

From the ocean to outer space – and almost everything in between

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Innovation: Shaping South Africa through science



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If you have ever wondered how the innovation sector in South Africa has transformed since 1994, *Innovation*, by Sarah Wild is an extremely informative and interesting publication on the topic. The book is not an academic monograph nor is it a textbook for students. Rather it presents a diversity of the innovations underway in South Africa, along with their challenges and their potential to benefit humankind, in a very easy to read style that avoids unnecessary jargon. One striking value of Wild's style is that in many cases a chapter (describing a single innovation) can be read in under 10 minutes.

Pre-1990, science, technology and innovation in South Africa primarily focused on the military-industrial complex and labour-intensive commodity production. Wild's collection of 30 concise articles, based on personal interviews and encounters over the last decade, suggests that this situation has changed significantly. She highlights five areas of South African society in which transformation is taking place in the application of science, technology and innovation: environment, energy, health, industry and education.

Following a brief and rather sombre introduction, in which Wild summarises the historical and the contemporary local and global challenges dogging the innovation sector in South Africa, the remaining chapters provide captivating accounts of many of the research and development (R&D) innovations in various stages: development, completion, application and commercialisation. The multitude of innovations extend from unmanned ocean-going vessels that monitor weather and carbon data (Chapter 7), to monitoring solar storms to ensure the safety of regional aviation and maritime services (Chapter 3), and satellites in outer space that inform us of fire threats across the continent (Chapter 1) or monitor the water quality in our dams (Chapter 2). In between there are numerous other innovations: potential life-saving genetic research (Chapter 16); mitigation of fresh produce wastage on supermarket shelves (Chapter 4); the possibility of robots in our mines to reduce the human cost of underground mining (Chapter 23); deriving energy from the sun (Chapter 9), to power homes in informal settlements (Chapters 13 and 14), and energy from burning unmined underground coal seams (Chapter 10); cameras to predict power line interruptions (Chapter 12); ultrasonic transducers to ensure railway line safety (Chapter 22); and diamond fingerprinting (Chapter 27). For many, the journey has been exciting and challenging; for others, the journey is far from complete (Chapters 5, 9, 11, 18 and 24) and they need to circumnavigate financial and legal obstacles. A few more recent innovations have been purposefully designed to address specific local societal challenges identified post-1994 (Chapters 13, 14, 28 and 30).

Some of the innovations described are South African in origin (Chapters 6, 9, 20 and 22), or have had a long history in South Africa (Chapters 11, 12 and 19). Others are the improvement of external ideas and inventions through their local adaption to the particular needs of South Africa and similar developing countries, including several countries in sub-Saharan Africa (Chapters 1, 2, 3, 7, 8, 15, 26 and 29).

Most innovations described involve local partners from universities, science councils and private research laboratories. A few include international partnerships, which in some cases simply provide access to costly infrastructure or information that is shared with many countries (Chapters 1, 2, 3 and 11). For other innovations, there is close collaboration in design and research with international partners (Chapters 5, 8, 16, 18, 21 and 27). What is strongly evident throughout most of the book is the diversity of the scientists, engineers and technicians who comprise the innovation sector in South Africa. Innovations arise not from individuals but through the hard work of cosmopolitan, multi-racial, interethnic, gender inclusive and intergenerational teams, all striving to create or expand on new ideas to improve society in the broadest sense, including the environment, industry and the health and contentment of the population. Exclusion from the National System of Innovation (NSI) is no longer the norm, while government remains a key partner in innovation funding, although amounts are less (p. 2–3). Regrettably, social scientists do not feature in these teams, which are predominantly composed of information technologists, engineers and natural scientists, indicating that social scientists are still far from readily acknowledged by the prevailing actors in South Africa's NSI. Another group that appears to take a backseat in most examples are the actual beneficiaries of innovation. In most cases they are unidentified and supposedly indirect beneficiaries. When they are identified, it is often as test subjects in pilot studies (Chapters 6, 13, 14 and 28).

While balanced and very positive in its outlook, the book does not place much emphasis on how innovation in South Africa can tackle the three primary socio-economic challenges of inequality, poverty and unemployment – all of which have increased since 1994. Clearly the knowledge economy is growing. It is diverse in its make-up and skills base, and the innovation sector is steadily moving forward. But as Prof. De la Rey asks in the Foreword (p. vii), how can the objectives of development, social inclusion and innovation be aligned? When Wild considers several examples of improvement of the quality of life of the poor and social inclusion, the focus is heavily towards high-tech scientific solutions, led by the NSI actors rather than the poor, who remain treated largely as passive recipients. Wild acknowledges their significance but confines it to their uptake or adoption of innovations and scientific solutions rather than indicating their ability to innovate in the broader sense of inventing and adapting (Chapters 6, 13, 14 and 28). In reality, it is more about matching the right solutions to specific problems and many of these solutions may not be of a scientific or technical nature. As some scholars note, we should not repeat the regular mistake of trying to interpret social problems as technical and thus suitable to technical interventions, when they are not.^{1,2} Rather the solutions might be simple innovations developed out of need by people who are still completely separated from South Africa's NSI, but who encounter such problems on a daily basis.

While Wild reports on some successes and challenges in these examples, many are pilot studies situated on the urban periphery of major centres (housing, toilets) that provide the poor or previously marginalised actors with close access to the developing and implementing partners (Chapters 13 and 14). Others involve pilot studies located further afield in distant rural areas (Chapters 6 and 28). Ultimately many of these scientific solutions are only available to a select few and are unlikely to be rolled out to reach all those in need. The ICT4RED in the iNciba locality surrounding Cofimvaba in the Eastern Cape is a pilot project which is generously funded by the Department of Science and Technology. The concern, as Wild rightly points out, is that the Department of Science and Technology cannot continually (or sustainably) fund such an endeavour and the National and Provincial Department of Basic Education does not have the money to replicate the project across the province or to maintain the existing ITC infrastructure after the current implementing

agencies exit. No long-term funders are volunteering to keep the high-tech solutions going forward.

Despite their usefulness and appropriateness to many walks of life, high-tech scientific solutions may be inappropriate in some South African contexts, as they create expectations that they seem unlikely to fulfil because of the challenges, which include infrastructure requirements and the high costs involved in implementation and maintenance.

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