



# The role of government in promoting innovation-led entrepreneurial ecosystems



## Authors:

Danielle Nel-Sanders<sup>1</sup>   
Peta Thomas<sup>2</sup> 

## Affiliations:

<sup>1</sup>School of Public Management, Governance and Public Policy, College of Business and Economics, University of Johannesburg, Johannesburg, South Africa

<sup>2</sup>Department of Business Management, College of Business and Economics, School of Management, University of Johannesburg, Johannesburg, South Africa

## Corresponding author:

Danielle Nel-Sanders,  
daniellen@uj.ac.za

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**Background:** The Fourth Industrial Revolution (4IR) presents a number of implications for both the public and private sectors. An important feature of the 4IR is enhancing the sustainability of businesses through innovation.

**Aim:** This article examines the government's entrepreneurial role in promoting innovation-led entrepreneurial ecosystems (EEs).

**Setting:** Through a comparative approach, the research presented in this article investigates the role of government in promoting innovation-led EEs, in a top-performing EE, namely Silicon Valley and South Africa.

**Methods:** A qualitative research design is adopted, and unobtrusive research methods are used for the conceptual, contextual and comparative analysis of authoritative literature and secondary data. A best practice case of Silicon Valley is used to analyse factors influencing innovation-led EE development in South Africa.

**Results:** Challenges currently influencing the growth and sustainability of entrepreneurship in South Africa are identified. These challenges include 4IR readiness, policy implementation and the impact of the coronavirus disease 2019 (COVID-19) pandemic. The findings suggest that governments should play an important role in shaping innovation-led EE policy implementation.

**Conclusion:** The article concludes by proposing a conceptual framework to aid managerial and policy guidance for the development of innovation-led EEs.

**Contribution:** The findings of this article will be useful to guide managerial and policy guidance on the role of government in shaping innovation-led EE policy implementation.

**Keywords:** entrepreneurial ecosystems; entrepreneurial government; Fourth Industrial Revolution; innovation; small and medium enterprises; South Africa; best practices.

## Introduction

The Fourth Industrial Revolution (4IR) presents a number of implications for both the public and private sectors. Some of these implications include digitisation, data reform and revolution, ethics around dehumanising governance and policymaking and the reconceptualisation of capacity, scale and transition. These changes also present a number of opportunities for revolutionising entrepreneurship, which may result in innovation-led development. However, transformative approaches by governments are necessary to fully benefit from the opportunities presented by the 4IR. A prerequisite for the 4IR is an increase in innovation. The South African National Development Plan's (NDP) Outcome 4 addresses decent employment through inclusive economic growth (National Planning Commission 2020). This outcome highlights the importance of innovation. Sub-outcome 9 of Outcome 4 emphasises investment in research, development and innovation to support inclusive growth by enhancing the productivity of existing and emerging enterprises and improving the living conditions of the poor. This article assesses government's role in promoting innovation-led entrepreneurial ecosystems (EEs) for small and medium enterprise (SMEs). This article provides an overview of the conceptual underpinnings of EE, innovation-led EEs and the role of government in providing an enabling environment for the development of innovation-led EEs. The case of Silicon Valley is considered to identify factors influencing innovation-led EE development in South Africa.

## Literature review

The term 'entrepreneurship' has been used in business to explain the exchange and barter between producers and customers of goods and services (Hébert & Link 2006:261; Shane & Venkataraman 2000:217). Recently, Stam (2018:1) has highlighted the importance of

macro-environmental elements and their effect on conducting business within a specific entrepreneurial system. 'Cultural, social, political and economic structures and processes associated with a place' affect how an SME can operate (Stam & Van De Ven 2018:21). Influencing an SME's entrepreneurial system – both as self-interest for growth by the SME and for the growth of complementary businesses of partners connected through the same system – is important for innovation to thrive.

The notion of an ecosystem, where SMEs work within a community of other SMEs to flourish, holds true. Small and medium enterprises must work together to keep their community ecosystem viable (Stam 2015:5). In 21st-century entrepreneurial businesses, the category of social entrepreneurial SMEs cannot be overlooked in terms of business incubators for innovation. Penn, Thomas and Goldman (2019:13) highlight how social entrepreneurs run not-for-profit businesses giving these entrepreneurs the chance to be both innovative and gainfully employed. Ngorora and Mago (2018:8) and Penn et al. (2019:13) further note that in South Africa, social entrepreneurial SMEs (often registered as non-profit organisations) often constitute a business incubator for both employee upskilling and innovation. This allows them to adapt to the macro environment's influences by developing unique funding sources and business models to attain the dual goals of social and financial value creation. Small and medium enterprises operating in an EE community develop business models from the economic perspective of profitability and the social standpoint of social innovation (Wu, Wu & Wu 2018:5).

### Small and medium enterprise ecosystems

The EE concept is generally loosely defined and measured (Stam & Van Den Ven 2019). Mason and Brown (2014) define an EE as:

[A] set of interconnected entrepreneurial actors (both potential and existing), entrepreneurial organizations (firms, venture capitalists, business angels, banks), institutions (universities, public sector agencies, financial bodies) and entrepreneurial processes (the business birth rate, numbers of high growth firms, levels of 'blockbuster entrepreneurship', number of serial entrepreneurs, degree of sell out mentality within firms and levels of entrepreneurial ambition) which formally and informally coalesce to connect, mediate and govern the performance within the local entrepreneurial environment. (p. 5)

Stam (2015:2) provides a synthesis of EE system components. Specific conditions need to be in place in an EE for SMEs to encourage a culture of 'ambitious entrepreneurship' which is a premise for adopting an 'entrepreneurial ecosystem approach to developing elements of policies that support ambitious and innovative SME growth' (Stam 2015:1).

Spigel (2017:52) groups the components of EE into three categories, namely cultural, social and material. The ecosystem of interrelationships developed for these three categories, to a lesser or greater extent, encourages productive entrepreneurship within a particular geographic context. Regional culture influences entrepreneurial activities through

the feelings of trust and safety that must develop for a community of co-existing entrepreneurs (Audretsch & Belitski 2017:6). An EE's culture will be influenced if the EE includes prominent local role models who are successful in their entrepreneurial ventures and who can be emulated (Feld 2012). Positive societal customs and perspectives concerning entrepreneurship are also important (Brown & Mason 2017:23). Social EE attributes include the ecosystem having talented workers. These opportunistically leverage the EE community's networks of knowledge about the entrepreneurship process through informal social networks (Stam & Spigel 2016:9) as well as accessing investment capital (Atiase et al. 2017:649). The material attributes of an EE encouraging SMEs to flourish are government policies that stimulate market mechanisms to encourage SME sales (Atiase et al. 2017:645); universities providing entrepreneurial catalysts of stimulus (Stam 2015:4); support services in the form of organisations or individuals who act as mentors, offer professional services and provide opportunities for business idea incubation (Stam 2015:3) and domestic markets to test out local products on local people as well as larger global and regional African markets, which can now be accessed with limited resources thanks to technological communication advances (Spigel 2017:56).

### Entrepreneurial ecosystem impacts

It is important to measure the variables at play in EEs at any point to encourage entrepreneurial growth. The effects of these variables change over time; therefore, investors such as governments and private finance sources need to understand how SMEs are reacting, adapting and using changing ecosystems optimally to protect their ventures (Taich et al. 2016:18). Theoretical interpretations of these complex, shifting systems have been posited for some years (Stam 2018:5), but little progress has been made on what actually leads to the management of a healthy system. Measurement becomes a way of interpreting EE health to support SME growth (Stangler & Bell-Masterson 2015:1). This is because constant measurement pinpoints what ails EEs. However, the measurement of such ecosystems is difficult because they are constantly changing. Ultimately, each entrepreneur's awareness of the elements of the system that aid development and how these elements connect plays a central role in their own SME growth (Cavallo, Ghezzi & Balocco 2018:9; Prochazkova 2016:25). The EE must be able to accept and adapt to change if it is to survive as a whole; it also needs to refocus the flow of available resources to all SME elements in a manner that balances the system for renewed growth (Roundy, Brockman & Bradshaw 2017:21). One such balancing agent in African SME EEs is the increasing use of business hubs (incubators, accelerators and co-working spaces), linked within cellular communication networks to provide entrepreneurs with the information and skills required to survive and leverage change for continued viability (Global System for Mobile Communications [GSMA] 2019:10).

South Africa, Nigeria, Egypt, Kenya and Morocco have used this concept to develop SME support nodes, set within

networks (Friederici 2016:18; GSMA 2019). For developing countries, this suggests the need for a new business system model that is dynamic, as opposed to traditional, static strategy tools (for instance, SWOT, Boston Consulting Group analytics). This is because knowledge-sharing lies at the core of SME development. Yet, this requirement for links between information nodes appears largely unrecognised by African governments. Indeed, only 40% of Africans have access to the internet, compared with the rest of the world at over 60% (Internet World Stats 2019). Khodaei and Ortt (2019:1) indicate that four connection criteria need to be assessed for dynamic system connections: 'completeness of business model aspects (inputs, transformations, outputs), interrelationships between aspects, interrelationships over time, [and] framework changes over time and across contexts'. This unique information flow of a stable EE is one specific requirement for success in an EE but goes a long way to linking resources to each SME. The dynamic business model is as yet little understood in practice (Haas 2018:38), yet it is essential to understand African SME EE sustainability, namely a system that requires *sharing through interconnection*.

The African entrepreneurial technology revolution has a number of influences on SME EEs. Small and medium enterprises are growing in South Africa. The country's Small Enterprise Development Agency's (SEDA) 2019 survey shows that employment 'provided by SMMEs [small, medium and micro-sized enterprises] (including the owners) increased to 10.8 million in 2019 Quarter 1, accounting for 66% of economy-wide employment' (SEDA 2019:1). The establishment of the African Continental Free Trade Area (AfCFTA) in March 2018 sought to deepen the economic integration of African businesses by creating a single, continental market with free movement of business and investments (Intracen 2018:2). The guiding principles of AfCFTA will, in turn, facilitate job creation for African SMEs through opportunities to trade with ease through multilateral and regional trade agreements. In this way, SMEs will be able to find potential synergies, solve common issues and benefit from opportunities with their continental trade partners. Radical change in an African SME EE requires radical mindset changes in policies that facilitate entrepreneurial creativity.

Audretsch and Link (2012:16) suggest that policy should have predefined levers to encourage higher levels of entrepreneurial activity to boost SME performance and national economic growth. The Frost and Sullivan (2019) information and communication technology (ICT) report suggested that in 2019, South Africa would genuinely embrace such a policy lever by expanding ICT to support regional and continental SME growth. This EE system for economic growth would be facilitated by improving the reach of Internet-based communication links to rural areas and across business. Managing an EE requires continuous dialogue across all EE stakeholders to agree on strategic goals. Noruwana, Chigona and Malanga (2018:3) observe that in rural areas, creating awareness of what ICT can offer is central to empowering previously disadvantaged rural

people to undertake business development using their mobile phones and the Internet.

## Innovation-led entrepreneurial ecosystems

Innovation is a key driver of entrepreneurial and economic growth. Surugia and Surugia (2018:106) state that 'without innovation, a society cannot evolve and develop'. Bashir and Akhtar (2016:91) concur that 'innovation and entrepreneurship are ... key factors of growth and survival of modern economies'. Economic development is also characterised by social and technological progress. It includes both quantitative and qualitative determinants, such as capital, resources, production, goods and services, knowledge, scientific and technical information, technological innovation, research development and investment (Surugia & Surugia 2018:106).

In the early 1900s, Joseph Schumpeter, an economist, popularised the concept of innovation of economic development. According to Schumpeter, 'an entrepreneur is the man who gets new things done, and not necessarily the man who invents' (Schumpeter & Clemence 1989:266). In this context, the term 'new' is subjective; 'what is new to one firm, is not necessarily new to another' (Kim-Soon et al. 2017:3).

The following aspects are included in Schumpeter's (1939) conceptualisation of innovation:

[C]hanges in the methods of supplying commodities, technological change in the production of commodities already in use, the opening up of new markets or of new sources of supply, improved handling of material and the setting up of new business organisations. (p. 80)

Furthermore, Schumpeter (1939:80) explains that 'any [way of] "doing things differently" in the realm of economic life [is an] instance of ... innovation'.

Firms and countries can pass through the various stages of growth faster in an environment that enables innovation (Surugia & Surugia 2018:114). To develop innovation-led EEs, governments must facilitate change and reform to stimulate innovation. As mentioned earlier, good governance by the government is necessary to create a conducive environment for entrepreneurial growth. Change and innovation take place across three levels of good governance (Duits & Kleingeld 2013:5).

These governance levels include:

1. Focus on inputs to create organisational processes, strategy, structures and systems.
2. Focus on outputs to achieve objectives, performance and effective mobilisation of resources and managing change, adaptive capacity and innovation.
3. Focus on outcomes to create value and sustainability (Duits & Kleingeld 2013:5).

A transforming society would advance past the first level of governance and function at the second and third levels.



Various stakeholders in society contribute to innovation; governments alone cannot fulfil this role. Entrepreneurs should also actively change and innovate their strategy, systems and structures to enable an innovative EE. According to Sama, Ndunguru and Baisi (2014:64), 'risk-taking, creativity and innovativeness are specific tools of an entrepreneur; hence an effective entrepreneur converts a source into a resource'. Innovation is not possible in an environment that is not conducive to creativity and adaptation (Surugia & Surugia 2018:111).

Important characteristics of an innovative entrepreneur are to have an attitude and aptitude for change, take initiative, be highly motivated and action-oriented and be willing to take risks (Windapo 2018:3). Innovation enables adaptability, resilience, productivity and the ability to change. It stimulates job creation, productivity, growth, competition and business development (Bashir & Akhtar 2017:91). Innovation requires a sense of imagination to transform raw information into fresh ideas (Windapo 2018:1).

Francke and Alexander (2019:2) argue that it is important for entrepreneurs to innovate their business models. This implies transforming their business systems to determine the area in which market innovation is most desired (Francke & Alexander 2019:2–3). Re-engineering business models in this way may require disruptive innovation. Disruptive innovation should be facilitated through good management (Francke & Alexander 2019:1). However, a holistic approach to innovation is necessary. Disruptive innovation represents novel technology or a new business model. It is therefore important to consider innovation across products, processes and organisations. Product innovation involves creating a totally new product from new materials (Kim-Soon et al. 2017:3). Process innovation focuses on eliminating non-value-adding activities in delivery and production-related processes and decreasing variable cost or increasing the variable speed of processes (Kim-Soon et al. 2017:7). Organisational innovation involves the renewing of organisational structure to facilitate teamwork, strategic partnerships and collaborations; production and quality management systems and renewing systems, including human resources, supply chain and information management (Kim-Soon et al. 2017:8).

Sun et al. (2019:104–105) recommend moving beyond the two ideal types of government approaches in an innovation ecosystem towards a hybrid approach that combines both the top-down and bottom-up approaches. Sun et al. (2019:104) explain that the top-down approach is where 'the government acts more like a planner and directly involves itself in the innovation process'. With a bottom-up approach, 'the government regards its role as more of a facilitator and promotes innovation through market mechanisms, such as indirect incentives' (Sun et al. 2019:104). Mason and Brown (2014) emphasise that:

[E]fforts to stimulate high growth entrepreneurship cannot be restricted to top-down efforts which simply focus on

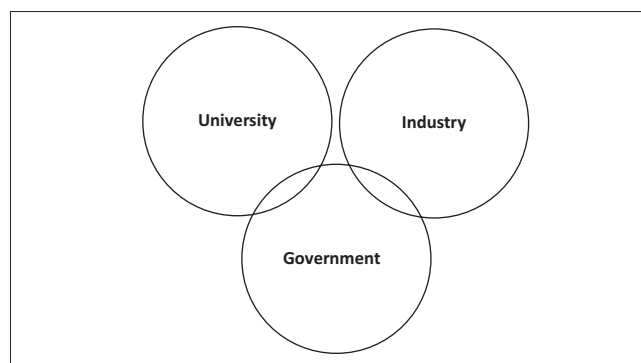
framework conditions. Bottom-up efforts, involving other tiers of government as well as non-government actors, are also required. (p. 8)

Entrepreneurship in the EE context is not limited to the for-profit sector; numerous entrepreneurial actors in the public and non-profit sectors also play a critical role in either enabling or limiting components of an ecosystem (Stam & Van Den Ven 2019). It is important that governments stimulate investment in research and development (R & D) and innovation (Surugia & Surugia 2018:107). Collaboration with various stakeholders in society is important to achieve innovation-led development. Collaboration can take place at different levels of society, including higher education, academia, the public sector, industry, multilateral organisations and civil society.

Etzkowitz (2002:2) is a seminal source defining the collaboration between three entities – universities, industry and the public sector – as follows: 'the "triple helix" is a spiral model of innovation that captures multiple reciprocal relationships at different points in the process of knowledge capitalisation'. The first element in the triple helix model is internal innovation in each of the helices, for instance, the development of links between entities, coupled with an economic development goal. The second element is the overlapping effect of each helix. The final element is the formation of a new connection of trilateral networks from the collaboration between the helices, to achieve high-tech development and innovation (Etzkowitz 2002:2). Figure 1 illustrates the triple helix model.

The triple helix model emphasises collaboration and partnerships to stimulate opportunities for improved research and innovation. There are many benefits to increased innovation through collaboration between higher education research innovation (HERI) institutions and the public and private sectors to facilitate an entrepreneurial mindset among students moving into the business world. There should be a synergy in the relationship between HERI institutions, the government and the private sector (Nel 2010:573).

Higher education research innovation institutions should emphasise 'managing and producing knowledge and research



Source: Etzkowitz, H., 2002, 'The triple helix of university-industry-government: Implications for policy and evaluation', Working Paper 2002–11, Science Policy Institute, Stockholm, viewed 20 March 2020, from [http://www.sister.nu/pdf/wp\\_11.pdf](http://www.sister.nu/pdf/wp_11.pdf)

FIGURE 1: The triple helix model.

for impact. Research for impact should extend to multiple domains of innovation for economic and sustainable value, social good and human capital' (Nel 2010:574). Universities should take on an entrepreneurial role in society. The entrepreneurial university is recognised as an important role player in facilitating innovation, with its focus on university-industry connections (Sun et al. 2019:107).

Sun et al. (2019:107) argue that 'in addition to the traditional tasks of teaching and research, universities are increasingly expected to engage in a third mission of supporting socio-economic development, including developing collaborations with industry'. University-industry connections should engage in local innovation systems (Sun et al. 2019:111). Actors in the triple helix model should not function in isolation. This model enables SME EEs as open systems. Stam (2018:9) observes that energy and influences flow between all business systems as they are interconnected; therefore, if one is doing well, the value of its health will automatically flow into promoting viable SME EEs.

Networked governance is necessary to ensure that the actors in the triple helix benefit from conjunction. Network theory and network governance are based on the principle of conjunction. Conjunction is a process where events occur concurrently. Network theory emphasises the benefits of interagency concurrence, which could encourage the exchange of specialisation, knowledge and research and innovation between agencies (Nel 2015:82).

Networked governance is also referred to as 'digital era governance', which focuses on 'reintegrating responsibilities into government, needs-based holism (doing things in joined-up ways) and digitalisation' (Auriacombe 2017:36). Network governance should 'exploit the capabilities of modern information and communication technology (ICT)' (Auriacombe 2017:36). Building strong innovation networks is important as the strength of a national system of innovation (NSI) is dependent on the quality, quantity and performance of innovation in a network (Manzini 2015:6). Establishing an NSI is key to facilitating innovation in society.

### **The role of government in developing innovative entrepreneurial ecosystems**

The neoliberalist school of thought emphasises the importance of SMEs as promoters of economic and social development, particularly in developing countries (Dzafic & Babajic 2016:70). The development of entrepreneurial activity depends on the institutional, physical and financial infrastructure of a country. The higher the level of infrastructure, the higher the level of entrepreneurial development (Dzafic & Babajic 2016:68). However, developed markets are saturated for new business compared with developing countries with lower gross domestic product per capita and fewer entrepreneurial opportunities (Friedman 2011:224). According to Cassim, Soni and Karodia (2014:29), 'entrepreneurs in developing countries have more opportunities to exploit, thereby increasing the potential for

entrepreneurship to contribute to decreasing unemployment and increase economic growth'.

Entrepreneurship is important for national competitiveness (Friedman 2011:224). Small and medium enterprises stimulate economic growth and development (Dzafic & Babajic 2016:68). The relationship between government and entrepreneurship is complex (Friedman 2011:224). The success of SMEs is dependent on the support provided by government (Dzafic & Babajic 2016:68). Entrepreneurship is affected by the leadership and quality of governance in a country (Faruk & Atobatele 2018:18).

Mason and Brown (2014:19–21) identify the following policy factors in creating a conducive environment for EE development:

- Government can contribute to the pre-conditions for the emergence of EE; however, policy alone cannot systematically 'create' EE.
- Policy approaches need to evolve over time. Ecosystems are dynamic and complex organisms. Appropriate forms of intervention will therefore be related to the maturity of the ecosystem.
- Policies should be 'fit for purpose' as there is no 'one size fits all' approach. The local context needs to be taken in consideration as every country is unique. Policy implementation has to be holistic and initiatives should not be introduced in isolation.
- Policies should establish connections between different components within EE. Policies should build networks and connections between different actors such as the public and private sector and higher education.

Good governance is necessary to build an environment conducive to entrepreneurial growth. Faruk and Atobatele (2018:18) define governance as the 'process of managing public and private affairs'. Good governance nurtures entrepreneurship; citizens are more inclined to take new risks in terms of starting, investing and managing businesses if they trust in the government's effectiveness, the rule of law and political stability (Friedman 2011:221). Governance should create social cohesion and value, which is a balancing act between change and sustainability (Duits & Kleingeld 2013:1).

Value creation is realised by a number of actors such as businesses, clients, financial institutions, suppliers and governments, and should be based on trust and shared objectives (Duits & Kleingeld 2013:3). The role of the government in the entrepreneurial economy is to protect business ventures. The government and its officials do not act as executive authorities; their role is to provide administrative services for business to succeed (Dzafic & Babajic 2016:68). The entrepreneurial role of government includes land policy, legal and administrative reform, training and development, technology and information, finance and credit policy, support institutions and trade and export promotion policies. Most studies on the relationship

between governments and SMEs have indicated that government policies influence entrepreneurial activities; however, very little research has been conducted on the impact of government policies on SME EEs (Akinyemi & Adejumo 2018:2).

A number of challenges need to be addressed by government to create a more conducive environment for SMEs, including removing barriers such as company registration by simplifying regulations, removing time limits for land registration in terms of issuing approvals and permits and reducing bureaucratic obstructions such as delays and rigid administrative practices (Dzafic & Babajic 2016:73).

Various measures need to be taken to ensure concrete economic, institutional and legislative reforms to support sustainable SME EEs, including:

- maintaining macroeconomic stability
- increasing private investment in the SME sector
- developing a robust legal framework for SMEs
- eliminating bureaucratic barriers (Dzafic & Babajic 2016:77).

To stimulate entrepreneurial development, policymakers should target specific entrepreneurship phases to stimulate growth (Akinyemi & Adejumo 2018:16).

Nguyen et al. (2009:62) assert that the growth of an SME depends on relationships between government and market resources; they explain that unsynchronised support from the government plus inadequate market support hinder SME growth. In a study on SMEs in Vietnam, Nguyen et al. (2009:62) identify government and market factors that affect SMEs. The market forces that influence SMEs include the business and legal environment, the social and cultural environment, the supporting infrastructure, the level of technological development, access to global information and knowledge networks and the presence of business clusters and networks with suppliers (Nguyen et al. 2009:62).

Faruk and Atobatele (2018:18) argue that 'the success of entrepreneurship in a country depends on ... sound policy direction of the country'. The challenge of governments is to develop policies that encourage economic growth, job creation and entrepreneurship (Igwe 2016:31). In the absence of a strong market in a developing context, government needs to play a central role in creating those conditions (Nguyen et al. 2009:61). Governments should facilitate innovation by providing policy and financial instruments and by removing regulatory, structural, competitive and functional obstacles to innovation (Rogerson 2018:27). Innovation is widely recognised by experts and decision-makers as a powerful means to facilitate economic development (Surugia & Surugia 2018:106).

## Research methodology

This study is theoretical and descriptive in nature and utilises a qualitative research approach by way of a literature

study. Secondary data, academic literature, government reports, policies and other authoritative sources were consulted. Unobtrusive research techniques were used to analyse credible documents, literature and secondary data. Unobtrusive research techniques are non-reactive, with information gathered from public documents (Auriacombe 2016:6). Both conceptual analysis and qualitative content analysis were applied. Secondary data were used to analyse factors influencing South Africa's EE development. Country data for South Africa was obtained from the most recent Global Competitiveness Index 2018 of the World Economic Forum (WEF) and the most recent Govdata 360 (2017) World Bank indicators.

The article is based on a desktop study by way of documentary review. The methods used in conducting a documentary analysis, determining inclusion and exclusion criteria, choosing the correct search keywords and screening sources for relevance. Appropriate sources were selected based on the following key search words: SME, EE, Innovation in SMEs, Innovation & EE, Triple helix model, Government & EE, EE & best practice, EE & innovation & best practice and databases were selected to search for relevant documents. The search process was carried out based on selected inclusion and exclusion criteria to find the most appropriate sources of information. The article has undertaken three stages to the review:

1. firstly, finding the initial list of studies
2. secondly, evaluating relevance
3. thirdly, extraction and analysis of data.

In order to locate the initial list of sources, 11 website databases were searched using the relevant keywords. The search took into account titles, key concepts, abstracts and full texts, and it was not publication-year-restricted. The following online databases were used: Elsevier, Google, Ebscohost, Emerald, Sage Publications, Wiley Online, WEF, GovData 360, Global Competitiveness Index 2018, World Bank Indicators and Government websites. The initial stage generated a total of 113 sources of information including articles and internet web pages. Table 1 indicates the initial list of sources generated through the first review.

After carefully reviewing the titles, keywords, abstracts and complete texts, relevant sources were selected from the initial list and irrelevant sources were illuminated. The following exclusion criteria were applied to remove irrelevant sources and articles from the initial list: the source did not focus on SME, EE, Innovation in SMEs, Innovation & EE, Triple helix model, Government & EE, EE & best practice, EE & innovation & best practice and the source was not English. A total of 81 sources were included after evaluating the relevance based on inclusion and exclusion criteria.

During the extraction stage, the most important information and data were extracted based on the inclusion and exclusion criteria. This information and data were synthesized in a

**TABLE 1:** Initial list of research.

Database	Type of document	Number of articles	Filtered by key concept or title	Total number of relevant documents used	Type of source used	Total number of sources used
Elsevier	Journal	4	SME, EE, Innovation, Government and EE	4	Articles	4
Google	All	40	SME, EE, Innovation, Government and EE, best practices, Triple helix model	20	Conference articles, books, other internet sources	20
Ebscohost	Journal	18	SME, EE, Innovation, Government and EE	14	Articles	14
Emerald	Journal	22	SME, EE, Innovation, Government and EE	20	Articles	20
Sage Publications	Journal	10	SME, EE, Innovation, Government and EE	8	Articles	8
Wiley Online	Journal	16	SME, EE, Innovation, Government and EE	12	Articles	12
World Economic Forum	Secondary country data	1	SME country indicators	1	Internet source html text	1
GovData 360	Secondary country data	1	SME country indicators	1	Internet source html text	1
Global Competiveness Index 2018	Secondary country data	1	SME country indicators	1	Internet source html text	1
World Bank Indicators	Secondary country data	1	SME country indicators	1	Internet source html text	1
Government	Policies	4	SME, EE, Innovation	1	Policy framework	1
<b>Total</b>	-	<b>113</b>	-	<b>81</b>	<b>Articles</b>	<b>81</b>

SME, small and medium enterprises; EE, entrepreneurial ecosystems.

literature review. In total the article used 81 articles and other internet sources. Fifty-eight sources were used in the study; these include journal articles, books, official documents, conference articles and online databases.

The qualitative findings that focused on the emergent themes and conceptualisations were used to form a conceptual framework. Silicon Valley was selected as a case to compare with the South African context. Information is provided according to the key issues, analysed at the macro level. These key issues were derived from the best practices of the Silicon Valley case. Furthermore, informed by a theoretical and conceptual investigation, a conceptual framework was developed. This framework revealed the scope of concepts, assumptions, expectations, beliefs and theories that supported the analysis (Auriacombe 2016:5).

### Ethical considerations

Ethical clearance to conduct this study was obtained from the University of Johannesburg School of Public Management, Governance and Public Policy, Research Ethics Committee (reference number: 20PMGPP02).

## Results and discussion

The top-performing EE in the world is Silicon Valley. Based on the case study of Silicon Valley, this section provides an overview of best practices for establishing an innovation-led EE system.

### Best practices from Silicon Valley

The Global Startup Ecosystem Report 2020 (GSER 2020) classifies Silicon Valley as the top performing EE globally. Silicon Valley has produced successive waves of disruptive technologies and innovations that have profoundly affected the world since the invention of the transistor radio (Kushida 2015:4).

The WEF (2014) indicates that there are eight pillars for EE development, identifying Silicon Valley as the strongest by

the prominence of each pillar. The pillars of an EE identified by the WEF (2014) include the following:

- Accessible markets with revenue-paying customers, who are the lifeblood of all for-profit companies.
- The scaling of an early-stage company is enhanced by the quality and quantity of its workforce.
- Companies with deep financial reserves benefit from the flexibility of acquiring many of the resources that help sustain their growth.
- Support systems and mentors constitute a pillar that facilitates early-stage development.
- Government and regulatory frameworks constitute a pillar, including ease of starting a business, tax incentives and business friendly legislation and policies.
- Availability of an educated workforce.
- Major universities are catalysts and play a key role in the growth of EE.
- Cultural support plays a key role in entrepreneurship.

The lessons from Silicon Valley are important for the development of EEs, which rely on innovation and productivity gains to achieve value (Kushida 2015:4). Silicon Valley's economic success has been attributed to its relatively open, non-hierarchical, 'regional network-based industrial system' with porous boundaries (Mason & Brown 2014:7). Educational institutions played a key role from the outset, and continue to play a key role in the growth of entrepreneurship in Silicon Valley (WEF 2014). According to Kushida (2015), the following are key elements of the Silicon Valley EE:

- Dual ecosystem of large firms and start-ups: Silicon Valley has a business ecosystem in which both large firms and start-ups exist symbiotically.
- Silicon Valley has extremely competitive industries with a balance of open innovation and intellectual property protection.
- Successful entrepreneurs can expect high financial returns. Silicon Valley has the most competitive venture capital market in the world.
- The business infrastructure of Silicon Valley, such as law firms, accounting firms, mentor networks and other



- aspects, provide value to entrepreneurs and start-ups beyond direct financing or services rendered.
- Silicon Valley enjoys an extremely deep human resources pool in which people from all over the world come to compete. Labour mobility in Silicon Valley is higher than in other areas of the country, particularly in the IT sector.
  - Global top-level human resources are available for all stages of start-ups.
  - Universities provide focal points for human resource clusters; top talent from all over the world has come to Silicon Valley through universities.
  - Extensive government role in shaping technological trajectories and basic science. The government was not only critical to establishing Silicon Valley but it also continues to fund much of the research in the area.
  - Silicon Valley is widely known to have a culture of accepting failure as a positive experience if the failure led to important lessons.

### Factors influencing an innovation-led entrepreneurial ecosystems in South Africa

Silicon Valley's best practices identified in section 'best practices from Silicon Valley' were analysed to determine the factors influencing innovation-led EE in South Africa. Table 2 presents the factors influencing innovation-led-innovation EEs in South Africa.

The following have been identified by the WEF (2018) as the most problematic factors for conducting business in South Africa:

- corruption
- crime and theft
- government instability or coups
- tax rates
- inefficient government bureaucracy
- poor work ethic
- restrictive labour regulations

**TABLE 2:** Comparison between the Silicon Valley entrepreneurial ecosystems and the South African entrepreneurial ecosystems.

Number	Silicon Valley best practice	Practice in South Africa
1	Dual ecosystem capacity	Yes. South Africa accommodates both large firms and start-ups.
2	Competitive industries	Yes. South Africa is one of the most competitive countries in sub-Saharan Africa, although the economy is nearly at a standstill (WEF 2018).
3	Competitive venture capital market	No. It is difficult to acquire venture capital (World Bank Govdata 2017).
4	Business support and mentoring	No. Poorly educated work force and lack of capacity to innovate (WEF 2018), specifically lack of experienced SME owners to pass on tacit or implicit SME business knowledge.
5	Labour mobility and deep human resource pools	No. Poorly educated workforce (WEF 2018).
6	Top human resource levels	No. Poorly educated workforce (WEF 2018).
7	Universities as EE focal points	Yes, but can improve. WEF (2018) scores South Africa's higher education system as 4.1 out of 7.
8	Extensive government role in basic science	Yes, but can improve. WEF (2018) scores South Africa's basic education system as 4.5 out of 7.
9	Culture	No. Lack of cultural experience to innovate (WEF 2018).

SME, small and medium enterprises; EE, entrepreneurial ecosystems.

- poorly educated workforce
- inflation
- lack of access to financing
- policy instability
- inadequate infrastructure
- insufficient capacity to innovate
- tax regulations
- poor public health
- foreign currency regulations.

These factors should be addressed to create an enabling environment for innovation-led EE development. Access to foreign capital, government tax credit and subsidies is instrumental in facilitating entrepreneur innovation. Companies that have access to foreign capital are more likely to innovate (Udimal et al. 2019:10). It is therefore important for the government to decrease the level of political risk in the country, which would attract foreign investors and decrease sovereign and credit risk. South Africa has often been downgraded to junk status by international credit rating agencies, which decreases trust in local business and creates a poor reputation for foreign assistance.

Governments should adapt to become more resilient and efficient at all levels and actively seek service delivery innovation (Manzini 2015:6). Entrepreneurial innovation in industry has resulted in rapid change; governments will not be able to keep up with this change unless they innovate themselves and embrace technological innovations in ICT and the Internet to move towards virtual government (Naudé 2017:12).

Innovation systems involve diverse organisations, which co-evolve capabilities in the co-creation of value (Dedehayir, Mäkinen & Ortt 2018:5). Rogerson (2018:25) identifies three stages of developing innovation systems, namely:

1. Emergent innovation system: Low levels of technological innovation.
2. Fragmented innovation system: Dual system with medium levels of technological capacity and some pockets of innovation.
3. Mature innovation system: International competitiveness and high levels of technological capability.

South Africa can be classified as an example of a fragmented innovation system (Stage 2 in the development process). This is characterised by a dual innovation system that consists of developed and underdeveloped clusters performing at different speeds (Rogerson 2018:25). The underdeveloped cluster includes the informal sector, social and economic disparity, inequality in terms of education and corruption (Rogerson 2018:26). A number of key drivers are necessary for improved innovation, including market development, capacity building, national systems of innovation and institutional development (Naudé, Szirmai & Goedhuys 2011:4-7).

A horizontal alignment of development agenda and science, technology and innovation (STI) policy, coordination and implementation is required (Rogerson 2018:26) for



South Africa to move to Stage 3. Governments should facilitate innovation by providing policy and financial instruments and by removing regulatory, structural, competitive and functional obstacles to innovation (Rogerson 2018:27). Government and public investments have historically been responsible for the greatest innovations by funding the riskiest research, which has led to ground-breaking discoveries and new markets (Mazzucato 2014:62). In South Africa, the development of science, technology, engineering and mathematics (STEM) skills is actively encouraged through tripartite collaborations with community, the government, public high schools, lecturers from the University of Johannesburg and industry representatives through the South African Institute of Electrical Engineers (Ettershank et al. 2016:1145). Such collaborations ensure upcoming and future entrepreneurs. The culture of South Africa is finding unique and innovative solutions and is adopting indigenous knowledge and philosophies into workplace operations, such as the concept of Ubuntu. Research on the value of indigenous knowledge in business is actively encouraged at South African universities (Molose, Goldman & Thomas 2018:196). Ubuntu principles, which are defined by Khoza (2005:269) as 'an African value system that is characterised by caring, sharing, compassion, communocracy and related predispositions'. These principles are easy for young entrepreneurs in South Africa to adopt into their SMEs to gain a unique leadership attribute. Mazzucato (2014:39) argues that the state's role in terms of innovation is not only to create knowledge through research hubs, laboratories, councils and universities but also to 'mobilise resources and innovations to diffuse broadly across sectors of the economy'. The government must develop vertical and horizontal innovation networks, ensure industrialisation and make technological capability advancement a policy priority (Mazzucato 2014:39–40). This is even more important given the rapid rate of technological development experienced in the current industrial revolution.

Francke and Alexander (2019:2) argue that South Africa has a low level of entrepreneurship compared with other emerging economies. South Africa has a number of policies and laws in place to support small business development. The Constitution of South Africa of 1996, the New Growth Path, the NDP, the White Paper on Small, Medium and Micro-Enterprises and the Integrated Small Business Development Strategy provide frameworks for SME support and development in the country.

In South Africa, the NSI is an important construct in policy, as reflected in key national planning initiatives such as the NDP (Manzini 2015:1). All agencies, including universities, governments and industry within the triple helix model, should actively facilitate innovation within agency and across agency. The NDP strongly supports the need for innovation in economic development (Manzini 2015:1). The Department of Education and Technology's efforts are aligned with the NDP, which positions innovation as a foundation for development planning (Rogerson 2018:22).

Changes in the external environment of organisations, governments, universities and businesses influence the strategic context in which they operate and require constant new approaches and initiatives (Cloete & De Coning 2011:152) to ensure opportunities for EE growth. The world is currently faced with 'wicked problems' because of a pandemic that has brought about change in the external environment. The rapid spread of the corona virus disease 2019 (COVID-19) virus throughout the globe during 2019 and 2020 has had a far-reaching social and economic effect (Wang et al. 2020:2). Periods of extended lockdown have had a severe impact on local and global economies.

Global Startup Ecosystem Report (2020) contends that top start-up ecosystems such as Silicon Valley will remain high-performing even during times of economic crisis or downturns, as they are able to produce numerous innovations and create astonishing value and they have a depth of talent, experience and capital in their ecosystem. Although this might retract during periods of crisis, it will continue post-crisis. However, GSER (2020) cautions that entrepreneurship in emerging ecosystems will not remain high-performing, displaying risk of failure with talent being laid-off and the closure of businesses.

Technology governance and people management are becoming increasingly more important as the workplaces transitions to working remotely. Some of the current challenges include a lack of clarity of roles and responsibilities, lack of communication and misunderstandings, lack of direction and certainty, wasted work, outdated architecture, slow network access and impractical cybersecurity solutions (McKinsey and Company 2020:28). These reduce the viability of EEs.

Financial and global structural changes because of environmental changes, such as those implemented in response to COVID-19, have brought about great uncertainty. An individual who takes advantage of an opportunity that emerges from a crisis, takes a risk but may benefit far more if the risk is managed well, rather than remaining conservative (Bakir & Jarvis 2017:468). Attributes that could increase effective functioning of entrepreneurs in a disruptive environment include risk-taking tendency, access to scarce resources and leadership ability and quality (Obaji & Oluju 2014:110).

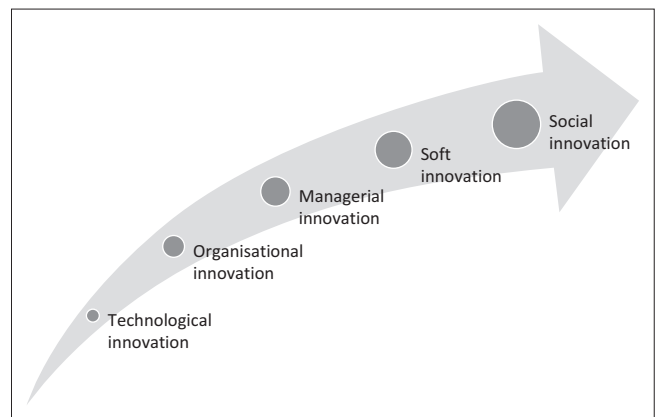
Mazzucato (2018:201) argues that 'a better realignment between risks and rewards, across public and private actors, can ... allow smart, innovation-led growth to also become inclusive growth'. Favourable changes in the environment for institutional entrepreneurship arise when structures, institutions and policy agents reinforce similar incentives to bring about institutional changes (Bakir & Jarvis 2017:474). Disruptive technologies can bring about innovation and structural change. Opportunities are created by technological developments and demands shifting in terms of resources (Audretsch, Grilo & Thurik 2007:4). Audretsch et al. (2007:4)

indicate that competition policy, protection of intellectual property rights and the product and labour market enhance the exploitation of opportunities.

A new system of balancing risk and reward is necessary to move away from the 'socialised risk' and 'privatised reward' dynamic (Mazzucato 2014:182). To overcome the current crisis, 'the right balance of risk and reward can nurture – rather than undermine – future innovation and reflect its collective nature through a broader diffusion of the benefit' (Mazzucato 2014:182). It is time to recognise the important 'entrepreneurial role of the state as lead investor and risk-taker and focusing only on the role of the public sector as setting the background (horizontal) conditions' (Mazzucato 2014:182). Government intervention is justified when market failures arise (Mazzucato 2018:202). The view of the role of the government needs to change in terms of the traditional industrial-innovation economics view, which is 'limited to spending on public goods, science and infrastructure investment and to de-risking the activities of innovators, to being an innovator itself' (Mazzucato 2018:201).

These uncertain times during the pandemic call for innovative approaches of industry, work, governance and teaching and learning to be resilient and to overcome challenges. Co-creation is an essential driver for adapting to the current challenges presented by the COVID-19 pandemic. Co-creation should extend the triple helix network and should be inclusive of all spheres and sectors of society, including government, industry, communities, civil society and society as a whole. It should ultimately lead to cross-sectoral and social innovation. Governments should be viewed as co-creators of wealth and markets, instead of facilitators of a market system (Mazzucato 2018:201). Policy should now seek to stimulate social innovation and social entrepreneurship to create social value (McNeil 2012:6). Social value focuses on the returns that generate social benefit and not only individual benefit (McNeil 2012:8). Governments should assist in generating social benefits through a creative transformation process. This can be achieved through policies that direct the allocation of a portion of resources to opportunities to generate social value (McNeil 2012:9–11). Because capitalism is marked by more liberal commercial policies that enhance economic and entrepreneurial activities (Akinyemi & Adejumo 2018:3), there will always be a market-based component to innovation. Commercially focused innovators will continue to innovate and may generate socially and environmentally beneficial outcomes (McNeil 2012:7). Social entrepreneurship effects social change through financing partners who focus on positive social impact, including financing efforts such as grant funding and social investment (McNeil 2012:11). The challenge is to balance competitiveness, sustainability and create value through alleviating poverty and reducing economic inequality (Francke & Alexander 2019:3).

Within cross-sectoral innovation is a requirement to ultimately achieve social innovation. According to Manzini (2015:3),



Source: Adapted from Manzini, S.T., 2015, 'Measurement of innovation in South Africa: Analysis of survey metrics and recommendations', *South African Journal of Science* 111(11/12), 1–8. <https://doi.org/10.17159/sajs.2015/20140163>

**FIGURE 2:** Social innovation.

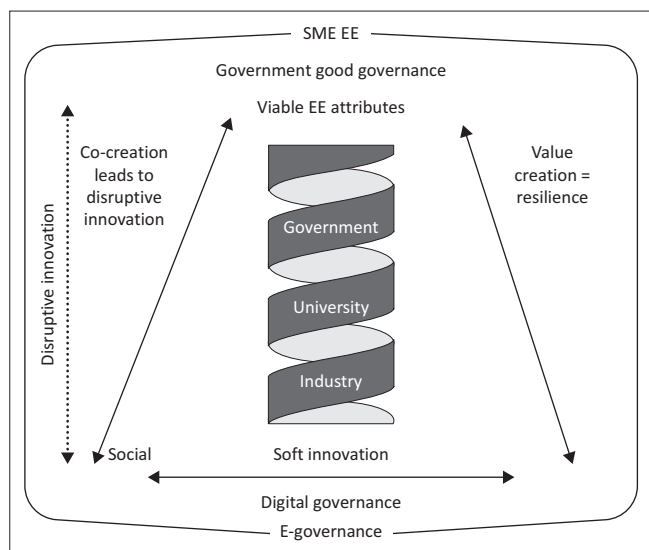
'sectoral innovation is an important conceptual framework for innovation activity that provides a multidimensional, integrated and dynamic' approach to innovation. Manzini (2015:4) adds that soft innovation 'is the type of innovation that takes place across all sectors of the economy'. In contrast, social innovation is a more comprehensive form of innovation; it is a value-adding outcome, emanating from interactions between a variety of actors, where value is created through human-to-human contact (Manzini 2015:4). Figure 2 illustrates the various modes of innovation, with social innovation as the end product.

Policy implementation through e-government and e-governance is essential in the 4IR. E-government entails 'electronic governmental processes through which policy problems are transformed into policy solutions, while e-governance refers to the outcomes of this process' (Cloete & De Coning 2011:157).

A holistic, strategic, innovation-led development approach for EEs is necessary to overcome the above-mentioned challenges. This approach should include the attributes of EE, the cultural elements resulting in soft innovation as well as social and economic elements to increase productivity. Policy should focus on value creation while in terms of context, a hybrid approach should be followed, including both top and down policy decision-making and implementation. Co-creation is only possible if there is commitment from all stakeholders, including the triple helix coalitions. Cooperation within a network governance setting is essential. Capacity should be strengthened, particularly in terms of technological capacity. E-government should improve service delivery. Good governance should ensure that the interests of all coalitions and clients are managed. Systemic risk management is essential, especially considering the challenges presented by the COVID-19 pandemic.

### Conceptual framework for an innovation-led entrepreneurial ecosystems

Based on the theoretical and conceptual analyses in this article, a conceptual framework for an innovation-led EE is



SME, small and medium enterprises; EE, entrepreneurial ecosystems.

**FIGURE 3:** Conceptual framework for an innovation-led entrepreneurial ecosystems.

suggested. Figure 3 shows that the various elements and variables in the conceptual framework are overlapping and inter-related; therefore, a change in one will influence another.

On the whole, key recommendations for government to foster innovation-led EEs are to:

- make the formation of entrepreneurial activity a government priority
- ensure that government policy is broadly focused
- allow for natural growth, not top-down solutions
- ensure all industry sectors are involved and facilitate collaboration and network governance
- provide top-down leadership but delegate responsibility and ownership (Mazzarol 2014).

## Conclusion

This article examined the role of the government in establishing and maintaining innovation-led EEs. Entrepreneurship and the main attributes of EEs were conceptualised. Furthermore, current trends in the African entrepreneurial technology revolution were outlined, followed by an overview of the important measures of EEs. The role of government in promoting EEs was described and the requirements for an innovation-led EE were determined. Particular emphasis was placed on the importance of establishing an innovation system, the triple helix model for innovation and a network approach to managing innovation systems. The various attributes and stages of development were then outlined and the 4IR was conceptualised.

The findings identified current systemic risks in developing and maintaining EEs in South Africa. These challenges include 4IR readiness, policy implementation and the impact of the COVID-19 pandemic. Best practices from the Silicon Valley case were used to identify factors influencing innovation-led EE development in South Africa. It was concluded that the South African government should work towards addressing

the following factors: creating more competitive industries, enabling a competitive venture capital market, encouraging business support and mentoring, developing deeper human resource pools, acquiring top human resource levels, improving the role of universities as focal points for capacity development, extensive government intervention and involvement in basic science and lastly, enabling a culture of risk-taking. The findings also suggest that governments are instrumental in shaping innovation-led EEs. The article recommended a conceptual framework to conceptualise a new strategic approach to overcome current challenges. The implications of the article are relevant for managerial decision-making in the public, private and higher education sectors. The findings of the study also provide guidelines to improve policy implementation.

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### Authors' contributions

D.N.-S. was responsible for conceptualisation, methodology and formal analysis.

P.T. contributed toward the investigation, formal analysis and resources. Both D.N.-S. and P.T. contributed in writing the original draft, reviewing and the editing thereof.

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