial and non-financial programmes administered by different departments and entities. Figure 16 illustrates that 42.1% of *innovation-active* businesses in industry were aware of government support. Similarly, 40% of *innovative* businesses in industry were also aware of the availability of government funding sources. Businesses in the services sectors were much less aware of government support. Only 28.5% of innovation-active services enterprises were aware of government support, while 27.1% of innovative enterprises were aware of government support. Across both industry and services, 1.7% of enterprises that abandoned their innovation activities or that had on-going innovation activities were aware of government support. A very small percentage of non-innovative businesses (10.1%) were cognisant of the availability of government funding sources for innovation (see Appendix Table A25.1).

Figure 16: Awareness of government financial support for innovation



Source: Appendix Tables A25.1

Where did business source their innovation funding from?

A vast majority of innovation-active businesses (77.0%) and innovative businesses (74.9%) relied on their own funds to support their innovation activities. Table 13 below shows that government supported 1.7% of innovation-active businesses between 2014 and 2016, and that foreign investors only funded 0.7% of innovation-active businesses.

Table 13: Financial support for innovation activities

Funding source (% of businesses)	Total	Industry	Services
Innovation-active businesses			
Own funds	77.0	72.5	79.7
Funds from related companies (subsidiary or associated companies)	16.5	19.0	14.9
Funds from other (non-financial) businesses	3.4	2.1	4.2
Funds from South African government	1.7	3.5	0.5
Foreign funds (EU, etc)	0.7	1.2	0.5
Other sources	1.0	1.6	0.6
Innovative businesses			
Own funds	74.9	72.1	76.6
Funds from related companies (subsidiary or associated companies)	15.6	19.0	13.6
Funds from other (non-financial) businesses	3.4	2.1	4.2
Funds from South African government	1.7	3.5	0.5
Foreign funds (EU, etc)	0.7	1.2	0.5
Other sources	1.0	1.6	0.6
Businesses with only on-going and/or abandoned innovations			
Own funds	2.1	0.4	3.1
Funds from related companies (subsidiary or associated companies)	0.8	0.0	1.3
Funds from other (non-financial) businesses	0.0	0.0	0.0
Funds from South African government	0.0	0.0	0.0
Foreign funds (EU, etc)	0.0	0.0	0.0
Other sources	0.0	0.0	0.0

Source: Appendix Table A25.3

Note: Businesses may have received funding from multiple sources hence the total percentage will not add up to 100%.

Where support was sought out, the few businesses that did apply for financial support were mostly interested in applying for incentive grants (7.7%), with 5.0% of businesses obtaining these grants (Table 14). Below 5.0% of businesses applied for training support or internships and 3.7% of businesses actually obtained this support.

Table 14: Types of support applied for and accessed

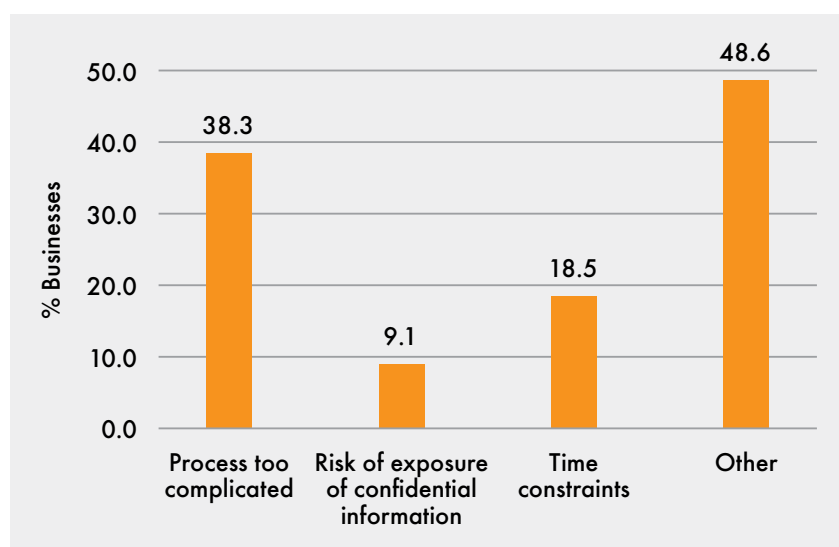
Percentage of businesses (%)	Applied for/ Requested support	Accessed/ Obtained support
Financial		
Incentive grants	7.7	5.0
Loans or guarantees	1.7	0.5
Equity financing or venture capital	0.3	0.1
Tax incentive for R&D*	1.0	1.7
Non-financial		
Training support or internships	4.9	3.7
Access to research equipment or laboratory facilities	0.7	0.6
Access to ICT infrastructure	0.2	0.3
Export support	1.6	0.5
Incubation or mentoring	1.4	0.2
Other	1.1	0.4

Source: Appendix Tables A26.2

Note: * Missing data led to a higher proportion of enterprises that accessed than applied for financial support for innovations.

Figure 17 shows that a proportionally large number of businesses indicated that the process of accessing government funds is too complicated (38.3%). Nearly 20% reported that the process was too time consuming, while very few were concerned about exposure of confidential information (9.1%).

Figure 17: Reasons government funds not accessed

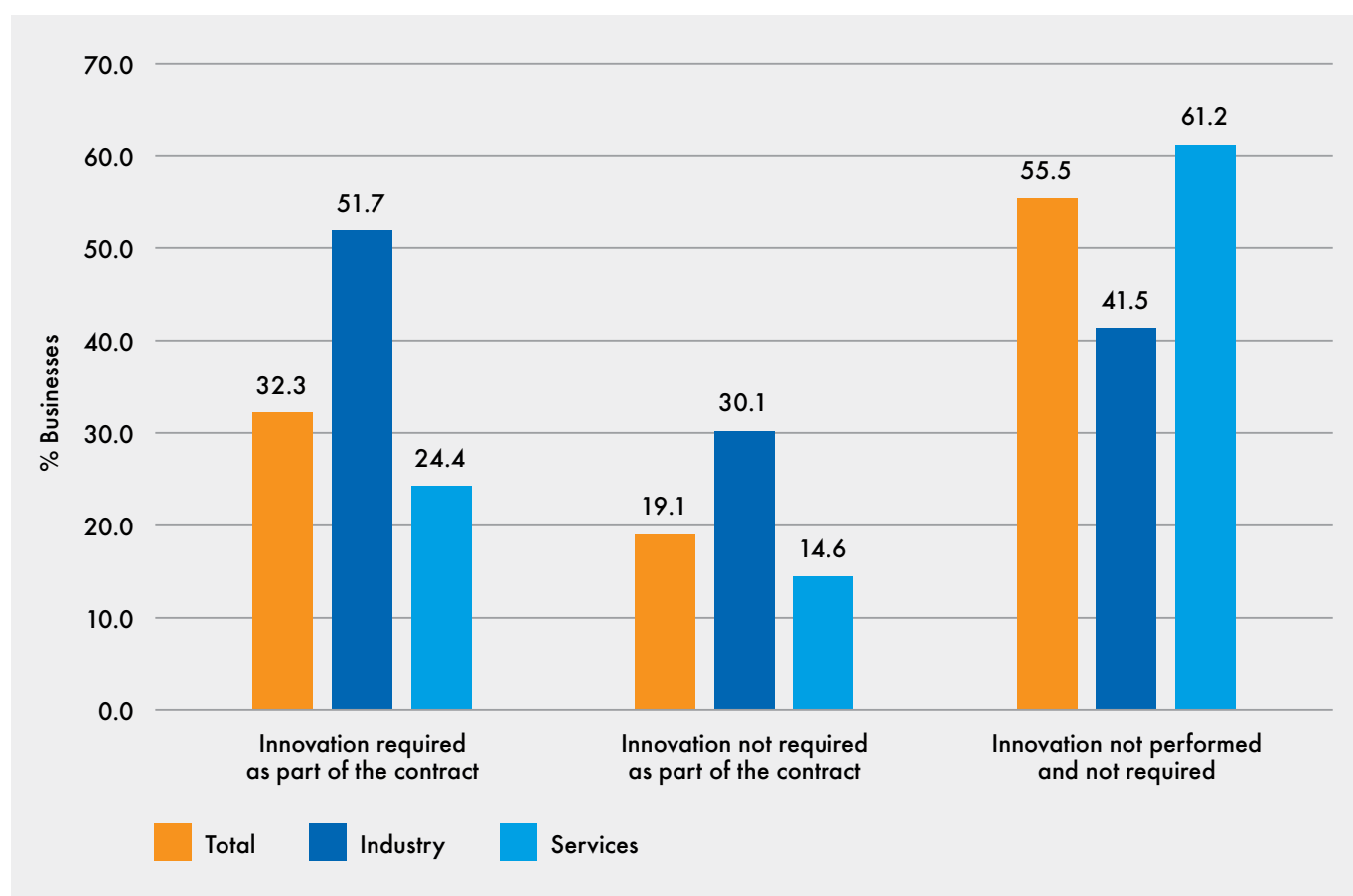


Source: Appendix Table A26.3

Did businesses have procurement contracts in place to promote innovation to provide goods or services to public sector organisations?

About 22% of all businesses indicated that they had contracts to provide goods and services to the public sector (see Appendix Table A27). Of these businesses, 51.7% in the industrial sector indicated that innovation was required as part of the contract, while 24.4% of businesses in the services sector reported this (Figure 18). About 30% of businesses in industry that had procurement contracts indicated that innovation was not required as part of the contract, while this was true for only 14.6% of businesses in the services sector. More than 50% of businesses with procurement contracts indicated that they did not perform innovation and it was not a requirement of their procurement contract (see Appendix Table A27).

Figure 18: Businesses that provided goods and services from public procurement contracts



Source: Appendix Table A27

INNOVATION CONSTRAINTS

Innovation constraints can lead to decisions not to innovate, which may have longer-term impacts on the competitiveness of businesses. Understanding the business sector's perceptions of the barriers to innovation provides essential evidence to promote innovation, going forward.

What were businesses' perceptions of the main barriers to innovation?

As shown in Table 15, a generally low percentage of innovation-active and non-innovation-active businesses identified any of barriers to innovation measured as 'highly important'. However, factors related to innovation funding and market competition were identified as the most 'highly important' barriers to greater innovation activity for their businesses. Lack of funds within their own enterprise or group was reported as the most 'highly important' barrier to innovation by 31.5% of innovation-active businesses, in contrast to the difficulties of obtaining government funding (21.5%), an issue examined in greater depth below. Lack of credit or private equity also emerged as a significant barrier to innovative businesses (24.8%), but was not important to non-innovative businesses (5.5%). Competition, high innovation costs and competitor-dominated markets were also significant barriers to innovation activities for both innovation-active as well as non-innovation-active businesses. Of note is that knowledge factors tended to be of relatively low-to-medium importance as barriers to innovation.

The table also reflects a ranking of the barriers, calculated using a weighted average index of all responses, and not only the barriers identified as highly important. The pattern here is similar to the barriers that are reported to be of the highest importance. Lack of funds from within the enterprise was still ranked the highest in both innovation-active and non-innovation-active businesses. Lack of managerial skills was the highest-ranked knowledge barrier for both innovation-active and non-innovation-active businesses. Difficulty of finding cooperation partners ranked high as an important barrier among innovation-active businesses, and lack of technicians among non-innovation-active businesses. Competition in business's market ranked high as an important barrier and it was the highest ranked market barrier for both innovation-active and non-innovation-active businesses.

Table 15: Barriers to innovation, by businesses with and without innovation activities

	Innovation-active (%)	Non-innovation active (%)	Ranking*: Innovation active	Ranking*: Non-innovation-active
Cost factors				
Lack of funds within your enterprise or group	31.5	17.0	2.4	1.9
Lack of finance from sources outside your enterprise	25.0	14.3	2.1	1.7
Lack of credit or private equity	24.8	5.5	2.1	1.9
Innovation costs too high	22.5	14.4	2.0	1.8
Difficulty in obtaining government grants or subsidies for innovation	21.5	13.1	1.8	1.7
Knowledge factors				
Difficulty in finding cooperation partners for innovation	8.7	6.4	1.6	1.5
Lack of technicians	3.8	8.4	1.6	1.7
Lack of engineering skills	2.3	5.5	1.5	1.6
Lack of managerial skills	2.1	7.4	1.7	1.8
Lack of information on technology	1.7	4.2	1.5	1.6
Lack of information on markets	1.4	3.1	1.6	1.5

Continues overleaf...

	Innovation-active (%)	Non-innovation active (%)	Ranking*: Innovation active	Ranking*: Non-innovation-active
Market factors				
Too much competition in your market	20.0	17.0	2.4	2.1
Uncertain demand for innovative goods or services	19.3	9.7	2.2	1.9
Market dominated by established enterprises	16.4	12.3	2.4	2.0
Lack of demand from customers	8.6	13.7	2.1	1.9
Institutional factors				
Legislation, regulations, standards, taxation	11.3	15.3	1.7	1.9
Lack of infrastructure	7.6	7.8	1.7	1.7
Weakness of intellectual property (IP) rights	4.3	6.2	1.3	1.6
Reasons not to innovate				
No need due to prior innovations	9.0	12.0	1.7	1.8
No need because of no demand for innovations	9.0	20.0	1.7	2.1

*Scale: 4.0 = High, 3.0 = Medium, 2.0 = Low, 1.0 = Not experienced
Source: Appendix Tables A28.2, A28.4, A28.5 and A28.6

When we assess the most important barriers to innovation for innovative businesses in the industrial and services sectors (Table 16), lack of funds within the businesses group was the most reported cost factor for both industry (26.9%) and services (34.3%). Knowledge factors that are important barriers were lack of technicians (8.4%) in the case of industry and difficulty in finding cooperation partners for innovation (9.3%) in services.

Table 16: Barriers to innovation, by sector

	Total	Industry	Services
Cost factors			
Lack of funds within your enterprise or group	31.5	26.9	34.3
Lack of finance from sources outside your enterprise	25.0	19.0	28.7
Innovation costs too high	22.5	23.6	21.9
Lack of credit or private equity	24.8	18.0	28.9
Difficulty in obtaining government grants or subsidies for innovation	21.5	20.0	22.4
Knowledge factors			
Lack of managerial skills	2.1	4.0	0.8
Lack of engineering skills	2.3	4.7	0.9
Lack of technicians	3.8	8.4	1.1
Lack of information on technology	1.7	2.9	0.9
Lack of information on markets	1.4	2.0	1.1
Difficulty in finding cooperation partners for innovation	8.7	7.6	9.3
Market factors			
Market dominated by established enterprises	16.4	13.2	18.4
Uncertain demand for innovative goods or services	19.3	8.9	25.6
Lack of demand from customers	8.6	11.9	6.6
Too much competition in your market	20.0	16.9	21.8
Institutional factors			
Lack of infrastructure	7.6	2.7	10.6
Weakness of intellectual property (IP) rights	4.3	4.6	4.2
Legislation, regulations, standards, taxation	11.3	16.2	8.4
Reasons not to innovate			
No need due to prior innovations	9.0	6.7	10.4
No need because of no demand for innovations	9.0	10.9	7.9

Source: Appendix Table A28.2

WHAT NEXT?

We live and work in a context of emergent global challenges, as well as rapidly advancing digital technologies. In our local, national and global contexts, these technologies and their applications have opened up the space for as yet unimagined product, process, marketing and organisational innovations to emerge. The measurement of innovation is an invaluable opportunity to pause and reflect on where South Africa's innovation strengths and challenges lie.



Conclusions and recommendations for further research

This report offers a bird's eye view of the profile of business innovation in South Africa in the 2014-2016 period. Vitality, it provides a fresh and updated evidence base for innovation policy towards inclusive and sustainable development. The critical policy value these data represent is to aid our understanding of the distinctive nature of the innovation taking place in South African businesses. Policy makers, business leaders, trade unions, and industry associations can use this data, as well as 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 the existing—and desired—forms of business innovation in South Africa.

Innovation data is vital to a more innovative South Africa.

The scale and scope of innovation

A high proportion of South African businesses indicated that they were innovation-active; almost all of these innovation-active businesses reported introducing one or more types of innovation. Especially striking was that the degree of novelty of innovation in South African businesses appears very low, with survey data suggesting that a pattern of incremental innovation was widespread. Businesses were oriented almost equally towards both technological (product and process) and non-technological (marketing and organisational) innovations. However, patterns vary significantly between sectors.



RECOMMENDATION:

Manufacturing and service sector data need to be analysed separately in a disaggregated approach. Analysis should examine more closely how the profiles of innovation and innovation activity differ between the various sub-sectors and class size groups. It should also assess outcomes, enablers, and constraints of different types of innovation.

Return on innovation investment

For product (goods and services) innovations, the return on innovation investment in terms of an increase in turnover was most typically for products that were only marginally modified. Very few businesses reported a return on investment for a product that was new to the world, new to the business, or new to the market. Firms across the industrial and services sectors invested in combinations of innovation activity, such as training, acquisition of computer hardware and software, and acquisition of machinery.



RECOMMENDATION:

In-depth analysis of how combinations of various activities could facilitate innovation will be of value.

Barriers to innovation

Lack of funding was one of the main barriers to innovation activity identified. Most businesses relied on their own funds to innovate, while very few were aware of, or received, funding from the South African government. Market competition and uncertain demand for innovative goods and services were also significant obstacles to innovation for both innovation-active and non-innovation-active businesses.



RECOMMENDATION:

An opportunity exists to explore how innovation requirements could be mainstreamed as a condition for public sector procurement contracts.

Strategies to enhance innovation performance

To the extent that a large number of businesses acquired computer hardware and software to enhance their innovation processes, the data show South African businesses across industry and services on a digitalisation path. Businesses also made use of new advanced technologies to promote their innovation activities. Acquisition of machinery and equipment was by far the biggest-ticket item when it came to business expenditure on innovation activities. By contrast, only a small number of businesses protected their intellectual property and protection was more likely to take the form of guarding trade secrets or administering confidentiality agreements, rather than through patents. Also, businesses were not likely to collaborate with others in their pursuit of innovation, especially not with universities or government institutions. Their main partners—and sources of knowledge—were clients, customers and competitors.



RECOMMENDATION:

Further evidence gathering is required to understand the depth of technological learning and capability building that occurs when businesses make investments in new computer technology or machinery.

METHODOLOGY, AT A GLANCE

The South African business innovation surveys are based on the guidelines of the Organisation for Economic Co-operation and Development's (OECD) *Oslo Manual* (OECD, 2005).⁷ More specifically, these surveys use the methodological recommendations for the Community Innovation Survey (CIS) series of the European Union (EU) countries, as provided by Eurostat, the Statistical Office of the European Commission. Indicators that are both relevant for South Africa and internationally comparable are produced using these guidelines.⁸

⁷ The survey results reported on in this report were based on the methodological guidelines outlined in the third edition of the *Oslo Manual*, published in 2005. The *Oslo Manual* has since been revised, and its fourth edition was published in 2018. Where possible, this report has reflected on/made use of some of the new concepts introduced in the fourth edition.

⁸ To access previous South African innovation survey reports and datasets, to go <http://www.hsrc.ac.za/en/departments/CeSTii/reports-cestii>.

Sampling and response

The survey design is informed by the structure of the national business register of Statistics South Africa (Stats SA), which is used to draw a suitable stratified random sample. The *Oslo Manual* recommends size cut-offs that are based on employment, including only businesses with ten or more employees. The Stats SA business register has insufficient information on employment, and hence the size classes are of necessity based on turnover. The relationship between turnover and the number of full-time employees is prescribed by a schedule contained in the National Small Business Amendment Act (Act No. 26 of 2003). Businesses are divided into four size classes. The criteria used to differentiate between the four size classes are also sector specific. Table 17 shows the criteria used to group the businesses into their respective size classes, based on their sector and turnover.

Table 17: Statistics South Africa size class (turnover Rands)

Sector	SIC* code	Large more than	Medium less than	Small less than	Very Small less than
Mining and Quarrying	2	39 000 000	39 000 000	10 000 000	4 000 000
Manufacturing	3	51 000 000	51 000 000	13 000 000	5 000 000
Electricity, Gas and Water Supply	4	51 000 000	51 000 000	13 000 000	5 100 000
Wholesale	61	64 000 000	64 000 000	32 000 000	6 000 000
Retail	62	39 000 000	39 000 000	19 000 000	4 000 000
Transport, Storage and Communication	7	26 000 000	26 000 000	13 000 000	3 000 000
Financial Intermediation	81	26 000 000	26 000 000	13 000 000	3 000 000
Computer and Related Activities	86	26 000 000	26 000 000	13 000 000	3 000 000
Research and Development	87	26 000 000	26 000 000	13 000 000	3 000 000
Architectural and Engineering	8821	26 000 000	26 000 000	13 000 000	3 000 000
Technical Testing	8822	26 000 000	26 000 000	13 000 000	3 000 000

*SIC = Standard Industrial Classification

Source: National Small Business Amendment Act (2003)

The sample frame had 30 Standard Industrial Classification (SIC) codes and four size classes, which gave a total of 120 strata. The SIC codes covered **industry sectors** (*mining, manufacturing and electricity, gas and water supply*) as well as **services sectors** (*wholesale and retail trade, transport, storage and communication, financial intermediation, and computer and related activities*).

The initial sample obtained from Stats SA contained 4 950 businesses. A process of sample cleaning identified 759 businesses as invalid. In particular, these were businesses that were: not identifiable or traceable through several methods, duplicates, or inactive businesses. Invalid businesses were excluded from the original sample, resulting in a final survey sample of 4 191 businesses. In a difficult business climate, despite implementing an extensive advocacy strategy prior to and as part of the fieldwork, 642 businesses responded to the survey. On this basis, the survey achieved an overall response rate of 15%. Limitations of the survey associated with this low response rate were addressed as outlined below.

Non-response survey

A simple random sample non-response survey was conducted, as recommended by the *Oslo Manual* (OECD, 2005) for surveys that achieve response rates of less than 70%. The purpose of the non-response survey was to correct for any bias that might arise due to businesses that did not respond to the survey being less or more innovative than those businesses that did respond. The non-response survey covered 493 or 15% of the businesses that did not respond to the main survey, and a response rate of 68.3% was achieved. The correction for bias due to non-response was implemented by adjusting the probability weights used to project the sample results to the target population of businesses. This methodology also adjusts the weights for invalid businesses (businesses that were found to have merged or been liquidated).

Projection of results

The results from the survey were then projected to the target population of South African businesses in the sectors listed above.

A great deal of effort was made during fieldwork to ensure that at least one response was received per stratum, to allow for weighting. Nevertheless, no responses were realised in certain business size classes in some sub-sectors of mining and quarrying, and in electricity, gas and water supply. Therefore, sector average weights were used for these sectors. As a result it was not possible to project or generalise the sample results for these sectors, and hence the industry subgroup by size-class. However, the sample results of the manufacturing sector in this subgroup were generalisable at size-class level.

Since none of the sectors in the services subgroup were affected in this way, the services subgroup of sectors was generalisable at size-class level. For this reason, the results are presented by size-class level for the manufacturing sector, and for the services subgroup of sectors.

To further ensure generalisability from the sample to the population, error margins of the proportion of businesses that engaged in specific innovation activities were calculated. This quality indicator ranged between 0.45 and 0.62 percentage points, which was sufficiently low for the proportion estimates to be deemed good.

In order to enhance validity, the survey results were triangulated and found to be consistent with corresponding results from other national surveys, for similar reference periods and sectors covered by the survey. These are:

- Turnover, consistent with GDP from Stats SA's GDP publication;
- Employment, consistent with Stats SA's employment statistics; and
- R&D expenditure, consistent with business sector R&D expenditure based on the national R&D Survey conducted by the Centre for Science, Technology and Innovation Indicators (CeSTII).

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