

## Article

# Social Innovation for Sustainable Urban Developmental Transitions in Sub-Saharan Africa: Leveraging Economic Ecosystems and the Entrepreneurial State

Camaren Peter 

Allan Gray Centre for Values-Based Leadership, Graduate School of Business, Faculty of Commerce, University of Cape Town, Cape Town 8002, Western Cape, South Africa; camaren.peter@gsb.uct.ac.za

**Abstract:** This study theorizes social innovation-based transitions to sustainable urban development from the perspective of the African urban condition, highlighting that large infrastructure and service provision deficits, poverty, inequality, heavy import dependence and the prevalence of dual formal–informal sector systems are key factors to account for in a just, sustainable urban African developmental transition. It identifies an opportunity space that can be leveraged for urban and broader transitions to sustainability on the continent by leveraging “economic ecosystems” for local scale social innovation-based development interventions. It theorizes that multi-level transitions to sustainability can be engendered by adopting an entrepreneurial state led approach at local scales by using economic ecosystems as the framework to (1) stimulate social innovation-based entrepreneurship that meets local and local–regional demands through decentralized, low cost, small-scale infrastructures, technologies and services, (2) leverage social innovation-based economic ecosystems for catalyzing multi-scalar transitions to sustainability, (3) recast the role of the entrepreneurial state, specifically in relation to social innovation and sustainable urban development (SUD) in Africa and (4) bridge formal–informal sector dualism. This framing prioritizes local economic development over centralized, state-led interventions that involve grand-scale masterplans, wholly new satellite cities and bulk infrastructure deployments in conceptualizing sustainable urban development transitions in Africa.

**Keywords:** Sub-Saharan Africa; social innovation; sustainable urban development; economic ecosystems; transitions to sustainability; informality; green technology; fourth industrial revolution



**Citation:** Peter, C. Social Innovation for Sustainable Urban Developmental Transitions in Sub-Saharan Africa: Leveraging Economic Ecosystems and the Entrepreneurial State. *Sustainability* **2021**, *13*, 7360. <https://doi.org/10.3390/su13137360>

Academic Editor: Harald A. Mieg

Received: 23 May 2021  
Accepted: 25 June 2021  
Published: 30 June 2021

**Publisher’s Note:** MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



**Copyright:** © 2021 by the author. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

## 1. Introduction

“The state must also *lead* the process of industrial development, by developing strategies for technological advance in priority areas. This type of State action . . . seeks to *create* and *shape* markets and systems.” [1] (p. 47)

The celebrated growth of the African continent’s countries over the past four decades has been accompanied and underpinned by the growth of Africa’s cities [2], which are growing at the highest rates in the world [3,4]. Notwithstanding the dramatic projections of the continent’s urban dwellers tripling from 548 million in 2018 to 1.5 billion in 2050—around 22% of the global urban citizenry at that time [4]—African cities remain characterized by high levels of informality, poverty, inequality, unemployment and infrastructure and service provision deficits. Rapid urbanization is unfolding in the absence of any significant industrialization [3]. The question of what urban development and industrialization trajectories may ensue on the continent and how sustainably the growing needs of the African urban citizenry will be met, is hence important for (note that this study builds on recent work—i.e., [5,6]—that set the foundation for the emphasis on social innovation articulated in this paper) (1) meeting global sustainable development goals [7,8] and (2) mitigating against the exacerbation and/or increased growth of existing socio-economic ills, such as poverty and inequality, which characterizes the urban divide in Africa [9].

African cities have become targets for multi-national corporations seeking to secure urban real estate in the “new scramble for Africa”, i.e., for knowledge cities, global cities, eco-cities and smart cities [10]. Yet, in contrast to this push for grand master planning styled urban development and the establishment of wholly new green fields satellite cities [10–12], the scholarly discourse on African cities has, for the greater part of the past two decades, focused on the need to pay detailed attention to the strategies and tactics through which the “everyday” navigation of dual formal and informal systems is navigated [13–17]. More recently, in response to this emphasis on the quotidian, several scholarly contributions have argued for a re-appraisal of the role of the state, namely, that the state, through both its presence and absence, significantly shapes the development of African cities [18,19]. This tension—between bottom-up and top-down intervention priorities—in the southern urbanism literature closely mirrors similar tensions in the debates on social innovation [20].

This top-down, bottom-up tension speaks directly to what scales of intervention are required, what the target of intervention should be (i.e., who, what) and what mode (i.e., how) of intervention is required for SUD in Africa. It also raises the question of what roles—i.e., the state, private sector, civil society and academia—can play. In this respect, considering the role that social innovation can play—with the support of the aforementioned sectors and, particularly, the state [21]—in engendering sustainable urban development (SUD) in Africa is worth exploring in tandem. This is particularly the case as social innovation (taking a cue from Moulaert et. al. [22] this study adopts a broad, all-encompassing definition of social innovation of as “conscious corporations to non-profit charitable ventures” [23] (p.2)) is widely recognized as “‘transformative’ in relation to systemic change” as well as “‘instrumental’” in responding to the need for the provision of social services [24], both of which are clearly required when contemplating transitions to SUD in African cities. Moreover, social innovation can emerge independently from the aforementioned sectors alone, from collaboration and cooperation between them [21,24] and from top-down, bottom-up and hybrid approaches that integrate both [20].

In response to this, this study explores the African urban condition to help diagnose what kind of sustainability transition is required in the African context and what role social innovation can play in catalyzing transition. It draws on a range of scholarly and policy outputs to characterize the African urban condition and its specificities, peculiarities and vulnerabilities. This enables an argument to be made for social innovation that is informed by the following three considerations: (1) the appropriate scale of intervention that is required (i.e., small to intermediate scale cities), (2) the target of intervention (i.e., the food–water–energy–transport nexus that middle class African households are heavily dependent on) and (3) the appropriate mode of intervention for African cities (i.e., in situ development in slums and informal settlements, leveraging low-tech sustainability-oriented and green offerings in combination with fourth industrial revolution offerings).

This study adopts an economic ecosystem lens because it places a specific focus on local economic development [25]. It argues that—by adopting an economic ecosystem perspective and focusing social innovation agendas on the scales, targets and mode of intervention identified in this study—transitions to SUD can be seeded, catalyzed and consolidated at local and local–regional scales, empowering local authorities and social innovation-based organizations to deliver on SUD agendas. In this framing, small to intermediate scale African cities serve as incubators of niche social innovations and catalysts for local transitions to SUD, respectively. These cities are ideal candidates for sustainability transitions that are infrastructure and technology intensive, as well as inclusive, precisely due to their more manageable developmental scales. Moreover, due to their location along corridors that typically connect larger cities to rural towns and areas, they can act as a “glue” in the rural–urban assemblage, helping overcome rural–urban divides on the continent to some extent.

With respect to broader, macro-scale transitions to sustainability, this study theorizes that by deploying the multi-level perspective on sustainability transitions (MLP) [26], small-scale, decentralized development at local and local–regional scales—driven by social

innovation—can help develop the niche innovations and economic ecosystems [25,27] that can drive broader scale transitions. In this casting, economic ecosystems established in small to intermediate sized cities—which draw on both green/sustainable solutions and fourth industrial revolution offerings to innovate context-specific offerings (i.e., products and services)—act as distributed “engines” of social innovation and local economic diversification that cumulatively drives national and regional-scale economic diversification trajectories.

This framing, in turn, helps elucidate the role of the entrepreneurial state in actualizing SUD in Africa. Namely, the role of the entrepreneurial state is to shape SUD transitions in Africa through directing, building and supporting local economic ecosystems that foster social innovation for SUD at the appropriate scales, for the targets identified and in the modes stipulated in this study. This includes managing the complexity of hybrid top-down bottom-up participation, protecting the interests of the marginal majority poor and maintaining a focus on scaling for sustainability at broader scales.

In addition to its emphasis on local economic development, this study also adopts an economic ecosystem lens because it is agnostic towards formal–informal sector dualism, i.e., both these considerations are important for actualizing local transitions to SUD in the African context. The economic ecosystem framing helps overcome formal–informal sector dualism, providing a framework for a post-dualistic conception of formal and informal sectors, one that enables a holistic, heterodox perspective that is more suited to the realities of the African urban context.

In the next section the dimensions of African urbanism are accounted for and serve as a basis upon which the scales, targets and modes of intervention are rationalized. Section 3 offers a specific definition of what a sustainable African city would ideally be characterized by and identifies the stabilization of the middle class as key to the broader transition, as well as the means through which that can be achieved, i.e., by targeting “nexus” (i.e., food–water–energy–transport) costs. Section 4 positions local economic ecosystems as vehicles through which infrastructural, technological and economic diversification can be achieved (i.e., in both formal and informal sectors, as well as local, national and regional), drawing on the multi-level perspective as a framework for transitions to sustainability. Section 5 discusses the key theoretical contributions of this study and Section 6 summarizes and concludes the study. Section 7 identifies its key limitations and suggests avenues for future (theoretical and empirical) research on this basis.

It is important to note that the vast heterogeneity of the African continent limits the validity of any developmental approach that attempts to be comprehensive. Hence, this study maintains a strict focus on the urban condition, drawing on well-established common developmental conditions and challenges in African cities, while acknowledging that accommodating territorial differences and sensitivity to context and heterogeneity is a critical and necessary consideration in formulating and implementing this approach. Moreover, while the study draws on Africa-wide data and findings for pragmatic reasons relating to data availability, the approach that is developed in this study is mainly directed at Sub-Saharan African cities.

## 2. African Urbanism: The Scale, Target and Mode of Intervention

The African continent’s celebrated growth [2]—characterized by even growth across sectors that fueled consistent GDP growth over the past four decades—is largely underpinned by its urbanization rates [3], which are projected to soon be the highest in the world [28]. The continent exhibits the highest city growth rates in the world [4]. City growth rates hovered at around 4% for the four decades spanning from 1950 to 1990 and is projected to be at least 3% by 2035–2040 [4]. Consequently, the continent’s highest performing 18 cities are likely to achieve a purchasing power of USD 1.3 trillion by 2030 [3,29]. Africa’s middle class is expected to grow to 1.1 billion in 2060, up from 355 million in 2010 [3,30] and its labor force is expected to reach 1.1 billion, exceeding that of China and India [2] by 2034 [28]. Hence, Africa’s cities have become targets for the global multina-

tional corporations seeking to secure and re-valorize urban real estate in the new scramble for Africa [12].

However, African cities are characterized by dual formal–informal systems spanning almost every sector and activity (i.e., trade, service provision, employment, housing, land ownership and leasing and finance). The informal sector in Africa employs 66% of Africa’s non-agricultural labor force, while contributing around upwards of 35% (35% in middle income countries, 40% and higher in low-income countries) of GDP [31]. Urban slum dwellers increased from 31 % in 1995 to 62% in 2012 [32] and it can reasonably be expected that this growth has continued with rapid city growth rates. The large infrastructure and service deficits that prevail across the continent and its cities, alongside the prevalence of dual formal and informal systems, present perhaps the largest obstacle to stabilizing the African middle class and alleviating those in poverty. The prevalence of slums and informal settlements—which are characterized by piecemeal planning and uneven development—typically serves as a barrier to the provision of bulk infrastructures, such as water and sanitation, bulk energy supply, waste management and roads and transportation [3]. Demand is met through a combination of formal and informal service providers, often at higher cost to the poor, who cannot physically access formal bulk infrastructures and service provisions [3]. Moreover, Africa and its cities are heavily dependent on imports, such as goods, food and fuel, to meet local demand, rendering them vulnerable to exogenous change effects [33].

Three key additional—and peculiar—factors are critical to account for in respect of aspirations to SUD on the continent.

*Scale of intervention.* First, contrary to popular perceptions of urbanization on the continent, the large majority of growth has not been occurring in the large metropolises of the continent (e.g., such as Lagos and Kinshasa), but has rather been occurring in small to intermediate cities instead (i.e., 63.9%) [34]. With 54% of growth occurring in small cities (i.e., 100,000–500,000) and 9.9% in intermediate cities (i.e., 500,000–1,000,000) [34] and the majority of these cities springing up along corridors that connect larger cities, the spatial transition that African urbanization is undergoing offers up a key opportunity to leapfrog urban development by focusing efforts at smaller, more manageable scales yet still driving macro-scale transitions at the same time. This indicates that inclusive, participatory-based approaches are more achievable as well, as the scale of engagement is smaller. It also speaks to the need for stronger decentralization for local and local–regional economic diversification; decentralized infrastructures and service provisions are key to this transition. Hence, the scale of intervention can be identified as that consisting of small to intermediate cities, focusing on local and local–regional (the term “local–regional” is used in this article to differentiate between transnational regions and local regions) developmental scales.

*Target of intervention.* Second, the African middle class does not resemble the global middle class and is in contrast—in reality—a middle-class precariat. Whereas the global middle class is defined as people living on USD 10–100 per day, the African middle class is defined as those living on USD 2–20 per day [35]. The African middle class in 2010 constituted 34% of the total African population and around 60% of this 34% actually survived on incomes of USD 2–4 per day (i.e., the “floating middle class”) [35]. Hence, the African middle class is considerably vulnerable to exogenous shocks and changes, with household budgets under severe and persistent strain, especially due to heavy dependence on imports of goods, food and energy (i.e., nexus effects; see Section 3.2). Only 4% of Africans earn above USD 10 per day and constitute only 2% of the global middle class, with 50% of Africans living under the poverty line of USD 1.25 per day [36]. Hence, the target of intervention is clear: transitioning the precarious middle class into stability and growing it, particularly by focusing on household budgets, alongside stabilizing formal and informal sector SMEs that typically provide services at the—mentioned—scales of intervention.

*Mode of intervention.* Third, in contrast to the first wave of urbanization that saw urbanization accompany the industrialization (i.e., the industrial revolution from 1750 to 1950) of now developed nations, urbanization in Africa has largely been unfolding in the absence of any significant industrialization [3,15,29]. Extractive and agrarian activities largely underpin growth on the continent. Notwithstanding, significant tertiary sector growth has unfolded on the continent over the past decade, with telecommunications, finance and banking services reaching more people due to the—mainly ICT—platforms that technological advancements of the third industrial revolution have enabled [36–39]. This speaks to the need for and potential for Africa to leapfrog the type of industrialization trajectory that the cities of the developed world underwent. This is critical in respect of the need for low-carbon, sustainable growth that is just, inclusive, resource efficient and is hence suited to the pressing concerns of the 21st Century [29,30], particularly the need to meet global Sustainable Development Goals (SDGs). This in turn is a strong indication of the mode of intervention that is most appropriate for African cities, that is, in situ development that leverages the convergence of sustainability oriented and/or green solutions, as well as fourth industrial revolution offerings that are appropriate for and fit the African urban context and its needs (see Section 3.1).

In summary, this study enables us to discern (1) the scale of intervention, (2) the target of intervention and (3) the mode of intervention that ascribe a “fit-for-purpose” approach towards engendering sustainable urbanism in African cities. This in turn helps frame the role social innovation can play in generating radical, top-down, bottom-up and hybrid solutions [20] to the pressing—wicked—SUD challenges facing African cities. Moreover, it provides focus for sectoral intervention and support, particularly the role that the (entrepreneurial) state can play in supporting social innovation for local development in African cities, with a view to stimulating local economic development and broader transitions to sustainability at the same time.

### **3. Transitions to Sustainable Urbanism in Africa**

#### *3.1. Sustainable Urbanism in Africa: A Broad Definition*

With respect to what kind of sustainable development trajectory is appropriate for African cities, it is worth tendering a comprehensive definition, based on what the key, desirable characteristics of just, sustainable African cities would be. To this end, this study conceives of sustainable African cities as being (1) resilient, adaptive and transformative (e.g., to change effects and shocks, whether emanating from the global, regional or national/local scales), (2) able to leverage intra- and cross-scale interdependencies and relationships (i.e., more internal coherence and resilience through strengthening intra-relations and leveraging cross-scale interdependencies to navigate change), (3) more equitable in respect of the urban citizenry (i.e., with respect to livability and reducing inequalities in access to infrastructure services and provisions, access and mobility), (4) resource efficient and sustainable (i.e., in order to navigate the pressures of resource scarcity and low-carbon development in the 21st Century) and (5) productive (i.e., through economic diversification that boosts economic growth and employment where it is most needed).

In short, the sustainable African city should ideally be inclusive, productive, resilient and sustainable. This speaks directly to the kind of social innovation that is required in African cities, that is, social innovation that draws on inclusive, participatory based processes bottom-up, while also integrating inputs from experts and decision-makers from the top-down (articulated as hybrid by Manzini (2013)). In this framing, game-changing social innovation can be produced through transdisciplinary, multi-sector and multi-level engagements that are primarily informed by the needs of the communities and urban citizens that these social innovations target [40]. This is particularly important where informality is concerned. As articulated by Roy [41] (p. 152), a “different set of experts” needs to generate knowledge about upgrading, namely, “the residents of informal settlements” themselves. This is because, as Roy [41] (pp. 150–152) points out, “the provision and distribution of infrastructure is not a technical issue but rather a political

process” and that the “question of who sets the upgrading agenda” is central to meeting the needs of informal settlement dwellers. In this respect, social innovation that is inclusive and focused on producing an “enabling system: a system of producers and services aiming to empower the social actors involved” [20] (p. 60) is required in the African urban context.

In this paper, the enabling systems are conceptualized as social innovation-based economic ecosystems for SUD (see Section 4). The next section identifies, more precisely, the “nexus” (i.e., food–water–energy–transport) that this enabling system should ideally be oriented upon in the case of African cities, particularly at the household level. Moreover, it presents a rationale for stimulating game-changing social innovation through exploiting the convergence between green technologies and fourth industrial revolution offerings for SUD in the African context.

### 3.2. Nexus: Enabling Just, Inclusive Sustainable Urban Transitions

What is clear, is that any successful developmental transition must both stabilize and broaden the African middle class and lift poor households out of poverty at the same time if it is to reduce inequalities (with Africa’s Gini coefficient averaging 0.58, above the global average of 0.4) and the entrenched urban divide that persists in African cities [3,42]. Moreover, stabilizing the African middle class is critical to broader transition, as their precarity limits their ability to meet basic needs, service their assets effectively and make significant savings, as well as access entrepreneurial, educational and skills development opportunities [43]. It is also important because local authorities in Africa are generally unable to collect significant revenues locally and remain dependent on central authorities for funds [44] that are often limited and, in turn, subject to corruption and influence from central authorities. Growing and stabilizing the African middle class, who are mainly urban, is hence key to ensuring a macro-level developmental transition that is significantly transformative and raises African living standards to the same level as developed nations [3,35,43].

With respect to stabilizing middle class African household budgets, a key intervention point can be identified by acknowledging that between 50% and 70% of household budgets of the poor is spent on food, water, energy [45] (including transportation [46]), with food alone averaging above 50%. This is commonly referred to in development literature as the “nexus” [47] and, while it mainly pertains to poor African households, it is also significant for the African middle class, who in reality are precarious and earn significantly less than the global middle class (as discussed earlier in Section 2). This is especially the case as the—already high—dependence on imports in the food and energy sectors is projected to increase for most African countries [33]. These nexus effects are critical to account for at the household level, as they are combinatorial and can therefore result in double and triple squeeze effects between food, water, energy and transport costs on households [3].

Nexus impacts, hence, serve as key destabilizing factors for households and any intervention at the household level must necessarily address them. They can plunge households into near-poverty and poverty conditions from month to month. They hamper the ability of households to save, service their assets, engage in entrepreneurial activities in the formal and informal sectors, access basic services and engage in skills development and education for self-advancement. Moreover, this has upstream impacts on local governments, who are unable to collect revenues effectively enough to sustain local government funded programs of action, as previously discussed. Hence, nexus impacts at the household level/scale have significant knock-on effects on local authorities and are key to actualizing broader scale (i.e., city, national and regional) transitions to sustainability.

In acknowledgement of this reality and drawing on the scholarly discourse that emphasizes the importance of working with the everyday realities of African urbanism (especially informality), African urban theorists and practitioners alike have argued for in situ development approaches to take precedence in slums and informal settlements [3,15,48]. In situ development typically seeks to co-construct and implement small-scale, decentralized solutions, drawing on local and indigenous knowledge (e.g., constructing water reserves) or

convenient (low cost, easy to maintain) technologies and systems that can be implemented from household to neighborhood scales [3]. Critically, in situ development ensures that infrastructures and service provisions become available to slum and informal settlement dwellers quicker than bulk infrastructures. Indeed, this coheres with Swilling [40], who rationalizes game-changing local-level in situ interventions and solutions as critical for African urban and multi-scalar sustainability transitions on the continent.

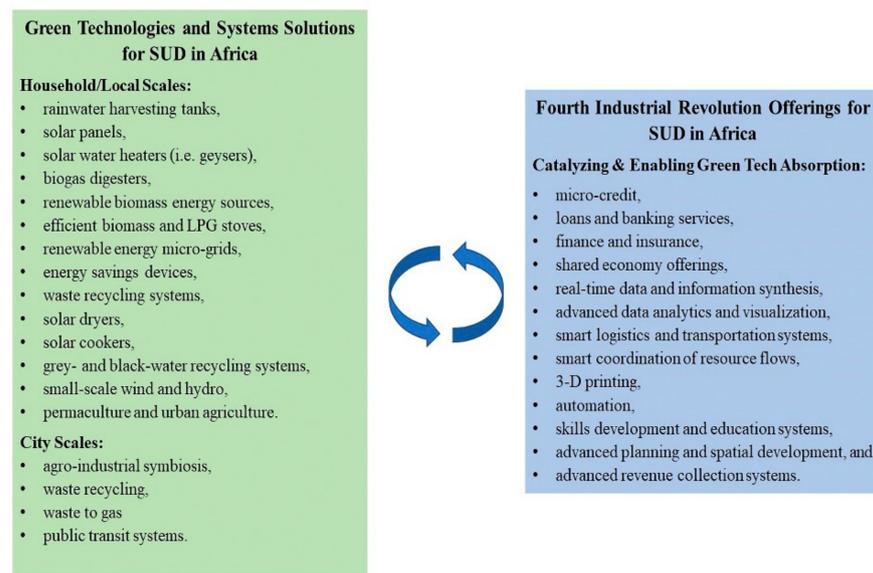
The role of social innovation in actualizing this in situ developmental vision in African cities warrants further discussion, particularly as it is focused on leveraging “new ways of thinking and acting” [21] (p. 2) on the grand developmental challenges of our era—which are complex and integrated [49]—with the specific aim of meeting social needs and goals. Moreover, the discourse around social innovation has risen in significance, as information and communications technology (ICT) offerings have grown and matured [21], enabling social innovation efforts to significantly extend their reach and impact. Critically, social innovation is widely viewed as key for actualizing collective visions of sustainability in local economic development ([20,50–52] in [21]). Social innovation also draws on and combines with both financial and technological innovations in producing and reproducing its offerings, for example, leveraging technological innovations in microfinancing to meet social needs through sustainable technology and infrastructure provisions and services [21,53] (p. 45). Social innovation can emerge from any sector alone—such as civil society, the state and the private sector—but also from the combined efforts of sectors. Likewise, social innovation can also emerge from transdisciplinary cooperation and collaboration [21].

Similarly, in the African context, Swilling [40] (p. 1) argues for “game-changers” in sustainable urban development that follow from precisely the modes of engagement through which social innovation is generated, i.e., that new, innovative systems and solutions emerge from cross-sector, transdisciplinary and multi-level interactions that are primarily informed by the context of implementation (i.e., the communities themselves). Collectivity (typically through participation) and relationality (i.e., cross-scale, cross-sector and multi-level) typically play a key role in unlocking solutions that are fit for context and give voice and primacy to the citizenry. That is, by generating cross-pollination of ideas about how to develop solutions that may range, for example, from innovations in financing to technological and systems innovation, to innovations that leverage local and indigenous knowledge(s) [23].

In their review of 29 cases of social innovation across nine domains, Angelidou and Psaltoglou [21] emphasize the importance of ICTs—i.e., digital social innovation (DSI)—in the recent rise of the prominence of social innovation. Taking their cue, this study argues that the potential for boosting social innovation through new technologies and systems solutions in SUD in Africa is even higher when considering the convergence between green technologies and fourth industrial revolution offerings. Note that the emphasis here is not necessarily on primary innovation in these areas, but rather generating systems solutions that are appropriate for context by recombining, “in a creative way, already existing products, services, places, knowledge skills and traditions” [20] (p. 61), an approach that is core to social innovation.

Many green technology offerings and systems solutions are particularly suited to the African context. They are predominantly decentralized and/or semi-decentralized and can operate independently or supplemental to bulk infrastructures. They are also scale-able and for example can be scaled up to neighborhood scales and higher (e.g., micro-grids). Green technology offerings and solutions are also customizable to local contexts, as they can be taken up in different systems configurations. This allows absorption considerations to be made, taking local specificities and contextual factors into account, as well as the specific needs of communities. Moreover, they are, in most cases, easy to install, service and maintain and low-skills levels are required, creating opportunities for low-skilled and semi-skilled workers (especially the youth) to be trained and absorbed into employment. There are also many low-cost options available, a key factor in ensuring absorption in this context.

Green technologies and solutions that have potential for absorption in the African urban context at the household and neighborhood/district scales are shown in Figure 1. At city scales, green activities, such as agro-industrial symbiosis, waste recycling, waste to gas/energy plants and public transit systems, have significant potential for uptake and indeed have been taken up in some major cities. For example, Addis Ababa has implemented a waste-to-energy plant that will process 80% of the city's waste while supplying 30% of the city's electricity needs [54]. It also boasts its own light rail system since 2015, which can carry 15,000 passengers in each direction [55]. Lagos City in Nigeria boasts both a light rail and bus rapid transit system and so does the City of Johannesburg in South Africa. Kenya has one of the most dynamic solar power markets in Africa, having adopted solar power in the 1980s, producing thousands of solar technicians since then [3].



**Figure 1.** An inexhaustive account of green technology and fourth industrial revolution offerings that may be combined for SUD in Africa.

Additionally, fourth industrial revolution offerings, shown in Figure 1, can serve as significant catalysts and facilitators of the absorption potential of these green technology offerings and systems solutions by (1) helping develop the skills base that is required for roll-out and implementation, (2) assisting with data-driven systems optimization and customization of solutions, (3) optimizing resource efficiencies, while improving resilience to potential shocks, (4) contributing to local production and (5) providing innovative, new non-predatory micro-credit, financial and banking services and savings schemes that low-income households can access.

Countries like Kenya, where mobile phone enabled money transfer and microfinancing services are offered by M-Pesa, are actively engaged in absorption of blockchain technologies [56]. Blockchain and the ubiquity of mobile phones and telecommunications are already at the heart of many innovative offerings that are transforming both urban and rural citizenries' abilities to access previously inaccessible services on the continent, for example, in the agricultural sector, which is dominated by small farmers [57]. One new blockchain initiative seeks to provide loans to 50,000 smallholder farmers in Africa, to the value of USD 10 million. This project is a collaboration between Block Commodities, an African blockchain based commodities trader, Wala, a financial services platform powered by Blockchain, Dala, which provides crypto-tokens that supports instant, borderless micro-payments at no cost and FinComEco, which assists farmers in gaining wider market access for their crops [58]. In Ghana, BenBen [59] provides a trust-based, Blockchain enabled platform for land tenure and property that "aggregates both formal and informal public

transaction data”, integrating diverse property market data sources to provide verified and rated land data for use by differing market actors.

The potential convergence between green technologies and fourth industrial revolution offerings hosts considerable promise for development and economic diversification on the continent, but whether development will prove to be inclusive and equitable depends in large part on how these solutions are customized to African urban contexts. This is in turn dependent on who participates in the processes that conceptualize and implement that customization. To cater for the vast array of stakeholders and interest groups who will be affected by any deployment of smart solutions in African cities, this customization requires a more inclusive, participatory approach towards local implementation of sustainability agendas. In this respect, social innovation is oriented on precisely those considerations that are key for realizing SUD in African cities. Social innovation can broadly be described as constituted of two key discursive streams: “the first one (is) predominantly concerned with the role of social innovation in local development, building on the role of citizens and their communities in neighborhoods, cities and regions and the second one (is) concerned with socio-technical transitions, focusing on the process and involved actors in social innovation in addressing social challenges . . . ” [21] (p. 5). This simultaneous focus on socio-technical transition and inclusive local development is precisely what is required in the African urban context, particularly in Sub-Saharan Africa. The next section mobilizes this assertion by drawing on a theory of transitions to sustainability (i.e., the multi-level perspective, or MLP) [26] and economic ecosystems theory [25] to contextualize and characterize the role that an entrepreneurial state led approach can play in local SUD in African cities. It also discusses the value that this perspective brings for African states and city governments, in particular, in respect of the role that they can play in facilitating economic ecosystems that drive broader transitions to sustainability while boosting economic diversification—i.e., through a technology and infrastructure led transition—at the same time.

#### 4. An Economic Ecosystems-Based Framework for Transitions to SUD in Africa

In respect of transitions, this study draws on multi-level perspective on transitions theory (MLP), as a basis for developing this framing, as it specifically focuses on socio-technical transitions to sustainability, which are clearly of great relevance in the African context given its high infrastructure deficits and stark urban divide. It is important to acknowledge, however, that the MLP has largely been developed in and for developed world contexts and may not adequately address the contextual specificities of developing world contexts.

The multi-level perspective on transitions to sustainability (MLP) conceptualizes transitions as socio-technical systems (STs) (see Figure 2 below), where transitions are multi-level in respect of micro (i.e., niche), meso (i.e., regime) and macro (i.e., landscape) levels [26,60,61]. At the meso-level, regimes comprise a whole system and its normative features, that is, policy, regulatory, institutional, societal, structural, processual, economic, social, physical (i.e., infrastructural and technological), cultural, environmental and so forth. This constitutes a socio-technical system that is recognizable and which is dynamically evolving. At the macro-scale, landscapes refer to the greater context (and scales) in which regimes reside (e.g., regional, global). Landscapes exert exogenous landscape pressures on regimes that force regimes to adapt, primarily because regimes have little or no direct control over landscape pressures. Landscape pressures act as forcing factors that drive change in regimes. This change is facilitated by the ability of the regime to reconfigure its internal structures, processes, functions and identity (i.e., its adaptive capacity), as well as by the absorption and amplification of niches that occur at the micro-level (i.e., its transformability) [62]. As landscape pressures exert pressures on a regime, this creates opportunities for niches to accumulate, gain momentum and penetrate at the regime level spurring transition to new modes of operation at the regime level.

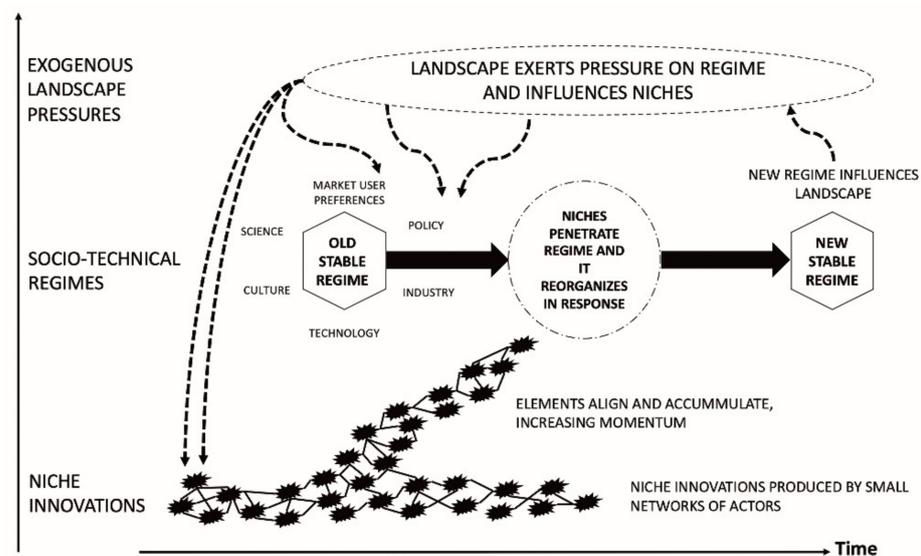


Figure 2. Illustration of the multi-level perspective on transitions. Adapted from [60] (p. 1263).

Niches are typically innovative on a range of different levels [62]; they can be discursive and policy oriented, technology and/or systems solutions oriented, or they may involve the establishment of strategic intermediaries that bridge activities that would otherwise be conducted in silos (e.g., urban coalitions, laboratories, management agencies). They are key to bringing about transformative change or transition at the regime level. This study theorizes that niche activities, as conceptualized in the MLP, can be further elaborated in the African context by embracing the notion of local and local–regional scale economic ecosystems, an old conceptual framing [27] that has enjoyed a recent revival [25].

Economic ecosystems theory has its roots in Malcolm Marshall’s 1920 eighth edition of *Principles of Economics* [27], where he argues for an approach towards economics that acknowledges two key insights. First, the use of the mechanistic metaphor accommodates complexity to a lesser degree than the biological metaphor in appreciating the adaptive evolution of economic systems. Second, localization of economic activity has profound commensurate benefits, particularly for knowledge co-creation and transfer, innovation and normalizing participation in trade and entrepreneurship at local levels. These insights have recently been mobilized by Auerswald and Dani [25] to formulate a comprehensive theoretical framework of economic ecosystems.

In this respect, Auerswald and Dani define an economic ecosystem as “(a) dynamically stable network of interconnected firms and institutions within a bounded geographical space” [25] (p. 362). In their framing, economic activities and innovations are geographically localized and characterized by innovation in ecosystems. They are densely interconnected and characterized by “speciation” (p. 374) between firms. The speciation of each firm is characterized by its “production algorithm” (p. 368), which serves as its differentiator in the broader “fitness landscape” (p. 369). Interconnectedness drives “biparental reproduction” (p. 366) as the progenitor of chance mutation in this fitness landscape, enabling Schumpeterian innovation and entrepreneurship to harness relationships to improve fitness. Firms proceed along the fitness landscape by leveraging their learning curves to proceed through learning and adaptation, adapting to changes as they occur and charting a way forward based on the new position achieved along the fitness landscape. This mirrors how complex systems maintain stability far away from equilibrium by harnessing feedbacks to “self-correct” to maintain stability through an “adaptive walk” (p. 369) of sorts. In this sense, the firm’s resilience is enhanced by its ability to adapt as well as the “DNA” (p. 368) that underpins its production algorithm, which provides it with the fallback mechanisms to adapt and self-organize [25].

Adopting a Schumpeterian perspective characterized by creative disruption—where innovation results from “a constant process of differentiation among firms, based on their

abilities to innovate because of different internal routines and competencies" [1] (p. 41)—this study theorizes that the potential for creative destruction (or disruption) at the regime level can best be achieved through catalyzing and organizing niche activities that produce social innovations in economic ecosystems at local and local–regional scales in African cities. That is, social innovation-based niches that respond to local demands (e.g., for goods, services, food, infrastructures and technology solutions, as well as skills development, financing, micro-credit) in service of sustainability transitions at local scales.

In this respect, an economic ecosystem perspective enables several key advances to be made that enable niche-level activities in the MLP to be organized for greater impact. First, it enables a heterodox economics perspective to be actualized. This is particularly suited to the African urban context as the prevalence of dual formal–informal systems negates the direct adoption of neoclassical economic models of development. Second, and related to the former, it enables a systems perspective, in which the false dichotomy between formal and informal systems can be transcended [6], enabling an inclusive, “organizing from the street” [63] perspective to be leveraged in service of in situ development in slums, informal settlements and informal trade, service provision, employment, production and the like. Third, an economic ecosystem perspective enables a unit of analysis and scale of implementation that is focused at the local and local–regional scales (this coheres with Mazzucato’s [1] (p. 43) perspective, whose focus is on the “network”, stating that, “from the meso perspective the network is the unit of analysis (not the firm). The network consists of customers, subcontractors, infrastructure, suppliers, competencies or functions and the links or relationships between them”), which is precisely where the need for infrastructure and technology provisions, service provisions, goods, skills development, reduced export dependence, cash flow and employment arises in African cities.

Hence, an economic ecosystem perspective brings a particular set of advantages when navigating urban development in African cities. Importantly, by leveraging a systems and heterodox economics perspective that is rooted in biological metaphor(s), it enables an understanding of what creates and drives adaptive and transformative capacity in local systems, i.e., what yields fitness and enables navigation of fitness trajectories on the fitness landscape. In this perspective, the economic ecosystem as a process becomes the unit of analysis in multi-level transition and not the production algorithm of firms, or their “DNA”. This enables a multi-scalar perspective on the accumulation of niches that penetrate at the regime level to be actualized. Individual firms’ fitness is predicated on their individual “DNA” (which is the unit of analysis at the firm level) and capacity for self-organizing in relation to other firms, as well as in response to exogenous and endogenous changes (e.g., in demand) in the environment. Local–regional economic ecosystems are constituted by the networked assemblage of firms that is organized into ecosystems and where self-organization and adaptive capacity yields fitness at the (economic) ecosystem scale. This in turn can catalyze niche penetration at the regime scale. In this casting, economic ecosystem fitness is not so much a product of *accumulation* of niches [26,61] as much as it is a product of networking, organization, adaptation and consolidation, i.e., *organization and institutionalization* of niches. Social innovation-based economic ecosystems hence become the enabling systems [1] that are directed by the entrepreneurial state (see Section 5.2).

Moreover, embracing an economic ecosystem perspective enables a valuable multi-scalar perspective to be actualized on the (object of and) unit of analysis. This extends down to the individual firm’s “DNA” (i.e., the firm as a single system understood through a biological metaphor where its essential traits are encoded throughout the system and informs its form, as well as function), to the local “ecosystem” level (i.e., a networked, self-organized and adaptive system) and all the way up to the large scale enterprises that come to dominate regime level normativity (networked, ubiquitous, normative, i.e., *institutional*). In other words, an economic ecosystem framing enables a multi-scalar perspective to be envisaged on the question of transitions to SUD, one which extends from local to the broader national and regional scale transitions (see Section 5.2).

## 5. Discussion: Enabling the Entrepreneurial State

### 5.1. Economic Ecosystems and Multi-Scalar Transitions to Sustainability

In theorizing the broader scales of transitions that can be underpinned by seeding and catalyzing local urban economic ecosystems on the continent, several levels of broader scale transition can be envisaged. First, building on the growth of local economic ecosystems in cities, niche development and evolution can be catalyzed through organization, increasing the potential for niches to penetrate at the regime level and bring about national scale transitions. Second, when considering that the majority growth is occurring in small to intermediate scale cities and that these cities typically occur along corridors that link larger cities, that considerable potential for strengthening rural–urban linkages and catalyzing national scale transitions can be harnessed. Third, extending this rationale, this study also speculatively theorizes that—because some of these urban corridors typically span across national boundaries (e.g., the Greater Ibadan, Accra, Lagos corridor in West Africa)—that transnational regional scale transitions can also be catalyzed to some extent in these regions. In these respects, local economic ecosystems can potentially play a key role in multi-level and multi-scalar transitions to sustainability, while boosting economic growth and diversification at the same time.

At each scale, different governance considerations may need to be made. For example, at the firm scale, it is the “DNA” and production algorithm of the firm that is important. At the local economic ecosystem scale the networked interaction of linked niche activities is important to organize, catalyze, support and shape/direct. At greater scales—particularly national scales—the institutions that govern how clusters of local economic ecosystems and their interconnectedness with other clusters in other cities across county/provincial and national boundaries become important.

At national scales, cities are key drivers of growth, innovation, economic diversification, skills development and socio-cultural change. Cities, hence, impact national policies and planning for transition as a result of their primacy in generating new and diverse offerings and ways of doing, particularly with respect to social innovation that responds to global and local sustainability challenges facing them [21]. In turn, at transnational regional scales, cities can engender networked cross-scale responses that coordinate key functions of cities, even adapting them to absorb impacts and alleviate regional scale damage (e.g., in the case of disasters). Hence, cities are also of key importance to regional governance bodies that oversee key policy and planning decisions, which accommodate the role of cities in regional development.

### 5.2. Entrepreneurial State for SUD in Africa

The entrepreneurial state is a term that has been popularized by Mariana Mazzucato [1], who refutes the discursive notion that innovation-led growth is purely an outcome of “‘market-driven’ mechanisms (p. 1), empirically emphasizing the large role that public investment programs plays in underwriting and absorbing the risk of early state innovation that underpins growth instead. Importantly, Mazzucato argues that the role of the entrepreneurial state “does not necessarily have to take place at a national level (although it can)” (p. 80). Hence, in the casting adopted in this study, the role of the state—whether at national, city or local scales/levels of governance—is to engage in shaping, catalyzing and supporting local economic ecosystems that foster sustainable local and local–regional diversification and growth. Additionally, she specifically argues for “pushing” (i.e., versus nudging) (p. 121) to catalyze green industrial transitions through building “green innovation ecosystem(s)” that are symbiotic and not parasitic (p. 176), where the flow and diffusion of knowledge and ideas serves as a basis for innovation (p. 43).

This study embraces the entrepreneurial state as playing a key role at local scales by shaping and facilitating organization of economic ecosystems and establishing the institutions for cooperation, adaptive capacity, competitiveness and sustainability of economic ecosystems. Enhancing niche-driven economic ecosystem fitness is the priority in this framing. In turn, local scale economic ecosystems drive broader urban transitions and the

role of the state is to direct and shape them (as well as clusters of economic ecosystems that may emerge). This perspective coheres with that of Lee et al. [64] in rationalizing how to respond to the fourth industrial revolution.

Moreover, the entrepreneurial state has a strong role to play in supporting social innovation for SUD through shaping the objectives and providing support to the hybrid processes (i.e., top-down and bottom-up) [20] that underpin social innovation. These hybrid processes typically entail bottom-up direct social innovation initiatives drawing on support from interventions by “institutions, civic organizations or companies (top-down)” (p. 63), where progress can be incremental. Critically, the entrepreneurial state has a critical role to play in managing the complexity of scaling social innovation processes that reside in economic ecosystems. As Manzini [20] puts it, “(t)he hybrid nature of these social innovation processes becomes increasingly evident as the scale of change to be achieved increases” (p. 63) and that “as highly dynamic processes” they “go far beyond” traditional views on participatory design, “becoming complex, interconnected and often contradictory processes” (p. 65). This points to the need for the entrepreneurial state to play a coordinating role as a strategic intermediary or supporting strategic intermediaries that help bring greater coordination and direction to social innovation in economic ecosystems, particularly with respect to hybrid social innovation. In addition, the entrepreneurial state has a role to play in grappling with the complexity of these “complex, interconnected and often contradictory processes” [20] (p. 65) by providing direction, helping mitigate risk and uncertainty and supporting local authorities to be able to deliver effectively on social innovation in respect of the required scale, target and mode of intervention. The entrepreneurial state also has a role to play in supporting the more *radical* “creative and proactive activities” [20] (p. 65) underpinning social innovation and participatory design, as it entails experimentation and, hence, navigating higher levels of risk that wholly independent and/or private sector organizations may be less likely to undertake (indeed, this is the role that the entrepreneurial state has historically undertaken through public venture capital [1] (p. 68)). Hence, in sum, it can be argued that the entrepreneurial state has a key role to play in (1) incremental and radical, as well as (2) top-down, bottom-up and hybrid social innovation activities [20] (p. 57).

The role of the entrepreneurial state in the African context is about more than simply shaping markets and providing directionality to them that responds better to local needs. The entrepreneurial state also has a key role to play in mitigating against both private sector and NGO led sustainable innovation activities in Africa, where public participation is teleological, that is, where communities are skillfully guided towards preconceived solutions that “usurp community autonomy” [23] (p. 3), underpinned by how tacit power dynamics play out. In this respect, it is not merely inclusion that the entrepreneurial state needs to be focused on, it also needs to overcome the formal–informal sector dualism that governs both state and private sector led approaches in Africa (see next section). Moreover, private sector and civil society led social innovation tends to emphasize “finding and scaling” solutions and offerings, where indigenous communities can be “overpowered by outside ideas and processes” [23] (p. 3). In this study, the proposition differs in that scaling transitions to SUD is the objective and not scaling social innovations themselves, precisely because the focus is on economic ecosystems.

### 5.3. Economic Ecosystems for Overcoming Formal–Informal “Sector” Dualism

Critically, embracing an economic ecosystem perspective advances the framing on transitions provided in the multi-level perspective on transitions framework to address the formal–informal system dualism that presents in African contexts. Indeed, the MLP framework is largely formulated on the basis of developed European and North American economies, where informality does not present in the way that it does in the Global South. In the framing provided in this study the concept of economic ecosystems becomes useful, as it enables a perspective that incorporates both formal and informal systems in a

post-dualistic conception, hence supplementing the MLP framework, rendering it more appropriate and “fit-for-purpose” in the African context.

This is particularly the case because transcending classical and neoclassical economic dualisms between formal and informal “sectors” requires adopting a systems perspective and embracing a holistic heterodox perspective. In this respect, Roy [41] (p. 148) asserts that urban informality is not as much a sector as it is a “series of transactions that connects different economies and spaces to one another” and a “mode” representing “an organizing logic, a system of norms that governs the process of urban transformation itself”. Hence, an economic ecosystem perspective that adopts a holistic systems perspective on formal and informal sectors and enables a post-dualistic conception is needed; one that is sensitive to the fluidity, overlap and porosity between them, as well as their fundamental inseparability [6]. In turn, this post-dualistic conception of formal and informal sector activities enables an entrepreneurial state led approach that is focused on local economic development—i.e., by adopting an economic ecosystem perspective—and remains agnostic with respect to whether economic activities are formal or informal. Instead, its focus is on organizing and institutionalizing economic ecosystems so that social innovation for SUD is prioritized rather than a particular “sector” and its activities.

#### 5.4. *Towards Inclusive Fourth Industrial Revolution Cum Green Technology Growth Trajectories*

The question of SUD transitions—and ICT-enabled social innovation—cannot escape the realities that the new, globalized, data-driven, fourth industrial revolution-enabled economy has introduced. The dangers of the new “surveillance capitalism” [65], characterized by oligarchic big technology companies whose machine learning (ML) algorithm driven business models are predicated on trawling and collating large swathes of data (i.e., physical, digital and biological), must, in some respects, be catered for in any developmental strategy that seeks to engage with the fourth industrial revolution. This is not only because this has introduced acute power asymmetries between big technology companies and the consumers and users of their platforms, but because of the monopolization and deep inequalities that have accompanied it. This inequality manifests particularly in steep wage inequalities in big technology companies, such as Apple [1] (p. 185), as well as in the “the distribution of returns” [1] (p. 181). As Mazzucato [1] (p. 192) puts it, lamenting where “corporate success result(s) in regional economic misery”, “(t)he big question for us here is: will the New Economy Business Model transform itself so as to distribute the benefits of the IT revolution?”

In conceptualizing what it means to build “green innovation ecosystems” [1] (p. 176) that are “symbiotic” [1] (p. 179), this study has proposed social innovation-based economic ecosystems as the enabling platforms for transitions to SUD and local economic diversification. In this respect, a deeper question can be asked, namely, what foundations support “‘fairer’ and more ‘inclusive’” [1] (p. 181) growth? That is, not in respect of wage inequality, but in respect of monopolization by platform-based technology companies that become heavily dominant due to the ubiquity and heavy dominance and control of markets and services that corralling vast data sets affords them. It is conceivable that social innovation-based economic ecosystems for SUD may find themselves controlled and heavily dependent on larger platform operators that essentially render them bit players in the fourth industrial revolution economy. To this end, deeper, more fundamental considerations have to be made with respect to the underlying platform choices that underpin the emergence of the fourth industrial revolution in economies and societies in cities on the continent.

Vergne [66] makes an insightful and thorough analysis of the platforms underpinning the new data-driven economy and highlights two key differences that are of relevance in this respect. Namely, that the big-tech giants that have monopolized the surveillance economy are underpinned by ML algorithms that essentially centralize decision-making and communications, even though their delivery models may be distributed (e.g., Amazon and Uber). In this respect, centralization of power is essentially derived from the control

of the algorithms that learn from data and are used to predict and control—to some extent—absorption of goods, services and commodities. Machine learning algorithms are centrally controlled and, hence, can—at the turn of a switch—be changed, impacting whole ecosystems of activities that are embedded in and rely upon that algorithmic reality.

In contrast, Blockchain, as a platform, is mediated by peer-to-peer consent by organizational members—through voting rights—over how that algorithmic reality is established. Blockchain essentially acts as a digital ledger that is decentralized and distributed where authenticated transaction data are securely stored [66] (p. 9). The chains represent a chronological history of transactions that cannot be unilaterally or centrally altered but requires that transactions are queued until consensus is obtained, whereafter the chain is grouped and recorded as a block. Blockchain essentially decentralizes communications creating a shared understanding of transactions whereby new members can quickly orient themselves and perform organizational tasks with contact with just a few organizational members. There is no need to interact with a centralized “command and control”, so to speak, to become familiar with the institutions, or to make decisions. Hence, decision-making is distributed.

In sum, whereas ML platforms are centralized and distributed, Blockchain is decentralized and distributed. Citing Vukolić [67], Vergne argues that there are inherent advantages in decentralized platforms such as Blockchain, namely, that they (1) are able to broker trust, a currency that ML platforms are increasingly and noticeably lacking in and (2) are inherently predisposed towards reduced scalability, which mitigates against the formation of monopolies, as “services and applications have to be shifted away from the main chain” [66] and are shed from it. In this respect, Blockchain is inherently anti-monopolistic, mitigating against the “data gravity” ([68] in [66] (p. 3)) that underpins the ML-based platforms upon which big technology platforms are based.

Citing Boudreau [69], Vergne argues that the platforms of the future will be those without “central ‘owners’” [66] (p. 15), capitalizing on decentralized trust where platform rules cannot be changed unilaterally by centralized command and control hierarchies. This presents a fundamentally different route, through which Africa and the Global South can engage with the new economy, i.e., where developing nations struggle to compete with the big technology giants that centralize decision-making through ML. It sets the scene for decentralized and distributed organizations to emerge as local providers of goods and services, where the platforms that fundamentally underpin how growth unfolds yields scalability without oligarchic dominance and peer representation that mitigates against runaway monopolization. Notably, this does not negate against existing “centralized, for-profit, non-neutral ML” platforms being “retrofitted with Blockchain to scale up outside of their initial market” [66] (p. 16), opening up room for offerings such as M-Pesa to retrofit [66] (p. 16) with Blockchain, as mentioned earlier. Rather, the key assertion is that more assiduous deliberation over what fundamental platform choices underpin economic ecosystems as enabling systems will likely impact the form of economies that emerge in absorbing fourth industrial revolution offerings.

## 6. Conclusions

In this study, the African urban context informs the theorizing by drawing on the literature on southern urbanism, particularly that relating to African cities. In theorizing, three key literature streams are further mobilized and integrated, namely, (1) social innovation and SUD, (2) economic ecosystems theory and (3) transitions to sustainability. In doing so, this study argues that small to intermediate African cities can facilitate broader transitions to sustainability through driving social innovation-based economic diversification at both local and macro-scales. Moreover, this study argues that this can be achieved by targeting the nexus costs of precarious African middle-class households by combining (1) green/sustainable technologies, infrastructures and service provisions and (2) fourth industrial revolution offerings to meet local development needs in African cities. Social innovation-based activities are critical to actualizing this vision. Harnessing

these activities into self-organizing economic ecosystems is key to generating broader scale transitions, as well as engendering multi-scale resilience at the same time. Hence, local economic ecosystem development is key to sustainability transitions in Africa and particularly in Sub-Saharan Africa. This, in essence, makes the argument for niche innovation activities—particularly social innovation—to be organized better (i.e., into local economic ecosystems). In this perspective, the state's involvement is rendered more effective, that is, in supporting the development of local and local–regional economic ecosystem creation and growth through social innovation that is sensitive to context, rather than the state engaging solely in centralized, large-scale strategic planning and/or research and development for innovation.

With respect to the entrepreneurial state, Mazzucato [1] (p. 27) presents “a case for a targeted, proactive *entrepreneurial* state, one able to take risks and create a highly networked system of actors that harness the best of the private sector for the national good over a medium- to long-term time horizon”, with “the State acting as lead investor and catalyst which sparks the network to act and spread knowledge.” Drawing on this understanding, this study argues for an interpretation of what the role of the entrepreneurial state should be in relation to the challenge of SUD in African cities, integrating the aforementioned literature streams to conceptualize transitions to sustainability. In theorizing from the perspective of African cities and by integrating these literature streams accordingly, the role of the entrepreneurial state in relation to social innovation in SUD is made clearer. Specifically, an emphasis on local economic development and diversification in African cities that draws on social innovation—which can be enhanced through an entrepreneurial state-led approach that adopts an economic ecosystem lens—to meet societal needs is required.

Lastly, this study also argues for deeper considerations regarding the underlying platforms on which these social innovation-based economic ecosystems and their products and services are to be made. Specifically, the entrepreneurial state should lead the way in shaping which foundational platforms become dominant, with a view to ensuring more equitable, diverse and inclusive growth and fostering trust-based symbiotic relationships within economic ecosystems. This consideration is critical for promoting diversification and mitigating against monopolization and control by private sector actors in transitions to SUD.

## 7. Limitations and Future Research

Three key limitations, that lie beyond the scope of this paper, present opportunities for further research on the key propositions of this paper.

First, one of the key limitations of this paper is that it does not explicitly deal with the question of what kind of governance may be required to actualize SUD and broader transitions to sustainability at the same time. What is clear is that multi-level governance that is “fit for purpose” [42] is required in order to act as a “glue” (i.e., coordinating framework) between national and local African governments, as well as between different sectors of society. Urban decision-making requires marrying national level decision-making (typically at a larger scale) with local context and their specific characteristics, constraints and opportunities. Multi-level governance can serve as a glue between different activities and development programs that act across scales and impact upon cities. It can also act as a capacity booster by drawing on leadership, management and technical skills and capacities from the different sectors that are distributed across different levels of governance and within cities. Critically, it can draw on a multi-scale understanding of what yields creative and adaptive capacity to govern multi-scale systems in service of broader transition objectives. Hence, further research into how the framing proposed in this paper can be actualized through multi-level governance is required, as without that understanding the role of the entrepreneurial state as proposed in this paper may not be realized.

Second, this paper also did not reflect in-depth on case studies of social innovation policies and activities in African cities that support SUD. It is conceivable, however, that even a non-comprehensive examination of these case studies might provide valuable insight

into the value of the framing proposed in this paper and may enhance the robustness of that framing. More specifically, more in-depth studies of social innovation policies and activities in African cities would (1) shift the perspective from a continental appraisal to a more local analysis, (2) thereby also enabling a cross-case analyses that could in turn improve the robustness of the overall framing. Hence, this presents a second avenue for future research and the prospect of developing a set of propositions to enhance social innovation for SUD in Africa, which lies beyond the scope of this study.

Third, in generalizing the African urban condition, there is a need to qualify that the approach proffered in this study—i.e., social innovation-based economic ecosystems—is not intended as a blueprint. It is important to acknowledge the vast heterogeneity of territorial conditions across the continent as this limits any attempt at comprehensiveness from an interpretive model. The territory, in this study, is the city and the study makes an in-depth analysis of what the appropriate scale of intervention is in this respect, particularly in the Sub-Saharan African context, highlighting that small to intermediate scale cities are the opportunity space for intervention. Moreover, the approach deliberately does not specify implementation priorities at the planning level but rather stipulates an inclusive approach and implementation modality that is sensitive to local context precisely to accommodate the aforementioned heterogeneity.

**Funding:** This research received no external funding.

**Acknowledgments:** The author would like to acknowledge the Allan Gray Centre for Values-Based Leadership for its continued intellectual and administrative support.

**Conflicts of Interest:** The author declares no conflict of interest.

## References

- Mazzucato, M. *The Entrepreneurial State. Debunking Public vs. Private Sector Myths*, 3rd ed.; Penguin Random House UK: Harlow, UK, 2018.
- McKinsey. *Lions on the Move: The Progress and Potential of African Economies*; McKinsey Global Institute, McKinsey and Company: Chicago, IL, USA, 2010.
- United Nations. *The State of African Cities 2014. Reimagining Sustainable Urban Transitions*; UN Report: Nairobi, Kenya, 2014.
- United Nations. *World Urbanization Prospects: The 2018 Revision*; United Nations Department for Economic and Social Affairs (UNDESA): New York, NY, USA, 2018.
- Peter, C. *Towards a Sustainable African Developmental Transition: From the Bottom Up!* Online: Budapest, Hungary, 2020.
- Peter, C. Informality, 4IR and the Entrepreneurial State in Africa: An ‘Economic Ecosystems’ Perspective. In *Values-Driven Entrepreneurship and Social Impact. Setting the Agenda for Entrepreneurial Across (Southern) Africa*; April, K., Zolfaghari, B., Eds.; KR Publishing: Randburg, South Africa, 2021; pp. 2–22.
- Ferraro, F.; Etzion, D.; Gehman, J. Tackling Grand Challenges Pragmatically: Robust Action Revisited. *Organ. Stud.* **2015**, *36*, 363–390. [[CrossRef](#)]
- McCormick, K.; Anderberg, S.; Coenen, L.; Neij, L. Advancing Sustainable Urban Transformation. *J. Clean. Prod.* **2013**, *50*, 1–11. [[CrossRef](#)]
- Peter, C. Privatization, Urban Fragmentation and Sustainability, Institute for Advanced Sustainability Studies. In *Institutional and Social Innovation for Sustainable Urban Development*; Mieg, H., Töpfer, K., Eds.; Routledge: Abingdon, Oxon, UK, 2012; pp. 130–145.
- Watson, V. The Allure of ‘Smart City’ Rhetoric: India and Africa. *Dialogues Hum. Geogr.* **2015**, *5*, 36–39. [[CrossRef](#)]
- Marvin, S.; Luque-Ayala, A.; McFarlane, C. *Smart Urbanism: Utopian Vision or False Dawn?* Routledge: Abingdon, UK; New York, NY, USA, 2016.
- Watson, V. African Urban Fantasies: Dreams or Nightmares? *Environ. Urban* **2013**, *26*, 215–231. [[CrossRef](#)]
- Amin, A. Lively Infrastructure. *Theory Cult. Soc.* **2014**, *31*, 137–161. [[CrossRef](#)]
- De Boeck, F.; Plissart, M.-F. *Kinshasa: Tales of an Invisible City*; Ludion: Ghent, Belgium, 2005.
- Parnell, S.; Pieterse, E. (Eds.) *Africa’s Urban Revolution*; Zed Books: London, UK, 2014.
- Simone, A. On the Worlding of African Cities. *Afr. Stud. Rev.* **2001**, *44*, 15–41. [[CrossRef](#)]
- Simone, A.M.; Abdelghani, A. *Urban Africa: Changing Contours of Survival in the City*; Zed Books: London, UK, 2005.
- Cirolia, L.R.; Scheba, S. Towards a Multi-Scalar Reading of Informality in Delft, South Africa: Weaving the ‘Everyday’ with Wider Structural Tracings. *Urban Stud.* **2019**, *56*, 594–611. [[CrossRef](#)]
- Gastrow, C. Urban States: The Presidency and Planning in Luanda, Angola. *Int. J. Urban Reg. Res.* **2019**, *44*, 366–383. [[CrossRef](#)]
- Manzini, E. Making Things Happen: Social Innovation and Design. *Des. Issues* **2014**, *30*, 57–66. [[CrossRef](#)]

21. Angelidou, M.; Psaltoglou, A. An Empirical Investigation of Social Innovation Initiatives for Sustainable Urban Development. *Sustain. Cities Soc.* **2017**, *33*, 113–125. [CrossRef]
22. Moulaert, F.; MacCallum, D.; Mehmood, A.; Hamdouch, A. (Eds.) *The International Handbook on Social Innovation: Collective Action, Social Learning, and Transdisciplinary Research*; Edward Elgar: Cheltenham, UK, 2013.
23. Matthews, J.R. Understanding Indigenous Innovation in Rural West Africa: Challenges to Diffusion of Innovations Theory and Current Social Innovation Practice. *J. Hum. Dev. Capab.* **2017**. [CrossRef]
24. Edwards-Schachter, M.; Wallace, M.L. 'Shaken, but Not Stirred': Sixty Years of Defining Social Innovation. *Technol. Forecast. Soc. Change* **2017**, *119*, 64–79. [CrossRef]
25. Auerswald, P.E.; Dani, L.M. Economic Ecosystems. *New Oxf. Handb. Econ. Geogr.* **2018**. [CrossRef]
26. Grin, J.; Rotmans, J.; Schot, J. *Transitions to Sustainable Development: New Directions in the Study of Long Term Transformative Change*; Routledge: New York, NYC, USA, 2010; ISBN 978-1-135-15118-8.
27. Marshall, A. *Principles of Economics*, 8th ed.; Macmillan: London, UK, 1920.
28. McKinsey. *Lions on the Move II: Realizing the Potential of Africa's Economies*; McKinsey Global Institute, McKinsey and Company: Chicago, IL, USA, 2016.
29. Swilling, M. *Africa 2050: Growth, Resource Productivity and Decoupling*; International Panel for Sustainable Resource Management of the United Nations Environment Programme: Nairobi, Kenya, 2010.
30. African Development Bank. *Africa in 50 Years Time. The Road towards Inclusive Growth*; African Development Bank (AfDB): Tunis, Tunisia, 2011.
31. Medina, L.; Jonelis, A.; Cangul, M. *The Informal Economy in Sub-Saharan Africa: Size and Determinants*; International Monetary Fund (IMF): Washington, DC, USA, 2017.
32. UN HABITAT. Global Urban Indicators Database 2012. In *Habitat III: Draft Africa Common Position on Habitat III (Guided by Agenda 2063)*; United Nations Human Settlements Programme (UN-Habitat): Nairobi, Kenya, 2012.
33. OECD-FAO *Agricultural Outlook 2018–2027*; OECD; FAO (Eds.) OECD, Paris/Food and Agriculture Organization of the United Nations: Rome, Italy, 2018; ISBN 978-92-64-29721-0.
34. United Nations. *World Urbanization Prospects: The 2011 Revision*; United Nations Department for Economic and Social Affairs (UNDESA): New York, NY, USA, 2012.
35. African Development Bank. *The Middle of the Pyramid: Dynamics of the Middle Class in Africa*; African Development Bank: Abidjan, Côte d'Ivoire, 2011.
36. Africa Progress Panel. *Africa Progress Report. Jobs, Justice and Equity. Seizing Opportunities in Times of Global Change*; Africa Progress Panel: Geneva, Switzerland, 2012.
37. Africa Progress Panel. *Africa Progress Report 2014. Fish, Grain Money: Financing Africa's Green and Blue Revolutions*; Africa Progress Panel: Geneva, Switzerland, 2014.
38. African Union. *2017 Africa Sustainable Development Report. Tracking Progress on Agenda 2063 and the Sustainable Development Goals*; African Union, Economic Commission for Africa: Addis Ababa, Ethiopia, 2017.
39. United Nations. *Economic Report on Africa 2019: Fiscal Policy for Financing Sustainable Development in Africa*; Economic Commission for Africa: Addis Ababa, Ethiopia, 2019; ISBN 978-92-1-004211-6.
40. Swilling, M. Africa's Game Changers and the Catalysts of Social and System Innovation. *Ecol. Soc.* **2016**, *21*, 37. [CrossRef]
41. Roy, A. Urban Informality: Toward an Epistemology of Planning. *J. Am. Plann. Assoc.* **2005**, *71*, 147–158. [CrossRef]
42. Peter, C. *Urban Policy Coalitions*; Cities Alliance Africa Think Tank: Cape Town, South Africa, 2016.
43. Peter, C. *Sustaining the African Middle Class: Leveraging Green Technologies and the Fourth Industrial Revolution*; The World Financial Review: London, UK, 4 October 2019; pp. 29–33.
44. Pieterse, E. Recasting Urban Sustainability in the South. *Development* **2011**, *54*, 309–316. [CrossRef]
45. De Magalhães, L.; Santaaulàlia-Llopis, R. The Consumption, Income, and Wealth of the Poorest: An Empirical Analysis of Economic Inequality in Rural and Urban Sub-Saharan Africa for Macroeconomists. *J. Dev. Econ.* **2018**, *134*, 350–371. [CrossRef]
46. Kojima, M.; Zhou, X.; Han, J.J.; de Wit, J.; Bacon, R.; Trimble, C. *Who Uses Electricity in Sub-Saharan Africa? Findings from Household Surveys*; Policy Research Working Paper No 7789; The World Bank: Washington, DC, USA, 2016.
47. Water, Food and Energy UN-Water. Available online: <https://www.unwater.org/water-facts/water-food-and-energy/> (accessed on 16 August 2019).
48. Peter, C.; Robinson, B.; Swilling, M. *African Cities in the Anthropocene*; Cities Alliance Africa Think Tank: Cape Town, South Africa, 2016.
49. Max-Neef, M.A. Foundations of Transdisciplinarity. *Ecol. Econ.* **2005**, *53*, 5–16. [CrossRef]
50. Bawens, M. *Peer to Peer and Human Evolution*; Foundation for P2P Alternatives: London, UK, 2007.
51. Murray, R. *Danger and Opportunity: Crisis and the Social Economy*; NESTA Provocation 09; National Endowment for Science, Technology and the Arts (NESTA): London, UK, 2009.
52. Tapscott, D.; Williams, A.D. *Wikinomics: How Mass Collaborations Changes Everything In*; Portfolio: New York, NY, USA, 2007.
53. Hubert, A. *Empowering People, Driving Change: Social Innovation in the European Union*; BEPA Bureau of European Policy Advisers, Publications Office of the European Union: Luxembourg, 2010.
54. Gray, A. This African City Is Turning a Mountain of Trash into Energy. Available online: <https://www.weforum.org/agenda/2018/05/addis-ababa-reppie-trash-into-energy/> (accessed on 24 May 2021).

55. Light Rail Transit in Addis Ababa. Available online: <https://www.centreforpublicimpact.org/case-study/light-rail-transit-in-addis-ababa> (accessed on 24 May 2021).
56. Dahir, A.L. Crypto Is Here. Kenya Is Finally Softening Its Stance on Blockchain Technology. Available online: <https://qz.com/africa/1222541/kenya-has-created-a-blockchain-task-force/> (accessed on 24 May 2021).
57. Tripoli, M.; Schmidhuber, J. *Emerging Opportunities for the Application of Blockchain in the Agri-Food Industry*; FAO and ICTSD: Rome, Italy; Geneva, Switzerland, 2020.
58. Wass, S. Fintech Startups to Provide Cryptocurrency Loans to African Farmers. Available online: <https://www.gtreview.com/news/africa/fintech-startups-to-provide-cryptocurrency-loans-to-african-farmers/> (accessed on 24 May 2021).
59. Bolt, J. BenBen Ghana: Empowering Citizens by Providing Land Security. Available online: <https://www.cta.int/en/blog/all/article/benben-ghana-empowering-citizens-by-providing-land-security-sid0ff22d6c6-ddf1-400c-a6cb-395c42d4e468> (accessed on 24 May 2021).
60. Geels, F.W. Technological Transitions as Evolutionary Reconfiguration Processes: A Multi-Level Perspective and a Case-Study. *Res. Policy* **2002**, *31*, 1257–1274. [[CrossRef](#)]
61. Geels, F.W.; Schot, J. Typology of Sociotechnical Transition Pathways. *Res Policy* **2007**, *36*, 399–417. [[CrossRef](#)]
62. Peter, C.; Swilling, M. Linking Complexity and Sustainability Theories: Implications for Modelling Sustainability Transitions. *Sustainability* **2014**, *6*, 1594–1622. [[CrossRef](#)]
63. Nossen, B.; de Vaujany, F.X.; Haefliger, S. The Street and Organization Studies. *Organ. Stud.* **2020**, 0170840620918380. [[CrossRef](#)]
64. Lee, M.; Yun, J.J.; Pyka, A.; Won, D.; Kodama, F.; Schiuma, G.; Park, H.; Jeon, J.; Park, K.; Jung, K.; et al. How to Respond to the Fourth Industrial Revolution, or the Second Information Technology Revolution? Dynamic New Combinations between Technology, Market, and Society through Open Innovation. *J. Open Innov. Technol. Mark. Complex.* **2018**, *4*, 21. [[CrossRef](#)]
65. Zuboff, S. *The Age of Surveillance Capitalism: The Fight for a Human Future at the New Frontier of Power: Barack Obama's Books of 2019*; Profile Books: London, UK, 2019; ISBN 978-1-78283-274-4.
66. Vergne, J.P. Decentralized vs. Distributed Organization: Blockchain, Machine Learning and the Future of the Digital Platform. *Organ. Theory Vol.* **2020**, *1*, 1–26.
67. Vukolić, M. The Quest for Scalable Blockchain Fabric: Proof-of-Work vs. BFT Replication. In *INetSec*; Springer: Berlin/Heidelberg, Germany, 2015; pp. 112–125.
68. McCrory, D. Data Gravity: In the Clouds. Available online: <https://datagravitas.com/2010/12/07/data-gravity-in-the-clouds/> (accessed on 24 May 2021).
69. Boudreau, K. Open Platform Strategies and Innovation: Granting Access vs. Devolving Control. *Manag. Sci.* **2010**, *56*, 1849–1872. [[CrossRef](#)]