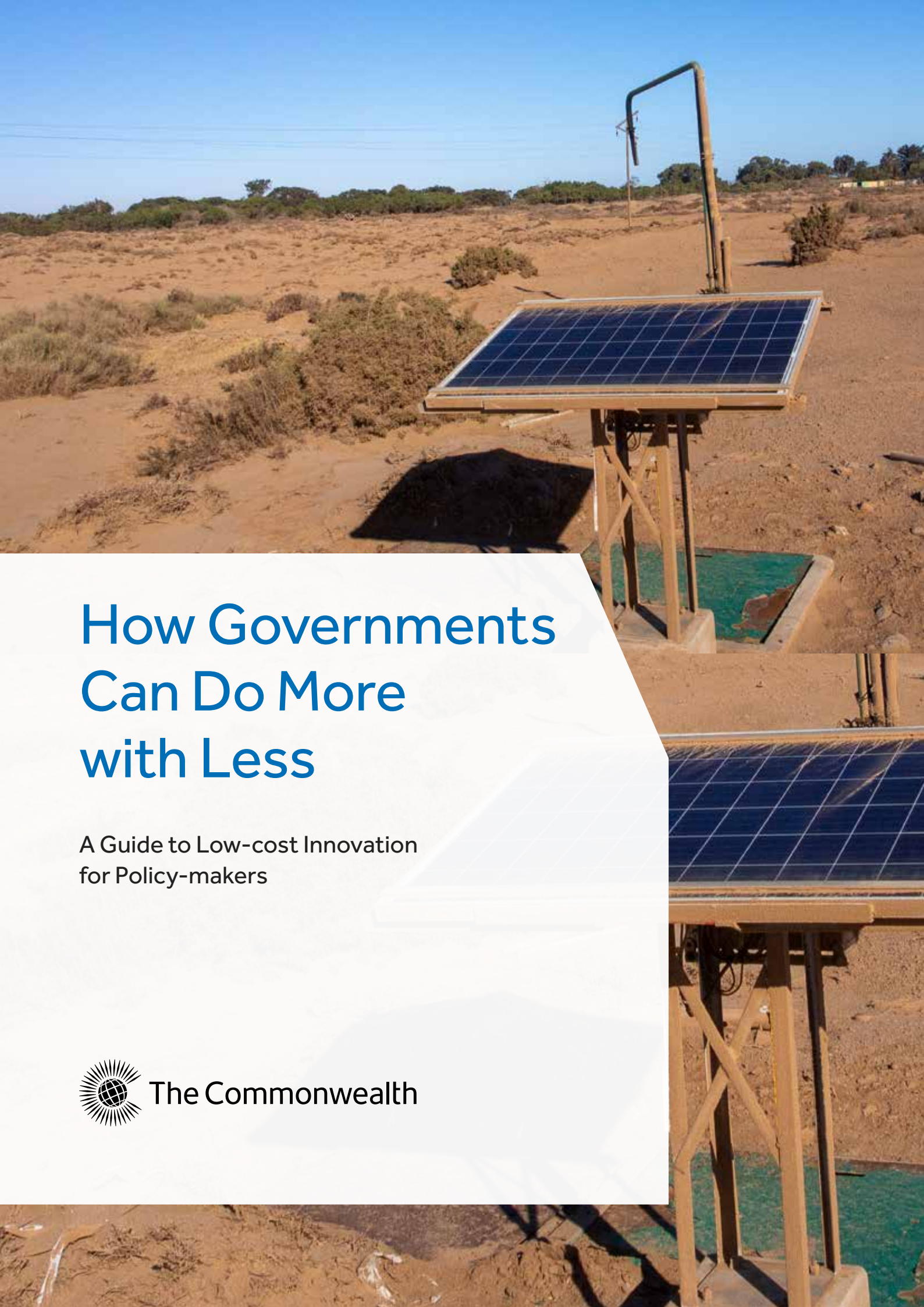

How Governments Can Do More with Less

A Guide to Low-cost Innovation for Policy-makers

The Commonwealth

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A GUIDE TO LOW-COST INNOVATION FOR POLICY-MAKERS

The Commonwealth

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'Logic will get you from A to B. Imagination will take you everywhere.'

– Albert Einstein, Scientist

'Without innovation there is no way we can overcome the challenges of our time.'

– Antonio Guterres, United Nations Secretary-General

'Taking risk is my natural way of being. You cannot discover the oceans unless you dare to lose sight of the pier.'

– Uneiza Ali Issufo, Mozambican Entrepreneur

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Foreword

This publication is a resource for all governments – designed as a useful and thought-provoking pillar of assistance in pursuit of the Sustainable Development Goals. I hope it will be particularly useful for the Commonwealth's small and developing states, which face daunting capacity constraints and are particularly vulnerable to external shocks.

Low-cost innovation - delivering more with less – is not a new concept for the Commonwealth's small and developing states. Innovation is a day-to-day necessity as states work to overcome barriers and constraints with novel home-grown solutions. Naturally, the Commonwealth Secretariat is committed to incubating, enhancing and championing Commonwealth-led innovation – and to ensuring that as many governments as possible can share in its benefits.

This guide offers a range of policy options and management strategies that policy-makers and decision-makers in government can tailor and adopt to create the optimal enabling environment for low-cost innovation to flourish in their countries. It is also a tool to help make their own ministries, departments or public sector organisations more efficient and innovative. A wide range of case studies in this guide illustrate the tangible benefits that low-cost innovation can offer, and the support required to make innovation happen.

As the world looks to emerge from the COVID-19 pandemic, low-cost innovation will become an even more important enabler for resource-constrained governments striving to build back better. With this guide, and our wider innovation work, the Secretariat does not seek to shape an unattainable magic formula, but to convene a process of continuous improvement.

I hope this guide is an asset for all Commonwealth member countries, especially small and developing states, as they put innovation at the heart of their efforts to build a more secure, more resilient, more prosperous future for their citizens.

The Rt Hon Patricia Scotland KC

Secretary-General of the Commonwealth

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This guide has been prepared by a team led by Abhik Sen, Head of Innovation and Partnerships at the Commonwealth Secretariat. The publication has benefited immensely from the guidance of Professor Jaideep Prabhu at the University of Cambridge, author of the book *Frugal Innovation: how to do more with less*. Key contributors to this guide were Dr Simon White and Dr Michael Boampong. Principal researchers for this guide were Anita Collins and Tim Balin. This guide for policy-makers and public sector leaders and managers draws upon and cites policy and strategy documents, research, analysis, data, abstracts and case studies published by governments, international development organisations, innovation policy experts, think tanks, researchers and others. Sincere thanks to all of them, as well as to the interviewees and reviewers whose insights and experience have enriched this guide.

The primary sources for many of the elements in this interactive guide are duly cited and included as hyperlinks. Readers are advised to click on these links and go straight to the primary sources if they wish to explore in detail any of the elements featured in this guide.

Suggestions and recommendations to enrich and improve this guide are very welcome. For further information, please write to us at innovation@commonwealth.int.

Executive Summary

This publication is a guide to assist policy-makers, civil servants and public administrators across government ministries, departments and public service delivery agencies, particularly in developing and low-income countries. It is a resource to help design and improve policies, programmes and services that can stimulate low-cost innovation and help organisations and individuals in the public, private or voluntary sector overcome structural and resource constraints.

The key messages of this guide are:

How governments can stimulate low-cost innovation

Strengthen the frugal innovation ecosystem: Governments can play a critical role in enabling frugal innovation to flourish by encouraging and facilitating collaboration and knowledge sharing between institutions, organisations, communities and individuals critical to triggering the quest for low-cost and home-grown innovative solutions.

Build innovation capacity based on comparative advantage: Identify and build on strengths in every sphere – social, economic and environmental – to inspire and incentivise people in every strata of society, to develop innovative solutions critical to national or local development within the resources available.

Address the key legal and regulatory barriers: Barriers to frugal innovation often differ from those that affect the kind of innovation triggered by a combination of research, technology and high levels of investment. Removing microlevel barriers for low-cost innovation to flourish at the local level can sometimes be more effective than any 'big bang' reform at the national level.

Introduce policy incentives that can catalyse low-cost innovation: Governments can empower and incentivise frugal innovators with policies that, for example, lower the barriers to public procurement for small, micro or social enterprises, or by giving them tax holidays, export subsidies and easier access to finance and capital.

Identify key sectors for resource allocation: Prioritise and ensure scarce resources are allocated to the most deserving ideas or innovations, by identifying the needs of the target group and by piloting and testing new products and services within selected markets and sectors.

Promote frugal innovation through public procurement: Create new market opportunities for frugal innovation to flourish, by designing public procurement policies and processes that incentivise potential suppliers in the local economy to innovate and produce or deliver the goods and services sought by the government.

Accelerate technology diffusion and prioritise digital connectivity as a 'public good': Design effective institutions that facilitate the adoption and use of knowledge, methods and technical means, by increasing digital connectivity and improving access to digital tools and technology such as the internet and mobile phones.

Identify what works at the grassroots level and help replicate: Monitoring and assessing grassroots and low-cost innovations can help maximise impact and deliver value for money, often in a variety of contexts. Once identified, support the piloting of low-risk innovations, particularly in the 'last mile' stretch where the mainstream economy or government services struggle to serve the interests of the most vulnerable and marginalised sections of society.

Support innovation and investment in the informal economy: The informal economy is a hive of frugal innovation, particularly in developing countries, where it often overshadows the formal or regulated sector as a source of productivity, wealth and employment. Governments can support innovation in ways that create a path to formalisation and growth, while increasing social protection for informal business owners and workers.

Encourage social innovation and 'circular economy' initiatives: Civil society and non-governmental organisations rooted in the communities they serve are often a rich repository of knowledge and enterprise. A cross-sectoral approach to problem solving, in which civil society participates as a partner with the public and private sectors, can give birth to low-cost smart solutions and accelerate the transition to a 'circular model' – which seeks to achieve sustainable development and regeneration of natural systems through the recycling of products and materials and greater use of renewable energy.

Ensure intellectual property regimes safeguard indigenous knowledge systems: The intellectual property rights regime should balance the need to protect copyrights and trademarks with the imperative of every country to move up the innovation value chain, by accelerating the diffusion of knowledge, resources, technology and opportunities and by making the most of local expertise and native ingenuity.

Encourage and facilitate innovation networks: Support the development of cross-sectoral networks in which individuals and organisations can share ideas, experiences and resources that foster innovation across all sectors.

Support frugal innovation intermediaries: Help innovation promotion agencies and organisations to teach and encourage frugal innovation practices, while providing the information, advice and partnership-brokering services that innovators and entrepreneurs often require.

Create a challenge prize or frugal innovation fund: Introduce a challenge prize to promote, celebrate, identify and reward frugal innovation that can demonstrate impact or quantifiable positive potential for the future.

How governments can become frugal innovators

Establish clear vision, purpose and priorities: Formulate a clear vision, purpose and set of priorities, so public servants and citizens understand why modest or incremental innovation in the culture, practices and operations of the government is necessary and achievable and how it could spur positive transformation and accelerate sustainable national development.

Ensure commitment to innovation from high-level leadership: Public innovation needs champions at the highest levels of government, who understand the value of innovation and are prepared to create the space in which civil servants and public administrators are willing to take calculated risks and are keen to try something different without feeling inhibited by the fear of failure.

Apply a systems approach to public innovation: A 'systems thinking' approach to frugal innovation implies that government departments, employees and their public service delivery partners understand the intended and unintended consequences their often-inter-related work has on the society and economy they serve. They can then use that prior knowledge to design and deliver their programmes in a more efficient, equitable and inclusive way.

Decentralise decision-making and empower local authorities to be more entrepreneurial in their problem solving: Proximity to grassroots-level challenges and a first-hand understanding of the risks and opportunities at the local level can

make local and regional governments ideal engines and incubators of innovation, provided they have the support of higher authorities to be flexible and unconventional in their approach.

Recognise, support and reward public sector changemakers: Build the capacity of changemakers who can champion frugal innovation within their organisations, either as individuals or as team leaders, and create incentives to make risk-taking more attractive for public servants.

Manage risk, while supporting pilots and prototypes: Governments can incubate and assess innovative ideas or approaches to problem solving through objectively evaluated prototypes and trials. They can then scale or replicate promising innovations iteratively – or one step at a time – in order to manage risk as well as the appetite for accepting change within key stakeholder groups, such as the target category of beneficiaries.

Develop the 'frugal innovation' skills of policy-makers and civil servants: Successful innovation is a combination of art and science, or 'inspiration and perspiration'. Governments should invest in developing the skills, attitudes and behaviours required by civil servants to become successful frugal innovators within the public sector.

Build partnerships to foster collaborative frugal innovation: In the absence of abundant resources, governments can become innovative simply by partnering and co-creating more with public, private, academic and civil society sectors to address clearly defined problems and challenges.

Apply behavioural insights to improve policy-making, public service delivery and impact: Apply research-based insight into human behaviour and psychology, to refine policy and programme design, develop or refresh policies, and improve public administration practices or public service delivery.

Experiment with low-cost innovations to boost social inclusion and co-creation of policies and programmes with citizens: Frugal innovation can be used to put citizens at the heart of societal transformations. Innovative public organisations use citizen experiences to understand people's experience of accessing services, such as public transport and business licensing registries.

Make government more transparent and public data more accessible: One of the most cost-effective ways in which governments can trigger innovation within ministries and public sector organisations, is by making official data on key development indicators transparent and accessible to those within the government and outside. They can then use the data as a primary ingredient of innovation within the public sector.

Use low-cost digital tools and technology to boost impact, productivity and efficiency: Mobile phones, the internet, cloud computing, open-source software and a host of other affordable technology can help governments incubate and scale low-cost innovations that make the public sector more efficient and public services more effective.

Monitor, evaluate, collate and share impact of frugal innovation: Make government a learning organisation by regularly monitoring, assessing and sharing with peers the effects of frugal innovation or low-cost interventions on the organisational efficiency and effectiveness of various branches of government, individually and collectively, and on the quality and impact of public service delivery that takes into account the views of citizens and other stakeholders.

1. Introduction

The history of the world makes it clear that innovation is the engine that powers economic growth and prosperity, catalyses social progress, and offers the best bet for ensuring sustainable development in the future. All countries, particularly developing ones, face an increasing array of complex and interrelated economic, social, technological and environmental challenges. These challenges affect governments, business, civil society and ordinary citizens at the global, national and local levels. Particularly after the COVID-19 pandemic and considering the existential challenge from climate change, it is clear that many of the tools and methods of the past, or a 'business as usual' approach, will no longer work. Overcoming these daunting challenges requires new ways of *thinking* and *doing* – with limited resources – to produce the effective solutions necessary to mitigate or overcome many of these challenges.

1.1 What is innovation?

Innovation means different things in different contexts but, essentially, innovation is the change in *thinking* and *doing* that produces a new or more effective solution to an existing problem. It is the process of innovation that gives birth to new products, services, systems and models that help tackle challenges more effectively and efficiently than before. Innovation has always been the primary engine of socioeconomic development and the principal reason for the progress humanity has made from the Stone Age to the Digital Age. Therefore, it is important for governments and society to embrace and encourage innovation.

In its most widely understood and simplistic definition, innovation is closely associated with the complex web of investment in scientific research and development by state and society, which when combined with the disruptive potential of emergent technology and the risks and opportunities inherent in market-based economies, leads to the creation of new products, services or processes. These then either enable the state to serve its citizens better and more efficiently, or allow a business to thrive by creating or serving the market for its products and services.

Box 1.1 What is frugal innovation?

Within the broad field of innovation, 'frugal innovation' refers to the implementation of ideas that help achieve extraordinary results and value for money in a low-resource environment. In the private sector, it represents a low-cost process aimed at creating better products, services or business models that can be rapidly scaled-up to achieve a significant economic and social impact. Frugal innovation focuses on doing better with less and finding ways to reduce complexity in business (Radjou and Prabhu 2015). Frugal innovations embrace the indigenous innovation potential of emerging economies, while offering the promise of more inclusive and resource efficient economic growth (Granqvist 2016). While often equated with the creation of cheap or 'low–tech' products, frugal innovation is in fact about making better things, or making things better, at an affordable cost.

Source: Nesta (undated)

In resource-constrained settings – conditions in which many countries and governments find themselves in today – frugal innovation is a particularly relevant and powerful concept.

A frugal, flexible and inclusive approach to innovation has its genesis in the Indian word *jugaad*. A colloquial term used to describe home-grown ingenuity and initiatives aimed at overcoming everyday hurdles common in all developing countries, the word has come to symbolise the creative improvisation associated with innovation and entrepreneurship activity observed in these contexts (Prabhu and Jain 2015).[1] Frugal innovation comprises of a 'frugal mindset, a frugal process and a frugal outcome' (Soni and Krishnan 2014). Frugal innovation

1 Radjou et al. (2012) suggest that the entrepreneurial spirit of *jugaad* is not limited to India. It is widely practised in other emerging economies such as China and Brazil, where entrepreneurs are also pursuing growth in difficult circumstances. Brazilians have their own word for this approach: *gambiarra*. The Chinese call it *zizhu chuangxin*. The Kenyans refer to it as *jua kali*.

is now a global phenomenon driving inclusive and sustainable growth across nations. In the developing world, large and small firms see the 'bottom of the pyramid', or the large swathe of population with modest income and resources, as a market opportunity, and have begun to design and produce low-cost solutions to meet the unmet needs of billions. In advanced or industrialised countries, digital tools and emerging technologies, such as smart phones, cloud computing and 3D printers, are empowering more and more people to do with limited resources what only organisations or people with deep pockets could pull off in the past. Frugal innovations can help promote context-appropriate solutions, products and services, and inspire anyone and everyone to create a better future for themselves, their communities and their countries, with the power of good ideas that do not need advanced infrastructure or a big investment of resources first in order to have a chance of succeeding.

More than three billion people, many of them in Commonwealth countries, have significant unmet basic needs such as health, education, energy, food and financial services. In recent times, businesses and not-for-profit organisations have begun to develop home-grown, low-cost solutions to address the socioeconomic challenges common to most low-income and developing countries. Governments, too, have found new ways of governing and delivering their services more effectively and efficiently.

A key strength of frugal innovation is its ability to solve sustainability challenges (Hossain 2016). Entrepreneurs and firms can use frugal innovation to 'reduce their consumption of scarce natural resources' by 'designing, making and selling products and services with a lower environmental impact' (Radjou and Prabhu 2015).

It is also important to acknowledge what frugal innovation is not, or what it cannot achieve. For example, frugal innovation cannot overcome resource constraints to solve developmental challenges beyond a point. A series of small-scale interventions is also not a substitute for pursuing national development, strengthening state capacity and building a responsive government machinery without long-term planning and large-scale, complex, messy and contested transformations (Pritchett et al. 2010).

There are many paths to frugal innovation and success can often be the result of a combination of processes and approaches that encompass terms such as 'lean innovation', 'grassroots innovation' and 'social innovation'. While not all these approaches have a requirement of affordability, they do have in common the imperative to overcome the resource constraints which lie at the heart of the idea of frugal innovation.

Innovation, particularly in a resource-constrained environment, is often a difficult and lonely pursuit. For many frugal innovators, it can be close to impossible to turn their ideas into action, without the support of friends and family. However, governments with their power to decide public policy and their monopoly over the delivery of public services, can help create a strong frugal innovation ecosystem in which good ideas can emerge from anywhere, be tested, adapted and scaled with speed and efficiency to achieve the maximum benefit for the greatest number of people.

Box 1.2 Interview with Professor Jaideep Prabhu, University of Cambridge

Professor Jaideep Prabhu, University of Cambridge, is the co-author of *Frugal Innovation*, a best-selling book published in 2015 that explains how the concept of 'doing more with less' is transforming businesses and economies across the world.

Based on your research on the subject, could you please explain what 'frugal innovation' means and how is it different from any other type of innovation?

For most people, innovation conjures up an image of big, technology-driven projects that are highly structured, involve a lot of people, take a lot of time and require a lot of money. This is true both in the corporate sector, as well as in government.

In contrast, frugal innovation is all about how to do more and better with less. The frugal innovation approach asserts that it is both possible and necessary to make change happen faster, better and cheaper. Innovation in this view is not about expensive, time-consuming, technology-led change. Rather it is about working back from unmet human needs and then quickly developing highly affordable, appropriate solutions that are accessible to large numbers of people.

Is 'frugal innovation' relevant to any particular type of country or economy?

Frugal innovation is particularly relevant to economies that are resource constrained and where there are large numbers of people whose basic needs in areas such as financial services, health, education, energy and food are unmet. Thus, emerging and developing economies are particularly adept at and suited to frugal innovation.

That said, we are increasingly seeing frugal innovation take off in developed economies as well. This is partly due to increasing resource constraints in the developed world, including increasing pressures on household and government budgets. But it is also because more and more people in the developed world are now empowered to do with limited resources what only large organisations could do in the past. Specifically, ubiquitous tools and technologies such as smart phones, cloud computing, 3D printers, crowdfunding and social media, have given rise to frugal innovation in advanced economies too, driving such trends as the maker movement and the sharing economy.

How would you say, 'frugal innovation' is relevant to governments and what can they do to promote 'frugal innovation'?

Frugal innovation is crucial to governments, both in developing and developed countries. In both types of countries, government can and should empower the private sector and the third sector to develop affordable solutions to meet the unmet needs of the populace. This will not only improve consumer welfare and reduce inequality, but it will also create employment, reduce the problems of the informal economy, and drive sustainable, inclusive growth. Importantly, governments can also adopt frugal innovation internally. By learning how to do more and better with less within their own departments and agencies, governments can not only serve citizens more affordably, they can also become more efficient and effective while remaining fiscally and environmentally responsible.

If there is one thing you could advise governments to do in order to harness the benefits of 'frugal innovation', what would it be?

The first step for a government would be to take stock of what is already happening within the country in the area of frugal innovation, both within government as well as externally in the private and third sectors. Where are the most creative solutions to pressing needs being developed and by whom? Once this is done, it will become clearer to governments how they can disseminate, encourage, support and scale these frugal innovations more widely.

1.2 Frugal innovation, COVID-19 and sustainable development

The 2030 Agenda for Sustainable Development (UN 2015) adopted by all countries in 2015 provides, as described by the United Nations:

a shared blueprint for peace and prosperity for people and the planet, now and into the future. At its heart are the 17 Sustainable Development Goals (SDGs) [UN Department of Economic and Social Affairs undated], which are an urgent call for action by all countries – developed and developing – in a global partnership. They recognise that ending poverty and other deprivations must go hand-in-hand with strategies that improve health and education, reduce inequality, and spur economic growth – all while tackling climate change and working to preserve our oceans and forests.

The SDGs, underpinned by data on key indicators and targets, create a framework in which innovation can accelerate the progress on each of the 17 goals.

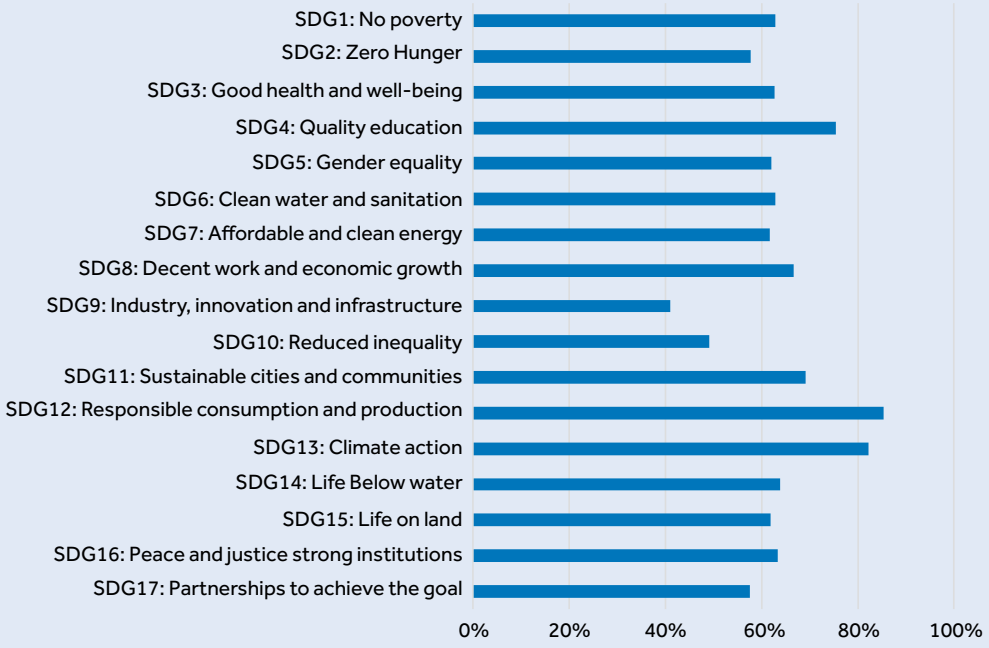
However, achieving the SDGs will not be easy, least of all for resource-constrained developing countries, after the unprecedented shock and socioeconomic distress inflicted by the COVID-19 pandemic. As the Organisation for Economic Co-operation and Development (OECD) and others have highlighted: 'advancing on the SDGs represents a complex governance challenge. The indivisible, interdependent and inter-generational nature of the SDGs implies a need for governments to rethink their organisation and working methods' (Fyson et al. undated).

To ensure the pandemic doesn't mutate into an endemic catastrophe for their countries, and then to 'build back better', governments will have to get out of the 'business as usual' mode and become more creative, entrepreneurial and, yes, innovative. With resource constraints more severe now than ever before, the principles and tools of frugal innovation can be their greatest ally in these most testing of times.

Box 1.3 SDGs and the Commonwealth

The Commonwealth SDG Tracker, created by the Commonwealth Secretariat, indicates that, based on the data available until 2021, the 56 Commonwealth countries collectively were making the greatest progress, and in many instances doing better than the rest of the world, on SDG 13 (Climate Action) and SDG 4 (Quality Education). Among the 17 SDGs, Commonwealth countries as a group scored the lowest on SDG 9 (Industry, Innovation and Infrastructure) and SDG 10 (Reduced Inequality). Taking the score for all 17 SDGs into account, where the index score signifies a position between the worst (0) and the best (100) target outcomes, the Commonwealth average of 63.8 for 2022 was slightly below the average score of 68.3 for the rest of the world.

Figure 1.1 Sustainable Development Goals % achieved



Source: The Commonwealth (2022)

2. How Governments Can Stimulate Low-Cost Innovation

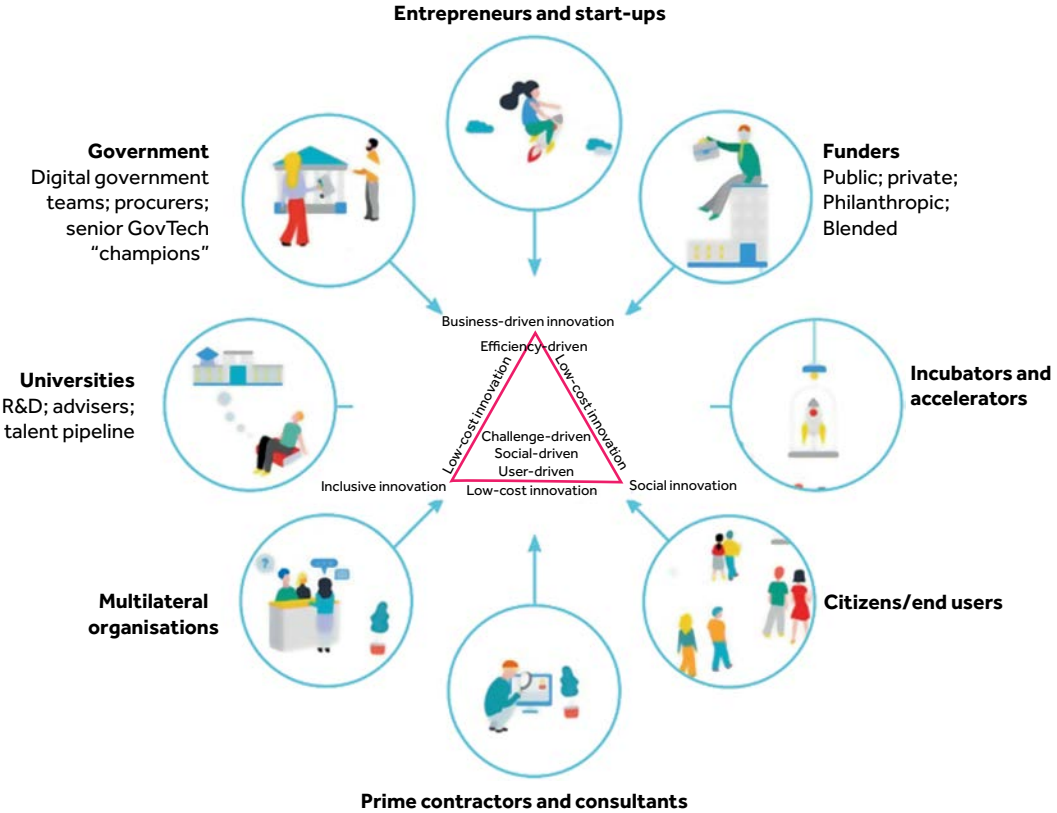
This section concentrates on the many ways in which a government can strengthen the enabling environment – including policy and regulatory frameworks – for frugal innovation to flourish in a country. It also suggests how governments can facilitate and accelerate systematic collaboration between the public, private, academic and voluntary sectors, as the resulting cross-fertilisation of ideas, expertise and knowledge can often give birth to frugal and home-grown solutions to local and national challenges.

2.1 Strengthen the frugal innovation ecosystem

Enrich and expand opportunities for collaboration and partnership between different sectors and stakeholders in society to maximise the possibility of successful frugal innovation emerging.

An innovation ecosystem is, to cite US National Science Foundation (undated), simply the combination of 'people, institutions, policies and resources that promote the translation of new ideas into products, processes and services'. In every country and context, as shown in Figure 2.1, an innovation ecosystem comprises a diverse range of actors: government departments, public agencies, regulators, financial institutions, business enterprises, entrepreneurs, investors, researchers, schools, universities, vocational training institutes, digital service providers, local communities and grassroots or social

Figure 2.1 Components of a National Innovation Ecosystem



Source: Centre for Social Innovation (2016)

innovators, among others. While traditional innovation systems and policies focus primarily on the investments and capacity in science, research and technology required to support and develop innovation in the context of an industrial and capital-intensive economy, the focus of a 'frugal innovation ecosystem' should be on designing systems and processes that bring together key stakeholders at the local or national level – individuals, organisations or communities – through professional and social groups that can lead to the development of innovative solutions for local challenges without the help of advanced technology or high levels of financial investment.

Box 2.1 What can governments do to strengthen frugal innovation ecosystems?

1. Create a supportive policy and regulatory environment in which local innovators, entrepreneurs and start-ups can thrive by accessing the technological, financial and knowledge resources available.
2. Direct the state's capacity to address resource gaps in society.
3. Share relevant data, information and evidence more widely.
4. Strengthen the skills, capacities and partnerships of enablers of innovation.
5. Facilitate ecosystem interactions and relationships and promote continuous creativity and healthy competition of ideas.
6. Strengthen innovation management processes to help identify and mobilise support for the most promising ideas that can be translated into low-cost innovations.
7. Build regional and global alliances – with the corporate sector, international development organisations and civil society networks – to strengthen the local innovation ecosystem.

Source: International Development Innovation Alliance (undated); Ramalingam et al. (2015)

Box 2.2 Frugal innovation's role in India's national innovation framework

India has identified frugal innovation as a national priority to catalyse growth for inclusive development. In addition, there are numerous programmes and initiatives that support frugal innovation in specific fields. The National Innovation Foundation (NIF) supports grassroots innovators, while the Inclusive Innovation Fund mobilises finance to support enterprises that are developing innovative solutions for the 'bottom 500 million'. NIF was established by the Government of India's Department of Science and Technology to strengthen grassroots technological innovations and traditional knowledge systems. The foundation scouts for grassroots innovations developed by individuals and local communities. NIF helps grassroots innovators and outstanding traditional knowledge holders to get due recognition and reward for their innovations.

Source: OECD (2014); National Innovation Foundation (2018)

2.2 Build innovation capacity based on comparative advantage

Identify and build on national comparative advantages – economic, social or environmental – and make available resources easily accessible to potential innovators in the country.

Rather than focusing on deficits or the resources that are missing to develop an orthodox innovation system based on high levels of investment in science and technology, or research and development, a frugal innovation approach prioritises the identification of opportunity in adversity and seeks to capitalise upon a country's native or latent resources and strengths.

Box 2.3 How small island states can create successful innovation policy

More than 30 Commonwealth countries are small island developing states (SIDS). A few of the most common myths about innovation policy in SIDS – and why they don't need to be a barrier to innovation – are as follows:

Myth #1: 'Science, technology and innovation policy is too expensive. Small island states don't have the economic capacity to invest in innovation.'

Innovation activities emerge out of complex interactions across the public and private sectors, shaped by the institutional framework – policies, laws, norms and routines – that can enable or constrain innovation. Although small island developing states often have limited public resources, more can be done to improve governance structures related to research, innovation and business support among government ministries and agencies.

Establishing effective mechanisms to co-ordinate innovation activities under the influence of the public sector can significantly improve the creation, diffusion and adoption of new knowledge in the economy, as well as help optimise the use of available resources, without requiring a step change in investment.

The quality of connections between the different parts of an innovation system is a critical determinant of competitiveness. In this regard, smaller nations have an advantage – a smaller system is easier to co-ordinate, while raising awareness of the value of innovation among policy-makers and firms is less onerous. It is also easier to ensure that all relevant parts of the system can be part of the design and implementation of national development goals.

Myth #2: 'It would be difficult for small states to compete with leading nations in scientific research.'

Small island developing states don't necessarily have to compete against leading scientific countries; instead, they can benefit from a stock of knowledge that is internationally available and, to some extent, increasingly open. An innovation system reaches beyond the process of scientific research and discovery, comprising three elements: knowledge creation, knowledge diffusion and knowledge adoption.

Knowledge creation is the research and development activities related to new technologies, tools and techniques. **Knowledge diffusion** is the development of network linkages, norms and system-wide intelligence to facilitate efficient diffusion of knowledge. **Knowledge adoption** is the capability development activities related to accessing and applying new technological knowledge. Building capabilities across these three dimensions needs to be understood as a gradual process.

Myth #3: 'Science, technology and innovation initiatives from larger and more industrialised countries are not applicable to small island countries.'

While policy initiatives cannot simply be copied and transferred from one country to another, particularly when there are obvious differences in terms of innovation and industrial system structures and levels of maturity, they can still provide information on best practice with regards to effective design, implementation and operation. The study of international experience offers an invaluable insight into what makes a successful science, technology and innovation programme, and can be adapted to support the development of similar initiatives in smaller states, tailored to their specific scale and political, social and economic frameworks.

In short, it is not only high-income countries with advanced research ecosystems that can implement meaningful interventions in science, technology and innovation policy. There are many **low-cost interventions** that can lead to significant change in any context, and many lessons from more industrialised countries that can be adapted and utilised in small island developing states.

Source: Naselli (2021)

Box 2.4 Innovation strategy in Seychelles

Mr Xavier Estico, Chief Executive Officer of the Seychelles National Institute for Science, Technology and Innovation (NISTI) (https://nisti.sc/):

The Seychelles is a small island developing country and should pursue innovation by building on its existing resource base and strengthening what works. While we in the Seychelles plan to map the national innovation system to identify gaps to be filled, we also recognise there are considerable national resources that can be more effectively applied. The current National Innovation Strategy locates innovation within a framework for science and technology development and within specific sectors, but in the future, innovation will be pursued more horizontally, across all sectors. The natural habitat of the Seychelles is a key asset and so ensuring environmental protection is critical.

Thus, a sustainable model for innovation is one that enables citizens from all walks of life and in all sectors to adopt new practices, business models and create services and products that preserve the natural beauty of the environment. The challenge is to provide a co-ordinated framework for implementation in which all actors go beyond their traditional silos and ways of working. Innovation must be practical, rather than a theoretical concept, in which progress can be measured and the benefits to society made tangible.

NISTI supports a Science, Technology and Innovation Peoples Group, in which innovation is encouraged at the community level. Following the current restructuring of local and regional governments, links will be forged to help communities identify and respond to local problems and challenges. By harnessing community resources, innovation processes will be used to find solutions and create opportunities. In another example of mobilising local resources, NISTI is initiating an incubator for foreign experts and entrepreneurs who want to live and work for in the Seychelles for a few months and develop new innovative business ideas with locals. By leveraging the unique lifestyle offerings of the Seychelles, 'global freelancers' are attracted, along with their network and expertise, and brought into the national innovation system.

2.3 Address the key legal and regulatory barriers

Draw from regular legal and regulatory assessments to design reform programmes that remove or reduce the operating environment constraints to frugal innovation.

While industrial policies promote selected industries, laws and regulations affect the ability of any kind of innovative activity to start up, expand and deliver cost-effective solutions for 'knotty' problems at the local or grassroots level. Reforms that improve the legal and regulatory framework will change behaviours of innovators in different sectors in ways that lead to increased levels of risk-taking or, more accurately, 'ambition to dare' and also create a socioeconomic environment that liberates potential innovators from the fear or stigma of failure.

Box 2.5 Common constraints on frugal innovation

Among the more common business environment constraints to frugal innovation are the following:

- **Business registration and licensing:** Make it easier and cheaper for small enterprises to register and obtain the licenses they require.
- **Taxation policy and administration:** Simplify tax and reduce compliance costs for small enterprises, while considering the introduction of special tax regimes for micro and small enterprises.
- **Bankruptcy:** Ensure that bankruptcy laws do not overly penalise failure and risk-taking by grassroots innovators.

- **Judicial reform:** Improve access to formal dispute resolution, improve linkages between formal and informal systems of justice, and improve access to justice in bureaucratic administration.
- **Financial services:** Improve access to inclusive financial services, tailored to the size and needs of small businesses and voluntary sector organisations.
- **Intellectual property rights:** Enhance and protect the traditional knowledge of indigenous people and local communities, and facilitate engagement and partnership with suitable stakeholders from the public and private sectors at the local and national levels.

Source: Radjou et al. (2012)

Box 2.6 Saint Lucia's National Competitive Agenda 2020–2030

To strengthen Saint Lucia's economic diversification strategy, the National Competitiveness and Productivity Council (NCPC) spearheaded the development of an innovation policy in 2020.

According to Fiona Hinkson, Director of NCPC, 'This is the first time we are having such a policy in Saint Lucia. It gives us the opportunity to bring together the science aspects, innovation and technology into one comprehensive framework. So, we are now better able to help our researchers, our innovators, our business persons to come up with business ideas and solutions to help solve the problems of society.' 'We also see it creating a roadmap for the involvement of the various sectors and industries building clusters of networks for organisations, so that there is more communication and more sharing of information and knowledge. The know-how, the know-when, the know-why is important to enable persons to add that kind of value to whatever products or services or processes that they may be interested in bringing to the market,' said Lennel Malzaire, Director of Innovation in the Department of Education, Innovation, and Gender Relations.

Source: Simon (2020)

Box 2.7 The frugal innovator's perspective

Q&A with Simon Bransfield-Garth, Chief Executive Officer of Azuri Technologies Limited (https://www.azuri-group.com/about/):

What were the factors that led to the birth of Azuri?

Azuri is a company that is using new technology to address challenging global problems. Founded in 2012, the company provides micro-scale solar power systems to off-grid households in sub-Saharan Africa on a pay-as-you-go basis. Today, Azuri has sold some 150,000 systems improving the lives of around 750,000 people and has grown revenue at over 100 per cent each year for the last five years.

What were the most critical challenges the organisation faced in its early days, for example, was it lack of access to growth finance/appropriate technology, the policy environment, the licensing/tax regime, lack of skilled workers, or something else?

The biggest challenge of any innovative start-up is finance. In our case, the business case is very strong, but few investors in developed countries have experience of working in Africa. So, while the start-up funding gap is well known in a developed market like the UK, it is doubly challenging for businesses working in developing markets.

What strategy did you adopt to overcome these challenges?

The company was able to use financing from commercial partners to help with the early phases. The company also won many awards, including Technology Pioneer from the World Economic Forum, which helped us in finding financial support.

What in your opinion can governments do (without spending too much money) in terms of policies and incentives to encourage innovation and innovators in countries that face many kinds of resource constraints?

Governments (of developing countries in particular) should avoid restricting access to skilled foreign workers, but instead set quotas of local workers that need to be hired alongside. This way you get the skills transfer you need and progressively over time more senior roles will be taken by local candidates.

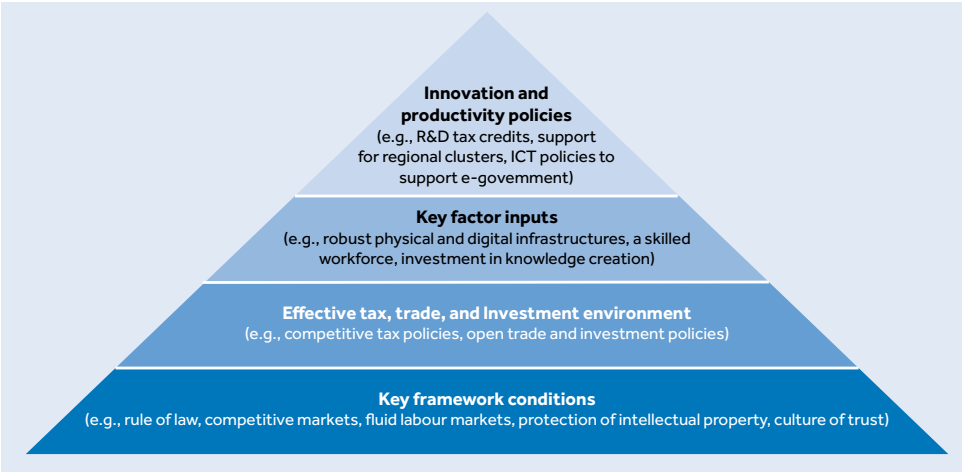
- Be consistent in your taxation and duty policies. Changing policies cause turmoil and retrospective interpretation of policies frightens investors away and makes investors focus only on the short term.
- Aggressively focus on corruption and governance. It is still one of the main things holding back growth. Regulate where you need to, but do not create regulation for the sake of it. If an international standard exists, adopt it. Do not create your own parallel regulations in the name of 'national autonomy'. It just means more expensive products in your country.
- The international development sector also needs to take risks. There is little point in having a development organisation that only invests after the market is proven (and so simply augments, or sometimes competes with, available commercial capital). Today international development organisations are mostly risk-averse and have very slow decision-making processes, which makes them much less effective than they could/should be in supporting innovation and innovators. Emerging markets are moving rapidly. As a result, incentive schemes should be fast and results driven.

2.4 Introduce policy incentives that can catalyse low-cost innovation

Encourage investments into low-cost innovation through public policies that empower and incentivise frugal innovators.

Both demand- and supply-side policy incentives can be used in combination to transform markets and catalyse innovation as demonstrated in Figure 2.2. Demand-side incentives increase the market opportunities for innovation (for example, by lowering the barriers to public procurement or by ensuring a reasonable proportion of goods and services procured by the state is sourced from indigenous or local suppliers and vendors), while supply-side incentives develop the capacity of the local actors to innovate (e.g., fiscal incentives such as tax holidays and exemptions, export subsidies). On the flip side, poorly designed incentives can lead to many negative or unintended consequences that need to be understood and avoided.

Figure 2.2 Policy incentives to catalyse innovation



Source: World Intellectual Property Organization (2015)

2.5 Identify key sectors for resource allocation

In a resource-scarce environment, it is important to prioritise and ensure the available resources are allocated to the areas where low-cost innovations are most needed or where they can make the biggest positive difference.

Public policies and programmes should identify the needs of the target group, and pilot and test new products and services within selected markets and sectors. It is important to understand the local context and operating environment. This is often best achieved through partnerships with strategic local actors. However, as frugal principles may be new to businesses, awareness raising, training and mentoring are also often required (Granqvist 2016).

Box 2.8 How frugal innovation is raising agricultural productivity in Africa

Green Innovation Centres in African countries, including Cameroon, Ghana, Kenya, Malawi, Mozambique, Nigeria and Zambia, are incubating and promoting innovations in the agriculture and food sector that have increased the incomes of small farming enterprises, boosted employment and improved the regional food supply in rural areas. The Green Innovation Centres focus on smallholder farmers and aim to generate new jobs in food processing, ensuring that a greater portion of the value added from agricultural production remains in the local area, especially within rural regions.

The programme promotes networking between local innovation partners, to improve and accelerate the spread of innovations within the participating countries. These innovations may be technical in nature, such as mechanisation within agriculture or improved seeds, fertilisers and food cooling chains. In many cases, they focus on new channels for co-operation, such as setting up producer associations, specialised enterprises or interest groups. By providing advisory services, organising educational and training courses, and facilitating access to loans to support innovation, the centres foster the development and dissemination of knowledge. Special attention is given to women in agriculture and, whenever possible, the programme co-operates with existing agricultural schools, knowledge hubs and research institutes, such as the Africa Rice Centre.

Green Innovation Centres report the following results in selected countries:

- In Nigeria, after attending Farmer Business Schools, the average annual income of potato farmers increased by 600 euros (EUR) to EUR1,170.
- In Kenya, the income earned by more than 3,000 sweet potato farmers, 22 per cent of whom are women, has increased by 22 per cent.
- In Malawi, using *rhizobiaceae* bacteria for fertilisers and enhanced seeds, agricultural yields have increased by around one third, while resilience to the impact of the El Niño climatic phenomenon has also increased.
- In Cameroon, smallholder farmers have increased their yields by an average of 25 per cent through the introduction of solar dryers within cacao production.

Source: GIZ (2017)

Box 2.9 How Rwanda is supporting innovation in its strategic value chains

The National Industrial Research and Development Agency (NIRDA; https://www.nirda.gov.rw/home/) in Rwanda was established in 2013 to support diversification of the Rwandan economy. Through its Vision 2020, the Government of Rwanda has set specific targets aimed at driving Rwanda's journey towards economic transformation from a subsistence agriculture economy to a knowledge-based society.

NIRDA works to improve the competitiveness of existing industries, to increase their export potential or their potential to undertake import substitution. It does this by identifying sectors, subsectors or value chains where investment by the private sector would likely lead to export growth or import substitution. Through an Open Calls programme, NIRDA invites firms in selected value chains to engage in partnerships that improve their capacity to compete in strategic national and international markets.

Former NIRDA Director General and new CEO of the Rwandan Development Bank, Kampeta Sayinzoga, says it is time for industries and enterprises across the country to adopt technology:

> *We want to help small firms so that they can grow to a higher level and generate more products. The Open Calls programme is a new way of providing existing firms with technology, equipment and capacity. Every year, we will be selecting different value chains based on the newly confirmed technology.*

Source: NIRDA (2017); Imanishimwe (2018)

2.6 Promote frugal innovation through public procurement

Create new market opportunities for frugal innovation to flourish by designing public procurement policies and processes that incentivise potential suppliers in the local economy to innovate and produce or deliver the goods and services sought by the government.

Public procurement accounts for nearly 20 per cent of gross domestic product (GDP) and more than a quarter of government spending in many countries. Seeking innovative solutions to serve the public good through a transparent and competitive tendering process enables public bodies, particularly at the regional and municipal levels, to deliver public services more efficiently, achieve cost savings and make their operations more environment friendly. At the same time, incentivising innovation through procurement policies creates opportunities for locally based small and medium-sized enterprises, often a hub of frugal innovation, to compete with larger or more sophisticated suppliers on the strength of their local expertise and lower cost of doing business. Government procurement policies and practices can be used to lower the barriers to market entry for frugal innovators. This may involve:

- preferential pricing, tendering and quotas for low-cost innovative solutions;
- improving access to finance, liquidity and working capital for frugal innovators; and/or
- advance purchase commitments.

Box 2.10 Build in Canada Innovation Programme (BCIP)

BCIP is a competitive first-purchase programme that matches technology developers to government and broader public sector departments. These partnerships provide two main benefits to businesses – the ability to:

- collect revenue on a pre-market technology; and
- work with a testing partner to receive feedback.

There is a continuous, open call for innovations through BCIP. Innovators currently in possession of a product with a relatively new technology may apply to the programme and request that they be matched with a testing organisation or government department.

Once approved into the programme, the technology developer may be awarded a contract by the government to develop their innovations. Collaborators will then begin their testing and validation activities until the project is complete.

Source: Innovative Solutions Canada (https://ic.gc.ca/eic/site/101.nsf/eng/home)

Box 2.11 How strategic procurement management is stimulating local innovation in Nigeria

Babs Omotowa, Nigeria LNG Chief Executive Officer, describes how high-value procurement contracts can be designed to support skills development and stimulate innovation within the local economy:

> *We recently signed a US$1.4 billion contract with Samsung and Hyundai in South Korea to build six new LNG ships. This followed a transparent and fiercely competitive tender, which ensured we got value for money. Having so ensured shareholder value, normally that is where the story would have ended. However, not for us, as we had involved the procurement team right from conceptualisation. This enabled us to look at stakeholder issues and to integrate into the purchase some solutions to address a number of socioeconomic challenges in Nigeria. These included skills acquisition, employment, capacity development, etc.*
>
> *We included in the contract terms that 600 Nigerians will be trained in shipbuilding – 200 in.South Korea over the two-year period of the ship construction, and 400 in.established institutions in Nigeria. For those Nigerians now in South Korea, the experience and skills they will gain will enable us to transfer shipbuilding knowledge that was hitherto not available in Nigeria. But then we did not stop at that. We looked at materials to be used for the construction of the ships and identified those that could be made in Nigeria, including cables, paints, furniture, anodes, etc. We then included in the contract that these must be bought in Nigeria by the Korean companies, once they met the required standards. We then worked with the local manufacturers to improve their capacity and also got international agencies to verify that their products met the global standards. Today, for the first time in Nigeria, local companies such as Kabelmetal – a beneficiary – have exported over US$1 million worth of cables to South Korea, and other categories are following.*

Source: CIPS Knowledge (2015)

2.7 Accelerate technology diffusion and prioritise digital connectivity as a 'public good'

Digital technology is a great enabler of innovation and its diffusion or spread can spur entrepreneurship, creativity, efficiency and job creation.

Major technological breakthroughs are usually the result of high levels of financial, technological and human resources coming together in a supportive enabling environment. However, by increasing digital connectivity for their people and improving access to relatively low-cost digital tools and technology, such as the internet and mobile phones, governments in developing countries can unleash a wave of frugal innovation powered by native ingenuity, local knowledge and an intimate understanding of what works best at the grassroots level, derived from lived experience.

'More households in developing countries own a mobile phone than have access to electricity or clean water, and nearly 70 per cent of the bottom fifth of the population in developing countries own a mobile phone,' according to the World Bank's *World Development Report 2016*. The report also states that, 'The number of internet users has more than tripled in a decade – from 1 billion in 2005 to an estimated 3.2 billion at the end of 2015. This means that businesses, people, and governments are more connected than ever before'.

However, while digital connectivity has been spreading, digital dividends have not – as more than 50 per cent of the world's population is still offline and therefore unable to participate in or benefit from the digital economy. According to the World Bank, 'making the internet universally accessible and affordable should be a priority' for governments everywhere, because for every person connected to high-speed broadband currently, five are not.

Box 2.12 Reaping the digital dividend

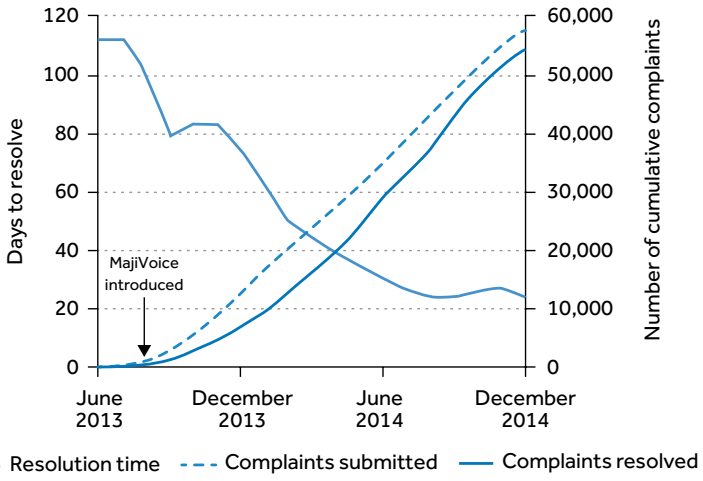
What are digital dividends?

Digital technologies help businesses become more productive; people find jobs and greater opportunities; and governments deliver better public services to all.

How do digital technologies promote development and generate digital dividends?

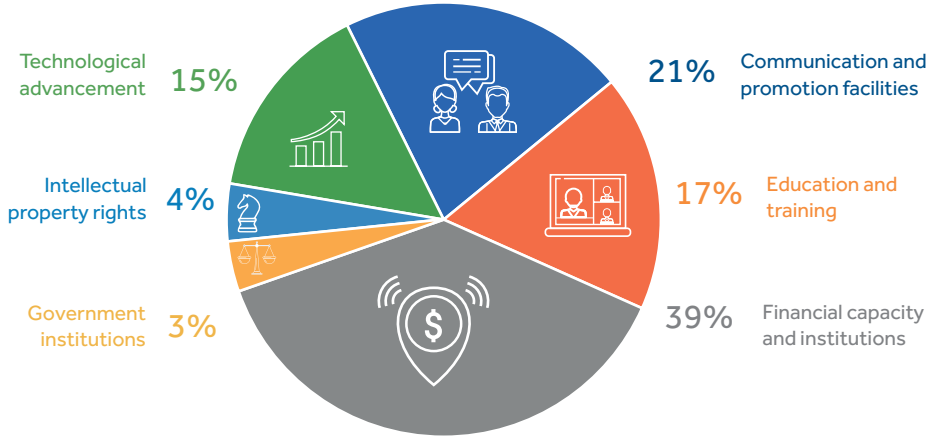
By reducing information costs, digital technologies greatly lower the cost of economic and social transactions for firms, individuals and the public sector. Figure 2.3 illustrates how the Nairobi water utility improved complaints resolution after the introduction of MajiVoice digital technology. Digital technologies promote innovation when transaction costs fall to essentially zero. They boost efficiency, as existing activities and services become cheaper, quicker or more convenient. They increase inclusion, as people get access to services that previously were out of reach.

Figure 2.3 Time taken by the Nairobi water utility to resolve complaints, and the number of cumulative complaints it received, June 2013–December 2014



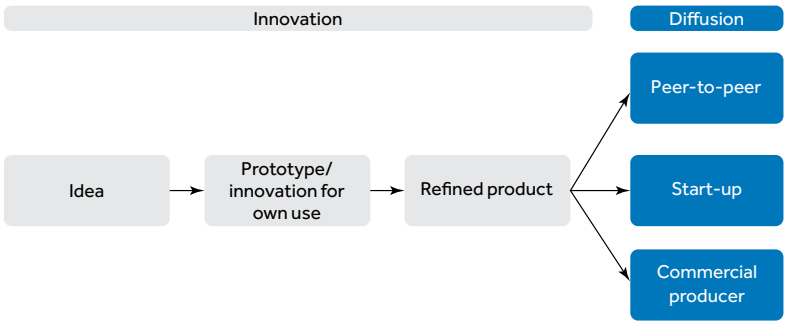
Source: World Bank (2016)

Figure 2.4 Barriers to grassroots innovation



Source: United Nations Development Programme (Accelerator Labs)

Figure 2.5 Grassroot innovator journey outline



Source: Behavioural Insights (2021)

Box 2.13 Lessons from COVID-19 innovation in low-resource settings

The COVID-19 pandemic underlined the importance of grassroot innovation in finding solutions to big challenges. Countries that addressed the barriers to grassroot innovation shown in Figure 2.4 saw thousands take the grassroot innovator journey illustrated in Figure 2.5 to develop low-cost solutions that addressed the needs of poor, marginalised or disadvantaged groups in low-and middle-income countries in mitigating and adapting to the risks associated with this highly infectious disease. Based on a study of their diverse approaches, scope and experience, a few lessons emerge on how low-cost innovation can help in tackling existential threats such as a pandemic. For example:

1. design innovation in a socially relevant and culturally sensitive way;
2. work with existing or easily available tools, technologies and resources;
3. invite those closest to the problem to join the quest for problem solving;
4. experiment with new permutations, substitutions and combinations of available resources;
5. identify and tap into existing but under-utilised resources;
6. engage constantly with 'endusers' in developing the innovation to make the final product or outcome 'user-led'; and
7. use data insights to make innovative solutions evidence-based.

Source: Ramalingam and Kumpf (2021); Von Krogh et al. (2020)

Box 2.14 Disasters and Emergencies Preparedness Programme innovation labs

The Disasters and Emergencies Preparedness Programme (DEPP) innovation window (https://startnetwork.org/depp-innovation-labs), funded by the UK Government, is a programme aiming to foster innovations that address key problems faced by communities living in disaster-affected areas. The programme, jointly managed by Start Network (https://startnetwork.org/) and CDAC Network (http://www.cdacnetwork.org/), has established innovation lab spaces for communities that are vulnerable to disaster in a few countries, including Bangladesh and Kenya. National and international organisations from diverse sectors oversee the running of the labs in partnership. The lab teams work directly with innovators and disaster-affected communities to identify and support the development and scaling of promising innovations, to strengthen disaster preparedness and build resiliency.

Labs have created space for collaboration, ideation, community involvement and new forms of interaction with external partners that may not have been possible in more traditional programmes. Many of the innovators are from the community and have limited experience and knowledge of developing and scaling innovations. Lab teams have developed unique and comprehensive packages

of support to help build capacity and guide participants through a curriculum. This programme has resulted in the creation of around 100 projects, businesses and initiatives owned and led primarily by people living in high-risk disaster areas.

Source: Start Network (undated)

2.8 Identify what works at the grassroots level and help replicate

Constantly monitor for low-cost innovations that deliver value for money and investigate how these can be replicated in other similar contexts.

Support should be provided to the piloting of low-risk innovations, particularly in the 'last mile' stretch, where the mainstream economy or government services struggle to serve the interests of the most vulnerable and marginalised sections of society.

2.9 Support innovations and investment in the informal economy

The informal economy is particularly well suited to frugal innovation, especially in developing countries where the formal or organised sector of the economy tends to be relatively small and is often ill-suited to meeting the needs and expectations of the most vulnerable or marginalised sections of society.

Policy-makers can support innovation in the informal sector in ways that both create a path to formalisation and growth, while also increasing social protection and support for informal business owners and workers who have stepped up to fill a gap at the local level resulting from market failures or inadequacies in state capacity.

According to the International Labour Organization (2018), the informal economy comprises more than half of the workforce worldwide, many of whom are self-employed or are part of microenterprises. This equates to employment that is unsafe, precarious, unprotected, poorly paid and underrepresented at a massive scale. Despite its extra-legal and marginalised status, the informal economy is a rich and diverse community engaged in innovation. As a result, there are some positive aspects of the informal economy that should be retained. There are two broad policy responses to informality that policy-makers should consider:

1. Improving the enabling environment in which informal enterprises operate, in order to encourage them to raise standards, become more competitive and play a more responsible and respected role in the development of the markets and communities they serve.
2. Encouraging informal enterprises to formalise through policy incentives, so that unregistered and unlicensed firms become registered and licensed and can reap the benefits of economies of scale and access a greater and more diverse range of resources, financial, technological and human. This is often difficult to do beyond a certain point in the informal sector, without exposure to high levels of legal, regulatory and market risk.

Box 2.15 How big is the informal economy?

'The Informal Economy in Developing Nations: Hidden Engine of Innovation', a World Intellectual Property Organization (WIPO) publication, includes one of the most complete and up-to-date analyses of the informal economy in developing countries. It states that:

1. more than half of all non-agricultural employment in most middle- and low-income economies is informal, reaching over 80 per cent in Central Africa;
2. the proportion of informal employment has risen in many regions over recent decades; and
3. the informal economy accounts for nearly a third of GDP in Latin America, more than half in India and well over 60 per cent of the total GDP of sub-Saharan Africa.

Source: Boyd (2017)

2.10 Support social innovation and 'circular economy' initiatives

Neither governments nor the private sector have the answers to all the challenges a country, society or community faces.

Often the smartest and most cost-effective solutions can come from the people most affected by a risk or problem, particularly in an environment where the state may lack the capacity and resources to invest in the search for a solution. Like the informal economy, civil society and non-governmental organisations rooted in the communities they serve are often a rich repository of knowledge and enterprise. A cross-sectoral approach to problem solving, in which civil society participates as a partner with the public and private sectors, is often called 'social innovation'. Proven low-cost innovations, such as the success of microfinance institutions, consumer co-operatives, Fairtrade movements, mass sanitation programmes and community courts in many developing countries, is a testament to how strengthening a society's capacity to solve its own problems with the resources that are available and easily accessible can help overcome some challenges that governments or businesses may not be able to with more top-down or corporate approaches.

Box 2.16 How social innovation happens

Social innovation can be defined as 'innovative activities and services that are motivated by the goal of meeting a social need and that are predominantly developed and diffused through organisations whose primary purposes are social'.

Stages of social innovation:

1. **Generating ideas by understanding needs and identifying potential solutions:** The starting point for innovation is an awareness of a need that is not being met and some idea of how it could be met. Sometimes needs are glaringly obvious, like hunger, homelessness or disease. But sometimes needs are less obvious, or not recognised – like the need for protection from domestic violence or racism – and it takes campaigners and movements to name and define these.
2. **Developing, prototyping and piloting ideas:** The second phase of any innovation process involves taking a promising idea and testing it out in practice. Few plans survive their first encounter with reality wholly intact. Yet it is through action that they evolve and improve. Social innovations may be helped by formal market research or desk analysis, but progress is often achieved more quickly by turning the idea into a prototype or pilot and then galvanising enthusiasm.
3. **Assessing then scaling up and diffusing the good ideas:** The third stage of the social innovation process comes when an idea is proving itself in practice and can then be grown, potentially through organic growth, replication, adaptation or franchising. Usually, innovations spread in an 'S curve', with an early phase of slow growth among a small group of committed supporters, then a phase of rapid take-off, and then a slowing down as saturation and maturity are achieved.
4. **Learning and evolving:** Learning and adaptation turns the ideas into forms that may be very different from the expectations of the pioneers. Experience may show unintended consequences or unexpected applications. In professions, in competitive markets and in the public sector, there is an increasingly sophisticated understanding of how learning takes place.

Source: Mulgan et al. (2007)

Governments can trigger a fresh wave of low-cost innovation in their countries, by implementing policy measures that address market and regulatory failures, as well as support and strengthen the enabling conditions and remove the barriers, mostly non-financial in nature, for the building blocks of an emerging economic model known as the 'circular economy'. A growing body of research makes clear that transitioning to a circular economy can bring about the lasting benefits of a more innovative, resilient, sustainable and environment-friendly economy.

Box 2.17 The 'circular economy' explained

What is the circular economy?

The circular economy is a model of production and consumption (EPRS 2016), which involves sharing, leasing, reusing, repairing, refurbishing and recycling existing materials and products as long as possible. In this way, the **life cycle of products is extended**.

In practice, it implies **reducing waste** to a minimum. When a product reaches the end of its life, its materials are kept within the economy wherever possible. These can be productively used again and again, thereby **creating further value**.

This is a departure from the traditional, **linear** economic model, which is based on a 'take-make-consume-throw away' pattern. This model relies on large quantities of cheap, easily accessible materials and energy. Also part of this model, is planned obsolescence (European Parliament 2020), when a product has been designed to have a limited lifespan to encourage consumers to buy it again.

Why do we need to switch to a circular economy?

The world's population is growing and with it the demand for raw materials. However, the supply of crucial raw materials is limited. Finite supplies also means some countries are dependent on other countries for their raw materials. In addition, extracting and using raw materials has a major impact on the environment. It also increases energy consumption and CO2 emissions. However, a smarter use of raw materials can lower CO2 emissions (European Parliament 2021a).

What are the benefits?

Measures such as waste prevention, ecodesign (European Parliament 2018) and re-use could save companies money while also reducing total annual greenhouse gas emissions (European Parliament 2019). Currently, the production of materials we use everyday account for 45 per cent of the CO2 emissions.

Moving towards a more circular economy could deliver benefits, such as reducing pressure on the environment, improving the security of the supply of raw materials, increasing competitiveness, stimulating innovation, boosting economic growth and creating jobs. Consumers will also be provided with more durable and innovative products that will increase the quality of life and save them money in the long term.

Source: European Parliament (2021b)

2.11 Ensure intellectual property regimes safeguard indigenous knowledge systems

In economies that are increasingly based on the fruits of investment in science, technology and research, it is important that intellectual property rights systems are coupled with measures to protect and promote innovations that emerge from the informal or grassroots sectors.

Intellectual property rights can include the 'traditional knowledge' of indigenous people (World Intellectual Property Organization 2005). Improved rights can ensure this knowledge and genetic resources are not misappropriated or misused.[1]

1 One example illustrating the use of intellectual property rights relates to traditional medicines in the People's Republic of China, in respect of which several thousand patents have been granted in past years (Abbott 2014).

Box 2.18 South Africa's National Indigenous Knowledge Systems Policy

There is a growing realisation, particularly in developing countries, that a nation's ability to use and build on the knowledge systems that exist among its people is as vital to socioeconomic development as physical and financial resources. Learning from what local communities already know also creates an understanding of local conditions and provides important context for any activities designed to support them.

It was for these reasons that, in 2004, the South African government adopted the National Indigenous Knowledge Systems Policy, which mandated the advancement of indigenous knowledge systems in universities as a key component of human capital and the transformation of higher education to meet developmental challenges. Integrating indigenous knowledge in this way not only helps to protect and promote this valuable knowledge, but it also acknowledges the plurality of knowledge systems and their contribution to the world.

'Indigenous knowledge' refers to the longstanding traditions and practices of indigenous communities and cultures. It encompasses the skills, innovations, wisdom, teachings, beliefs, languages and insights of the people, produced and accumulated over centuries and used to maintain or improve their ways of living. The depth of these knowledge systems, rooted in the long inhabitation of local ecosystems, offers lessons that can benefit everyone in the search for a more satisfying and sustainable way to live, share and prosper on this planet. In many communities, especially in rural areas, indigenous knowledge systems are at the heart of survival and inform decision-making about every aspect of day-to-day life – from nutrition and reproductive health to environmental management and conflict resolution. This knowledge is community based, accessible, affordable and culturally sensitive – and hence sustainable – and it may hold solutions to many of the most pressing global challenges. Yet it remains an underutilised and even marginalised resource.

Source: Kaya and Chinsamy (2021)

Box 2.19 How intellectual property laws promote innovation in a low-resource environment

While traditionally, innovation-driven growth has been the domain of high-income countries, developing countries are increasingly recognising innovation as a key driver of economic growth. The 2015 Global Innovation Index identifies several developing countries, including Malawi, Mozambique, Rwanda, Kenya and Uganda, that outperform others in their income group as a result of rising levels of innovation input and output results. These are due to improvements made to institutional frameworks, a skilled labour force, better innovation infrastructures, deeper integration with global markets and a sophisticated business community.

The principal policy objectives of intellectual property rights are to provide an incentive for innovation through the creation of a limited period of commercial exclusivity, during which research and development costs can be recovered, as well as to create a legal infrastructure to encourage technology transfer. Appropriately designed intellectual property rights that, for example, allow for licencing or franchising of patents and copyrights, can play a vital role in encouraging private investments in innovation, promoting access to new knowledge-intensive goods and encouraging downstream innovation, particularly in the low-resource innovation ecosystem that characterises most developing countries. In some Commonwealth countries, however, there is still significant scope for strengthening national intellectual property laws and policies. The World Intellectual Property Organization's (WIPO) Global Innovation Index of 2015 notes that fragmentations in intellectual property policies are often observed in developing countries, creating ineffective regulatory environments that do not provide the proper incentives for innovation and development.

Source: WIPO (2015)

Box 2.20 Barbados Innovation Support Programme

The Barbados Innovation Support Programme provides strictly confidential assistance for creative Barbadians involved in the development, intellectual property protection and commercialisation of any new product ideas that they may entertain from time to time. The programme aims to ensure that no good ideas are lost due to a lack of financial, technical or other means of pursuing them, linking all the expertise and skills necessary to assist persons in developing new products or services with good commercial potential.

Source: Barbados Innovation Support Programme (see: http://www.bidc.org/innovation-support)

2.12 Encourage and facilitate innovation networks

Support the development of cross-sectoral networks in which individuals and organisations can share ideas, experiences and resources that foster innovation across all sectors.

Networks have been found to induce innovation linkages and public–private partnerships. In developing countries, pockets of innovation and entrepreneurship have developed around industrial or technological clusters and networks (Cornell University et al. 2017). Furthermore, open networks have proved to be powerful mechanisms for supporting grassroots frugal innovations (Gupta 2013).

Box 2.21 Honey Bee Network

The Honey Bee Network is made up of like-minded individuals, innovators, farmers, scholars, academicians, policy-makers, entrepreneurs and non-governmental organisations. Present in more than 75 countries, the Honey Bee Network believes that for a knowledge system to become sustainable, it must be both just and fair. While collecting knowledge from the knowledge holder, the network has made it a norm to acknowledge the provider. This helps to protect intellectual property rights and encourages members to share. Any proceeds from the value addition of local traditional knowledge and innovation must go back to the knowledge holders.

The Honey Bee Network is open to people from all the walks of life. Anyone with a strong commitment to the improvement of local knowledge networks, innovations, grassroots creativity, conservation of biodiversity, natural resource management, augmentation of innovation and intellectual property rights can be a member. In 2011, the Honey Bee Network and the National Innovation Fund in India created the Grassroots Technological Innovation Acquisition Fund. Patent rights to dozens of technologies were acquired from innovators by paying a notional amount to create a public pool of innovations for licensing at no or low cost to small entrepreneurs within and outside India. Providing this kind of financial incentive helps attract innovators to the programme and reduce barriers to diffusion.

Source: Gupta (2013); Society for Research and Initiatives for Sustainable Technologies and Institutions (https://www.sristi.org/about-us/)

Box 2.22 Commonwealth Partnerships for Antimicrobial Stewardship (CWPAMS)

The Commonwealth Pharmacists Association (CPA) is supporting partnerships between the health services of the UK, Ghana, Tanzania, Uganda and Zambia that will catalyse skill sharing for frugal innovation in antimicrobial stewardship.

What is the significance of CWPAMS and what are its key objectives?

Antimicrobial resistance (AMR) presents the world's greatest threat to health security; without urgent action, it is predicted to kill more than 10 million per year by 2050. This will disproportionately impact low- and middle-income countries, where health systems will be stretched further by this increasing burden. Enhancing capacity to monitor and detect AMR pathogens, and developing new antimicrobials, are highly important to tackle this issue. However, a key, often overlooked, driver of AMR is inappropriate use of existing antimicrobials in healthcare institutions – [this is] particularly prevalent in many low- and middle-income countries (LMICs).

Despite structures to steward appropriate antimicrobial use being highly advanced in many high-income healthcare settings, antimicrobial stewardship (AMS) measures are often limited, or lacking completely, in many LMICs. This highlights a gap with large potential to prevent further AMR developing by harnessing existing structures and skills, without requiring development of new technology. CWPAMS aims to share skills and expertise between multidisciplinary healthcare teams in the UK and four LMIC countries, Ghana, Tanzania, Uganda and Zambia, to support AMS initiatives. Through sharing insights and adapting AMS approaches to suit low-resource settings, this will also highlight frugal innovation and learnings for healthcare workers to apply in high-income settings.

How will this project be implemented?

Commonwealth Partnerships for Antimicrobial Stewardship is being implemented through a health partnership approach to facilitate bidirectional knowledge transfer. This model has been shown to be effective at improving skills and capacity in the high-income partner healthcare workforce, as well as leading to long-term improvements and strengthening of health systems in a LMICs. The CWPAMS approach is unique, as it is the first partnership programme utilising pharmacy expertise to focus on enhancing AMS.

What is the key to achieving success with a project like this in a low-resource environment?

Establishing antimicrobial stewardship requires changing behaviours. This cannot be achieved by improving staff knowledge and skills alone. It also requires creating opportunity, workplace culture and motivations to support such behaviours. This will depend on context-specific barriers and drivers. However, the close-knit working of partnerships allows them to unpack this, while being part of a network of partnerships – sharing innovations and leading to sustainable systems change.

What can governments, particularly of developing nations, do without having to spend a lot of money that will encourage and support frugal innovation of this kind?

Health partnerships focusing on AMS take a very lean approach to tackle a widespread global issue, AMR, by targeting efforts to ensure existing antimicrobials are used appropriately. This does not require investment in new technology or infrastructure. The tools exist already; they are the expertise hidden within your health workforce. This approach appreciates the value of healthcare workers and brings together expertise to be shared bidirectionally, to maximise its impact in both high- and low-resource settings. It is a catalyst for frugal innovation.

2.13 Support frugal innovation intermediaries

Help intermediary organisations to teach and encourage frugal innovation practices, while providing the information, advice and partnership-brokering services that innovators and entrepreneurs often require.

An 'innovation intermediary' is an organisation that is formed to strengthen the relationship between innovators and support agencies, typically government or finance providers. Intermediary organisations work closely with innovators and entrepreneurs. They understand the needs, interests and dynamics of innovators and entrepreneurs; they speak their language and provide services that are tailored to their clients' requirements.

Box 2.23 Why are innovation intermediaries important?

Innovation intermediaries, broadly defined as 'organisations that provide a supportive role for collaboration between two or more parties during various stages of the innovation process' (Howells 2006), are therefore seen to be central to creating and maintaining a successful innovation ecosystem. The role of innovation intermediaries extends from linking parties for collaboration, to setting up and mediating relationships and bridging a wide array of knowledge, competency and capability gaps. Among the varied types of engagement by innovation intermediaries, their interaction in collaborative projects represents one of their more complex, enriched and involved roles, as they (in addition to developing and supporting the partnership) engage in co-creative innovative activity with collaborators, in a process of wider co-creation and co-development (Boon et al. 2011).

Source: De Silva et al. (2018)

Box 2.24 Botswana Innovation Hub

The Botswana Innovation Hub Science and Technology Park's vision is to 'serve the people of Botswana through a creative and networked innovation system which supports the goals of strengthening knowledge, productivity, competitiveness, and economic diversification, leading to more resilient wealth creation, while being mindful to protect the environment'. To do this, it offers facilities and services that attract local and international organisations and promotes scientific, technological and indigenous knowledge-based innovation relevant to realising Botswana's national development goals.

Botswana Innovation Hub's impact includes supporting new innovations, such as 'Kebalepile technologies', a mobile application that allows users such as freight companies to make payments before entering Botswana. This enables the government to collect tax revenue in a more efficient manner and enhances security, by vetting and clearing vehicles in collaboration with the countries in the Southern African Development Community.

Source: Botswana Innovation Hub (https://www.bih.co.bw/)

2.14 Create a challenge prize or frugal innovation fund

Introduce a challenge prize to promote and reward frugal innovation.

Challenge prizes offer a reward to whoever can first or most effectively meet a defined challenge. They act as an incentive for meeting a specific challenge, rather than being a reward for past achievements. Challenge prizes sometimes aim to solve big problems and, if they are successful, produce major breakthroughs in human knowledge and practice. Prizes can also play a role in accelerating progress towards ambitious goals. They do this by shining a light on an issue or opportunity and providing an incentive for lots of different innovators and investors to make meeting the challenge a priority.

Box 2.25 Malawi Innovation Challenge Fund

The Malawi Innovation Challenge Fund improves the competitiveness of value chains in the agricultural and manufacturing sectors. The fund has adopted a social impact investment model: it provides grants as prizes for projects that have great potential to accelerate the achievement of the SDGs. In the space of two years, the fund's support of agribusiness ventures resulted in increased income for an estimated 11,800 households and created 290 new jobs. The investments in manufacturing projects increased the income of 21,500 households and created an estimated 900 jobs.

Source: United Nations Development Programme (2016)

Box 2.26 Longitude Explorer Prize – UK

The Longitude Explorer Prize is designed to inspire young people to find innovative ways of tackling pressing societal issues, and to present innovation and entrepreneurship as accessible endeavours for all young people. Following a successful first pilot in 2014, in 2017 the Longitude Explorer Prize challenged young people to develop innovative, practical solutions that use the 'internet of things' to improve health and well-being in the UK. Suggested areas of focus were childhood obesity, physical activity, mental health and pollution – but students were given free rein to explore other health issues as they wished. Ideas were assessed according to the following criteria:

- **Innovation:** new ideas or adaptations and/or new interpretations of a solution
- **Theme:** articulation of problem and how the idea is addressing the issue
- **Use of data:** what data was intended to/was used, why and how, how the data will be collected
- **Turning the idea into reality:** clear planning process, research and experimentation to progress the solution from idea to reality
- **Application to the real world:** how will it be made; costs for production/ prototyping; who would use it; market potential; usability, design
- **Teamwork:** assigning roles; recognition and progression of skills
- **Communication:** marketing and promotion

Source: Nesta (2018)

Checklist

1. Does government support the strengthening of a frugal innovation ecosystem? ☐
2. Are the comparative advantage and capacities of the country and its regions identified and used as a strategic base for supporting innovation in key sectors and among key actors? ☐
3. Does government have a reform programme for addressing the major constraints to innovation taking off in a low-resource environment? ☐
4. How do the regulatory authorities approach innovation? Do they recognise the role of frugal innovation and have in place a flexible mechanism for assessing the regulatory effects on new business products, services and models? ☐
5. Is government identifying impactful low-cost innovations that can be replicated and scaled-up? ☐
6. Does government support for innovation embrace inclusiveness and accommodate the special needs and opportunities facing vulnerable and marginalised groups? ☐
7. Does government incentivise low-cost innovation through public procurement? ☐
8. How does government work with informal business operators? Is it antagonistic towards informal firms or does it work collaboratively with informal business associations? ☐
9. Are there dynamic, open networks of individuals and organisations in which ideas, experiences and resources are shared? Is government supporting these? Do they involve a wide cross-section of society? ☐
10. Are there intermediary organisations located between government and innovators that can encourage and facilitate frugal innovation practices and partnerships? ☐
11. Does government promote the use and protection of traditional knowledge systems? ☐
12. Are frugal innovation programmes and services directed at sectors of strategic economic importance? ☐
13. Do frugal innovation programmes and services focus on vulnerable and marginalised groups? ☐
14. Are there effective policies, regulations and institutions that can accelerate technology diffusion and adoption by different strata of society? ☐
15. Has government used awards or challenge funds to stimulate the national or regional innovation ecosystem? ☐

3. How Governments Can Become Frugal Innovators

This section describes the ways in which policy-makers and public sector managers can adopt and implement the principles and techniques of frugal innovation in order to make governments and public service delivery more innovative, cost-effective and citizen centric.

Around the world, governments are 'watching their pennies' and adopting frugal innovation methods to reduce costs and better serve citizens and customers, while providing value for money to the tax payer. Frugal innovation helps public services to improve performance and increase public value, while responding to the expectations of citizens, adapting to the needs of users, increasing service efficiency and minimising costs. It is crucial that all levels of government seek out and foster innovation, while striving for continual development and improvement (Mulgan and Albury 2003).

Organisational structures influence the ways people work. Where some structures encourage diverse, multidisciplinary teams and collaboration, others are more hierarchical, working in specialised, risk-averse silos. While each government ministry, department and agency is different, and a 'one-size-fits-all' approach to organisational structure is not encouraged, there are ways in which governments can organise to encourage innovation practices.

3.1 Establish clear vision, purpose and priorities

Formulate and communicate a clear set of values, objectives and priorities, so public servants and citizens understand why change is necessary and how it will spur transformation and development.

This establishes a direction and rationale for change, even when the outcomes of change are not entirely clear from the outset. Public innovation requires 'cadence and co-ordination in delivery' (McKinsey & Company 2018). While change requires a fast yet steady pace, it also requires the flexibility to solve problems as they arise. To fully reap the benefits of frugal innovation, governments should also emphasise the value of pursuing more and better partnerships, as Kenya has done in its Vision 2030 document (Government of Kenya 2015).

Box 3.1 What is public sector innovation?

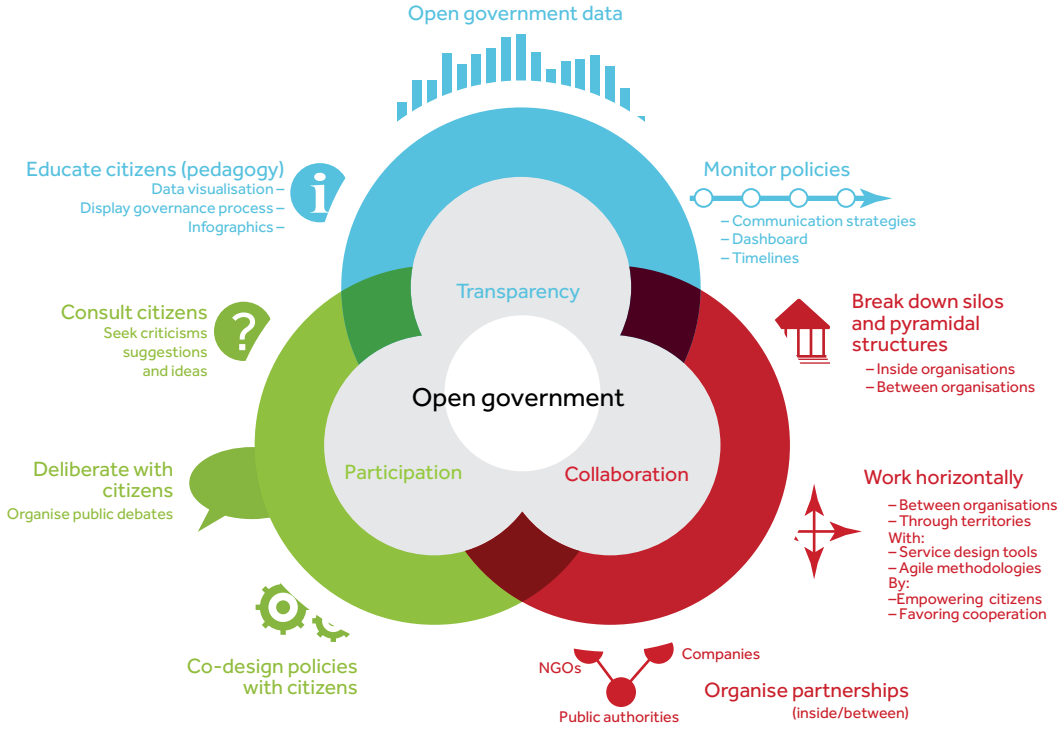
Broadly, public sector innovation refers to new or significant improvements in government administration and/or services. Public sector innovation involves creating, developing and implementing practical ideas that achieve a public benefit. Governments are constantly innovating to find new ways of organising social security or healthcare and developing online portals, smart cards, public health programmes and imaginative incentives to cut carbon emissions. Figure 3.1 illustrates an integrated open government innovation model built on transparency, participation, and collaboration.

Building on these elements and evidence of innovations in the public sector, the OECD Observatory of Public Sector Innovation has identified the following characteristics of public sector innovation:

1. **Novelty:** innovations introduce new approaches, relative to the context where they are introduced.
2. **Implementation:** innovations must be implemented; they are not just an idea.
3. **Impact:** innovations aim to result in better public results including efficiency, effectiveness, and user or employee satisfaction.

Sources: Daglio et al. (2015); Mulgan (2014)

Figure 3.1 Public innovation model



Source: OECD (undated)

Box 3.2 Excerpt from 'Smart Nation Singapore: The Way Forward'

What is 'Smart Nation'?

A Smart Nation is a Singapore where people will be more empowered to live meaningful and fulfilled lives, enabled seamlessly by technology, offering exciting opportunities for all. It is where businesses can be more productive and seize new opportunities in the digital economy. It is a nation which collaborates with our international partners to deliver digital solutions and benefit people and businesses across boundaries. As PM Lee described it at the launch of Smart Nation in November 2014, it is a nation 'where we can create possibilities for ourselves beyond what we imagined possible'.

Why 'Smart Nation'?

Smart Nation is integral to Singapore's next phase of nation building. Technology disruption is a global force we must confront and harness to our advantage. Developments in digital technology present opportunities for Singapore to enhance our strengths, overcome our national challenges and physical limits, and build new sources of comparative advantage. Digitalisation will be pervasive, and change life as we know it. To continue to prosper and stay relevant, Singapore must embrace digitalisation and the benefits it brings. This new era of digital transformation will power Singapore to SG100 and beyond.

Source: Government of Singapore (2021)

3.2 Ensure commitment to innovation from high-level leadership

Governments need to attract and empower transformational leaders who are willing to be risk takers and take personal accountability for success or failure.

These leaders lead by example and challenge long-established conventions. They inspire transformation and spend substantial time communicating face to face with the people

affected, listening as much as they talk (McKinsey & Company 2018). Without clear support from the top, most promising innovations are stifled. And without clear drive from the most senior levels of organisations, it will rarely be possible to create space for new ideas to develop, or for ideas to be pushed through to the testing or implementation stages. Leadership is vital to counteract the powerful tendencies towards inertia.

3.3 Apply a systems approach to public innovation

Public servants should view and understand the entire operation of government as an interconnected system in which every action, policy or programme has intended and unintended consequences, cutting across society and the economy.

Frugal innovation is a process rather than an outcome to be achieved. Process and service innovation involve understanding public sector service provision and the process by which it is made and delivered. It adopts a 'systems approach', which incorporates concepts such as 'human-centred design', 'circular economy principles' and 'behavioural insights' in policy-making and public management.[1] A good example of systems thinking informing frugal innovation in the public sphere was the decision taken by some countries to hold their parliamentary sessions in a virtual or digital format during the COVID-19 pandemic. This fairly simple and frugal innovation resulted in a number of positive outcomes: despite the challenges and restrictions created by the pandemic, 'virtual parliaments' allowed the business of democracy to continue without too much disruption; they resulted in cost savings for the tax payer, as parliamentarians did not have to travel to their parliaments to attend the parliamentary sessions; and it made parliamentary proceedings more participatory and inclusive, as citizens and their parliamentary representatives were more directly engaged through digital mediums.

Box 3.3 Public sector innovation capacity building

As economic, social and environmental challenges are becoming increasingly complex, governments are struggling to effectively solve the problems they are facing with their traditional instruments and toolkits. Government innovation, then, is about finding better approaches to deal with public problems. This means improving the capability to:

- **Understand:** Capturing everyday experiences of citizens, unpacking the causes and consequences of public problems, and analysing their dimensions and implications.
- **Imagine:** Expanding the scope and options for creatively identifying or generating new ideas (through new forms of user involvement, foresight, collaboration, solution mapping, etc.)
- **Synthesise:** Prioritising ideas by drawing upon the right evidence, experiences and expertise and shaping the initiative, its enabling conditions and decision-making process.
- **Experiment:** Testing how the initiative will work in practice and enabling iterative learning and adjustment, while considering unexpected consequences and opportunities.
- **Operationalise:** Turning the initiative to a new, consistent practice, by creating an effective and appropriate dynamic between intervention, implementation and learning/feedback.

Source: Christiansen et al./ Nesta (2016)

1 Systems approaches are a set of processes, methods and practices that aim to affect systems change. Systems approaches focus on the impacts and outcomes of policies and their purpose, going beyond the linear logic of 'input-output-outcome' of traditional policy design. They emphasise the involvement of all affected actors inside and outside government, as well as the importance of leaving room for iterative processes to account for the uncertainty associated with wicked problems (OECD 2018, 46).

Box 3.4 Systemic approach to solving 'wicked problems'

'Wicked problems' are defined by high levels of interdependence, complexity and ambiguity. The problem, its definition and description, and potential solutions are all poorly understood and typically the focus of strong disagreement among experts from different fields or stakeholders with varying interests and perspectives. Steps toward solutions often produce unanticipated negative consequences, or externalities, which themselves then change the definition of the problem.

Wicked problems challenge leaders to engage multiple stakeholders at various levels with competing perspectives and to build management strategies to handle high uncertainty, ambiguity and dynamic developments. Contemporary governance requires visionary leaders and public executives who focus strategically on creating such value, rather than simply enacting routine procedures and processes bureaucratically.

Contemporary challenges often lie inherently across jurisdictional, organisational and geographic boundaries. Although many problems can be solved through linear, regularised processes within and across organisations, others will not respond to such approaches. National security challenges require expertise from a range of different stakeholders, who may prefer not to communicate with one another. Youth services involve a range of expertise found in employment, education, health and other ministries. Climate change and environmental issues fall across different regions, jurisdictions and levels of government.

Collaborative governance emphasises the importance of cross-boundary management in a networked, highly interdependent world. Wicked problems demand more than simply an ability to work across boundaries, but that skill forms an essential starting point.

Source: Fountain (undated)

Table 3.1 Policy priorities for better service delivery

Emerging countries: Laying the foundation for more effective institutions	Transitioning countries: Building capable and accountable institutions	Transforming countries: Deepening collaborative institutions
• Improve information services to citizens • Strengthen monitoring of and payment to providers • Establish population registers • Scale up nonstate provision of services • Increase electoral accountability	• Strengthen government delivery systems • Strengthen provider management • Get regular user feedback on service quality • Increase transparency in priority areas	• I mprove collaboration across and beyond government • Enhance participatory policy making

Source: World Bank (2016)

3.4 Decentralise decision-making to promote frugal innovation at the local administration and service delivery levels

Support city and local government authorities to become more innovative in the way they work, share data and stimulate local innovation.

Table 3.1 shows how countries can improve institutional service delivery. While there is no single pathway to success, there are certain things that high-performing city and local governments share (CITIE 2015):

1. **They make sure that very different areas of policy work in concert:** Good policy in one area can be undermined by

bad policy in another. As a result, they tend to have teams, individuals or strategies in place who champion innovation across departmental siloes.

2. **They are open by default:** They recognise that the kind of knowledge and ideas needed to drive change are unlikely to reside entirely within the city hall or the district administration's office. As a result, they habitually find ways to work with the local community, civic groups and citizens in solving urban problems.

3. Their ethos and style of working often have more in common with innovative start-up companies than with the bureaucratic and lumbering culture often associated with 'big government': they are happy to try things out and not afraid to fail. And they are increasingly delivering agile projects, prototyping, deploying user-led design and developing digital services. As a result, they can move quickly as the world changes around them.

National government can create healthy competition and co-operation among subnational governments to support frugal innovation. Some of the best examples of new, creative approaches to digital and data innovation at a local government level have emerged out of small teams that do not have large budgets, but have been given the time and space to discover and experiment with iterative and incremental methods on small-scale projects (Nowlan 2016). Local authorities often have a better knowledge of local development issues and the capacity to solving a problem through locally available ingenuity. Empowering them through resources and policies could reduce bureaucratic approaches, especially in resource-constrained communities (Pansera and Sarkar 2016). At the grassroot level, many of these innovators operate under conditions of resource scarcity, with very limited or no support by formal institutions. Yet, they demonstrate everyday survival skills, which are essential for frugal innovation. Empowering local communities with decision-making responsibilities can foster inclusive development (Ibid.), while addressing rural–urban divides, environmental and social problems (Pansera and Sarkar 2016; Seyfang and Smith 2007).

Box 3.5 Policy coherence at the national and subnational levels can accelerate innovation for SDGs

The 2030 Agenda emphasises that 'government and public institutions will work closely on implementation with regional and local authorities'. It is estimated that 65 per cent of the 169 targets underlying the 17 SDGs will not be reached without proper engagement of, and co-ordination with, local and subnational governments.

Regional and local governments are essential for delivering a wide range of public services, as well as the economic, social and environmental transformations needed to achieve the SDGs. Subnational governments were responsible for 59.3 per cent of total public investment in 2015 throughout the OECD area and for almost 40 per cent worldwide.

In Germany and Mexico, the federal government supports the efforts of regional governments and municipalities to integrate the SDGs into their policies and actions and to develop their own sustainable development strategies. In Canada, the government has worked closely with provinces, territories and municipalities to develop the national strategy on the 2030 Agenda; it has also signed agreements with them in areas where they hold jurisdiction, such as green infrastructure and transportation. In India, both States and Union Territories play a pivotal role in designing, executing and monitoring development policies and interventions. As such, they are important drivers of the country's efforts to implement the SDGs.

Source: Fyson et al. (undated)

Box 3.6 How to make local governments an engine of innovation

On the Commonwealth Local Government Knowledge Hub website (https://www.clgf.org.uk/resource-centre/knowledge-hub/), further guidance and resources can be found on:

Local democracy

This section contains information relating to all aspects of local democracy and good governance at the local level.

Local government service delivery

Equitable and efficient service delivery is at the heart of local government's mandate. The resources in this section focus on the management and delivery of key strategic, corporate and technical services, ranging from those for which local government has direct responsibility, to shared service provision and services for which local government is a partner.

Local economic development

Local economic development is increasingly seen as a key function of local government and a means of ensuring that local and regional authorities can address the priority needs of local citizens in a sustainable way. There is no single model for local economic development; approaches reflect local needs and circumstances. Themes include local economic development guides, tourism, support to small, medium and micro enterprises, microfinance and credit, and public–private partnership.

Source: Commonwealth Local Government Forum (undated)

3.5 Recognise, support and reward public sector changemakers

Identify, support and incentivise changemakers who can champion frugal innovation in their own domains of work.

Identify the innovators within the organisation. These are public servants who strive to make a positive difference by pushing for change with ideas and innovations that can overcome the bureaucratic barriers and institutional constraints, such as a risk-averse culture within the public sector, to deliver results, yet can be pragmatic and practical enough to be tolerated and accepted by the system within which policy-makers and public administrators must operate. These 'frugal public innovators' bring in fresh ideas, methods, models and techniques to fill an unmet need and are skilled at building diverse, passionate and multifaceted teams that form the backbone of any successful innovation in the public sector. Changemakers in government are also adept at tapping their horizontal and vertical networks across government, testing their ideas with colleagues, who can provide constructive feedback, and building supportive coalitions of key stakeholders and high-level mentors that are critical to successfully 'deviating from the norm' in the public sector. To cultivate 'intrapreneurship', government leaders can adopt formal programmes that teach skills while giving intrapreneurs a 'playground'– a safe place to experiment and potentially fail (Deloitte 2013). Maintaining a diverse staff is essential, as is paying attention to the needs and expectations of users and frontline staff (Mulgan and Albury 2003).

Box 3.7 Motivation and rewards: a fine balance for innovation in the public sector

Motivation, defined as the desire or willingness to do something, is not a simple concept to describe. Nevertheless, it is considered key to a wide range of performance outcomes at the personal and organisational levels. Even if the employee has all the abilities required to perform, they will apply these abilities if they are valued by the organisation. Hence, organisations must offer the right incentives to motivate the best behaviour.

Motivation is linked closely to the concept of employee engagement, which is often defined in conjunction with motivation, commitment and job satisfaction, and is significantly correlated in multiple studies to improved organisational outcomes, including performance and innovation. For example, studies by Gallup on firms in the private sector found that engagement correlated with innovation: 59 per cent of engaged employees said that their job brought out their most creative ideas, compared with only 3 per cent of disengaged employees. Motivated employees are hence considered to be better at their job, to put in more effort to achieve outcomes, and to be willing to push for positive change in their workplaces by committing extra energy above and beyond the minimum required from their job descriptions.

Source: Daglio et al. (2015)

Box 3.8 Centre for Public Service Innovation, South Africa

The Centre for Public Service Innovation is a government agency of the Ministry for Public Service and Administration, established to identify, support and nurture innovation in the public service, with a view to improve service delivery. The centre seeks to celebrate the successes of individuals, teams and departments in the quest for a more effective, efficient and accountable government. It has three broad work streams:

- **Research and Development:** Investigates and recommends sustainable models and solutions for innovative service delivery. Collaboration with departments, civil society and research institutions helps to investigate and confirm service delivery challenges, potential policy failures or policy implementation failures, while ensuring the public service becomes proactive rather than remaining responsive by addressing only the existing challenges.
- **Solution Support and Incubation:** Tests, pilots, demonstrates and mainstreams innovative solutions for the public sector. Challenges and potential solutions are investigated in collaboration with stakeholders, to ensure that line departments and implementing institutions assume ownership of sector-specific innovations.
- **Enabling Environment:** Creates and sustains an enabling environment that entrenches a culture and practice of innovation in the public sector, through innovative platforms and products. This includes an annual awards programme, to unearth innovative approaches and solutions and promote internal recognition and acknowledgement of innovators, leading to the unlocking of resources for improved service delivery.

Source: Centre for Public Service Innovation (https://www.cpsi.co.za/)

3.6 Manage risk while supporting pilots and prototypes

Incubate and evaluate innovative ideas and approaches through prototypes, testing and trials in order to assess risk and feasibility.

The disruptive nature of innovation can be at odds with the fundamental role of government institutions in reducing uncertainty and ensuring stability (Bason 2010). The political context of public sector organisations, their highly visible activities and potentially high consequences of failure, can reinforce a culture of risk aversion. Innovation as a concept is not easily measured in the public service and not well tracked or rewarded at the individual level (Australian Government 2011). It is important to develop risk management approaches, such as prototyping, simulation and piloting, and incentive structures that enable and reward public sectors to innovate efficiently, while continuing to prioritise safety and the stewardship of public resources.

Box 3.9 Stimulating innovation through experimentation and gaming

Experimentation has become a popular way for government in many countries around the world to find new or innovative approaches to deliver better outcomes. Experimentation can be described as the unconventional way to tackle difficult and complex issues facing governments today, such as quality of education and health, crime reduction, housing, air quality, and many others. Experimentation is about systematically testing an assumption, identifying gaps and exploring potential solutions, without allocating too much time and resources.

The goal of this approach is to build an experimental mindset across the government through shared infrastructure, methodologies and models, not only to promote new and innovative ways to tackle challenges and come up with policies, but also to test them in real life more rapidly.

Experimentation can be applied to explore new ideas, framed as hypotheses and assumptions. Here are some examples of experimentation types: regulation experiments; policy experiments; technology experiments; back office experiments; department experiments; service experiments.

An increasing number of games and game-like experiences are also being used in more traditional sectors and settings, such as public consultation, research, policy and decision-making. There are many reasons why games are an effective tool for innovation. Games are useful tools to start conversations and they are particularly effective at illustrating the trade-offs associated with making choices. They also encourage players to understand the perspectives of other players, they can present data, ideas and trends in new and intuitive ways, and they can engage new audiences.

As such, games present a real opportunity to be used for more serious purposes, pushing participants out of their comfort zone, engaging them in meaningful debates and generating new ideas. Games can bring bold ideas to life, from researching a wide range of examples to understand how to harness their value. 'Cards for the Future' (Cretu et al. 2019) is an example of a card game exploring the future of technology and society.

Source: Mohammed Bin Rashid Centre for Government Innovation (undated); Nesta (undated)

Box 3.10 How to evaluate innovative ideas for the public sector

Organisational innovation is not just about generating creative ideas. It is also about reviewing ideas to identify those which are most likely to become successful innovations. This is likely to involve:

- identifying the ideas that are most likely to succeed as innovations;
- ensuring complex ideas are reviewed by people with the appropriate expertise necessary to understand what would be necessary to implement the idea, and what might go wrong;
- enabling a middle manager to defend the idea to senior management, stakeholders and financial officers, who may need to grant budgetary approval of the idea;
- making it possible to review a large number of ideas in a resource-efficient manner; and
- improving the idea by identifying potential implementation problems and preparing suitable actions to overcome those problems.

Source: Baumgartner (undated)

3.7 Develop frugal innovation skills of policy-makers and civil servants

Governments should invest in the skills, attitudes and behaviours required by civil servants to practise and promote frugal or low-cost innovation successfully.

While this will require both on- and off-the-job training, sound human resource management systems are also necessary, containing appropriate performance indicators and incentive structures. Beyond the core skills required for public innovation, other 'soft' skills, such an appropriate mindset and attitude, are just as important for enabling innovation within the public sector. The essential characteristic of frugal innovation is that it is a process that challenges traditional models of innovation, which can be highly structured and capital intensive. Frugal skillsets and mindsets are based on knowledge, skills and experience that limited resources can be turned into low-cost innovations. These 'intangible assets' may be embedded in communities and individuals outside the formal institutions. Creating learning and training opportunities across different levels of society (national, regional and local communities) and sectors can foster frugal innovation, appropriately adaptive mindsets and 'soft' skills that can give rise to public innovation which is inclusive and environmentally friendly.

Box 3.11 Problem-Driven Iterative Adaptation (PDIA) Framework

PDIA offers a framework and a method for policy professionals to do things differently. The PDIA process helps governments escape the 'capability trap' through a series of 'find and fit' iterations, which are intended to foster the gradual but progressive identification and implementation of reforms.

The PDIA Framework rests on four principles:

1. **Local solutions for local challenges:** Transitioning from promoting predetermined solutions to allowing the local nomination, articulation and prioritisation of concrete problems to be solved.
2. **Pushing problem-driven positive deviance:** Creating (and protecting) environments within and across organisations that encourage experimentation and positive deviance.
3. **Try, learn, iterate, adapt:** Promoting active experiential (and experimental) learning, with evidence-driven feedback built into regular management that allows for real-time adaptation.
4. **Scale through diffusion:** Engaging multiple agents across sectors and organisations to ensure reforms are viable, legitimate and relevant.

Source: Andrews and Samji (undated)

Box 3.12 Applying 'lean thinking' principles to become an innovator in government

While lean thinking has its origins in manufacturing, the principles and tools underpinning this form of frugal innovation can be applied and adapted to many domains, including the work of governments and public sector organisations.

The key principles:

Understanding what value is and how it is created

An activity that adds value is one that gets you closer to a finished product, a completed service or achieved goal in meeting the needs of the end consumer or citizen.

How to recognise and remove waste

Waste is anything that has a cost (in time, money or other means) but that does not add value. Incurring the cost of storing something that has not already been sold is waste. Making products no one wants to buy is waste. Being blocked in your programming is waste. Sometimes the waste is obvious, other times not so much; or while on the surface the waste seems obvious, the real cause is hidden. It is important therefore to understand the root cause of any given waste that you find. Only by fixing the root cause that led to the wastage can you stop it from reoccurring. To find it, one simple technique is to ask why, five times, until you get to the bottom of the problem.

Shared ownership of the product or service and the process

Don't rely on external consultants to carry out the transformation for you, because when they leave, you'll still be the same. And anyway, they can never know your job as well as you do, so no one is better placed to make your work more efficient than you. Become the transformation yourselves.

If your organisation is part of a chain, working with lots of other organisations, or if you are only one organisation in a bigger one, and only your division is implementing lean thinking, then you need to understand that while you will get some improvements, you will hit a plateau. This will occur when you have nothing left to improve, except those things that can't be improved without the engagement of others. It will have an exponentially greater effect if you can get your whole organisation implementing lean practices.

Remember also that an organisation is made up of people, and the organisations that are your customers and suppliers are people too. So, to change an organisation, it's really the people that need to change.

By involving everyone, you create a shared sense of ownership in the process and in the output (the product or service) of the process. Shared ownership makes it much easier to be objectively critical without individuals feeling defensive or unfairly criticised, and it makes sure that teams work together and support each other. Instead of teaching people a specific way something should be done, you teach them how to come up with their own best way.

Use the right tool for the job, and modify it

Lean practices form a toolkit, one that you pick and choose yourself, starting with the works of others in your domain, but then adapting them to your own circumstances. With each new project or activity, look at the tools in your toolkit, in the form of practices, tricks, ways of setting up your work environment, ways of organising your teams, as well as physical and software tools you have, and pick the ones you think will best support you in the activity.

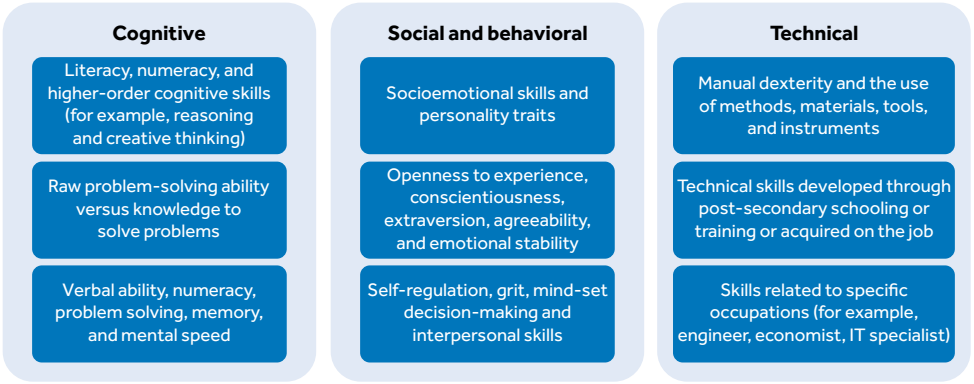
Adjust for size, length, complexity and experience of the team you have, or implement changes and new tools based on lessons learned from previous endeavours. Revisit your toolbox often and make adjustments based on how things are going. Don't dogmatically stick to the approach you originally chose to the end of the project, if new information and experiences tell you something could be improved as you go.

Change is good

In becoming lean, the organisation must see continuous, incremental change as a desirable natural state. This is hard for many organisations, who associate change with cost and who are naturally conservative. Most organisations prefer to do a programme of change to get from A to B in one fell swoop. But big, disruptive, rushed change leads to high costs, inefficient processes and, especially, reinforces dogma and attitudes that assume change can only happen in windows when big sweeping changes are approved and not the rest of the time.

Source: Bhatia and Drew (2006); Lean Thinking Examples (2017)

Figure 3.2 The skills set needed to be an innovator



Source: World Bank (2016). Adapted from Pierre, Sanchez Puerta and Valerio (2014)

Box 3.13 Core skills for public sector innovators

For a modern twenty-first century public service, all officials should have at least some level of awareness of the following six core skills to support increased levels of innovation in the public sector, particularly when cost and resource constraints are critical limiting factors and the institutional capacity for risk-taking is much more modest compared with the private sector. These are also categorised by cognitive, social, and behavioural, and technical skill sets as shown in Figure 3.2.

1. **Iteration:** Incrementally and experimentally developing policies, products and services.
2. **Data literacy:** Ensuring decisions are data-driven and that data isn't an afterthought.
3. **User centricity:** Public services should be focused on solving and servicing user needs.
4. **Curiosity:** Seeking out and trying new ideas or ways of working.
5. **Storytelling:** Explaining change in a way that builds support.
6. **Insurgency:** Challenging the status quo and working with unusual partners.

Source: OECD (2017)

3.8 Build partnerships to foster collaborative low-cost innovation

Catalyse innovation through collaboration with public, private, academic and civil society actors around clearly defined problems and challenges.

Innovation happens when people choose to use innovative processes to develop, test and ultimately implement new ideas that work. Collaborative innovation opens public bureaucracies by engaging a diverse group of public and private actors in processes of creative problem solving. The exchange of different experiences, ideas and opinions tends to disturb established practices and trigger transformative learning processes, while simultaneously building joint ownership over new and bold solutions. Focus less on innovations triggered by technological developments and more on multi-actor collaboration in the public sector.

Box 3.14 Roles for government in collaborative innovation

Collaborative innovation can be enhanced, and the barriers partially overcome, if public leaders and managers assume the following roles:

- **Convener:** Brings together the relevant actors, spurs trust-based interaction, and orchestrates the exchange of information, views and ideas.
- **Facilitator:** Induces the actors to collaborate, by constructively managing their differences and engaging in processes of mutual learning that bring them beyond the least common denominator, which is seldom very innovative and tends to preserve status quo.
- **Catalyst:** Creates appropriate opportunities for collaboration and matchmaking and prompts the actors to come out of their 'safe zones' and develop, implement and disseminate new and bold solutions.

Source: Torfing (2018)

Box 3.15 The Southern Agriculture Growth Corridor of Tanzania (SAGCOT)

SAGCOT is a Tanzanian public–private platform to co-ordinate government, donor and corporate investments and interventions in agribusiness value chains and supporting infrastructure. The purpose is to remove bottlenecks and improve the overall agriculture system, to kick-start environmentally sustainable and socially beneficial commercial agricultural development in the Southern Agricultural Corridor of Tanzania. SAGCOT is a long-term platform, with targets for 2030. SAGOT provides a dedicated secretariat and forum, to facilitate dialogue and catalyse new public and private sector investments in the corridor.

Source: Tanzania Invest (2016); SAGCOT (sagcot.co.tz/)

3.9 Apply behavioural insights to improve policy-making, public service delivery and impact

Design and reform policies and public service delivery on the basis of a more realistic view of human behaviour that nudges people, rather than forcing them, towards making better choices for themselves and for society.

Behavioural insights are gleaned from a rigorously tested combination of behavioural science, economics and psychology. Though it is still a fairly new concept in the public sector, many governments have set up behavioural insight units and hundreds of public entities all over the world are already applying behavioural insights to their policies (OECD 2019). These can help policy-makers to think carefully about the way problems are defined or framed, and design solutions based on an objective and unbiased analysis of research results that takes into account the counterintuitive choices or decisions that people often make but traditional economic and policy-making frameworks often ignore. Behavioural insights can be applied to the entire gamut of policy-making and public administration, from addressing education-related challenges, such as reducing teacher absenteeism or student dropout rates, to overcoming vaccine hesitancy in some quarters or communities.

To avoid unwanted biases and maximise the opportunities for policy innovation based on behavioural insights, government should (Hallsworth et al. 2018):

1. **Raise awareness:** Policy-makers should be made aware of biases and encouraged to address them. However, because people find it difficult to notice and correct their own biases, other actions are required.

2. **Adopt strategies to mitigate biases:** Policy-makers should adopt strategies to identify and reduce biases, such as through training on how to adopt new behaviours within a specific context.
3. **Helping governments to develop structural changes that reduce the impact of biases:** Because reforms cannot focus on individuals in isolation, policy-makers should consider how systems, processes and institutions create behaviours. While some of these drivers may be too large and complex to change, others can be amended or redesigned. As part of the policy-making process, government officials should engage and consult with experts and researchers who forensically study the human condition, such as behavioural economists, psychologists and other social scientists, in order to make sure policies are designed to serve people 'as they live', not the way policy-makers think people 'ought to live'.

Box 3.16 Application of behavioural insights by the Government of Singapore

Singapore has been considering behavioural science in policy since the 1960s. Examples include the 1968 'Keep Singapore Clean' public cleanliness campaign, which, in addition to extensive publicity efforts, utilised social pressure and competition methods; and the 'Stop at Two' family planning campaign, which began in 1972. In 2009, Singapore utilised behavioural insights to nationalise default organ donor enrolment. In 2011, a behavioural insights and design unit was established in the Ministry of the Environment and Water Resources, followed by a unit in the Public Service Division of the Prime Minister's Office in 2012. Starting in 2012, the UK Behavioural Insights Team (BIT) advised the Ministry of Manpower and the Ministry of Transport on applying behavioural insights to their policy and programmes. In 2013, the Ministry of Manpower established a behavioural insights unit. The following year, the Ministry of Communications and Information began exploring social and behavioural insights as part of the Singapore government's move towards data-driven communications.

By 2015, according to the then-head of the Singapore Public Service, Peter Ong, Singapore had worked to incorporate behavioural insights in policy-making across the government, and in 2017, the Singapore Public Service committed to continuing the integration of behavioural science as a tool to improve the country. Behavioural insights within the Singaporean government take place primarily at the agency level, with at least 15 government agencies now utilising this approach. The government has also partnered with academia (National University Singapore, Lee Kuan Yew School of Public Policy and Singapore Management University) to integrate design thinking and behavioural science into public policy. In addition, government agencies also work with various private sector consultants to augment their capacity in design thinking and behavioural science.

Source: Afif et al. (2019)

Box 3.17 Empathy training of civil servants in Bangladesh to foster citizen-centric innovation

Aspire to Innovate (a2i; see: a2i.gov.bd/) is a Government of Bangladesh agency which catalyses citizen-friendly public service innovations by bringing the government machinery closer to the people it serves. 'Empathy' is the first guiding principle in a2i's three-phased approach (Initiation–> Execution–> Celebration), to help civil servants embark on a journey of innovating citizen-centric public services:

Q&A with Mr Anir Chowdhury, Policy Adviser to the Bangladesh Prime Minister and Head of a2i:

What happens when public services are not designed with citizens' needs in mind?

Understanding the citizens we serve is central to what we are trying to do. When public services are not designed with empathy for the people who use them, mothers have to travel long distances with their new-borns and wait in long queues to collect government maternity allowances; citizens, not knowing where to go to access a service or even how to apply, ping-pong among different agencies, sometimes for months (land services) and years (judicial services). Unscrupulous intermediaries or 'middle-men' take advantage and charge exorbitant 'speed money'.

Triggering empathy

Typically, civil servants who are in a position to overhaul processes and institutionalise improvements in service delivery are far removed from the grassroots level, where citizens come in [contact] with the system. Even when, for example, the director general of health makes an effort to visit a village-level community clinic to see how things are first-hand, given their rank (which shields them from being exposed to the real picture) and knowledge of their own domain (which makes it difficult to objectively assess process flows), they are often unable to identify 'pain points' from the citizen's perspective. a2i's empathy methodology thus arranges for relatively senior government officers to act as 'secret shoppers' and visit citizens' access points for services outside of their ministry or area of expertise. This truly places them in citizens' shoes, since they are forced to navigate public systems without any official or intellectual privileges. The result in most cases is a powerful, moving experience that creates a deep sense of empathy for citizens and the myriad sufferings they must endure to avail even the most basic services. This experience helps participants develop a critical eye, which they use to scrutinise their own agency's delivery systems and improve the overall quality of services.

Citizen-centric innovation journey of civil servants in Bangladesh

To date, a2i's empathy methodology has empowered hundreds of civil servants to redesign services in a citizen-centric manner and launch Innovation Pilots (a2i undated a) around the country, especially at the field level. These pilots, some of which are funded by a2i's Service Innovation Fund (a2i undated b), with the rest funded by local resources mobilised by the innovators themselves, allow government innovators to test their ideas.

Source: Aspire to Innovate (a2i) (undated c)

3.10 Experiment with low-cost innovations to boost social inclusion and co-creation of policies and programmes with citizens

Use frugal public innovation principles to improve governance and deliver better, more relevant and more efficient services to all citizens, especially to marginalised communities and socially disadvantaged citizens.

Frugal innovation can be used to put citizens at the heart of societal transformations. It can apply technology-inspired techniques to support faster and better change, by drawing on citizen experiences and adopting design thinking and agile practices. Innovative public organisations use citizen experiences to understand people's experience of accessing services, such as public transport and business licensing registries. They draw on design thinking to reconfigure services in a way that integrates the needs of people, the possibilities of technology and the requirements of the provider organisation.

Box 3.18 Participatory policy-making as a key to unlocking low-cost public innovation

Participatory policy-making is more of a general approach than a specific 'tool', as the overall goal, no matter which method is followed, is to facilitate the inclusion of individuals or groups in the design of policies via consultative or participatory means to achieve accountability, transparency and active citizenship. The push for this participatory process can be 'top-down', that is, by the government/organisation initiating participatory approaches to policy-making, or 'bottom-up', through particular stakeholder groups advocating a participatory approach or seeking to influence a specific policy.

Several governments have engaged in participative experiments that have affected public policy over the last two decades. These experiments have identified five actionable propositions that can be summarised as follows:

1. An administration that extends participation beyond the minimum legal requirement earns trust and eases the path to its goals.
2. Recent history shows that this is not a practice area that depends absolutely on digital tools, but rather a combination of real-life interaction facilitated by digital tools.
3. Social media tools have ushered a new era in public sector engagement. This takes place first, for the engagement of colleagues and from there, engagement of the public.
4. Social media also makes it possible to systematically involve citizens in many more aspects of public life, alerting them to changes, new events or even requesting input.
5. Leading the digital participation revolution is one 'Next Big Thing' for the public sector everywhere. It need not require a top-down mega-mandate to succeed.

Source: Rietbergen-McCracken (undated); Madelin (undated)

Box 3.19 Strategies for promoting inclusive innovation

- **Co-ordinate cross-government action on inclusive innovation:** A key issue preventing the emergence of more inclusive innovation policies is that responsibilities for inclusion and innovation often sit in different parts of government. Cross-fertilisation of ideas and solutions between these areas could be a powerful stimulus for inclusive forms of innovation.

- **Tailor innovation support models to local needs:** There is a strong drive – in South-East Asia and elsewhere – to create local Silicon Valley-styled ecosystems. However, copying what has worked elsewhere is unlikely to prove effective locally, if initiatives are not tailored to fit the local economic conditions, social values and needs of a country's government and its people.
- **More inclusive policy-making processes:** There are limited efforts to involve those who stand to benefit from inclusive innovation policies and activities, in their design or governance. This risks creating a system where people are innovated for, but where they have little agency of their own to become producers, as well as consumers, of innovation. To deliver positive impact, the policy-making process needs to begin with giving a voice to those who are impacted, to understand their objectives and obstacles.

Source: Glennie et al. (2020)

Box 3.20 Zambia Business in Development Facility

The Zambia Business in Development Facility (ZBiDF; see: zbidf.org/) is a multistakeholder platform, comprising champions from business, government, donors and civil society in Zambia. It is designed to engage business, facilitate dialogue and innovation, and directly support public–private partnership action on key business and development challenges. ZBiDF is part of an international network of partnership hubs.

Securing buy-in to the platform was deliberately participatory and tailored to the local context. This involved creating a dialogue with partners (rather than a 'one-size-fits-all' approach) and providing explanatory materials on the process of partnering. While this process took significant time due to existing cultural silos between the public and private sectors, it allowed various partnering values to be built; these included treating partners as equal, obtaining a trusted facilitator, selecting diverse representation in advisory groups and creating a jointly owned platform. These values were highlighted as important factors in being able to successfully create the platforms.

Source: The Partnering Initiative (2015); Reid et al. (2014)

3.11 Make government more transparent and public data more accessible

One of the most effective ways in which governments can trigger low-cost innovation within ministries and public sector organisations is by making official data on key development indicators transparent and accessible.

The data, in combination with technology whose marginal cost is constantly falling, will highlight the areas in which innovation is sorely needed. It will also spur innovators within and outside government, to search for 'out of the box' solutions to problems that conventional approaches often fail to solve. Just as in the private sector, where many successful companies are now digital platforms (Imperial College Business School 2016), i.e., an online space where interested parties from any sector can interact, collaborate or do business, governments too can strive to become more open to more effectively share data and connect the state with citizens and other key stakeholders in a secure way that inspires and encourages innovators from within the society the state is meant to serve. Explore opportunities to build open application programming interfaces (APIs) (IBM Cloud Education 2020), which enable the smooth exchange of data and functionality, reduce friction between different arms of the government, including those between federal and regional or local agencies, and simplify the environment for innovation to emerge from within the public sector.

Box 3.21 What is open innovation?

'Open innovation' describes an organisation 'opening up' its innovation process in order to gain knowledge and ideas from external sources. Rather than relying solely on an internal research and development department, for example, open innovation allows a company to access a wider pool of ideas and technology to solve a challenge. To run a successful open innovation process requires trust between participating organisations, and commitment to a shared outcome. Often, sharing data plays a crucial role in supporting effective collaboration between organisations. There are different reasons for an organisation to embrace open innovation, such as:

- getting a fresh perspective on a problem;
- access to new talent, expertise and creativity;
- increased capacity and faster development processes; and/or
- reduced costs.

Source: Open Data Institute (2020)

Box 3.22 How open data can make government an innovation platform

Opening up government data can help to create a two-way interaction between government and society. Government opens up its information, making it accessible and reusable, so that it is no longer the sole provider of solutions but rather becomes a platform that facilitates other actors to create public value.

The availability of public sector information also plays an important role in raising public awareness, helping to create societal consensus for action and a springboard for co-innovation. Openness is also important in creating competition and driving performance pressures. Openness of performance data can support competition between public sector organisations to drive public sector innovation.

Comparative benchmarking and user choice, for example, among schools and hospitals, neighbouring municipalities or boroughs, subnational governments, or across countries can create pressures and incentives between public sector organisations to improve quality, where innovation is one of the means to achieve this.

Source: Daglio et al (2015)

Box 3.23 GovHack, Australia

GovHack is a two-day event held simultaneously around Australia to create working prototypes with government data, and to help find new ways to solve the challenges facing government, contributing towards social and economic development. GovHack includes several locations around Australia, with participation from federal, state and local governments.

Each year, GovHack shows that the 'civic hacker community is strong, rapidly growing and able to tackle tricky data problems in clever ways'. Governments collect and publish enormous amounts of data, but have limited resources to get it into the hands of their citizens in engaging ways. GovHack is an event to draw together people from government, industry, academia and, of course, the general public to mashup, reuse and remix government data. GovHack is about finding new ways to do great things, and encouraging open government and open data.

Source: GovHack (govhack.org/)

3.12 Use low-cost digital tools and technology to boost impact, productivity and efficiency

The ongoing Digital Revolution (Meyer 2017) offers a wide range of affordable technological resources that governments can adopt to initiate low-cost innovations, which can help improve operational efficiency and make public service delivery more citizen friendly.

Mobile phones, internet connectivity, cloud computing and open-source (or freely available to use, modify and redistribute) software are collectively the new fuel in the engine of governments. Just as technology-based innovations are revolutionising every sector of industry from transport to financial services, procuring off-the-shelf technological products and services can empower changemakers within the public sector to experiment and create new low-cost solutions for 'knotty problems', which every government department or public agency has to grapple with. Governments can also incentivise the private sector to come up with tech-based innovations that can make national development equitable, inclusive and sustainable.

Box 3.24 How to develop a 'GovTech' innovation ecosystem

Governments around the world recognise an urgent need to move away from expensive, 'bloated' IT contracts, and to serve citizens with greater efficiency and accountability. If carefully shaped, the emergent GovTech (Filer 2019) ecosystem, in which private-sector start-ups and small and medium enterprises (SMEs) provide innovative technology products and services to public sector clients, can contribute to achieving these objectives. The concept of 'GovTech' identifies eight activities that policy-makers can undertake to foster national GovTech innovation ecosystems and to steer them towards positive outcomes for citizens and public administrators. It advises policy-makers to:

1. **Build the social and technical foundations for GovTech:** Ensure that the basic conditions are in place for GovTech to thrive and enjoy public support, including public digital infrastructure, cybersecurity, universal internet access, and universalism in access to online public service provision.
2. **Embed expectations of accountability at an ecosystem-wide level:** Promote a joined-up vision of accountability, particularly when handling citizens' data, across the ecosystem. Consider setting industry standards to ensure that this is observed.
3. **Address GovTech procurement barriers:** Facilitate the process of small, innovative technology companies selling to government. Communicate to non-traditional providers with clarity and seek to build trust with them throughout the procurement process.
4. **Ensure the provision of appropriate, and often patient, long-term capital:** Consider the possible long-term outcomes of different financing mechanisms, and plan government funding and incentivisation schemes accordingly.
5. **Engage academia at each stage of the GovTech innovation lifecycle:** Draw on the multidisciplinary capacities of universities to build human capital; enable knowledge transfer and access to new ideas; develop technological spin-offs that convert research into high-value commercialisation ventures; and provide support on ethics and governance.
6. **Develop pipelines of technological talent, emphasising public sector problems and opportunities:** Learn from cyber security education programmes and consider a holistic range of engagements to build interest among technically skilled young people.
7. **Build translator capacity within the public sector:** Ensure that public sector agencies and departments are equipped to converse at the intersection of technology and public policy, including with GovTech companies.
8. **Develop and utilise regional and international networks:** Engage regional and international networks both to learn about innovations elsewhere and to assist domestic GovTech companies with internationalisation, contributing to economic growth.

Source: Filer/Bennett Institute for Public Policy (2019)

Box 3.25 Digital Economy Toolkit: Harnessing digital technologies for inclusive growth

The Digital Economy Kit is a toolkit which translates research undertaken by the Pathways to Prosperity Commission – now Digital Pathways - into a **cross-cutting framework and process that coordinates a country's actions in the digital space into a cohesive, comprehensive strategy for inclusive economic growth**.

The process focuses on national government policies and programmes and also seeks to facilitate the development of dialogue and partnerships between governments, civil society and the private sector. It involves **three steps**: an **assessment phase** to diagnose the level of digital readiness in the country in question; a **dialogues phase**, which involves bringing together experts and key players from government, the private sector and civil society; and a **strategy primer phase**, where, building on the previous two phases, a plan for national digital transformation is developed.

The outcome of the Kit process is distinct from a narrow Information and Communication Technology (ICT) strategy and should set out a **plan for countries to leverage connectivity and digital technology for job creation, inclusive development and economic growth in addition to delivering government services. However, the framework is flexible** and it can be tailored to the particular needs and goals of the country in question.

The Digital Economy Toolkit emphasizes that:

- Digital technologies are transforming economies and societies around the world. Developing countries need to be ready to take advantage of new opportunities.
- But gains from digital technology are not inevitable. They depend on national vision, strategy and action today.
- The Digital Economy Kit is not about ICT sector strategy. Instead, it is about holistic growth strategies that harness digital technologies throughout the economy.
- Countries need to chart their own path in the digital age. This kit provides a useful framework to help countries assess their digital readiness, decide their priorities through dialogue, and craft a strategy going forward.

The Digital Pathways final report, the Digital Roadmap, recommends that countries craft a national digital compact – a shared vision of the digital future, in which all relevant stakeholders, not just government, have a voice. This Digital Economy Kit offers one proven way to achieving that by:

- Codifying this digital compact – this shared vision – in a formal digital strategy provides value beyond simply writing out a plan. It will coordinate actors across the private sector, government and civil society. It should create a platform to attract investment and hold monitor progress.
- The Digital Economy Kit focuses on **four discrete pillars** that countries must focus on to become digital-ready – **infrastructure, people, finances, and policy and regulation** – and provides a framework for action that goes from analysis to dialogue, and then to planning.

Source: University of Oxford (2020)

3.13 Monitor, evaluate, collate and share impact of frugal innovation

Regularly monitor, assess and share with peers the effects – good or not-so-good – of frugal innovation or low-cost interventions on organisational efficiency and effectiveness of various branches of government, in order to foster peer-to-peer learning and build a body of knowledge that others can draw inspiration or lessons from.

While international benchmarks such as the Global Innovation Index (globalinnovationindex.org/Home)

and the Global Competitive Index (World Economic Forum 2017) provide some insight on a country's innovation ecosystem, they are inadequate for measuring and monitoring the role and value of frugal innovation in enhancing state capacity or a country's socioeconomic development, particularly in a context where the traditional barometers of innovation bear little relevance to achieving sustainable development. True to the spirit and principles of frugal innovation, metrics and methodologies for measuring its effectiveness should not be beholden to traditional notions of what is 'good innovation', but should reflect the norms, priorities and realities intrinsic to the low-resource environment in which frugal innovation strives to make a difference.

Box 3.26 What does good (frugal) innovation look like?

The following questions can help ascertain the relative success of a frugal innovation:

- Are the solutions focused on outcomes that will substantially benefit society and address people's needs and aspirations?
- Can you demonstrate that the solution adds value to what already exists within a given field?
- Has the solution been proved, through evaluation, to be more life-changing or more cost-effective than existing practices?
- Does the solution have a credible route to large-scale adoption?

Source: Gurumurthy (2020)

Box 3.27 South–South Network for Public Service Innovation (SSN4PSI)

SSN4PSI is a global collaborative platform where governments, private sector organisations, experts, academics and innovators can exchange knowledge, experiences and expertise to harness innovations in public service delivery and help governments and people to achieve the Sustainable Development Goals.

What does SSN4PSI do?

- Developing countries and multilateral institutions are developing formal rules, informal norms and dedicated organisations to support Southern collaboration – in knowledge-sharing, peer-to-peer learning, capacity building, technical co-operation and technology transfer. The SSN4PSI supports regional capacity building, documentation and research on public service innovation. While it promotes pragmatic co-operation among the developing countries with the SDGs in focus, the SSN4PSI also catalyses positive change around the global South to ensure a better future for all citizens, leaving no one behind.

Source: UN Office for South-South Cooperation (undated)

Box 3.28 Commonwealth Innovation Hub

The Commonwealth Innovation Hub is a digital platform dedicated to creating shared value for the Commonwealth by connecting, harnessing and unleashing the innovative potential of its 56 member countries and 2.4 billion citizens to overcome the most critical challenges on the path to sustainable development. It is a knowledge-sharing exchange, a networking forum and an interactive repository of news, data, expertise and digital resources that have been created by Commonwealth organisations and their partners to catalyse innovation in Commonwealth countries.

The platform has four key facets:

1. To display useful news and information and connect all the members of the Commonwealth family: 56 member states, 87 Commonwealth organisations and dozens of partner institutions.
2. To offer a 'treasure trove' of data that could help generate more evidence-based policies and innovative programmes and projects across the Commonwealth.
3. To be a cost-effective 'single-window' delivery channel for the dissemination of all knowledge products, services and policy toolkits that Commonwealth organisations and partner institutions produce for the benefit of governments and other key stakeholders in Commonwealth countries.
4. To be a 'beehive' of collaboration and a digital laboratory for the discovery of innovative ideas that can be turned into transformational solutions for overcoming one or more of the critical developmental challenges that Commonwealth countries face.

Useful resources on the innovation hub for the Commonwealth family and partners include:

1. **Sustainable Development Goals:** A portal with data, analysis and tools such as the SDG Tracker and the SDG Data Explorer Tool, which help track progress towards the SDGs in Commonwealth countries.
2. **Commonwealth COVID-19 Response Centre:** A digital repository of pandemic-relevant information, data, resources, policy advice, funding opportunities, online learning tools and innovative responses to COVID-19 in.Commonwealth countries.
3. **Commonwealth COVID-19 Data Dashboard:** Provides daily and real-time data, trends and analysis on cases and fatalities at the pan-Commonwealth level, as well as in every member state.
4. **Commonwealth COVID-19 Vaccination Tracker:** Provides comprehensive and daily updates on the scale and speed of vaccination in Commonwealth countries, and illuminates the growing vaccination gap between member states and regions.
5. **Commonwealth Innovation News:** A curated digest of information and insight on impactful innovations and innovative breakthroughs in Commonwealth countries.

Source: Commonwealth Innovation Hub (thecommonwealth.io)

Checklist

1. Does your ministry, department or agency recognise, support and reward public sector changemakers? ☐
2. Are you encouraged to take risks and consider new approaches and solutions to the problems you face? ☐
3. Can you apply frugal approaches to innovation within your existing departmental budget? ☐
4. Does your ministry, department or agency collaborate with public, private, academic and civil society actors to collectively tackle societal challenges? ☐
5. Does your ministry, department or agency apply behavioural approaches to policy-making? How does it do this? ☐
6. Does your ministry, department or agency share its data on public platforms and encourage the use of new technologies and platforms to support innovation? ☐
7. Does your organisation embrace digital tools and technology to improve efficiency, productivity or impact? ☐
8. Are regional and local government bodies empowered to embrace innovation? ☐
9. Is there a culture or practice of constant peer-to-peer learning and knowledge sharing within innovation networks across government? ☐

4. Low-Cost Innovation Case Studies

This section offers a selection of case studies and examples that demonstrate the importance of low-cost innovation in helping governments overcome resource constraints and achieve key national developmental objectives with low-cost solutions.

Box 4.1 Seychelles' debt-for-nature swap programme

Challenge

In Seychelles, like many small island states, current and future prosperity is intrinsically linked to its marine and coastal assets. However, the 2008 financial crisis left the country with substantial debts and made it difficult to invest in the Blue Economy.

Debt problems affecting small island states is one of the biggest barriers to development. Due to the size of their economies, it can be difficult for small island developing states (SIDS) to get finance and restructure debt.

Response

Seychelles became the first ever country to successfully undertake a debt-for-nature swap to protect the world's oceans. The debt restructuring mechanism is an innovative method of debt forgiveness, in which a portion of a developing country's foreign debt is forgiven in exchange for a commitment for investments in domestic environmental conservation and sustainability projects. The debt-for-nature swap enables small island states to leverage the country's assets as part of the Blue Economy Sector, this being a comparative advantage for many large ocean states. Seychelles has an exclusive economic zone (EEZ) of 1.37 million km^2 compared to a land area of just 455km^2.

Impact

The debt swap has allowed Seychelles' government to buy back some of its debt at a discount and restructure it, while freeing up cash flow for conservation projects. The government repays the loans into a specially created independent trust, the Seychelles Conservation and Climate Adaptation Trust (SeyCCAT), which will use this to fund marine conservation and climate adaptation programmes over the next 20 years. In the five years since its creation, Seychelles has progressed from protecting 0.04 per cent to 30 per cent of its national waters, covering 410,000 square kilometres (158,000 square miles) of ocean – an area larger than Germany. Fishing, oil exploration and other marine development has been banned or severely restricted in the marine protected areas.

Source: The Commonwealth (2020)

Box 4.2 Accelerating safe delivery of COVID-19 vaccines in Ghana with drones

Challenge

COVID-19 vaccine vials need to be kept refrigerated at low temperatures to maintain their effectiveness. This poses a significant logistics challenge for many developing countries like Ghana, which have limited cold storage facilities, cold chain logistics capabilities and transport systems, and large communities living in remote or inaccessible areas.

Response

The Government of Ghana partnered with Zipline, a private sector operator, to deliver vaccines speedily to remote areas by unmanned aerial vehicles known as drones. Zipline operates four distribution centres in Ghana, each of which is part drone airport and part medical warehouse, housing a fleet of 30 fixed-wing drones as well as medical supplies. The drones fly to their destination autonomously, drop off packages via parachute, and return home. Each distribution centre can make deliveries in a 22,500 km^2 surrounding area (8,750 square miles). Drones can deliver to hospitals, but also to the temporary mobile clinics that will be used to distribute the COVID-19 vaccine in the country's more remote areas.

Impact

The speedy and relatively cost-effective nature of drone delivery helps overcome the challenges posed by cold chain logistics and Ghana's transport infrastructure. There are no traffic delays in the sky, and the drones, which travel at 100 km/h, take only 30 to 40 minutes on average to complete each delivery. That means passive rather than active refrigeration is all that is needed to keep the vaccines at the desired temperature: just an ice box is required rather than a refrigerator.

Source: Prabhu (2021)

Box 4.3 Behavioural insights and randomised trials help Bangladesh stem COVID-19

Challenge

There is widespread misinformation regarding COVID-19 in.Bangladesh, which has created the need for factual, contextually appropriate and simple messages to be disseminated across communities. Bangladesh is a densely populated country, with many households that lack running water within their homes.

Response

The Government of Bangladesh quickly built 1,000 public handwashing stations (HWS) at busy locations across the 20 subdistricts, such as outside schools, mosques, markets and bus stands. The programme developed communications materials to encourage thorough handwashing. Each HWS consists of three sinks, with a message board positioned behind the sinks. Using a randomised control trial allowed for refinement of the handwashing guidance, with more than 2,000 Bengali adults testing their ability to recall and understand key messages from the posters. Mass media communications were analysed and disseminated to encourage preventive behaviours. Messages have been distributed across television channels, radio and social media such as Facebook, Instagram and YouTube.

Impact

When communicating about public health risks, policy-makers face a delicate balancing act – sharing enough information so people know what to do, but not so much that it becomes overwhelming. The handwashing posters and media communications based on randomised controlled trials helped the government understand how much information was appropriate to communicate to the people. The behavioural insights and randomised controlled trial allowed for the refinement of the handwashing guidance and adoption of improved handwashing practices and facemask usage. These simple research-based interventions by the Government of Bangladesh and its implementing partners have helped prevent the sort of uncontrollable spikes in the spread of the pandemic that other countries have experienced.

Source: Hygiene Hub (undated)

Box 4.4 Empowering illiterate villagers in India with data visualisations

Challenge

In the southern Indian state of Tamil Nadu, democratically elected village councils hold regular and open village meetings to plan and monitor budget priorities in the community. Many villagers, particularly women, are illiterate, which hampers their understanding, representation and advocacy at these meetings.

Response

A novel experiment utilised a method called 'participatory tracking' to support a network of women's self-help groups to empower villagers. Representatives of the women's groups participated in a census exercise, which led to the conceptualisation of what constitutes a good life. Indicators were developed using a simple questionnaire facilitated by training members of the groups via video. As approximately one-third of villagers could not read or write, the process used co-developed data visualisations to demonstrate the impact of decisions on the household. Through this co-production, women's groups were able to design their own process for collecting and deploying data to track changes in the quality of public services and in their living standards and to make better decisions in village meetings.

Impact

Evidence showed a substantial improvement in the quality of deliberation, by allowing citizens and officials to focus on the issues of concern rather than debate the facts about where decision-making power lay. Versions of participatory tracking that focus more on the management of public goods and common property are being designed and will be scaled up in the Indian states of Tamil Nadu (where the pilot was developed) and Karnataka. This will cover more than 75 million people.

Source: World Bank (2021)

Box 4.5 Contact tracing in Kenya to curb the spread of COVID-19

Challenge

The rapid spread of COVID-19 has presented a health security threat to all countries globally. The challenge is even starker in contexts where traditional health services are stretched and there are fewer available preventative behavioural mechanisms, such as lockdowns, to curb the spread of the virus. In Kenya, the over 50 per cent of people in cities use public transport every day and the vast majority of jobs and education cannot be performed remotely.

Response

The mSafari mobile app, launched by the Kenyan government in late March 2020, requires public transport authorities to sign up to the app using their vehicle registration numbers. All passengers then upload their details onto the app, which is used to trace future cases and clusters, trigger automated warnings to passengers exposed to known cases, and also to set and monitor the maximum safe number of passengers allowed on each public transport vehicle. Public service vehicles, including taxis and motorbike operators, are also required to collect contact details of every passenger. These are then automatically registered on the mSafari platform, providing critical data that will help trace movements of infected or suspected cases. Additionally, mSafari can also track the GPS location of each vehicle.

Impact

mSafari provides a multisectoral approach to fills critical gaps in the Kenyan response to the pandemic. mSafair also provides crucial contact tracing data to the Kenyan Ministry of Health to reduce transmission risks, target interventions in at-risk areas and save finite resources. After an initial pilot, the Government of Kenya is looking at wider legislative changes around the collection and use of public transportation information.

Source: WHO (2020)

Box 4.6 Lifesaving mobile technology for emergency services in a rapidly urbanising Ghana

Challenge

Ghana, like many African Commonwealth countries, is undergoing rapid urbanisation. Some African cities are expanding so fast that maps are outdated the moment they are published. Meanwhile, the formal addressing system has not kept up, with many roads and houses simply being built without names or numbers. Emergency services would typically struggled to find victims, while those in need of emergency attention would often waste valuable time trying to direct ambulances to their location.

Response

TinyDavid, in partnership with the Vodafone Ghana Foundation, enabled the Ghana National Ambulance Service to accurately locate victims in emergency situations using a free mobile app, SnooCode. The mobile app uses a computer algorithm to generate a unique code – for any location – which then serves as an address. Ghanaians simply download the app, stand at the location in question (such as in front of their house or at a restaurant), and select the option to generate the code. Users then receive a six-digit unique code for the specific location. This never changes and is in effect tied to the land. Once downloaded, no internet connection or even cellular coverage is needed to generate the code.

Impact

The code replaces the street name, the house number, the area and everything else that could be part of an address. This makes it even more accessible to people who have lower levels of education, as they do not have to be able to read the area and street name. With SnooCode, all a person needs to know are the alphabets and numbers, which is just about a first grade education. The app also provides navigation options to each unique code's location.

Use by the emergency services is only one of many applications of the app, which can support traditional government services and business. The app allows businesses (such as restaurants) to be easily located by consumers, and could support e-commerce companies, delivery services and the postal system. For instance, the lack of formal addresses in Ghana restricts postal services with mail not typically delivered to a person's house. With the app, for first time it will be possible to get mail delivered reliably.

Source: Douglas (2015)

Box 4.7 Empowering girls and women in Uganda

Challenge

It is estimated that 35 per cent of women worldwide have experienced physical and/or sexual intimate partner violence or sexual violence by a non-partner at some point in their lives. In Africa, this number is estimated to be even higher. Women who have been physically or sexually abused by their partners are more than twice as likely to have an abortion, almost twice as likely to experience depression and, in some regions, 1.5 times more likely to acquire HIV, as compared to women who have not experienced partner violence. Moreover, it is estimated that 246 million girls and boys experience school-related violence every year.

Response

No Means No Worldwide, an international non-governmental organisation, has developed a short programme called the IMpower curriculum, which it delivers to boys and girls aged between 10 and 20 in.schools and clubs. It is a system of knowledge and strategies that aims to end the cycle of

violence, by engaging boys to respect and support women and girls, and empowering girls to stand up for their rights.

The training includes explanation of the assault continuum, verbal and basic physical strategies for self-defence, and six hours of role playing. A video of the programme has been featured on the BBC and a shorter Facebook video has hit 42 million views. The curriculum has so far been delivered to approximately 300,000 girls and boys in Kenya, Uganda and Malawi.

Impact

A recent efficacy study of the IMpower curriculum found that some domains of children's knowledge of child sexual abuse (CSA), as well as their efficacy to resist an attack, increased from pre- to post-test. Moreover, 83 per cent of children reported that they liked the programme and 96 per cent of children reported that the programme helped keep them safe.

Source: Global Innovation Fund (undated); No Means No Worldwide

Box 4.8 Smokeless cookstoves for the poor in India and Africa

Challenge

A large proportion of people in the world cook their food on basic wood-fired stoves, endangering their own health and safety, while also harming the environment. Each year, more than four million people die from inhaling indoor air pollution, adding up to more deaths than those caused by malaria, tuberculosis and AIDS altogether.

Response

BioLite is a commercial company that specialises in a low-cost biomass HomeStove. The stove creates a highly efficient fire that not only drastically reduces carbon emissions, but also generates electricity. This provides users in the poorest, most unconnected parts of the world with modern luxuries like the ability to charge their cell phones. The stove lessens smoke-related illnesses, reduces income spent on fuel consumption and improves access to electricity.

The HomeStove is the world's first biomass stove that creates a smokeless cooking experience, independent of an external source of energy. BioLite's innovative technology makes the stove particularly suitable for consumers with very limited resources.

Impact

The HomeStove generates 2W of electricity, saves families up to US$200 annually, and creates 94 per cent less smoke and 91 per cent less carbon monoxide than regular cookstoves. This low-cost innovation is serving a huge untapped market in India, Ghana and Uganda.

Source: Acumen.org

Box 4.9 Low-cost rural health network in India

Challenge

India's 638,000 villages are home to more than 775 million people. Nearly half of this population survives on less than US$1 a day. Surveys have found that the average villager earns US$90 a year and spends 80 per cent of that income on subsistence items like healthcare, housing and food.

Response

Drishtee, an Indian-based business, builds service kiosks run by local entrepreneurs to provide villages with access to internet connections, consumer products and critical community services. Offerings

include computer education, English education, e-governance, health check-ups and a wide range of consumer goods such as groceries, cosmetics, mobile phone recharge coupons, and rechargeable torches and batteries. Local entrepreneurs run the Drishtee kiosks. With Acumen's investment, Drishtee is increasing the number and reach of the entrepreneurs and expanding its health-related services.

Impact

Through its low-cost, direct delivery rural supply chain network, Drishtee has created significant cost and time savings for villagers and an effective channel for enterprises to sell products and services. Drishtee has a strong presence in three states – Assam, Bihar and Uttar Pradesh – and more than 14,000 entrepreneurs currently registered in the network.

Source: Acumen.org

Box 4.10 Offsetting a shortage in water infrastructure

Challenge

In sub-Saharan Africa, only 16 per cent of the population has household water connections (mostly in urban areas) and only 56 per cent has access to safe drinking water (only 42 per cent of the rural population). As a result, local initiatives are needed to fill the water gap.

Lufumbu is a small village in the Ludewa district in South West Tanzania, with a population of 6,180 people. Almost all the people in the village are poor, living on less than US$1 per day. Villagers earn a living through agriculture, growing food crops, namely maize, beans and other legumes, as well as cash crops, mainly coffee and banana. This requires access to sustainable and continuous water sources.

Response

The villagers in Lufumbu, guided by their leaders, conducted an analysis of their situation and ranked water as their priority need, without involvement of external support. They participated fully in the design and implementation of a scheme, although technicians were hired. They used their own resources to kick start the project. External resources came later to complement resources that had been provided by the villagers themselves.

The implementation of the scheme was divided into seven segments, each of them being managed by a committee. Through these committees, all community members were involved in project implementation. Likewise, the management of the scheme is ensured by a water committee that is elected democratically. It is made up of villagers who have undergone training.

Impact

The scheme, which relies on a simple gravity principle, was designed jointly by the villagers and water technicians. The system cost less than US$50,000, with 10 kilometres of mains, a reservoir tank of 60,000 litres and 56 drawing points. The scheme was designed to serve the whole community.

The case demonstrates how a small community can decide on and build its own water supply scheme and effectively construct and manage such a scheme. Such projects are typically seen as requiring significant technical knowledge and investment.

The project has generated positive feedback for the whole region, through technological innovations. Lufumbu villagers invented and designed low-cost reservoir tanks that use locally obtainable materials, namely stones and corrugated iron sheets. This invention has now been adopted by the district government as the standard design for all community-based water schemes in the district.

Source: United Nations (undated)

Box 4.11 Mobile insurance to build financial resilience in Pacific Islands

Challenge

The Pacific Islands are exposed to extreme natural events and political instability, in addition to the normal threats to personal health and safety. However, less than five per cent of the population is protected by formal life, health or other personal insurance.

When adverse events occur, they impact uninsured families almost immediately, derailing their financial situation and pushing them back into poverty. This has a compounding effect on small and medium-sized enterprises (SMEs), which can find their physical and human capital affected. For example, during a natural disaster, uninsured employees may struggle to afford healthcare, causing extended absences from work and prompting them to ask employers for financial support.

Response

Offering insurance as an employee benefit is an effective way to improve the financial resilience of SMEs, but many of these companies struggle to provide such a service. Challenges include the complexity and high cost of traditional insurance products and a lack of understanding of the value of insurance.

While insurance levels in the region are woefully low, 60 to 100 per cent of the population has access to a mobile phone. BIMA, a mobile microinsurance provider, in partnership with the mobile network operator, Digicel, has created an innovative new model that uses mobile technology to bring low-cost employee insurance directly to SMEs in the Pacific Islands.

Impact

The innovation is expected to bring the power of insurance to 800,000 people within 24 months, at a price of just US$25–US$85 per family per year. This initiative will significantly improve the financial resilience of the Pacific Islands, fuelling financial inclusion and creating economic opportunities for the people who need it most.

Source: Pacific Humanitarian Challenge

Box 4.12 Sustainable school meals in Malawi

Challenge

Every day, countless children across the globe turn up for school on an empty stomach, which makes it hard to focus on lessons. Many simply do not go, as their families need them to help in the fields or around the house. For all of them, a daily school meal could mean not only better nutrition and health, but also increased access to and achievement in education. Provision of a school meal is also a strong incentive to consistently send children to school.

Nowhere is this more relevant than in Malawi, where many families rely on subsistence farming and have limited savings. If the annual rainfalls are particularly scarce, the impact on harvests and a family's access to food is severe.

Response

To reduce local dependency on aid organisations, the project promotes and supports the sustainable self-production of food in schools. With the help of the World Food Programme (WFP) Innovation Accelerator, WFP Malawi is developing an innovative new approach that allows WFP and partners to pass on a diverse range of expertise, from programme delivery to engineering, to local schools. WFP plans to help schools harness underground water reserves, such as Lake Malawi, by using pumps and wells.

The project also aims to integrate food production techniques, such as hydroponics. Coupled with training on agribusiness strategies, schools will be able to cover initial investment and maintenance costs by selling surplus on the local market.

Impact

Working with implementing partners, the Malawi government and WFP is developing an advisory/consultancy process that allows effective and quick analysis and intervention. It is anticipated that successful adoption by schools in Malawi will boost the self-production of food, reduce the cost of WFP-funded school meal programmes, and ensure a rich and nutritious diet for thousands of school children.

Source: World Food Programme (2020)

Box 4.13 Flood mapping in the Global South

Challenge

About 90% of natural disasters are water-related and floods alone account for approximately 54% of all water-related disasters. Since 2000, over 5,300 water-related disasters have been reported across the world, with over 325,000 fatalities and economic losses exceeding US$1.7 trillion. Forecasts are key to mitigating the worst effects of floods. However, the majority of flood forecasting centres in flood-prone countries lack critical resources to carry out their functions. The centres lack the ability to improve the spatial coverage and resolution of early warning systems. Inundation maps created using hydrodynamic models are critical for building flood risk maps as they point out the specific area flooded by a particular flood event.

Response

The United Nations University Flood Mapping Tool addresses information gaps in flood early warning and risk management systems. The Flood Mapping Tool created affordable inundation and flood risk maps by using Earth data, AI models, open data, and cloud computing. Maps focus on the Global South, where the data and information gaps are prominent and annual losses due to floods are high.

The Flood Mapping Tool generates inundation maps for significant floods from 1984 to the present using publicly available data on Google Earth Engine. Using a "data cube" — spatially overlapped pixels of Landsat satellite imagery captured over a period of time to reveals inundation patterns over space and time.

Impact

During the Flood Mapping Tool's two-year design, review and testing process has included extensive network of water-related disaster experts and representatives from disaster management agencies from a range of countries including Bangladesh, India, Pakistan, and Sri Lanka. The Flood Mapping tool allows the impacts of inundation on various socio-economic sectors — such as agriculture, forestry, transportation and communities — to be analysed and improved the accuracy of flood maps to capture the true extent of historical floods, rivers, streams, and water bodies.

Building on this innovation, the team plans to develop a flood forward-looking Flood Risk Prediction tool using artificial intelligence models to generate current and future flood risk maps for three climate change scenarios at the city, district, and river basin levels. The climate scenarios are defined by the Intergovernmental Panel on Climate Change. The models will be trained using the inundation maps generated by the Flood Mapping Tool and open datasets including land use, land cover, precipitation, temperature, gender, and age-disaggregated socio-economic data. Together, these tools will improve the coverage of national and regional flood early warning and risk management systems across the Global South.

Source: United Nations University (2021)

Box 4.14 Climate-resilient agriculture enables women farmers through access to market information in Malawi, Uganda, Nigeria and South Africa

Challenge

Access to reliable data and market information is a critical tool in the drive to make Africa's rural economies more equitable and sustainable. One of the biggest barriers for Africa's small-scale women farmers – is information and data on yields, soil health, weather patterns, good farming practices, seasonality, market proximity, and market prices. This information gap makes it more difficult for many women farmers to achieve healthy selling prices, and to access financial services products.

Response

UN Women in partnership with Standard Bank are equipping women farmers in Africa with the skills and resources needed to grow their operations and succeed in a changing climate by empowering women farmers in Malawi, Uganda, Nigeria and South Africa through modern and environmentally friendly farming technologies that increase yields and incomes across the value chain. The project provides small-scale women farmers with access to drought-resistant seeds and more environmentally friendly fertilizers. The project uses digital technology to conduct meetings and messages through community radio stations, SMSs and marketing materials to provide weather updates, good farming practices, expectant yields and market prices.

Impact

In Malawi, close to 6,000 women farmers have received support in the use of high-yield and drought-resistant groundnut seeds; the implementation of modern farming methods that conserve moisture and maximise land use; use of weather forecast information for the timely planting of groundnuts; use of market information and financial literacy sessions; and the adoption of modern farming technologies.

In Nigeria, the project is currently supporting 2,300 women beneficiary agri-business groups and cooperatives to increase the productivity and profitability of their operations within the rice and shea nut value chains.

In Uganda, 1,400 women have been equipped with the skills and technologies needed to run successful aquaculture operations. Over a quarter of a million high-quality fish fingerlings – of the Tilapia species – are being grown by the beneficiaries, using aquaculture technologies. The women have been supported through technical training, mentorship programmes, access to inputs including feeds, accommodation and business management skills.

In South Africa, the project delivered agricultural inputs to 2,753 women farmers including drought-resistant seeds of various crops, organic manure, farming equipment, and training on climate-smart agriculture.

Source: Malawi Voice (2021)

Box 4.15 Low-cost solar dryers reduce farmers' food loss in India

Challenge

In India, approximately 80 per cent of farmers are poor, marginal producers. Among the challenges they face are fluctuating market prices. A tomato can sell for US$0.28 one month and only US$0.03 one month later. However, farmers are not able to preserve their food for more than 1 to 2 weeks because of electricity costs, poor infrastructure and lack of funding to invest in storage facilities. When the market prices are low, farmers often have to throw away their produce, resulting in significant waste.

Response

Varun Raheja, a mechanical engineer from India with a low-cost solar dryer. The low-cost solar dryer works on the principle of greenhouse effect, in which solar radiation gets trapped inside the closed chamber. It has two sections: one is collector area, where heat is generated using black floor and second is drying area, where fresh products are kept to dry. The trapped radiation produces heated air in collector which is then supplied over fresh products using a constant air supply from fan results in vaporisation of moisture and then moisturised air goes out from other side of tunnel. Solar Dryer is self-sustainable model, by using solar energy, there are no additional electricity costs. Farmers can install the machine themselves, a technician is not required.

Impact

The machine costs US$200 and enables farmers to dehydrate their agricultural products and conserve them for a minimum of six months, while preserving nutrients, colour and taste. More than a 100 farmers are using the solar dryer and farmers are able to adapt to the market rates and increase their income while reducing food waste as much as possible. When the market prices are low, they can dry their produce and wait for a better price for at least six months. When the prices are high, they can sell it right away.

Source: United Nations Environment Programme (2019)

Box 4.16 Seated tree climber for coconut harvesting

Challenge

In Tamil Nadu, India, there is a shortage of labour for tree-climbing 'cocunut pluckers' due to the risks involved and the intensity of the work to climb a tree and pluck coconuts. Approximately one third of cocunut pluckers experience a fall from cocunut trees which result in serious injuries and even death. Due to scarcity of labour, many farmers harvest the coconuts only once in three to four months which limits the overall harvest as the typical harvesting cycle is 45-60 days.

Response

Mr D. N. Venkat from Coimbatore district of Tamil Nadu developed a modified tree climber which combines two frames instead of the traditional one. The upper frame is operated by hand the lower one is operated by the leg. Rollers are provided on both frames. The user is able to comfortably position themselves on a seat and move up and down using the upper and lower frame allowing climber to more easily climb the tree. To improve safety the tree climber provides a secure four lock pin which can be fixed at any height and a safety belt which enables the climber to work without becoming dislodged at any height.

Impact

Using the seated tree climber minimises the risk of injury and allows cocunut pluckers to climb an average of about 25 coconut trees many more than traditional methods. The seating device reduces fatigue and allows for rest periods during operation. The device is simple to use and does not require pre-existing knowledge to operate in turn expanding the pool of potential labor. The invention has featured in academic journals which has allowed for its expanded production and awareness campaigns to reduce risks associated with the profession.

Source: National Innovation Fund – India (2021)

Box 4.17 Bangladesh – SDG Tracker Tool

What is the SDG Tracker?

It is an online data repository for monitoring the implementation of various activities directed towards achievement of the Sustainable Development Goals (SDGs).

The SDG Tracker (www.sdg.gov.bd) was created by the Aspire to Innovate (a2i) programme of the Government of Bangladesh.

The SDG Tracker is intended to create an online data repository for accurately monitoring implementation of various activities in line with the SDGs, leading to efficient resource allocation and effective policy-making for inclusive and sustainable development. Initially, the biggest benefit will accrue from the identification of data sources and gaps, along with the system's requirement resulting from analyses conducted to set localised sustainable goals, targets and indicators.

Key features of the SDG Tracker:

- connects to all relevant data sources and shows progress towards the attainment of the SDGs over time;
- visualises key analysis, as well as significant trends and patterns;
- compares data from across districts and subdistricts, creating a healthy competition; and
- sets and tracks development targets for the future.

How is this tracker benefiting Bangladesh?

The tracker is a simple and cost-effective way for the government and citizens of Bangladesh to monitor the progress the country is making on the SDGs, and to identify the areas in which progress is lagging. This can galvanise the government and other sectors to prioritise the allocation of scarce resources in line with the evidence highlighted by the tracker.

Source: Bangladesh SDG Tracker (sdg.gov.bd/#1)

Box 4.18 Sri Lanka: Social Innovation Lab

What does the Lab do?

Social Innovation Lab Sri Lanka, popularly known as 'Citra' or 'the Lab', works with government partners to introduce innovation practices and frameworks such as design-thinking, behavioural insights, citizen-centred project development methodologies into government processes.

Citra also supports the prototyping of innovative ideas through research, scanning the horizon for similar experiences and carrying out user journey-mapping exercises.

What is the team like?

The Lab is staffed with a unique team comprising individuals from various areas of expertise including sociology, data science, behavioural psychology, digital design, development economics, engineering, international relations and gender studies.

The team also brings together years of diverse work experience ranging from time in the Government of Sri Lanka, private banking sector, development organisations in the country, exposure and experience at world renowned local and international institutions, and also valuable experience working within the UN system.

Citra's flagship projects

ShaRe Hub: An online disaster relief co-ordination tool developed for the Humanitarian Country Team (HCT) in Sri Lanka. This online tool contributes to easier co-ordination among all actors during a disaster and, subsequently, during relief efforts. It also allows all stakeholders to access real-time data on disasters and affected areas, so they can execute relief efforts accordingly.

Public transportation and road accidents: The Lab is using behavioural science, among other tools, to uncover insights into the existing public transportation system and work with relevant partners in create multipronged strategic interventions.

The establishment of Social Innovation Lab Sri Lanka was the primary outcome of the First National Summit on Foresight and Innovation, hosted by the UN Development Programme (UNDP) in 2016.

Source: South–South Network for Public Service Innovation (2021)

Box 4.19 Singapore to Uganda – What is The Teaching Factory Concept?

What is the Teaching Factory Concept?

The Teaching Factory Concept is a vocational education and training (VET) methodology designed for individuals aiming to develop sophisticated and specialised industrial and applied research skills. It emulates and integrates real-life industrial environments with the classroom teaching and learning environment, through on-site project work that is an integral component of the methodology.

The concept was developed by Singapore's Nanyang Polytechnic.

What makes the concept unique?

The concept:

- installs authentic and practical training facilities;
- creates an environment that inspires creative thinking;
- employs professionals with relevant industry experience and capability to form applied research and industry project teams;
- provides a sustainable and effective platform for capability development;
- brings in relevant and suitable industry projects that engage both staff and students to develop and research together;
- provides students with full-time 'semestral projects'; and
- appoints lecturers with professional experience to be project supervisors.

How is Uganda benefitting from importing this model?

Endowed with significant natural resources, including ample fertile land, regular rainfall, mineral deposits and a large youth population, it is thought that Uganda could feed all of Africa. The economy of Uganda has great potential and is poised for rapid economic growth and development.

However, the 77 per cent of Uganda's population who are under 30 years of age lack the skills necessary to transform the country's potential into reality. This is where Singapore's Teaching Factory Concept is helping Uganda, by:

- helping design effective, hands-on learning processes;
- sharpening problem-solving skills;
- expanding and deepening skills pools relevant to industry; and
- fostering closer strategic links between academia and industry.

Source: South–South Network for Public Service Innovation (2021)

Box 4.20 BlueDigital: using digital tools to improve the Blue Economy ecosystem in Barbados to recover from COVID-19

Challenge

The Eastern Caribbean Blue Economy has been negatively impacted by COVID-19 and many novel challenges have arisen as a result of the extended closure of much of the tourism industry, such as through reduced sales of fish and increased pressure on fragile waste management systems.

Response

COVID-19 acted as a catalyst for change among Micro, Small and Medium-Sized Enterprises (MSMEs) to embrace digital tools support their business practices as one example.

BlueDigital is a pilot project in Barbados that applies digital tools and solutions for segments of the Blue Economy ecosystem. BlueDigital contains four portals for four key groups of stakeholders in the Blue Economy ecosystem and related value chains. BlueFish for fisherfolk measures fisheries catch data, including species and size through image recognition technology, and transitions that data to basic digital business management. BlueData for Governments improves data collection for decision making and more sustainable fisheries management. BlueTrace for public audiecnes and consumers includes a traceability system for fisherfolk profiling including the journey of your fish from ocean to plate. BlueSeal for private sector businesses enhances sustainable and responsible tourism such as developing a nationally verified seal to recognize industry partners who implement sustainability into elements of their operations and a marketplace for fisherfolk to enhance access to tourism sector for sustainable fish and seafood products.

Impact

BlueDigital has created data-led insights for improving the management of the Blue Economy ecosystem and value chains including promotion of environmental sustainability. BlueDigital has enabled fisherfolk to improve business management including financial literacy and for fisherfolk to enhance their sales marketplace. Governments are able to enhance data collection of the fish catch including species, quantity and tracking sustainability factors. The public have gained greater transparency for sustainable seafood practices and access to local, sustainable fish and seafood products.

Source: UNDP Accelerator Lab Barbados (2021)

Bibliography

a2i Bangladesh, available at: https://a2i.gov.bd

Abbott, R (2014), *Documenting Traditional Medical Knowledge*, WIPO, available at: https://www.wipo.int/export/sites/www/tk/en/resources/pdf/medical_tk.pdf

Afif, Z, WW Islan, O Calvo-Gonzalez and AG Dalton (2019), *Behavioral Science Around the World: Profiles of 10 Countries (English)*, eMBeD brief, World Bank, Washington, DC, available at: https://documents1.worldbank.org/curated/en/710771543609067500/pdf/132610-REVISED-00-COUNTRY-PROFILES-dig.pdf

African Development Bank Group (2018), 'Rwanda Innovation Fund Project to receive US$30-million loan from African Development Bank', African Development Bank Group News and Events, 19 March, available at: https://www.afdb.org/en/news-and-events/rwanda-innovation-fund-project-to-receive-us-30-million-loan-from-african-development-bank-17956/

Andrews, M and S Samji (undated), 'How to Implement Policies with Impact? A Policymakers' Toolkit', *Dubai Policy Review*, available at: https://dubaipolicyreview.ae/how-to-implement-policies-with-impact-a-policymakers-toolkit-measurements/

Aspire to Innovate (a2i) (undated a), 'Innovation Culture', available at: http://a2i.gov.bd/innovation-culture/#1509863523826-98a47de7-7fb4

Aspire to Innovate (a2i) (undated b), 'Innovation Fund', available at: http://a2i.gov.bd/innovation-lab/#1509050558525-28a4c045-101f5c39-5bb2

Aspire to Innovate (a2i) (undated c), 'Empathy Training', available at: https://a2i.gov.bd/empathy-training/

Australian Government (2010), *Empowering change: fostering innovation in the Australian public service*, Barton ACT.

Australian Government (2011), 'Measuring Innovation in the Australian Public Sector', Consultation Paper 1.0, The Australian Public Sector Innovation Indicators (APSII) Project, June, Department of Innovation, Industry, Science and Research, Canberra.

Barbados Innovation Support Programme, available at: http://www.bidc.org

Bason, C (2010), *Leading public sector innovation*, Policy Press, Bristol.

Baumgartner, J (undated), 'How to Evaluate Ideas', Innovation Management, available at: https://innovationmanagement.se/2008/05/18/how-to-evaluate-ideas/

Behavioural Insights (2021), 'Can behavioural science facilitate frugal innovation?', Blog, available at: https://www.bi.team/blogs/can-behavioural-science-facilitate-frugal-innovation/

Bhatia, N and J Drew (2006), 'Applying lean production to the public sector', McKinsey & Co., available at: https://www.mckinsey.com/industries/public-and-social-sector/our-insights/applying-lean-production-to-the-public-sector#

Boon, WPC, EHM Moors, S Kuhlmann and REHM Smits (2011), 'Demand articulation in emerging technologies: Intermediary user organisations as co-producers?', *Research Policy*, Vol 40, Issue 2, March, available at: https://www.sciencedirect.com/science/article/abs/pii/S0048733310001964

Botswana Innovation Hub, available at: http://www.bih.co.bw

Bound, K and I Thornton (2012), 'Our frugal future: lessons from India's innovation system', Nesta, London.

Boyd, T (2017), 'The informal economy in developing nations: a hidden engine of growth', *WIPO Magazine*, June, available at: https://www.wipo.int/wipo_magazine/en/2017/03/article_0006.html#box

Caribbean Development Bank (2018), 'CDB establishes Cultural and Creative Industries Innovation Fund for member countries', available at: http://www.cbc.bb/index.php/mctv/item/1545-cdb-establishes-cultural-and-creative-industries-innovation-fund-for-member-countries

Centre for Social Innovation (2016), Policy brief: Funding frugal innovation, available at: https://www.zsi.at/object/publication/4266/attach/INDIGO_Policy_Brochure_Frugal_innovation_View.pdf

Christiansen, J, B Caffin and B Leurs (2016), 'Public innovation learning: what's next?', Nesta, available at: https://www.nesta.org.uk/blog/public-innovation-learning-whats-next/

CIPS Knowledge (2015), 'Case Study – Babs Omotowa', Chartered Institute of Procurement and Supply, available at: https://www.cips.org/Documents/Knowledge/Procurement-Topics-and-Skills/6-Efficiency/Value-Generation/Babs%20Omotowa%20Case%20Study.pdf

CITIE (2015), *Barcelona digital city: Putting technology at the service of people*, Barcelona Digital City Plan 2015–2019, available at: https://ajuntament.barcelona.cat/digital/sites/default/files/pla_barcelona_digital_city_in.pdf

CITIE (2015), *City Initiatives for Technology, Innovation and Entrepreneurship; A resource for city leadership*, available at: https://media.nesta.org.uk/documents/citie_report_2015.pdf

The Commonwealth (2020), 'Case Study: Innovative Financing – Debt for Conservation Swap, Seychelles; Conservation and Climate Adaptation Trust and the Blue Bonds Plan, Seychelles (ongoing)', The Commonwealth Blue Charter, available at: https://bluecharter.thecommonwealth.org/innovative-financing-debt-for-conservation-swap-seychelles-conservation-and-climate-adaptation-trust-and-the-blue-bonds-plan-seychelles-on-going/

The Commonwealth (2021), Commonwealth 2021 SDG Tracker/ Sustainable Development Solutions Network, available at: https://www.thecommonwealth.io/sdgtracker/

Commonwealth Local Government Forum (undated), Knowledge hub, available at: https://www.clgf.org.uk/resource-centre/knowledge-hub/

Commonwealth of Australia (2015), *National Innovation and Science Agenda*, Australian Government, Canberra.

Corbett, A (2018), 'The myth of the intrapreneur', *Harvard Business Review*, available at: https://hbr.org/2018/06/the-myth-of-the-intrapreneur

Cornell University, INSEAD and WIPO (2017), *The Global Innovation Index 2017: Innovation Feeding the World*, Ithaca, Fontainebleau and Geneva.

Cretu, C, M Stokes and T Symons (2019), 'Cards for the Future', Nesta, available at: https://www.nesta.org.uk/report/cards-for-the-future/

Daglio, M, D Gerson and H Kitchen (2015), 'Building Organisational Capacity for Public Sector Innovation', Background Paper prepared for the OECD Conference 'Innovating the Public Sector: from Ideas to Impact', Paris, 12–13 November 2014, available at: https://www.oecd.org/innovating-the-public-sector/Background-report.pdf

Damanpour, F and D Aravind (2011), 'Organic to Ambidextrous Structure', chapter 19, in MD Mumford (ed.), *Handbook of Organisational Creativity*, Academic Press.

De Silva, M, J Howells and M Meyer (2018), 'Innovation intermediaries and collaboration: Knowledge-based practices and internal value creation', Research Policy, Vol 47, Issue 1, February, 70–87, available at: https://www.sciencedirect.com/science/article/pii/S0048733317301610#bib0075

Deloitte (2013), *Intrapreneurship in government; making it work*, A GovLab report, Deloitte University Press.

Deloitte (2015), 'Five insights into intrapreneurship; a guide to accelerating innovation within corporations', Deloitte Digital.

Douglas, K (2015), 'SnooCode: A solution to the lack of formal addresses in Ghana and beyond', 14 August, How we made it in Africa, available at: https://www.howwemadeitinafrica.com/snoocode-a-solution-to-the-lack-of-formal-addresses-in-ghana-and-beyond/51075/

Department of Science and Technology (2018a), 'Technology Development Programme', available at: http://www.dst.gov.in/technology-systems-development-programme-tsdp

Department of Science and Technology (2018b), 'India Innovation Growth Programme 2.0', India Innovates, available at: http://www.indiainnovates.in/

Donor Committee for Enterprise Development (2008), *Supporting business environment reforms; Practical guidance for development agencies*, Business Environment Working Group, DCED, Cambridge, UK.

Dupont, J (2018), *The smart state; Redesigning government in the era of intelligent services*, The Policy Exchange, London.

Ebrahim, Z and R Darius (2017), 'Boosting employment through innovation; How can we implement the enabling environment

for technological change?', *Discussion Note*, Commonwealth Finance Ministers Meeting 2017, Commonwealth Secretariat, London.

Estica, X (2018), Skype interview conducted by Simon White with Mr Xavier Estico, Chief Executive Officer, National Institute for Science, Technology and Innovation, *Seychelles*.

European Union (2013), European Public Sector Innovation Scoreboard 2013; a pilot exercise, European Commission, Belgium.

European Parliament (2018), 'Ecodesign directive: from energy efficiency to recycling', News, available at: https://www.europarl.europa.eu/news/en/headlines/society/20180522STO04021/ecodesign-directive-from-energy-efficiency-to-recycling

European Parliament (2019), 'Greenhouse gas emissions by country and sector (infographic)', News, available at: https://www.europarl.europa.eu/news/en/headlines/priorities/climate-change/20180301STO98928/greenhouse-gas-emissions-by-country-and-sector-infographic

European Parliament (2020), 'How to promote sustainable consumption', News, available at: https://www.europarl.europa.eu/news/en/headlines/economy/20201119STO92005/how-to-promote-sustainable-consumption

European Parliament (2021a), 'Reducing carbon emissions: EU targets and measures', News, available at: https://www.europarl.europa.eu/news/en/headlines/priorities/climate-change/20180305STO99003/reducing-carbon-emissions-eu-targets-and-measures

European Parliament (2021b), 'Circular economy: definition, importance and benefits', News, available at: https://www.europarl.europa.eu/news/en/headlines/economy/20151201STO05603/circular-economy-definition-importance-and-benefits

European Parliamentary Research Service (2016), 'Closing the loop: new circular economy package', Briefing, available at: https://www.europarl.europa.eu/RegData/etudes/BRIE/2016/573899/EPRS_BRI%282016%29573899_EN.pdf

Filer, T (2019), *Thinking about GovTech: A Brief Guide for Policymakers*, Bennett Institute for Public Policy, University of Cambridge, available at: https://www.bennettinstitute.cam.ac.uk/media/uploads/files/Thinking_about_Govtech_Jan_2019_online.pdf

Fountain, JE (undated), 'The Wicked Nature of Digital Transformation: A Policy Perspective', *Dubai Policy Review*, available at: https://dubaipolicyreview.ae/the-wicked-nature-of-digital-transformation-a-policy-perspective/

Fraunhofer Institute for Systems and Innovation Research (2016), *Cheaper, better, more relevant; is frugal innovation an opportunity for Europe?*, Fraunhofer ISI and Nesta, Karlsruhe, Germany and London, UK.

Fraunhofer Institute for Systems and Innovation Research (2017), *Frugal innovation for Europe*, Fraunhofer ISI and Nesta, Karlsruhe, Germany and London, UK.

Fyson, S, C Lindberg and E Soria Morales (undated), 'Governance for the SDGs – How Can We Accelerate Achieving the Sustainable Development Goals', *Dubai Policy Review*, available at: https://dubaipolicyreview.ae/governance-for-the-sdgs-how-can-we-accelerate-achieving-the-sustainable-development-goals/

Gibson, J, M Robinson and S Cain (2015), *City Initiatives for Technology, Innovation and Entrepreneurship; A resource for city leadership*, June, CITIE, available at: https://media.nesta.org.uk/documents/citie_report_2015.pdf

GIZ (2013), *Shifting the paradigm; mapping the inclusive innovation ecosystem for MSME, GIZ, CII-ITC Centre of Excellence for Sustainable Development and Confederation of Indian Industry*.

GIZ (2017), Green Innovation Centres for the Agriculture and Food Sector (GIC), available at: https://www.giz.de/en/worldwide/32209.html

Glennie, A, I Stanley, J Ollard and R Klingler-Vidra (2020), 'Strategies for Supporting Inclusive Innovation: Insights from South-East Asia', Nesta, 13 March, available at: https://www.nesta.org.uk/report/supporting-inclusive-innovation-se-asia/

Global Innovation Fund (undated) 'No Means No Worldwide', Investments, available at: https://www.globalinnovation.fund/investments/no-means-no-worldwide/

Government Office for Science (2014), *Innovation: managing risk, not avoiding it*, Annual Report of the Government Chief Scientific Adviser, London.

Government of Kenya (2015), Electronic Project Monitoring Information Service website, available at: http://e-promis.treasury.go.ke/portal/development-strategy/vision-2030/

Government of Singapore (2021), 'Smart Nation: The Way Forward', available at: https://www.smartnation.gov.sg/about-smart-nation/transforming-singapore

Granqvist, K (2016a), 'Funding frugal innovations; lessons on design and implementation of public funding schemes for frugal innovations', Tech Monitor, July–September, 31–37.

Granqvist, K (2016b), 'Funding frugal innovation; lessons on design and implementation of public funding schemes stimulating frugal innovation', *Policy Brief*, Centre for Policy Innovation, Vienna.

Gupta, A (2013), 'Tapping the entrepreneurial potential of grassroots innovation', *Stanford Social Innovation Review, Summer*.

Gurumurthy, R (2020), 'Defining success: four tests of good innovation', Nesta, available at: https://www.nesta.org.uk/blog/defining-success-four-tests-good-innovati

Hallsworth, M, M Egan, J Rutter and J McCrae (2018), *Behavioural government; using behavioural science to improve how governments make decisions*, The Behavioural Insights Team, London.

Hossain, M (2016), 'Frugal innovation: a systematic literature review', 21 April, SSRN available at: https://ssrn.com/abstract=2768254

Howells, J (2006), 'Intermediation and the role of intermediaries in innovation', *Research Policy*, Vol 35, Issue 5, June, 715–728, available at: https://www.sciencedirect.com/science/article/abs/pii/S0048733306000497

Hygiene Hub (undated), 'Evidence-based communication materials to promote handwashing against COVID-19, A case study from BRAC and BIT', available at: https://resources.hygienehub.info/en/articles/4537537-evidence-based-communication-materials-to-promote-handwashing-against-covid-19

IBM Cloud Education (2020), 'Application Programming Interface', 19 August, available at: https://www.ibm.com/cloud/learn/api

Imanishimwe, E (2018), 'NIRDA to continue supporting innovative firms', Igihe, 12 October, available at: http://www.en.igihe.com/news/nirda-to-continue-supporting-innovative-firms.html

Imperial College Business School (2016), What Are Digital Platforms?, YouTube, available at: https://www.bing.com/videos/search?q=what+are+platforms+digital&qpvt=what+are+platforms+digital&view=detail&mid=421DC3D5B24E01E7B8ED421DC3D5B24E01E7B8ED&&FORM=VRDGAR&ru=%2Fvideos%2Fsearch%3Fq%3Dwhat%2Bare%2Bplatforms%2Bdigital%26qpvt%3Dwhat%2Bare%2Bplatforms%2Bdigital%26FORM%3DVDRE

India Brand Equity Foundation (2018), 'Atal Innovation Mission, NITI Aayog & MyGov launches', India Brand Equity Foundation, available at: https://www.ibef.org/news/atal-innovation-mission-niti-aayog-mygov-launches-innovate-india-platform?utm_source=phplist1051&utm_medium=email&utm_content=HTML&utm_campaign=India+News+Alert%3A+Direct+Benefit+Transfer+%28DBT%29+mechanism+is+being+used+in+over+500+Government+of+India+schemes%3B+Television+viewership+in+India+has+increased+12+per+cent+in+2016-18

InnoCentive (2017), 'Challenges, prize programs, and the opportunity for government', *Executive White Paper*, June, Waltham, MA.

Innovation and Science Australia (2017), *Australia 2030: prosperity through innovation*, Australian Government, Canberra.

International Development Innovation Alliance (undated), 'What is an Innovation Ecosystem?', available at: https://www.idiainnovation.org/ecosystem

International Development Innovation Alliance (2017a), *Insights on Measuring the Impact of Innovation*, available at: http://insights.globalinnovationexchange.org/resources/

International Development Innovation Alliance (2017b), *Insights on Scaling Innovation*, available at: http://insights.globalinnovationexchange.org/resources/

International Labour Conference (2002), *Conclusions Concerning Decent Work and the Informal Economy*, adopted by the International Labour Conference at its 90th Session.

International Labour Organization (2015), *Formalizing enterprises in Mongolia: Challenges and policy directions*, ILO Decent Work Team for East and South-East Asia and the Pacific, Ulaanbaatar.

International Labour Organization (2018), *Women and men in the informal economy: A statistical picture. Third edition*, available at: https://www.ilo.org/global/publications/books/WCMS_626831/lang--en/index.htm

Kaya, HO and M Chinsamy (2021), 'Closing the gap between living and learning', Association of Commonwealth Universities, available at: https://www.acu.ac.uk/the-acu-review/closing-the-gap-between-living-and-learning/?utm_content=buffer670b6&utm_medium=social&utm_source=linkedin.com&utm_campaign=buffer

Kenya Climate Innovation Centre (2018), website, available at: https://www.kenyacic.org

Lean Thinking Examples (2017), 'What is the philosophy underlying lean thinking?', 26 January, available at: http://www.leanthinkingexamples.com/

Madelin, R (undated), 'Digital Participation: A Public Administration Panacea?', *Dubai Policy Review*, available at: https://dubaipolicyreview.ae/digital-participation-a-public-administration-panacea/

McKinsey & Company (2018), 'Delivering for citizens; how to triple the success rate of government transformations', *Discussion Paper*, June, McKinsey Centre for Government.

Meyer, H (2017), 'Understanding the digital revolution and what it means', 6 July, available at: https://www.oecd-forum.org/posts/17957-understanding-the-digital-revolution-and-what-it-means

Mohammed Bin Rashid Centre for Government Innovation (undated), 'Experimentation is a tool', available at: https://www.mbrcgi.gov.ae/en/experiment/experimentation-starter-kit

Mulgan, G (2014), *Innovation in the Public Sector: How Can Public Organisations Better Create, Improve and Adapt?', Version 1*, Nesta, available at: https://media.nesta.org.uk/documents/innovation_in_the_public_sector-_how_can_public_organisations_better_create_improve_and_adapt.pdf

Mulgan, G (2016), 'Good and bad innovation: what kind of theory and practice do we need to distinguish them? Nesta Blog, available at: https://www.nesta.org.uk/blog/good-and-bad-innovation-what-kind-of-theory-and-practice-do-we-need-to-distinguish-them/

Mulgan, G and D Albury (2003), 'Innovation in the public sector', discussion paper, UK Government, available at: http://www.sba.oakland.edu/faculty/mathieson/mis524/resources/readings/innovation/innovation_in_the_public_sector.pdf

Mulgan, G et al. (2007), 'Social Innovation: What it is, why it matters and how it can be accelerated', The Young Foundation, available at: https://youngfoundation.org/wp-content/uploads/2012/10/Social-Innovation-what-it-is-why-it-matters-how-it-can-be-accelerated-March-2007.pdf

Naselli, J (2021), 'How small island states can create successful innovation policy', Cambridge University, available at: https://www.ciip.group.cam.ac.uk/reports-and-articles/how-small-island-states-can-create-successful-inno/

National Industrial Research and Development Agency (2017), Strategic Plan 2018–2022, available at: https://www.nirda.gov.rw/uploads/tx_dce/02_-_NIRDA_Strategic_Plan_2018-2022_08.pdf

National Innovation Foundation (2018), National Innovation Foundation website, India, available at: http://nif.org.in

National Science Foundation (undated), NSF Innovation Corps, available at: https://www.nsf.gov/news/special_reports/i-corps/index.jsp

Nesta (2014), *Challenge Prizes; A Practice Guide*, available at: https://media.nesta.org.uk/documents/challenge-prizes-design-practice-guide.pdf

Nesta (2018), 'Global Innovation Policy Accelerator', available at: https://www.nesta.org.uk/project/global-innovation-policy-accelerator/

Nesta (2018), 'Longitude Explorer Prize', Case Studies, available at: https://www.nesta.org.uk/case-study/longitude-explorer-prize/

Nesta (2018), Nesta's tools and insights for governments, available at: https://media.nesta.org.uk/documents/Tools_and_insights_for_governments_v8.pdf

Nesta (undated), 'Frugal innovations', available at: https://www.nesta.org.uk/feature/frugal-innovations/

Nesta (undated), 'Innovation games', available at: https://www.nesta.org.uk/project/innovation-games/

Nesta Government Innovation website, available at: https://www.nesta.org.uk/government-innovation/

Neuwirth, R (2011), *Stealth of Nations; The Global Rise of the Informal Economy*, Pantheon Books, New York.

NITI Aayog (2018), 'Atal innovation mission', National Institution for Transforming India, Government of India, available at: http://niti.gov.in/content/atal-innovation-mission-aim#

Nowlan, O (2016), 'Learning from frugal innovation: three lessons for local government', Nesta Blog, available at: https://www.nesta.org.uk/blog/learning-from-frugal-innovation-three-lessons-for-local-government/

Open Data Institute (2020), 'What is open innovation', 30 April, available at: https://theodi.org/article/what-is-open-innovation/

Organisation for Economic Co-operation and Development (2013a), *Supporting investment in knowledge capital, growth and innovation*, OECD Publishing, Paris.

OECD (2013b), 'Singapore: innovation profile', in *Innovation in Southeast Asia*, OECD Publishing, Paris.

OECD (2014), 'Innovation; Addressing economic and social challenges through innovation', *OECD Better Policies Series*, November, available at: https://www.oecd.org/policy-briefs/India-Addressing-Economic-and-Social-Challenges-through-Innovation.pdf

OECD (2015), 'The Innovation Imperative: contributing to productivity, growth and well-being', Directorate for Science, Technology and Innovation Policy Note, October, OECD, Paris.

OECD (2017a), *Fostering Innovation in the Public Sector*, OECD Publishing, Paris.

OECD (2017b), *Core skills for public sector innovation: a beta model*, April, Observatory of Public Sector Innovation, OECD, Paris, available at: https://www.oecd.org/media/oecdorg/satellitesites/opsi/contents/files/OECD_OPSI-core_skills_for_public_sector_innovation-201704.pdf

OECD (2017c), *The next production revolution: implications for governments and business*, OECD Publishing, Paris.

OECD (2018), *Embracing innovation in government: global trends 2018*, Observatory of Public Sector Innovation, OECD, Paris.

OECD (2019), 'Delivering Better Policies Through Behavioural Insights', 16 April, available at: https://www.oecd.org/gov/regulatory-policy/delivering-better-policies-through-behavioural-insights-6c9291e2-en.htm

OECD (undated), 'A framework for public sector innovation', available at: https://www.oecd.org/gov/innovative-government/a-framework-for-public-sector-innovation.htm

OECD, Observatory of Public Sector Innovation (an online resource), available at: https://www.oecd-opsi.org

Pansera, M and S Sarkar (2016), 'Crafting Sustainable Development Solutions: Frugal Innovations of Grassroots Entrepreneurs', *Sustainability*, Vol 8 No 1, available at: https://www.researchgate.net/publication/289525890_Crafting_Sustainable_Development_Solutions_Frugal_Innovations_of_Grassroots_Entrepreneurs

Pansera, M (2018), 'The frugal or fair? Unfulfilled promises of frugal innovation', *Technology Innovation Management Review*, Vol 8 No 4.

The Partnering Initiative (2015), *Zambia Partnering Toolbook: An essential guide to win-win collaboration for sustainable development*, ZBIDF, available at: http://www.thepartneringinitiative.org/wp-content/uploads/2015/10/Zambia-Partnering-Toolbook-1.pdf

Prabhu, J (2017), 'Frugal innovation: doing more with less for more', *Phil.Trans.R.Soc.A* 375: 20160372.

Prabhu, M (2021), 'COVAX vaccines take to the air by drone', 26 February, Gavi, available at: https://www.gavi.org/vaccineswork/covax-vaccines-take-air-drone

Prabhu, J and S Jain (2015), 'Innovation and entrepreneurship in India: understanding jugaad', *Asia Pacific Journal of Management* Vol 32, 843–868.

Pritchett, L, M Woolcock and M Andrews (2010), 'Capability Traps? The Mechanisms of Persistent Implementation Failure', Working Paper 234, December 7, available at: https://www.cgdev.org/publication/capability-traps-mechanisms-persistent-implementation-failure-working-paper-234

Radjou, N, J Prabhu and S Ahuja (2012), *Jugaad innovation: think frugal, be flexible, generate breakthrough growth*, Jossey-Bass, San Francisco, available at: https://www.wiley.com/en-us/Jugaad+Innovation%3A+Think+Frugal%2C+Be+Flexible%2C+Generate+Breakthrough+Growth-p-9781118249741

Radjou, N and J Prabhu (2015), *Frugal innovation; how to do more with less*, The Economist Newspaper Ltd., London, available at: http://naviradjou.com/book/frugal-innovation-how-to-do-more-with-less/

Ramalingam, B, H Rush, J Bessant, N Marshall et al. (2015), *Strengthening the Humanitarian Innovation Ecosystem: Humanitarian Innovation Ecosystem Research Project, Final Report*, University of Brighton, available at: https://www.brighton.ac.uk/_pdf/research/centrim/humanitarian-innovation-ecosystem-research-project-final-report-with-recommendations.pdf

Ramalingam, B and B Kumpf (2021), 'COVID-19 innovation in low and middle-income countries', OECD, available at: https://www.oecd-ilibrary.org/development/covid-19-innovation-in-low-and-middle-income-countries_19e81026-en;jsessionid=5qIeMbkYkKWe9KaRha9w1PNd.ip-10-240-5-25

Rietbergen-McCrackcen, J (undated), 'Participatory Policy Making', CIVICUS, available at: https://civicus.org/documents/toolkits/PGX_F_ParticipatoryPolicy%20Making.pdf

Reid, S, JP Hayes and D Stibbe (2014), *Platforms for Partnership: Emerging good practice to systematically engage business as a partner in development*, the Partnering Initiative, Sida, UK Aid, available at: https://sustainabledevelopment.un.org/content/documents/1687PLATFORMS%20for%20partnerships.pdf

Rodrik, D (2004), 'Industrial Policy for the Twenty-First Century', John F Kennedy School of Government Working Paper Series, rwp04-047.

Roscaa, R, M Arnold and JC Bendula (2016), 'Business models for sustainable innovation – an empirical analysis of frugal products and services', *Journal of Cleaner Production* 162, Supplement, September, S133–S145.

Seyfang, G and A Smith (2007), 'Grassroots Innovations for Sustainable Development: Towards a New Research and Policy Agenda', *Environmental Politics*, Vol 16 No 4, 584–603, available at: https://base.socioeco.org/docs/seyfang_and_smith.pdf

Simon, G (2020), 'Government embarks on science, technology and innovation policy for Saint Lucia', Ministry of Sustainable Development, Energy, Science and Technology, Government of Saint Lucia, available at: http://sustainabledevelopment.govt.lc/news/government-embarks-on-science-technology-and-innovation-policy-for-saint-lucia

Small Industries Development Bank of India (2018), 'Supporting entrepreneurs throughout their journey, from inception to growth', available at: https://www.sidbi.in/TIFAC_SIDBI_Revolving_Fund_for_Technology_Innovation_SRIJAN_Scheme.php

Society for Research and Initiatives for Sustainable Technologies and Institutions (2018), website, available at: http://www.sristi.org/cms/

Soni, P and RT Krishnan (2014), 'Frugal innovation: aligning theory, practice, and public policy', *Journal of Indian Business Research*, Vol 6 No 1, 29–47.

South–South Network for Public Service Innovation (2021), *The South–South Matchmaker* (2nd edition), available at: https://a2i.gov.bd/publication/the-south-south-matchmaker/

Start Network (undated), Disasters & Emergencies Preparedness Programme, available at: https://startnetwork.org/disasters-and-emergencies-preparedness-programme

Stirling, A (2014), 'Making choices in the face of uncertainty', in *the Annual Report of the Government Chief Scientific Adviser, Innovation: managing risk, not avoiding it. Evidence and Case Studies*, London.

Tanzania Invest (2016), 'SAGCOT', available at: https://www.tanzaniainvest.com/sagcot

Torfing, J (2016), *Collaborative Innovation in the Public Sector*, Georgetown University Press.

Torfing, J. (2018), 'Collaborative innovation in the public sector: the argument', *Public Management Review*, Vol 21 Issue 1, available at: https://www.tandfonline.com/doi/abs/10.1080/14719037.2018.1430248?journalCode=rpxm20&

Ubaldi, B (2013), 'Open Government Data: Towards Empirical Analysis of Open Government Data Initiatives', *OECD Working Papers on Public Governance*, No 22, OECD Publishing, Paris.

United Nations (2015), 'Transforming our world: The 2030 Agenda for Sustainable Development', United Nations Assembly Resolution A/RES/70/1, available at: https://sdgs.un.org/2030agenda

UNDP (2016), *Spark, scale, sustain – Innovation for the Sustainable Development Goals; 2016 Year in Review, Innovation Facility*, New York, available at: http://www.undp.org/content/dam/undp/library/innovation/Annual_Report_2016.pdf

UNDP (2018), *Moon Shots and Puddle Jumps – Innovation for the Sustainable Development Goals; 2017–2018 Year in Review, Innovation Facility*, New York, available at: https://www.undp.org/content/undp/en/home/librarypage/development-impact/undp-innovation-facility-year-in-review.html

United Nations (undated), 'Lufumbu Village Water Project, Tanzania: offsetting shortage in water infrastructure', Innovation for Sustainable Development: Local Case Studies from Africa, available at: https://www.un.org/esa/sustdev/publications/africa_casestudies/lufumbu.pdf

UN Department of Economic and Social Affairs (undated), Sustainable Development, The 17 Goals, available at: https://sdgs.un.org/goals

UN Office for South–South Cooperation (undated), South–South Network for Public Service Innovation, available at: https://www.asia-pacific.unsouthsouth.org/our-work/south-south-network-for-public-service-innovation/

University of Oxford (2020), Digital Economy Toolkit: Harnessing digital technologies for inclusive growth available at: pathwayscommission.bsg.ox.ac.uk/digital-economy-kit

Von Krogh, G, B Kucukkeles and SM Ben-Menahem (2020), 'Lessons in Rapid Innovation From the COVID-19 Pandemic', MIT Sloan, available at: https://sloanreview.mit.edu/article/lessons-in-rapid-innovation-from-the-covid-19-pandemic/

WaterAid (2016), 'Making sanitation happen: turning "political will" into action', Policy brief, WaterAid, *London*.

World Bank (2010), *Innovation Policy: A Guide for Developing Countries*, World Bank, Washington, DC.

World Bank, Policy Innovation Platform (an online resource), available at: https://www.innovationpolicyplatform.org

World Bank (2016), *World Development Report 2016: Digital Dividends*, available at: https://www.worldbank.org/en/publication/wdr2016

World Bank (2017), 'Creating consumer awareness for products or services', in Tinsley, E and N Agapitova (eds.), *Cross-Cutting Inclusive Innovations*, April, World Bank, Washington, DC.

World Bank (2018), 'Doing Business; measuring business regulations', available at: http://www.doingbusiness.org

World Bank (2021), World Bank Development Report 2021: Data for better lives, available at: https://www.worldbank.org/en/publication/wdr2021

World Economic Forum (2017), 'The Global Competitiveness Index as a public policy tool', available at: https://reports.weforum.org/global-competitiveness-index-2016-2017/box-2-the-global-competitiveness-index-as-a-public-policy-tool/?doing_wp_cron=1625052656.8997669219970703125000

World Economic Forum (2018), *Global Competitiveness Report*, available at: https://www.weforum.org

World Economic Forum, Innovation website, available at: https://www.weforum.org/agenda/archive/innovation/

World Food Programme (2020), 'Sustainable School Meals', available at: https://innovation.wfp.org/project/sustainable-school-meals

World Health Organization (2020), 'African innovators join the fight against COVID-19', available at: https://www.afro.who.int/news/african-innovators-join-fight-against-covid-19

World Intellectual Property Organization (2005), *Intellectual Property and Traditional Knowledge*, Booklet No 2. Publication No. 920(E), WIPO.

World Intellectual Property Organization (2005), 'WIPO's Work on Traditional Knowledge and Folklore Receives Broad Support', Press Update UPD/2005/251, available at: https://www.wipo.int/pressroom/en/prdocs/2005/wipo_upd_2005_251.html

World Intellectual Property Organization (2015), The Global Innovation Index 2015: Effective Innovation Policies for Development, available at: https://www.wipo.int/edocs/pubdocs/en/wipo_gii_2015.pdf

Appendix A

Table A1. Sectoral impacts of specific technologies in the Commonwealth

Technology adoption	Sectors with most potential to be disrupted	Impacts	Commonwealth examples
Basic ICT	All	'Thin-integration': small gains in terms of improved communication and productivity	e.g. East African firms in tea GVCs: firms are using email and online search (Foster et al. 2018). e.g. Tourism in East Africa: small hotels and travel agents use ICT to research tourism sights, co-ordinate and send e- mail confirmations of bookings (Foster and Graham 2015).
Digital platforms	All	Online information exchange B2C e-commerce platforms	e.g. Kenyan tea auction (Waema and Katua2014). e.g. Online exchange platforms: Chopal (Indial), Esoko (Ghana), mFarm (Kenya) and Novus Agro (Nigeria). e.g. Jumia (Nigeria), Bzzworld (PNG).
Automation/ robotics	Electronics/ automotive	Increasing robot deployment in more digitally prepared countries to meet international standards and quality; but can increase reshoring and limit offshoring in less digitally prepared countries catering to developed country markets.	e.g. Hero MotoCorp in India uses robotic arms and computerized warehouses to make almost7 million motorbikes a year In three factories, with hopes of expanding to 20 world markets by2020 (UNCTAD 2017).
3D-printing	Automotive, electronics, machinery	Increasing modularity of production, creating opportunities for new entrants, but resulting in shortening of the value chain as production shifts closer to end markets. Firms with knowledge of local preferences gain more.	e.g. In the United Republic of Tanzania, recycled plastic bottles are being used as the printing material for 3D-printers, for example, to30-print prosthetics (UNCTAD 2017).

Table A1. Sectoral impacts of specific technologies in the Commonwealth (*Continued*)

IoT	Manufacturing sector, energy	Smart factories can allow scaling upon interconnected manufacturing, leading to more ICT services being embedded within manufacturing processes, particularly data processing services - such as cloud computing and advanced data analytics. Predictive maintenance using IoT can reduce maintenance costs of factory equipment by 10-40 per cent (Manytka et al.2015).	e.g. Makino-one of the largest machine tool manufacturers in the world- launched its smart factory in Singapore in 2019. The facility consists of an existing assembly factory and a new state-of-the-art machining factory, designed with Industry 4.0 and Industrial Internet of Things (IIOT) capabilities to increase productivity and connectivity between its systems. The revamp is expected to nearly double the facility's machine production capacity.
Software as a service Saas	Agriculture	Boosts overall value-chain efficiency by helping to improve the management and tracking of goods and payments in complex value chains, reduce costs and open up export opportunities for more farmers.	e.g. Value chains of nuts using SAP software in Ghana e.g. ERP software, SAGE, in Kenya (Franz et al. 2014)
Blockchain	Agriculture, mobile tech, financial services	Increases logistical efficiency and transparency.	e.g. The Satoshi Centre, Botswana's block chain hub, is Incubating a programme deploying block chain technology in the small-scale agriculture sector. e.g. PLAAS in South Africa, is a full-spectrum farm management system and a robuste-commerce system to enable marketing but also to manage, record and transparently communicate dally agricultural production and stock for Individual farmers and co-operatives(PLAAS 2018).

Source: The Commonwealth (2020)

Table A2. E-Government Survey – Commonwealth Rankings

Member states	2020 - Global	2020 - Commonwealth	Rank change from Global 2018	Member states	2020 - Global	2020 - Commonwealth	Rank change from Global 2018
Australia	5	1	↓ 3	Saint Lucia	112	28	↑ 7
United Kingdom	7	2	↓ 3	Jamaica	114	29	↑ 4
New Zealand	8	3		Botswana	115	30	↑ 12
Singapore	11	4	↓ 4	Kenya	116	31	↑ 6
Cyprus	18	5	↑ 18	Bangladesh	119	32	↓ 4
Malta	22	6	↑ 8	Eswatini	128	33	↑ 13
Canada	28	7	↓ 5	Guyana	129	34	↓ 5
Malaysia	47	8	↑ 19	Rwanda	130	35	↓ 10
Brunei Darussalam	60	9	↓ 1	Lesotho	135	36	↑ 32
Barbados	62	10	↓ 16	Belize	136	37	↓ 4
Mauritius	63	11	↓ 5	Uganda	137	38	↓ 2
The Bahamas	73	12	↓ 1	Nigeria	141	39	↑ 2
Seychelles	76	13	↑ 7	Vanuatu	142	40	↓ 5
South Africa	78	14	↓ 10	Cameroon	144	41	↓ 8
Trinidad and Tobago	81	15	↓ 3	Kiribati	145	42	↑ 8
Sri Lanka	85	16	↑ 9	Zambia	148	43	↓ 15
Fiji	90	17	↑ 12	Samoa	149	44	↓ 21
St Kitts and Nevis	95	18	↓ 24	Tuvalu	151	45	↓ 7
Antigua and Barbuda	98	19	↓ 8	Tanzania	152	46	↓ 13
Dominica	99	20	↓ 6	Pakistan	153	47	↓ 5
India	100	21	↓ 4	Nauru	154	48	↑ 4
Ghana	101	22		Mozambique	163	49	↓ 3
Grenada	102	23	↓ 13	Malawi	165	50	↑ 10
Namibia	104	24	↑ 17	Solomon Islands	166	51	↑ 3
Maldives	105	25	↓ 8	Sierra Leone	174	52	
Tonga	108	26	↑ 1	Papua New Guinea	175	53	↓ 4
St Vincent and the Grenadines	109	27	↓ 5	The Gambia	181	54	↓ 13

Source: UN DESA (2021)
Note: Rankings are based on available country data

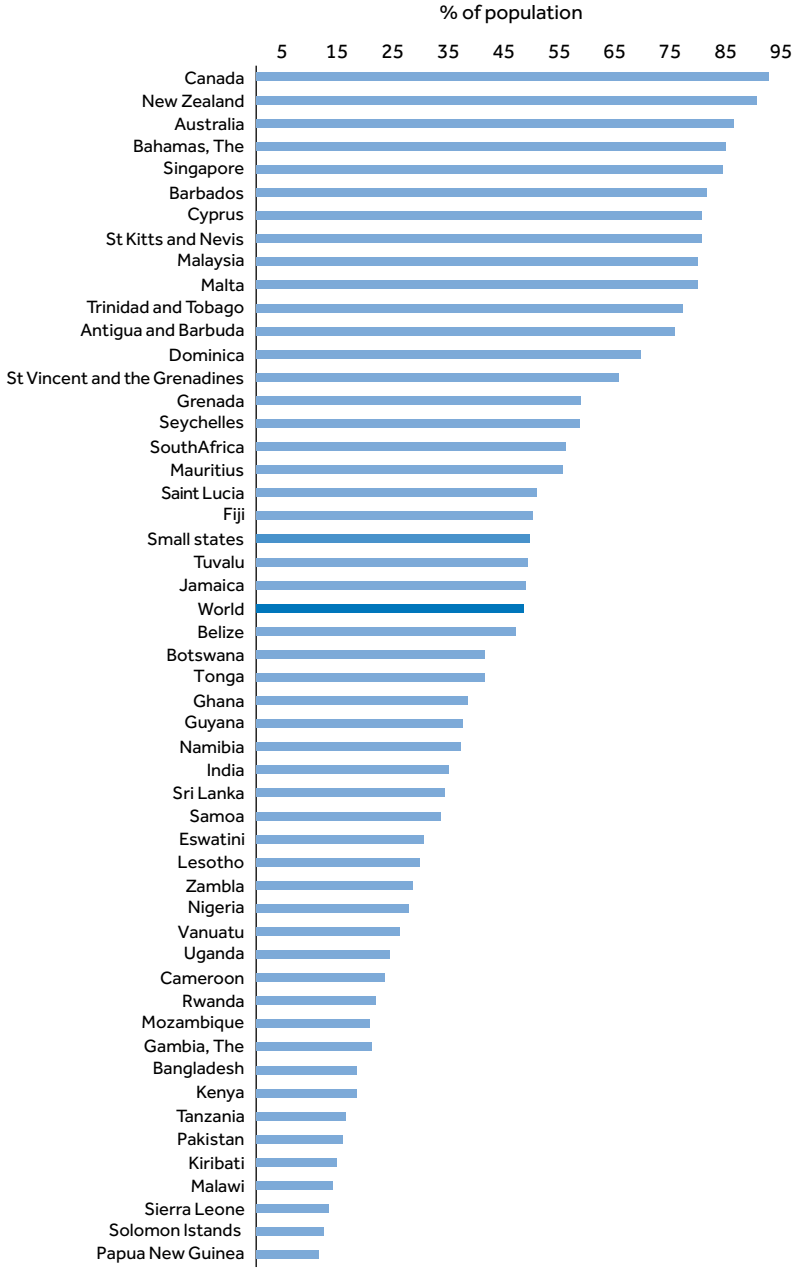
Figure A1. The World Intellectual Property Organization's Global Innovation Index – Commonwealth rankings

Country	Commonwealth rank 2021	Global rank 2021	Global rank 2020	Change in global rank (from 2020 to 2021)
United Kingdom	1	4	4	0
Singapore	2	8	8	0
Canada	3	16	17	1
Australia	4	25	23	–2
New Zealand	5	26	26	0
Malta	6	27	27	0
Cyprus	7	28	29	1
Malaysia	8	36	33	–3
India	9	46	48	2
Mauritius	10	52	52	0
South Africa	11	61	60	–1
Jamaica	12	74	71	–2
Brunei Darussalam	13	82	71	–11
Kenya	14	85	86	1
Tanzania (United republic of)	15	90	88	–2
Sri Lanka	16	95	101	6
Trinidad and Tobago	17	97	98	1
Pakistan	18	99	107	8
Namibia	19	100	104	4
Rwanda	20	102	91	–11
Botswana	21	106	89	17
Malawi	22	107	111	4
Ghana	23	112	108	–4
Bangladesh	24	116	116	0
Nigeria	25	118	117	–1
Uganda	26	119	114	–5
Mozambique	27	122	124	2
Cameroon	28	123	119	–4
Zambia	29	127	122	–5

Source: WIPO (2021)

Figure A2. Internet penetration rates (%) in the Commonwealth, 2017

On average, Commonwealth countries reached 48 per cent internet penetration in 2017. Canada, Australia, New Zealand and The Bahamas rank as the highest within the Commonwealth, with more than 90 per cent of the population having internet access. Meanwhile, more than half (28) Commonwealth member countries fall below the world average on this measure. In Kiribati, Malawi, Sierra Leone, Solomon Islands and Papua New Guinea, less than 15 per cent of the population are connected to the internet.



Source: Authors (constructed graph based on World Bank data).
Notes: Internet penetration is measured as % of population with access to the internet.

Source: The Commonwealth (2020)

References

The Commonwealth (2020), The State of the Digital Economy in the Commonwealth, available at: https://thecommonwealth.org/sites/default/files/inline/Digital%20Connectivity%20Report_low%20res_.pdf

UN Department of Economic and Social Affairs (2021), E-Government Survey, available at: https://publicadministration.un.org/en/Research/UN-e-Government-Surveys

World Intellectual Property Organization (undated), Global Innovation Index (GII), available at: https://www.wipo.int/global_innovation_index/en/

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