Chapter 8
Knowledge Co-production in Sub-Saharan African Cities: Building Capacity for the Urban Age

Zarina Patel, Ntombini Marrengane, Warren Smit, and Pippin M. L. Anderson

8.1 Introduction

Transdisciplinary approaches for the co-production of urban knowledge are gaining traction globally, as a means of creating better science-policy connections for enhancing societal benefits and achieving urban sustainability (International Expert Panel on Science and the Future of Cities 2018) (Chap. 9 vol. 2). The assumption that underpins this normative acceptance is that it is necessary to integrate multiple sources of knowledge in order to address complex sustainability challenges in cities (Polk 2015a, b) (Chap. 9 Vol. 2). This chapter focuses on the application of this assumption in the context of cities in sub-Saharan Africa (SSA), as it provides fertile grounds for research and knowledge generation considering that the continent enters its urban age (UN-Habitat 2008). Unlike countries of the global North, many SSA countries are undergoing an "urban revolution" and are projected to reach the 50% urbanisation threshold around 2030 (UN DESA 2011, cited in Pieterse and Parnell 2014: 1) (Chap. 1 Vol. 1). This dynamism and unpredictability regarding the scale of demographic and spatial transitions that are currently unfolding in SSA cities (and which are projected into the future) adds to the complexity of decision-making and policy development. Growth and development in a global context is constrained by limits to growth, and the desire to achieve low-carbon futures lends urgency to understanding the potential of alternate knowledge configurations to address such complexities in urban contexts (Chap. 9 Vol. 2).

Z. Patel (✉) · P. M. L. Anderson
Environmental and Geographical Science, University of Cape Town, Cape Town, South Africa
e-mail: zarina.patel@uct.ac.za; pippin.anderson@uct.ac.za

N. Marrengane · W. Smit
African Centre for Cities, University of Cape Town, Cape Town, South Africa
e-mail: ntombini.marrengane@uct.ac.za; warren.smit@uct.ac.za

A. Gasparatos et al. (eds.), *Sustainability Challenges in Sub-Saharan Africa II*,
Science for Sustainable Societies, https://doi.org/10.1007/978-981-15-5358-5_8

As primary and secondary cities across SSA expand and transform at an unprecedented rate, they are no longer viewed exclusively as political capitals or colonial monuments (Njoh 2009). In fact, since the colonial period, cities in the continent have come to be perceived both as spaces of deprivation, informality and poverty (Pieterse and Parnell 2014; Pieterse 2011) and engines of economic growth and technological excellence (South African Cities 2004). Leveraging the potential for economic growth and the role of technology must therefore be done in ways that address the multiple dimensions of sustainable development, with a specific focus on achieving social and environmental justice (Patel 2009; Cole 2015) (Chap. 8 Vol. 1).

However, SSA cities experience multiple sustainability challenges. For example, many of the environmental challenges faced by SSA cities are immediate and are closely linked to the lack of access to clean and safe basic services, such as drinking water and sanitation services among others (Chap. 1 Vol. 1; Chap. 4 Vol. 2). Traditional brown agenda challenges, associated with developing contexts, are rife in SSA cities, including overcrowding, indoor air pollution, water pollution, and fires (Hardoy et al. 2013) (Chap. 1 Vol. 1). The vulnerability of the urban poor on natural hazards is due to diverse socio-economic and environmental factors and severely undermines their adaptive capacity and ability to thrive alongside the escalating risks posed by climate change (Chap. 1 Vol. 1; Chap. 2 Vol. 2). Related to the above, the provision of urban social services such as healthcare, education, housing and sanitation has become a key urban sustainability challenge in many SSA cities in recent decades (Parnell and Walanege 2014) (Chaps. 1, 5 Vol. 1; Chap. 4 Vol. 2). The compounding effects of exceeding ecological limits and failing to deliver on the basic rights of the social protection floor[1] render many SSA cities both unsustainable and unjust (Cole 2015).

As mentioned above, SSA cities are evolving during the Anthropocene era, shaped to large degree by the global imperative of fostering low-carbon smart cities, with technology-based solutions to mitigate environmental impacts and address resource scarcity. Translating these imperatives into SSA contexts, considering the prevailing scale and severity of deprivation, as well as inequality and lack of access to adequate basic services for the majority of urban dwellers living in informal slums, poses significant societal and policy challenges (Pieterse and Parnell 2014) (Chap. 1 Vol. 1). Improving access to urban services is unsurprisingly difficult given the predominance of informal systems in these areas (Breda van and Swilling 2019). Spatial and demographic urban transition in SSA must be harnessed by introducing new ways of accessing data on both access to resources and services but also on the multiple and complex ways in which urban residents live and interact in cities.

Traditionally, government officials have assumed the responsibility of tackling such sustainability challenges whilst at the same time effectively managing limited

[1]The 'social protection floor' is defined as a *global and coherent social policy concept that promotes nationally defined strategies that protect a minimum level of access to essential services and income security for all.... A national Social Protection Floor is a basic set of rights and transfers that enables and empowers all members of a society to access a minimum of goods and services and that should be defended by any decent society at any time* (ILO and WHO 2009: 1).

resources (UN-Habitat 2008: 2014) (Chap. 5 Vol. 1). However, the assumption that governments can effectively drive such processes locally is based on the premise of strong governments. The reality in SSA cities is that the local government is often weak, with limited capacity to counter the invisible hand of power exerted by neoliberal agents shaping technological choices (Pieterse and Parnell 2014). Furthermore, the sheer scale of the technological innovation that would be required to address the imperatives of resource decoupling, decarbonisation and biodiversity restoration in SSA cities points to the need for reconfiguring research alliances to forge innovation (Chap. 8 Vol. 1).

It is within this context, where urban practitioners from the public and private sector have to increasingly find ways to collaborate and address constructively the current urban sustainability challenges in SSA, including the demand for (and access to) basic services and growing inequality. Several scholars have pointed out that the ability of SSA cities in meeting social service delivery (and generally enhancing urban sustainability) should no longer be the exclusive domain of local governments and should be perceived as a major governance challenge (Andersen et al. 2009).

Knowledge partnership between academic researchers, local government officials, civil society and local communities is a possible way of bringing together urban stakeholders to explore and design solutions to pressing urban sustainability challenges (Polk and Kain 2015). This need for knowledge partnerships gains further significance in the context of the Sustainable Development Goal 11 (SDG 11) that seeks to make cities and human settlements inclusive, safe, resilient and sustainable.

Indeed, despite the compelling case for transdisciplinary approaches to urban knowledge production, there is little evidence about the mechanisms through which these partnerships can occur and be successful. Patel et al. (2017) and Simon et al. (Simon et al. 2016) show that the success in meeting SDG 11 depends on the availability and accessibility of robust datasets, as well as the reconfiguration of governance systems that can catalyse urban transformation (Chaps. 1, 5 Vol. 1). The significance of reliable data and the centrality of urban knowledge for SDG 11 are obvious when honing in on the indicator frames. The UN Secretary General's Independent Advisory Group called for a data revolution, in which statistical systems must be strengthened at local, national and international levels and new means of collecting data of high quality and coverage should be promoted (IEAG 2014). Given the patchy and inconsistent datasets related to urban processes and services in SSA, specifically in informal contexts, establishing and leveraging informal and formal collaborations could enhance stakeholder dialogue and catalyse the development of additional capacities and innovations (Anderson et al. 2013; Patel et al. 2015).

However, forging such research collaborations and improving data collection, analysis, storage and sharing capabilities is a major sustainability challenge for many SSA countries, especially in urban contexts (Chaps. 1, 5 Vol. 1). This is possibly due to the combined effects of lack of capacity and resources for (and experience in) undertaking such processes. However, forging stronger transdisciplinary processes in urban contexts does not only relate to SDG11 but also to SDG17, which seeks to

strengthen SDG implementation and revitalise partnerships for sustainable development.

The aim of this chapter is to elucidate some critical characteristics of knowledge co-production approaches when engaging with urban sustainability challenges in SSA, especially (but not only) from experience in South Africa. We do not attempt to undertake a comprehensive review of the debates on knowledge co-production but to rather focus on demonstrating how the mechanics of two types of knowledge configurations can assist in understanding and solving urban sustainability challenges. The specific focus is on (a) knowledge partnerships between universities and city authorities and (b) knowledge co-production with civil society. We draw on three applied and transdisciplinary urban research projects conducted at the African Centre for Cities (ACC)[2] at the University of Cape Town. Throughout this chapter, we trace how salience, legitimacy and credibility emerged in these projects and how it catalysed the formation of effective knowledge partnerships (Cash et al. 2002a). This analysis serves to enrich our understanding of how SSA cities operate, how local government stakeholders engage with other urban stakeholders invested in the city's performance and how processes in SSA cities can be analysed and understood. Considering that most of the current research on assessing the impact of urban knowledge co-production processes comes from a northern perspective (Breda van and Swilling 2019), this chapter contributes to this emerging literature from an African perspective.

Section 8.2 provides an overview of current debates on (urban) knowledge co-production, with a focus on their application in SSA cities. Section 8.3 introduces the three case study projects and outlines the adopted methodological approaches based on the concepts of salience, legitimacy and credibility. Section 8.4 outlines how these three key elements of knowledge co-production emerged in the three case studies. Section 8.5 identifies the main lessons learnt from the three projects and some of the main policy implications for tackling urban sustainability challenges in SSA in the context of SDG11 and 17.

8.2 Urban Knowledge Co-production

8.2.1 Urban Knowledge Co-production: Conventional Wisdom

Knowledge co-production has increasingly gained attention in the interdisciplinary field of urban studies (Swilling 2014; Andersen et al. 2009; Polk and Knutsson 2008;

[2]The ACC is part of the University of Cape Town (UCT). It is an interdisciplinary research and teaching programme focusing on the dynamics of unsustainable urbanisation processes in Africa. The ACC has embedded knowledge co-production in its research philosophy and undertakes research projects related to sustainable urban transitions and urban management.

Cash et al. 2002a; Gibbons et al. 1994). This new paradigm is pushing knowledge production beyond the traditional view of the university as a ground for exploring the frontiers of science and technology, with a one-way flow of knowledge outwards to user groups (Pieterse 2013; May and Perry 2006). This shift towards "requesting" universities to work with other knowledge brokers in a bidirectional process of knowledge creation through transdisciplinarity and knowledge co-production receives increasing traction in order to increase relevance (Oldfield and Patel 2016). Below, we outline the main debates shaping the assumptions and accepted wisdom about urban knowledge co-production, namely, (a) what constitutes legitimate knowledge, (b) what is knowledge co-production, (c) what is the role of science and knowledge in co-production processes, (d) what are the implications of a shift to transdisciplinarity and (e) the question of research methods.

Regarding (a), there is a long debate about what constitutes knowledge (Nonaka 1994) and from where it gets its legitimacy. Choo (1996) proposes a broad definition of knowledge which places value on tacit knowledge, explicit knowledge and experiential knowledge. Tacit knowledge is defined as highly personalised and foregrounded in repeated exposure and experience of a particular environment (Nonaka 1991). Whilst tacit knowledge can include technical knowledge, it is not based on scientific principles but on experiential learning. Such an example in the context of urban development is the lived experiences of urban residents, whether in high- or low-income areas, and the ways in which they interact with city services (Polk 2015a, b). By contrast, explicit knowledge is defined as *formal and systematic* (Nonaka 1991: 98) and is based on the scientific method and hard evidence.

Regarding (b), knowledge co-production is based on the assumption that both tacit and explicit knowledge must co-exist, as policy must be based on an understanding of material conditions, consequences and robust norms, with the success of implementation being determined by an understanding of factors affecting and motivating action. Although the term knowledge co-production has enjoyed increasing popularity in the academic literature across various disciplines, there is a lack of a unified body of literature on the concept (Jasanoff 2004; Watson 2014). The initial terminology of knowledge co-production, which emerged in the 1980s, was used to describe the participation of citizens in the provision of urban public services outside of the built environment. Rather than simply being a single transaction where the state responds to citizen service delivery demands (Whitaker 1980; Brudney and England 1983), a partnership is developed between distinct stakeholder groups to enhance and move forward ideas and methods on service delivery. This creates a new outcome that each group may have been unable to achieve on its own.

Various terms have been used to describe this type of interaction, including knowledge co-production, interactive knowledge production, knowledge integration and knowledge co-creation, but there are some basic tenants across the competing classifications (Ostrom 1996; Jasanoff 2004; Hessels and Van Lente 2008; Pohl et al. 2010; Edelenbos et al. 2011). Nonaka (1991) explains that knowledge creation is moving beyond the 'processing of objective information' and instead requires the open review and assessment of the insights (and intuitions) of stakeholders, which are then translated and developed into new knowledge. Understanding that there is

no universally accepted definition of knowledge co-production, for the purpose of this chapter, we use the definition of Edelenbos et al. (2011) that draws on experience in the water sector. The process of knowledge co-production can be described as the outcome of bringing together scientific knowledge, bureaucratic knowledge and stakeholder knowledge (Edelenbos et al. 2011). This framing of knowledge co-production builds on the idea that whilst knowledge itself is useful, it needs to be relevant to broader constituencies (i.e. stakeholders) for it to be transformative and produce value. It must also be rigorous in order to meet the standards of the scientific community, as well convey (and generate) useful information that can shape and inform policy development and implementation.

Regarding (c), a common thread in the knowledge co-production literature is that science can no longer be viewed as a closed and hallowed domain. Jasanoff (2004) takes this a step further and highlights the role of knowledge co-production in addressing the hierarchical relationship between knowledge and power that gives science hegemony. Through the democratisation of knowledge (Delanty 2001), the pursuit of science is no longer the exclusive province of academics and scientists. Oldfield and Patel (2016) argue that this democratisation of knowledge does not eradicate power, but knowledge co-production relationships (which are reconfigured to be mutually accountable) certainly keep this power in check. This is particularly the case in the field of urban studies as *urban knowledge cannot be isolated from the conditions of its production and concepts must be related to specific circumstances in order to make sense of them* (Andersen et al. 2009: 9). That specificity comes from the perspective of those who live the urban experience and know intimately the constraints and opportunities at the city, neighbourhood and street scale (Andersen et al. 2009). Assembling the data and creating the narratives to explore urban conditions requires the input and voice of communities that occupy those geographies. Pohl et al. (2010) stress that all stakeholders (whether inside or outside academia) have relevant knowledge based on their unique perspectives and proximity to the issue being addressed. Andersen et al. (2009: 9) posit that urban knowledge co-production is necessarily an *action-oriented, multidisciplinary and contextually defined knowledge generation process that has the express purpose of enhancing the operations of cities and the quality of life of its residents through practical action*. Knowledge co-production has value in that it presents a possible way to bridge and integrate scientific knowledge and technocratic expertise, with the understandings and experiences of citizens outside the walls of power (Coburn 2007).

Regarding (d), transdisciplinarity is central to urban knowledge co-production, as it is necessary to work across academic and policy networks (Hanson and Polk 2018). Expertise from various disciplines is a starting point towards the assessment and solution of the complex and multidimensional aspects of urban development (Lemos and Morehouse 2005). Gibbons et al. (1994) have explained the shift towards knowledge co-production in recent years by comparing and contrasting the conventional academic scholarship (which depends on disciplinary expertise), with current transdisciplinary methodologies, theories and practices. They argue that traditional science and scholarship is generated and disseminated with an academic audience in mind. However, transdisciplinarity does not merely entail knowledge

generation using insights from more than one discipline but requires deliberate examination of theoretical and applied knowledge across disciplines (Pohl and Hirsch Hadorn 2007). Transdisciplinary approaches must recognise the (at times) competing perspectives that inform the types of problems to be solved. This process provides a space for assessing and valuing practical knowledge and scientific work. Thus, stretching the spaces of knowledge production beyond science and academia into the domains of the lived experience, policy and practice provides the potential for more effective policy formulation and implementation (Polk 2015a, b).

Regarding (e), methodology is a critical and highly contested aspect of knowledge co-production and transdisciplinary processes. Relevant concepts such as reflection and reflexivity have started becoming more popular outside the humanities (Gibbons et al. 1994; May and Perry 2010). What distinguishes transdisciplinarity from other approaches that seek to integrate divergent bodies of knowledge is that the research is conducted jointly between different stakeholders in a process of collective problem-solving that does not perceive them as objects of enquiry (Swilling 2014). In a sense, the relationship between subject and object in such research processes is no longer separate but is rather co-constituted (Oldfield and Patel 2016). In the transdisciplinary shift towards application in social contexts (Gibbons et al. 1994), academics should be able to reflect and acknowledge how their research (and its presentation) can influence audiences outside academia, transforming its purpose from knowledge generation to advocacy (Swilling 2014).

Considering the above, the transition from traditional scientific and disciplinary approaches to new methods for knowledge generation requires "contextualised" research (Gibbons et al. 1994). Research and experimentation processes are becoming increasingly more integrated in the applied and the social sciences. The distinction between Mode 1 and Mode 2 research approaches can illustrate this shift, with Mode 1 approaches classified as disciplinary and Mode 2 as transdisciplinary (Andersen et al. 2009; Gibbons et al. 1994). Hessels and Van Lente (2008) have illustrated succinctly the main points of departure between traditional scientific methods and the more fluid approach of knowledge co-production (Table 8.1).

However, despite the compelling arguments for the value of Mode 2 engagements, there is still the need to build multiple practices for effective urban knowledge co-production that are responsive to different contexts. Patel et al. (2015) examine

Table 8.1 Characteristics of Mode 1 and Mode 2 approaches to research

	Mode 1	Mode 2
Problem-solving	Academic context	Context of application
Knowledge base	Disciplinary	Transdisciplinary
Extent of organisational unity/ diversity	Homogeneous	Heterogeneous
Process of knowledge production	Autonomy	Reflexivity/social accountability
Quality assurance of knowledge	Traditional quality (peer review)	Novel quality control

Source: Hessels and Van Lente (2008)

how urban knowledge co-production may challenge notions of 'best practice' in formulating responses to urban sustainability challenges in SSA cities. This work contributes to an in-depth understanding of the possibilities for identifying alternative solutions at the city level, which promote both experimentation and flexibility towards urban sustainability. However, there remains room to explore what the critical dimensions that are found in urban knowledge co-production are in resource-constrained environments where a departure from standard practice is necessary.

8.2.2 Applicability of Urban Knowledge Co-production Processes in African Cities

Urban scholars in SSA are increasingly engaged in knowledge co-production partnerships that aim to better understand the relationship between rapid urbanisation and how to manage/solve the sustainability challenges posed by population growth and increasing demand for basic services (Sect. 8.1) (Chap. 1 Vol. 1). As SSA cities grow, more emphasis is required on urban planning and management. However, growing demand does not automatically translate into greater capacity, particularly in the SSA context, where the scale and scope of the backlog in service delivery adds complexity to future and anticipatory planning and delivery (Chap. 1 Vol. 1; Chap. 4 Vol. 2).

The literature on knowledge co-production suggests that capacity to produce knowledge can be enhanced through partnerships (Sects. 8.1 and 8.2.1). However, in tandem with the growth in knowledge co-production partnerships, there is also a growing need to prove the value of these partnerships and provide evidence to support the effectiveness of transdisciplinary research processes. However, providing such evidence is not straightforward. For example, Hanson and Polk (2018) suggest that the relationship between collaboration and impacts/outcomes is not always direct due to challenges related to attribution and the time needed for policy change.

Cash et al. (2002a) identify three criteria for effective sustainability research, namely, salience (or relevance), credibility and legitimacy. According to Cash et al. (2003: 8086), *credibility involves the scientific adequacy of the technical evidence and arguments. Salience deals with the relevance of the assessment to the needs of decision-makers. Legitimacy reflects the perceptions that the production of information and technology has been respectful of stakeholders' divergent values and beliefs, unbiased in its conduct, and fair in its treatment of views and interest*. These criteria are assumed to both help stakeholders in filtering knowledge and influence the decision-making process by assigning value and significance to this knowledge (Jones 1999; Cash et al. 2002b; Lemos and Morehouse 2005).

However, it is not always true that the knowledge processes and products that are relevant, credible and legitimate will be implemented and taken up in policy (Cash

et al. 2002a). However, some scholars caution that a lack of readily visible impact should not be interpreted as meaning the process and products are 'useless'. Cash et al. (2002a) instead suggest that the impact lag/gap can be better understood in terms of 'conditions, context and efforts of the involved institutions' (Godin and Dore 2005; cited in Polk 2018: 2).

Towards this end, Cash et al. (2002a) introduce the element of boundaries to explore the contextual and institutional factors related to the effective application of knowledge in decision-making. For example, in the context of SSA cities, the institutional boundaries of each stakeholder largely inform what is considered salient, credible and legitimate. In some instances, the creation of (or location of) a boundary organisation can enable stakeholders from different groups to start working collectively beyond their institutional boundaries. Such boundary organisations often "inhabit" the space between stakeholders groups, such as academia, policy-/decision-makers, urban practitioners and civil society. According to Hellström and Jacob (2003: 235), such boundary organisations "occupy the space between science, policy and business concerns" and enable effective communication across institutional limits. Such entities are crucial elements of an enabling environment for knowledge co-production in urban SSA contexts.

The efforts of involved institutions on knowledge co-production processes can be assessed by focussing on the actual commitment of the key stakeholders. Smit et al. (2015) argue that this is particularly important in SSA, as research driven by international donors is one of the leading sources of urban sustainability knowledge. In such contexts, the inputs of external consultants and technical advisors have traditionally been valued over the institutional knowledge and experience of officials in local authorities and local communities (Smit et al. 2015) (Chap. 4 Vol. 2). Thus, the commitment of key urban stakeholders to this knowledge (and the process of deriving it) cannot be underestimated and can pose a barrier to effective knowledge co-production. Ensuring stakeholder commitment to the knowledge co-production process can create a space or an agora (Gibbons et al. 1994; Cornell et al. 2013) for critical dialogue, where all relevant voices (including those often marginalised or not heard in urban management) are given a platform to share knowledge and experiences. Furthermore, the commitment of key decision-makers, in addition to local communities, academics and civil society, can also help steer donor-funded processes towards strengthening locally driven policy development and implementation, over and above the elicitation of information and data.

It is also worth noting that the conditions under which urban knowledge co-production processes occur affect the extent to which each involved stakeholder can contribute knowledge and expertise to these processes (Polk 2015a, b). For example, close interactions between stakeholders can catalyse new learnings and understandings of urban management approaches at city and project level. Furthermore, the perspectives and experiences of the stakeholders involved in co-production processes can be shared with other stakeholders to further enhance the effectiveness of these processes. Polk and Knutsson (2008) explore a concept of mutual learning which focuses on the informal exchanges that can occur in knowledge co-production and suggest that such mutual learning can contribute to the

production of legitimate and credible knowledge. Such efforts may not only validate experiential knowledge but more importantly build and strengthen the knowledge of researchers tasked with articulating the full scope of urban sustainability challenges and other stakeholders that are well positioned to address it.

8.3 Methodology

8.3.1 Research Approach

This chapter illustrates some of the critical aspects associated with knowledge co-production in partnerships between universities, government and civil society in SSA. As discussed in Sect. 8.2, there is no single model of knowledge co-production. In fact, different urban contexts 'demand' different approaches towards knowledge co-production (Patel et al. 2015). In this chapter, we focus on the relationship between the quality of knowledge collaborations and its influence on outcomes. To understand this relationship, we undertake an empirical investigation of three urban knowledge co-production partnership programmes in SSA (Sect. 8.3.2). By drawing on the literature summarised in Sect. 8.2, we develop an analytical framework focusing on the criteria of salience, legitimacy and credibility (Cash et al. 2002a, 2003).

In our study, salience refers to information which is deemed important for decision-making by each actor. Credibility refers to the scientific merit and technical robustness of information. Legitimacy refers to the perceived fairness and consideration of the perspectives of all relevant stakeholders. Even though our analysis is divided into these categories, it must be noted that these categories are difficult to separate completely, as they are interrelated and mutually constituted. Our analysis is based on project documents, reports from workshops and reports to funders.

8.3.2 Description of the Studied Knowledge Co-production Partnerships

The three programmes used in this chapter to highlight urban knowledge co-production practices include (a) the CityLab Programme, (b) the Mistra Urban Futures Knowledge Transfer Programme (KTP) and (c) the State of Cities in Africa (SOCA) programme. The key features that are used to describe these programmes are duration, funding, stakeholders and aims (Table 8.2). In all these programmes, the African Centre for Cities (ACC) served as the intermediary between academia and the relevant stakeholders engaged in knowledge partnerships to address societal and sustainability challenges.

Table 8.2 Key features of the studied knowledge co-production partnerships

	CityLabs	Knowledge Transfer Programme (KTP)	State of Cities in Africa (SOCA)
Aims	Investigated urban dynamics in the Cape Town city-region through multi-partner research processes	Sought to co-produce knowledge to support sustainable urban transitions in Cape Town	Documented urban conditions on a national basis Established a benchmark against which to measure the success of urban policies
Scale	Neighbourhood to city scale	City of Cape Town	National
Duration	Phase 1: 2008–2013 Phase 2: 2013–ongoing	Phase 1: 2012–2016 Phase 2: 2016–2019	2009–2013
Approach	Organised across different research themes: - Central City (2008–2013) - Philippi (2008–2015) - Climate Change (2009–2012) - Urban Flooding (2008–2012) - Healthy Cities (2009–) - Urban Ecology (2010–2013) - Public Culture (2012–) - Sustainable Human Settlements (2012–2019) - Urban Violence (2012–2015)	Embedded researchers in local government agencies with different foci, such as energy governance, climate change adaptation, green economy, space economy, transit-oriented development and SDGs Facilitated the City Officials Exchange Programme Held a joint programme on governance systems	Created a knowledge network for urban practitioners and policy-makers across the continent to promote information dissemination and knowledge exchange and enhance opportunities for peer learning
Mode of engagement	- Seminar series - Co-authoring processes - Collaborative research processes - Public engagements	- Embedded researchers supported policy processes - City Officials Exchange Programme was used to co-author publications	- Workshops - Virtual engagements (e.g. through Skype) - Webportal (refer to www.urbanafrica.net)
Partners	- University of Cape Town - City of Cape Town - Western Cape provincial departments - Civil society	- University of Cape Town - City of Cape Town	- University of Cape Town - National government departments in partner cities - Cities Alliance
Funders	Funding for each CityLab was provided according to salience of the focus area. Funders included (a) Western Cape provincial government, (b) City of Cape Town, (c) Eskom and Vodacom, (d) Mistra	- Mistra Urban Futures - City of Cape Town	- Cities Alliance - World Bank Institute - German Society for International Cooperation (GIZ)

(continued)

Table 8.2 (continued)

	CityLabs	Knowledge Transfer Programme (KTP)	State of Cities in Africa (SOCA)
	Urban Futures, (e) German Society for International Cooperation (GIZ) and (f) South African lotteries board		
Outputs	- Special journal issue in *Ecology and Society* (Anderson and Elmqvist 2012) - Three edited books (Brown-Luthango 2012; Cirolia et al. 2016) - Various journal publications - Postgraduate degrees (many theses and dissertations were linked to the individual CityLabs)	- Various journal publications through the City Officials Exchange Programme (over 20) - Journal papers by embedded researchers and programme managers - Policy briefs - Strategy documents - Conference presentations	- State of Cities reports for the partnering countries

Note: Embedded research 'describes a mutually beneficial relationship between academics and their host organizations whether they are public, private or third sector. The relationship typically provides the researcher with greater access to the host organization with benefits for collecting data and research funding. For the host organization the relationship provides a bridge to academia and academic knowledge, networks and critical approaches to developing organizational policies and practices' (McGinity and Salokangas 2014: 3)

8.3.2.1 CityLab Programme

The CityLab Programme aimed at establishing closer connections between academia, local government and broader society. Each CityLab focused on a specific theme as a means of understanding and responding to urban sustainability challenges in Cape Town (Anderson et al. 2013) (Table 8.2). The CityLabs were set up to catalyse transdisciplinary engagement, both across academic disciplines and between academia and the broader society. By using Cape Town as a 'laboratory,' the CityLabs sought to create working partnerships across the domains of research, governance, management and lived experience, thus creating policy-relevant knowledge.

The first generation of CityLabs operated between 2008 and 2013 and included four thematic labs undertaken at the scale of the entire city of Cape Town, namely, the Urban Ecology CityLab, the Healthy Cities CityLab, the Flooding CityLab and Climate Change CityLab/Think-Tank. Two additional CityLabs, the Central and the Philippi CityLabs, were geographically bounded and limited to specific regions of the city. The Central CityLab focused on central Cape Town and explored issues related to densification. The Philippi CityLab focused on the area of Philippi and

explored the multiple urban issues related to informal settlements, government spending and infrastructure.

Each CityLab encouraged the adoption of an original research approach. Whilst bounded by the broad imperative of responding to sustainability challenges relevant to the South African urban condition and to work towards knowledge dissemination, each CityLab leader was given full responsibility to run the CityLab in a configuration they saw most appropriate. This provided some degree of authority to the CityLab leader, to inform the scope and process of the lab through their own personal strengths and working knowledge of the field. This lack of a top-down, institutional approach served to validate each CityLab as an authoritative entity in its own field.

8.3.2.2 Knowledge Transfer Programme

The Knowledge Transfer Programme (KTP) is a partnership between the City of Cape Town and the ACC, under the umbrella of Mistra Urban Futures, a global network focused on knowledge co-production for urban sustainability. The KTP seeks to co-produce knowledge for supporting sustainable urban transitions in Cape Town by ensuring more defensible and legible urban policies to support sustainable development. This aim was understood and approached as both a policy/practice goal and an academic challenge. There was an implicit acknowledgement that if urban policy is to become more robust, then broader knowledge must contribute fruitfully to policy development and decision-making processes within the city. This partnership entailed the inclusion of academic methods and research as a means of generating evidence-based knowledge jointly with the practice-based knowledge typically informing policy processes in the city. The KTP was also committed towards increasing the legibility of policy processes, in ways that challenge and shape academic discourses about cities and urban transitions.

During the first phase of the KTP, four PhD researchers worked closely with city counterparts embedded in local government departments related to four policy areas: climate change adaptation and mitigation, energy governance, green economy and space economy. In the second phase, four researchers were embedded in local government departments tasked with transit-oriented development, cultural planning and the implementation of the SDGs. These embedded knowledge engagements provided opportunities for the development of alternate, robust and relevant policy responses whilst generating new insights into the internal operations of the local government.

The first phase of the programme had a reciprocal knowledge exchange where over two dozen city officials were granted a 2-month writing sabbatical, during which they were paired up with academics to co-author journal articles and an edited book on policy-relevant issues (Scott et al. 2019). These publications resulted in increasing the legibility of policy endeavours, by documenting and making accessible previously opaque policy processes, thereby situating local policy experiences and innovations in a much broader context and set of debates.

8.3.2.3 State of Cities in Africa Programme

The SOCA programme sought to catalyse urban research at a continental scale and facilitate the preparation of national 'State of Cities' reports. These reports sought to document for the first time contemporary urban conditions in baseline reports of demographic, economic and environmental patterns at the city scale across SSA. The SOCA Project supported networks of urban stakeholders in different countries, anchored by local learning institutions to engage in baseline studies of national urban systems. Subsequently, the project supported local actors to mobilise resources for the collection, analysis and monitoring of urban data in order to provide empirical evidence for urban policy-making. The selected countries included Ethiopia, Botswana, Malawi, Ghana and Tanzania.

The ACC served as a technical advisor and secretariat for the SOCA programme, providing resource mobilisation and management support. Eventually, it aspired to nurture and catalyse an emergent urban research centre of excellence, in order to take up the cities' research agenda in different national contexts. The SOCA programme was concluded in 2013, but the principles of consolidating research expertise and knowledge institutions in SSA have been adopted by the African Urban Research Initiative (AURI). AURI promotes and fosters interdisciplinary applied research through partnerships with urban research centres and think-tanks. Currently, the AURI network has 20 members in 16 SSA countries, each with solid research capacity and expert knowledge of their urban systems.

8.4 Results

8.4.1 Salience

All CityLabs achieved a high degree of salience in that they were created to either reflect a pressing sustainability challenge within Cape Town or were a direct response to interests expressed by the provincial or local government. The CityLab themes spanned geographical boundaries and issues of global (e.g. urban responses to climate change, urban ecology) and local importance. Despite the breadth of the CityLabs foci, all of them were bounded in (and aimed to tackle) urban sustainability challenges pertinent to Cape Town.

The Knowledge Transfer Programme (KTP) capitalised on the track record of the CityLab Programme on urban knowledge co-production. The KTP was launched in Cape Town in 2012 as a knowledge partnership between the City of Cape Town (CCT) and the ACC. The established relationships between the ACC and the city through the CityLab Programme made possible the identification of policy areas that could benefit from engagement with embedded researchers. Strong relationships between researchers and city officials were already established, facilitating an agreement on knowledge collaborations.

In most cases, the suggested priorities were mutually agreed, with only one major exception. In one case, the university believed that there would be strong benefits from embedding a well-respected academic with a background in architecture and urban design. However, this was not deemed a desirable match by the local government, as it had already identified spatial development frameworks and environmental management as two priority areas that required capacity.

In 2009, the ACC embarked on the State of Cities in Africa (SOCA) programme. The purpose of the SOCA programme was to respond to the need of city managers, mayors and established urban scholars, to measure the sustainability impacts of urbanisation in SSA in a tangible manner. Rather than using anecdotal information to gauge the rate of urban growth (and more precisely the growth of unplanned and unserviced settlements), these decision-makers urgently needed robust and well-organised research on urban systems across the continent. The SOCA programme sought to meet that demand, so simply designing a demand-driven programme ensured salience. In this process, the ACC operated as an intermediary, bringing together urban stakeholders in the different national contexts to articulate their information needs. It then used these as the defining principles upon which the respective State of Cities projects would be developed. This required working with central and local government agencies responsible for the delivery of urban services, civil society organisations working for the urban poor and academic institutions with built environment training programmes. The collective and upfront agreement of participating stakeholders ensured that those issues requiring the most urgent attention remained at the top of the research priority list.

8.4.2 Credibility

Each CityLab was headed by an academic researcher that directed the type of engagement and the outputs throughout the duration of the CityLab. Each leader had training and expertise pertinent to the theme of their CityLab, and each CityLab was positioned in relation to relevant academic debates. The CityLabs generally aimed at delivering academic outputs in the form of peer-reviewed special issues or book publications (see Table 8.2). This served to give each CityLab academic credibility, which was anchored to some extent in a related disciplinary culture. For example, the Urban Ecology CityLab decided early on to produce an entirely academic output, namely, a special issue in the international peer-reviewed journal *Ecology and Society* (Anderson and Elmqvist 2012). This particular CityLab, under the direction of its ecologically trained leader, sought credibility through the traditionally recognised route in the discipline of ecology, i.e. peer-reviewed journal publications. On the contrary, the past work experience of the Philippi CityLab leader in the civil society sector (community development) was reflected in the greater effort of this CityLab to establish credibility with the local communities, through meetings and delivery of community services. In this respect, whilst each CityLab strived to achieve credibility, there was always the question of 'credibility

by whose measure'. This raises questions around how success is measured or monitored (Petts et al. 2008) (see Sect. 8.5).

The credibility gained through the CityLabs and previous knowledge engagements between the City of Cape Town (CCT) and UCT were key in building trust between the two institutions over a long period of time, thus creating the conditions for deeper engagement. The credibility gained through the successful track record of knowledge co-production in the CityLabs was also recognised by Mistra Urban Futures (MUF), who partnered with ACC to support the KTP. The embedded researchers provided evidence-based and theoretically grounded inputs in the policy process to increase the defensibility of the outcomes. At the same time the embedded researchers used their experiences and understandings of the local government from within, to sharpen their own research questions and methods, thus ensuring relevance through engaged scholarship. The City Officials Exchange Programme entailed local government officials working with academics in pairs as writing partners to publish a journal article on the policy-relevant work they had been involved in. Through this process of academic writing and publishing, the work of the CCT became more legible and visible, without changing the authorial voice of officials involved in the policy processes. The credibility offered by these research publications gave greater traction to policy positions in decision-making processes within the local government and provided participants with opportunities for upward mobility within local government structures.

Unlike the two previous co-production processes, the SOCA programme occupied an uncharted space where academics, government officials and civil society organisations agreed to work together in an ambitious exercise of collecting and analysing data on SSA cities. Given its limited resources, the programme did not entail primary data collection but instead relied heavily on previously published data from government agencies that had not been analysed at the city level. In addition, the SOCA programme planned to use data collected by local authorities at the city level to assess their performance in key areas such as basic service provision to city residents, municipal income and expenditure and employment. As the data was generated using existing local and national government sources (augmented through new research based on data gaps), the credibility and authenticity of the new data was not contested. In this way, the SOCA programme also sought to generate data on key urban processes in contexts that previously lacked adequate data and engage with state agencies in producing and communicating this data to audiences outside of government.

8.4.3 Legitimacy

In the CityLabs, the involvement of various stakeholders in agenda setting was critical to ensure legitimacy. However, reaching consensus on terminology and shared goals was not always easy. For example, the establishment of the Healthy Cities and Flooding CityLabs was protracted, as time was required to collectively

agree on the frameworks, terminology and methods. Finding and agreeing on the actual methods was critical to ensure the legitimacy of these particular CityLabs, as method selection can often complicate trans- and interdisciplinary research (Ramadier 2004). Debates over methods sometimes slowed the research process and, in some instances, even caused the departure of certain actors. There were also evident shifts in perceptions around issues such as climate change, particularly from within local government, as was witnessed in the Climate Change Think-Tank. The ACC often played the role of 'broker' (Godfrey et al. 2010) to help systematically navigate differences between knowledge partners in joint workshops, further providing legitimacy to the process.

Later on, practical issues became critical, such as where to hold meetings. For example, this was a constant debate in the Philippi CityLab, where various participating civic groups voiced discomfort over meeting at the university. As a result, it was necessary to find new venues within the community to ensure broader stakeholder attendance and participation. Similarly, when the Urban Ecology CityLab approached a landscape planner to present a recent design informed by biodiversity, the invitation was only readily accepted (after the initial decline) when the proposed venue and field trip allowed for the presentation outside the confines of a conventional academic setting. These are only some of the examples of how CityLabs attempted to enhance legitimacy by understanding and incorporating the voices of different stakeholders.

Within the KTP, the local government counterparts highly valued aspects related to policy defensibility, credibility of academic arguments and the rigour of academic methods employed by the embedded researchers. This process was considered important in equipping local government officials with tools, evidence and reasoning to argue their case during decision-making processes. The fact that the embedded researchers were engaged in academic study gave them credibility within the CCT, compared to knowledge engagements with consultants. Whilst each of the embedded researchers had specific tasks within the local government (and were, to varying degrees, engaged in mainstream institutional work), they were primarily acting as 'researchers' during their participation in the programme (Patel et al. 2015). Thus, research was a legitimate part of their daily work, which is a luxury seldom afforded to local government officials. The spaces occupied by the embedded researchers allowed them unprecedented access to data and an intimate knowledge of local government processes. However, they also had to balance the multiple roles they simultaneously held. In this process, time proved to be one of the biggest challenges in ensuring legitimacy, as balancing these multiple roles left embedded researchers 'time-stressed'.

By being simultaneously involved in policy development and research, the embedded researchers had to navigate the very different timeframes within which the local governments and universities operate. For example, local government must often deliver interventions irrespective of the credibility of the facts at hand, as it cannot afford waiting to get facts perfectly right before acting on urgent matters. On the other hand, academic research is a slow process that requires numerous iterations and refinements to ensure validity and robustness. Thus, it was critical to partner the

embedded researchers with the most appropriate local government officials to help them navigate these complexities and institutional cultural differences to achieve mutual benefit. Finding the right fit between research focus and local government priorities was not only important for salience (Sect. 8.4.1) but also critical for ensuring legitimacy. Building trust and support to sustain these partnerships over a 3-year period was largely achieved by finding the right fit between researchers and local government counterparts. This was in turn instrumental for building legitimacy and mutual respect between them.

The secondary aim of the City Officials Exchange Programme was to address questions of policy defensibility through research. Local government officials highly valued the credibility of producing a journal article or book chapter. Furthermore, engaging with academic literature and discourses on the policy topics that local government officials had been working on for extended periods was also highly valued. It was perceived that this engagement added value to the policy work of the involved local government officials whilst also validating their practice-based skill set. Furthermore, their day-to-day work experience was useful for engaging with (but also contributing to and challenging) academic literature and discourse. This added further legitimacy to the production of academic articles that was seldom realised under traditional knowledge partnership arrangements.

One of the main contributions of the SOCA programme was the overarching guiding principle that it should be demand driven. Unlike other donor-facilitated projects, this demand had to be articulated explicitly by (and include voices from) local structures involved in the development and decision-making processes. As part of the preparatory phase in each country, the local universities seeking to host this project were required to engage with government actors and representatives from civil society that worked in specific urban sectors such as housing, water or employment. This was not always easy to be translated into practice, especially in contexts where the government was particularly dominant and/or civil society was weak and fragmented. However, the inclusion of this demand-driven approach in project design meant that the research agenda had to not only consider the views of decision-makers within government but also at least try to include the perspectives of representatives of the urban poor (e.g. civil society organisations). This effort to ensure broader participation sometimes led to tensions over who had the final say in determining the scope of the project, both in terms of selecting study cities and entry points for evaluating urban trends. For example, in the case of Ghana, the timing of the national census provided a window of opportunity to collect urban data systematically, hence providing legitimacy and support for SOCA activities in that country.

8.5 Discussion

8.5.1 Reflections on Urban Knowledge Co-production

The three research programmes discussed in Sects. 8.3 and 8.4 highlight the diversity of knowledge co-production approaches, as well as the differing scales at which the principles of co-production can be embedded in urban research in SSA. Between them, they illustrate the varied methodologies and the expanding boundaries of knowledge co-production approaches in SSA and respond to the call for addressing knowledge and capacity gaps in cities in the region (and in articulating the concrete sustainability challenges in doing so) (Pieterse 2010: 2011).

The connecting thread across the three programmes is a recognition that no single actor can fully understand or address the diverse sustainability challenges posed by urbanisation in SSA, ranging from the rapidly changing urban form to poverty, violence and biodiversity conservation in increasingly populated urban areas (Chap. 1 Vol. 1). This created a fertile ground for developing knowledge co-production partnerships based on shared interests and not on contractual relationships. It also created an opportunity for engaging constructively with the private sector (e.g. urban practitioners), urban residents, civil society and officials from other local government agencies.

Table 8.3 summarises how the criteria of credibility, salience and legitimacy emerged in each of the three case studies on urban knowledge co-production. Whilst there are some similarities, there are also significant differences between case studies. This suggests that context matters and that there is no single model for knowledge co-production that fits all cases, especially in highly diverse regions such as SSA.

All three research programmes show that the success of knowledge co-production processes depends on various 'soft' factors, including the alignment of interests, commitment to outcome and process and the right fit between research focus and policy priorities. The model then is 'no model' (Patel et al. 2015), as the factors that influence credibility, salience and legitimacy have to be navigated on a case-by-case basis and in a broader context of openness and willingness to experiment between involved actors (e.g. local government and university in the case of the KTP).

When assessing the effectiveness of the research programmes, history and context matter. In some cases, assessing effectiveness is far from straightforward. For example, although the depth and reach of the KTP can be measured through publications, events (e.g. conference, workshops, seminar presentations), op-eds, news items, blogs, graduated PhD students and policy development and outcomes (Table 8.2), the full impact of the programme cannot be easily captured in the short term. This poses important questions, and indeed challenges, on how to think about (and assess) the impact of knowledge co-production processes. Thus, the policy and practice impacts of such processes will have to be tracked longitudinally. In this sense, given the *longue duree* of building relationships and realising impact,

Table 8.3 Comparison of research programmes across the criteria of credibility, salience and legitimacy

Programme	Credibility (technical adequacy)	Salience (relevance to decision-making)	Legitimacy (fairness)
City lab (sub-city or city scale)	Develop a memorandum of understanding (MoU) between the local government, the province and the university	Identify joint focus areas among the university and the local government authorities. Main selection criteria were based on policy needs and researcher fit	Conduct research in partnership with community-based organisations and leaders. The research reflected different perspectives including that of academic facilitators, community participants and local government representatives
Knowledge Transfer Programme (city scale)	Develop formal agreement between the local government and the university to establish the City Officials Exchange Programme Develop academic knowledge outputs including books and journal articles	Enable bidirectional knowledge transfer to better inform and document policy options and decision-making processes	Establish the joint governance of the programme through equal participation in decision-making, co-funding and in-kind arrangements
State of Cities in Africa programme (regional scale)	Establish a coalition of willing participants, reflecting the authority of national and local government, voices of the urban poor and expertise of university researchers	Adopt an iterative process of data gathering on urban indicators agreed between different stakeholders at the city, regional and national levels	Utilise data and information from various sources in order to present a realistic picture of urban conditions

long-term funding could be critical to achieve objectives (effectiveness) and equal power sharing in producing policy and scholarly outputs (legitimacy).

It is worth noting that credibility, salience and legitimacy were achieved incrementally and on negotiated terms that took into account the perspectives, priorities and resources of the broad group of involved stakeholders. The salience of each co-production process went beyond the commitment of each stakeholder to engage in knowledge co-production. Salience was also visible in the commitment of each partner prior to the launch of the collaborative research activity. Thus, collaborating with a wider group of actors with different skills, but motivated by the same issues, reinforced the centrality of the research questions and approach. Legitimacy came from the creation of a space within each project to engage with (and even question when needed) not only the academics but also the influence and priorities of policy- and decision-makers. In other fora, these priorities might have eclipsed the voices and experience of community members or local government officials without access to the same platforms and resources.

Finally, the three case studies suggest that urban knowledge co-production processes in resource-constrained environments, such as those encountered in most SSA cities, might require more than the combination of salience, credibility and legitimacy. In such contexts, greater reflexivity, acknowledgement and commitment to the learning process are equally necessary features of urban knowledge co-production (Patel et al. 2017; Roux et al. 2017).

8.5.2 Policy Implications and Recommendations

This chapter has highlighted how different types of knowledge co-production processes can provide credible, salient and legitimate information to guide decision-making in SSA cities. Fostering such knowledge partnerships can catalyse (through different channels) progress in implementing multiple SDGs, especially SDG11 and 17. Based on the lessons learnt from these processes, we discuss below some of the major policy implications.

The experience accumulated through the different CityLabs suggests that the exposure of local government officials to the viewpoints of the different stakeholders involved in knowledge co-creation processes can indeed catalyse real change in views and practices. In order to incentivise officials to participate and remain committed, it would be important to ensure that the issues being addressed are of shared importance. Roux et al. (2017) reiterate this when they argue that what to partner about is as important as who to partner with.

It is also important to be clear about the main output of these processes as well as the timing. For example, some of the CityLabs specifically focussed on co-producing new policies,[3] which required long-term collaboration with government departments and other stakeholders (in one case, the co-production process took 5 years). These examples show that co-production processes can result in innovative policies that shift the thinking of government decision-makers. Furthermore, they also show that co-production can be useful for implementing these new policies. However, an important precondition is that the key government agencies involved need to be committed to the co-production process.

In some cases (e.g. the Urban Ecology CityLab), the process was ongoing and question driven within (and between) the original knowledge partners. In such cases where no immediate policy outcome is evident, it is important to retain the creative

[3]For example, the Sustainable Human Settlement CityLab, in addition to ongoing ad hoc policy support, facilitated a 4-year process to co-produce the Living Cape Framework. This new policy framework for the Western Cape provincial government sought to guide future investment in human settlements and create more functional and equitable cities and towns in the province. The new policy framework signifies an important shift in how the provincial government thinks about human settlements. There is currently an ongoing process underway to implement this new framework through 'testbeds of innovation', to pilot the proposed new approaches to intervene and learn through experimentation.

and generative relationships, as they might inform future policy development. Relationships can be maintained through seminar series, joint teaching or guest lectures and exchanges in knowledge products such as publications and policy briefs. Given that the success of partnerships has been shown to depend on long-term established relationships, these engagements serve to tether and efficiently build on knowledge and perspectives in the absence of windows for policy change. For example, a recent research project in green infrastructure mapping for the local government builds on the relationships and work established through the CityLab process.

In the KTP, the embedded researchers played different roles in respective policy processes during Phase 1.[4] Local government officials who were engaged in the writing exchanges and within academic debates were able to situate local policy innovations in a global context. Being able to draw on global debates in the literature and wider case study material provided credibility to the positions being put forward by officials to political decision-makers.

During Phase 2, embedded researchers were able to integrate academic insights and research into policies and projects. There was also some involvement in policy implementation, changing practices and establishing the implications of major new policies such as the transit-oriented development strategy and the adoption of the SDGs (Patel et al. 2017).

The outcomes of developing national State of Cities reports in partner countries were to (a) build urban knowledge and organisational capacity to respond effectively to the unique challenges and opportunities faced by SSA urban policy-makers, planners and development practitioners by creating access to integrated international best practices; (b) provide more detailed knowledge and information about their own national urban realities; and (c) develop effective means to rapidly increase their skills and capabilities in urban management.

Despite some common findings and lessons learned, it is important to note that numerous contextual factors affected each process and the stakeholder buy-in. Any similar projects following the approaches outlined in this chapter, whether in Cape Town or elsewhere in SSA, must therefore pay attention to goals, relationships and processes during knowledge co-production. A key lesson from the experiences outlined here is that there is no singular approach to partnering for knowledge co-production. Given the significance of context in shaping what is possible, policy development through knowledge partnerships cannot depend on ‘best practice’ but will of necessity be emergent (Patel et al. 2015).

[4]Interventions related to climate change adaptation included efforts to influence the institutional resourcing and functioning of this portfolio within the local government. In energy governance, the embedded researcher added capacity by aligning local policy directions with national policy imperatives. With regard to the space economy, new tools for decision-making and planning were co-developed between the researcher and his counterparts in the local government. In the green economy sector, engagement with academic debates led to an evidence-based entrenching of this policy direction.

8.6 Conclusions

This chapter has outlined the approach and lessons learned from three knowledge co-production research processes related to SSA cities. A common thread is that effective collaborative practices cannot be perfectly predetermined, as they are strongly shaped by context. The success of knowledge partnerships has been shown to be predicated on history, as well as past performance, which have in turn shown to influence both credibility and salience. Legitimacy was shown to increase in programmes that had deliberately built in opportunities that facilitated power sharing, including decisions on meeting venues, agenda setting and the forms of knowledge products emerging as joint outcomes. However, across the three programmes, the evidence of radical policy shifts is at best thin. Yet, the benefits of data and evidence generation based on rigorous processes and scientific outputs have left the partnering institutions in a stronger position to both navigate policy change and approach research with added confidence. Across the three programmes, it can therefore be concluded that knowledge co-production has resulted in building the capacity and commitment of the respective knowledge partners.

Acknowledgements Funding from Mistra Urban Futures and the National Research Foundation, South Africa, is duly acknowledged.

References

Andersen HT, Nolmark H, Atkinson R, Muir T, Troeva V (2009) Urban knowledge arenas. Final report of cost action C20. European Cooperation in Science and Technology, COST, Bruxelles

Anderson P, Elmqvist T (2012) Urban ecological and social-ecological research in the City of Cape Town: insights emerging from an urban ecology CityLab. Ecol Soc 17(4)

Anderson PML, Brown-Luthango M, Cartwright A, Farouk I, Smit W (2013) Brokering communities of knowledge and practices: reflections on the African Centre for Cities CityLab programme. Cities 32:1–10

Breda van J, Swilling M (2019) The guiding logics and principles for designing emergent transdisciplinary research processes: learning experiences and reflections from a transdisciplinary urbna case study in Enkanini informal settlement, South Africa. Sustain Sci 14:823–841

Brown-Luthango M (2012) Community-university engagement: the Philippi city lab in cape town and the challenge of collaboration across boundaries. High Educ 65:309–324

Brudney JL, England RE (1983) Toward a definition of the coproduction concept. Public Adm Rev 43(1):59–65

Cash D, Clark W, Alcock F, Dickson N, Eckley N, Jager J (2002a) Salience, credibility, legitimacy and boundaries: linking research, assessment and decision-making. John F. Kennedy School of Government, Harvard University, Faculty research working paper series RWP02–046, pp 1–24

Cash D et al (2002b) Salience, credibility, legitimacy and boundaries: linking research, assessment and decision making, KSG working papers series RWP02-046. SSRN: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=372280

Cash D, Clark W, Alcock F, Dickson N, Eckley N, Guston D, Jager J, Mitchell R (2003) Knowledge systems for sustainable development. Proc Natl Acad Sci U S A 100 (14):8086–8091

Choo CW (1996) The knowing organisation: how organisations use information to construct meaning, create knowledge and make decisions. Int J Inf Manag 16(5):329–340
Cirolia LR, Görgens T, van Donk M, Smit W, Drimie S (eds) (2016) Upgrading informal settlements in South Africa: A partnership-based approach. UCT Press, Cape Town
Coburn J (2007) Community knowledge in environmental health science: co-producing policy expertise. Environ Sci Pol 10:150–161
Cole M (2015) Is South Africa operating in a safe and just space? Using the doughnut model to explore environmental sustainability and social justice. Oxfam Research Reports. www.oxfam.org
Cornell S, Berkhout F, Tuinstra W, Tabara JB, Jager J, Chabay I, De Wit B, Langlais R, Mills D, Moll P, Otto IM, Petersen A, Pohl C, Van Kerkhoff L (2013) Opening up knowledge systems for better responses to global environmental change. Environ Sci Policy 28:60–70
Delanty G (2001) Challenging knowledge: the university in the knowledge society. The Society for Research into Higher Education & Open University Press, Buckingham
Edelenbos J, Van Buuren A, Van Schie N (2011) Co-producing knowledge: joint knowledge production between experts, bureaucrats and stakeholders in Dutch water management projects. Environ Sci Policy 14:675–684
Gibbons M, Limoges C, Nowonty H, Shwartzman S, Scott P, Trow M (1994) The new production of knowledge: the dynamics of science and research in contemporary societies. Sage, Stockholm
Godin B, Dore C (2005) Measuring the impacts of science: beyond the economic dimensions, INRS urbanisation, culture et societe, paper presented at the HIST lecture. Helsinki Institute for Science and Technology Studies, Helsinki Finland. http://www.csiic.ca/PDF/Godin_Dore_Impacts.pdf
Godfrey L, Funke N, Mbizvo C (2010) Bridging the science-policy interface: a new era for south African research and the role of knowledge brokering. S Afr J Sci 106(5–6):44–51. Retrieved from http://www.scielo.org.za/scielo.php?script=sci_arttext&pid=S0038-23532010000300013&lng=en&nrm=iso&tlng=es
Hanson S, Polk M (2018) Assessing the impact of transdisciplinary research: the usefulness of relevance, credibility, and legitimacy for understanding the link between process and impact. Res Eval 27(2):132–144
Hardoy JE, Mitlin D, Sattherthwaite D (2013) Environmental problems in an urbanising world. Finding solutions in cities in Africa, Asia and Latin America. Routledge, London
Hellström T, Jacob M (2003) Boundary organisations in science: from discourse to construction. Sci Public Policy 30(4):235–238
Hessels LK, Van Lente H (2008) Re-thinking new knowledge production: a literature review and research agenda. Res Policy 37:740–760
Independent Expert Advisory Group on a data revolution for sustainable development (2014) A world that counts: mobilising the data revolution for sustainable development. www.datarevolution.org
International Expert Panel on 'Science and the Future of Cities' (2018) Endorsed by nature sustainability
International Labour Organization (ILO) and World Health Organization (WHO) (2009). Social Protection Floor Initiative. The sixth initiative of the CEB on the global financial and economic crisis and its impact on the work of the UN system. Manual and strategic framework for joint UN country operations. Retrieved August 21, 2019, from https://www.social-protection.org/gimi/RessourcePDF.action?ressource.ressourceId=14484
Jasanoff S (2004) Ordering knowledge, ordering society. In: Jasanoff S (ed) States of knowledge: the co-production of science and the social order. Routledge, London, pp 13–45
Jones BD (1999) Bounded rationality. Annu Rev Polit Sci 2:297–321
Lemos MC, Morehouse BJ (2005) The co-production of science and policy in integrated climate assessments. Global Environmental Change-Human and Policy Dimensions 15(1):57–68
May T, Perry B (2006) Cities, knowledge and universities. Transformations in the image of the intangible. Soc Epistemol 20(3–4):259–282

May T, Perry B (2010) Social research and reflexivity. Sage, London
McGinity R, Salokangas M (2014) Introduction: 'embedded research' as an approach into academia for emerging researchers. Manag Educ 28(1):3–5
Njoh AJ (2009) Urban planning as a tool of power and social control in colonial Africa. Plan Perspect 24(3):301–317
Nonaka I (1991) The knowledge creating company. Harv Bus Rev 69:96–104
Nonaka I (1994) A dynamic theory of organizational knowledge creation. Organ Sci 5(1):14–37
Oldfield S, Patel Z (2016) Engaging geographies: questions of power and positionality in knowledge production. S Afr Geogr J 98(3):505–514
Ostrom E (1996) Crossing the great divide: co-production, synergy and development. World Dev 24:1073–1087
Parnell S, Walanege R (2014) Sub-Saharan African urbanisation and global environmental change. In: Parnell S, Pieterse E (eds) Africa's urban revolution. Zed Books, London, pp 35–59
Patel Z (2009) Environmental justice in South Africa: tools and trade-offs. Social Dynamics: A Journal of African Studies 35(1):94–110
Patel Z, Greyling S, Parnell S, Pirie G (2015) Co-producing urban knowledge: experimenting with alternatives to 'best practice' for Cape Town, South Africa. Int Dev Plan Rev 37(2). https://doi.org/10.3828/idpr.2015.15
Patel Z, Greyling S, Arfvidsson H, Moodley N, Primo N, Wright C (2017) Local responses to global agendas: the benefits of breaking with best practice in piloting the urban sustainable development goal in Cape Town. Sustain Sci 12:785–797. https://doi.org/10.1007/s11625-017-0500-y
Petts J, Owens S, Bulkeley H (2008) Crossing boundaries: interdisciplinarity in the context of urban environments. Geoforum 39(2):593–601
Pieterse E (2010) Cityness and African urban development. Urban Forum 21:205–219
Pieterse E (2011) Grasping the unknowable: coming to grips with African urbanism. Soc Dyn J Afr Stud 37(1):5–23
Pieterse E (2013) City/university interplays amidst complexity. Territorio 66:26–32
Pieterse E, Parnell S (2014) Africa's urban revolution in context. In: Parnell S, Pieterse E (eds) Africa's urban revolution. UCT Press, Cape Town, pp 1–17
Pohl C, Hirsch Hadorn G (2007) Principles for designing transdisciplinary research. Oekom, Munich
Pohl C, Rist S, Zimmerman A, Fry P, Gurung CS, Schnieder F, Speranza CI, Kiteme B, Boillat S, Serrano E, Hardorn GH, Wiesmann S (2010) Researchers' roles in knowledge co-production: experience from sustainability research in Kenya, Switzerland, Bolivia and Nepal. Sci Public Policy 37(4):267–281
Polk M (ed) (2015a) Co-producing knowledge for sustainable urban development: joining forces for change. Routledge, London
Polk M (2015b) Transdisciplinary co-production: designing and testing a transdisciplinary research framework for societal problem solving. Futures 65:110–122
Polk M, Kain J (2015) Co-producing knowledge for sustainable urban futures. In: Polk M (ed) Co-producing knowledge for sustainable urban development: joining forces for change. Routledge, Abingdon, pp 1–23
Polk M, Knutsson P (2008) Participation, value rationality and mutual learning in transdisciplinary knowledge production for sustainable development. Environ Educ Res 14(6):643–653
Ramadier T (2004) Transdisciplinarity and its challenges: the case of urban studies. Futures 36:423–439
Roux DJ, Nel JL, Cundill G et al (2017) Transdisciplinary research for systemic change: who to learn with, what to learn about and how to learn. Sustain Sci 12:711–726. https://doi.org/10.1007/s11625-017-0446-0
Scott D, Davies H, New M (eds) (2019) Mainstreaming climate change in urban development: lessons from Cape Town. UCT Press, Cape Town
Simon D, Arfvidsson H, Anand G, Bazaz A, Fenna G, Foster K, Jain G, Hansson S, Evans LM, Moodley N, Nyambuga C, Okolo M, Ombara DC, Patel Z, Perry B, Primo N, Revi A, van Niekerk B, Wharton A, Wright C (2016) Developing and testing the urban sustainable development goals, targets and indicators – a five-city study. Environ Urban 28(1):49–63

Smit W, Lawhon M, Patel Z (2015) Co-producing knowledge for whom, and to what end? reflections from the African centre for cities in cape town. In: Polk M (ed) Co-producing knowledge for sustainabile cities: joining forces for change. Routledge, Abingdon, UK, pp 47–69

South African Cities Network (2004) State of the cities report 2004. The South African Cities Network, Johannesburg

Swilling M (2014) Rethinking the science-policy interface in South Africa: experiments in knowledge co-production. S Afr J Sci 110(5/6):1–7

UN-Habitat (2008) The state of the African cities report 2008. Nairobi, UNHABITAT

Watson V (2014) Co-production and collaboration in planning – the difference. Plan Theory Pract 15:62–76

Whitaker GP (1980) Coproduction: citizen participation in service delivery. Public Adm Rev 40 (3):240–246