Infrastructure and SDG localization: the 21st century mandate

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Abstract

The United Nations sustainable development goals (SDGs) propose a vision for policymaking at all scales and an institutional platform for producing knowledge and sharing experiences. National governments have the prerogative to determine their SDG planning and implementation strategies, with 169 targets and 232 indicators guiding efforts to achieve the 17 goals. At the same time, pursuing the SDGs is often a ground-level endeavor, highlighting the local and urban scale for policy concerns like infrastructure. In this way, cities are at the front lines of SDG implementation. This article considers how the global political economy of the SDGs—that is, the power and resource dynamics shaping sustainability narratives—imprints itself on relationships among cities and across levels of government in the planning of sustainable infrastructure.

1. Situating global problems in their local context

Wicked, synchronous, and interconnected problems will shape the 21st century governance landscape. Given that cities are the settings for many such problems—including the localized effects of climate change—it is appropriate to consider urban governance as one determinant of humanity’s ability to survive this turbulent era (for discussions about sustainability in global cities, see Nickum and Lee2016 and De Sherbinin et al2007). One way to conceptualize urban policy on sustainability in the 21st century is by considering two pathways for city-hinterland relationships amidst growing threats to natural resources. The first is self-imposed isolation, where the most powerful and well-resourced cities leverage infrastructure and technology to avoid interactions with and separate themselves from the problems of contiguous regions. This go-it-alone approach can be considered beneficial as cities avoid exploiting hinterlands, but at the same time works against the collaboration needed to address systemic challenges. The second pathway is exploitative or imbalanced interdependency: city-hinterland interaction exists to benefit only those cities and regions having political influence. This scenario reflects a geopolitical ‘planetary urbanization’ discussed by Brenner (2018), Merrifield (2013), and Lefebvre (2003 (1970)). From the latter pathway emerges the notion of hinterlands as a global depot, with resource-hungry cities at the core. Such a dynamic is plausible given the increased likelihood that climate change and growing demand for natural resources will compel cities to double down on current sourcing strategies while searching for expedient new alternatives.

When considering how the role and behavior of powerful cities will evolve in the coming decades, it is prudent to anticipate exploitative sourcing strategies that render the non-urban world a resource depot. This perspective invites scholarly reflection about how the political economy of sustainability reproduces itself even in the throes of systemic change and crisis. In particular, the effort to make global sustainability goals locally meaningful can work either for or against exploitative core-hinterland dynamics. On one hand, the notion of sustainable development goal (SDG) localization1 is a powerful discursive force that draws an ideological ‘line in the sand’ regarding policy ideas about sustainability; urban governments take a public stand for or against

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1 SDG localization is defined by Hartley (2020) (p 235) as ‘city- or regional-scale interpretation and implementation of SDG targets’.
the narrative through their policies. Governments that operate in accordance with the global narrative\(^2\) join a well-resourced and deeply institutionalized movement that has the support of mainstream scientists. This movement offers public managers justification for their policy decisions and compels them to look beyond the local scale to consider the interconnectedness of resource-hungry behavior—including the impacts of extraction on hinterland communities. From a critical-theoretical perspective, the global sustainability movement acts coercively by normalizing a policy project that disciplines and silences alternative perspectives, such as those that attribute the sustainability crisis to underlying economic logics like capitalism and thereby suggest underexplored policy interventions.

On the other hand, the notion of SDG localization could work against the emergence of exploitative action by highlighting the significance of context for interpreting global policies. The reality that there is neither a universal set of policy problems and contexts nor a single way of understanding and approaching them undermines the promotion of totalizing narratives about problem characteristics and solutions. Relatedly, there exists an academic literature citing indigenous wisdom as a largely marginalized perspective for addressing what the mainstream community labels ‘sustainability challenges’ (Bayrak \textit{et al} 2021, Hendry 2014, Santha \textit{et al} 2010). This literature implicitly questions global policy visions by recognizing the experiences and perspectives of localities in their diverse multitudes. The acknowledgement and valorization of such perspectives highlights alternatives to a global policy vision that has been built only on the influence and experience of powerful actors and cities.

While powerful ‘global cities’ have much to contribute to the sustainability agenda in terms of scientific knowledge, financial resources, and political influence, there is a need for epistemic egalitarianism in global collaborations and narrative-building. If cities endeavor to shape the global policy agenda, they must ensure that the understanding of ‘global’ does not privilege the perspectives of wealthy cities over those of fiscally stressed mega-cities in the Global South. This endeavor mandates that networks and their powerful actors avoid coercing cities of lesser influence into embracing narrowly defined policy visions based on, for example, narratives like ‘smart,’ ‘sustainable,’ and ‘efficient’ (see Hartley and Kuecker 2020 for a case in water governance).

A more productive approach is for powerful cities to leverage their influence and resources to affirm policy knowledge and wisdom that comes from less powerful or less wealthy cities. Such perspectives may reveal novel policy approaches to address complex and convergent crises. The implication for infrastructure development is that ‘boys and their toys’ (Kosovac 2021)—typifying the technocratic efforts of wealthy cities—no longer enjoy unchallenged authority in how sustainability problems are framed and addressed. It may not be enough, or even beneficial at all, for society to simply engineer its way out of the problems that longstanding habits and behaviors have caused (e.g., capitalism and environmental degradation). Powerful cities have the option either to perpetuate narrative fallacies or to create and protect discursive space for alternative perspectives—including those that challenge the received orthodoxy about economic systems (viz emerging concepts like ‘indigenous planning’).

2. Circular economy as a framework for sustainable infrastructure

When considering how global policy goals like the SDGs are translated to local levels, it is appropriate to reflect on the role of infrastructure as a facilitator of SDG implementation. Multiple pathways exist for the application of infrastructure to sustainability goals, in particular through innovation and emerging technologies. According to Song and Wu (2021), examples of such technologies include ‘cloud computing for earth big data applications, digital twin for sustainable and smart cities, and blockchain for sustainable infrastructure management’ (p 11). A case of the digital twin concept in practice is Virtual Singapore, which is a ‘three-dimensional city model and collaborative data platform’ to facilitate virtual activities like experimentation, test-bedding, urban planning, and research and development\(^3\).

One example of a sustainability pathway enabled by infrastructure is the concept of the circular economy. In the longstanding and largely familiar ‘linear’ model of production, raw materials are extracted, processed into goods, bought and consumed, and disposed. By contrast, the circular economy approach seeks to reduce the volume of discarded industrial byproducts and used materials and to increase systemic self-sufficiency and resource circulation. In an analysis of 114 definitions, Kirchherr \textit{et al} (2017) define the circular economy as “an economic system that replaces the ‘end-of-life’ concept with reducing, alternatively reusing,

\(^2\) This critique of the global sustainability project does not target the claim that humans are doing damage to natural environments, but that economic ideas and institutions that have given rise to such behavior are ‘baked-in’ to sustainability policy goals as ways of achieving them (e.g., through the ‘market mechanism’) and as the reason why sustainability should be pursued in the first place (i.e., to protect the stability of human systems in the interest of perpetuating the economic status quo).

\(^3\) https://nrf.gov.sg/programmes/virtual-singapore.
recycling and recovering materials in production/distribution and consumption processes” (p 229). This production model is potentially useful because it also has the peripheral effect of reducing the need for the inter-region or inter-urban exploitation previously described. Policies pursuing SDG targets through infrastructure (e.g., waste facilities, virtual platforms for waste trading, and eco-industrial parks) can help firms overcome barriers to adopting circular economy practices (Hartley et al 2020). Studies by Kirchherr et al (2018) and Hartley et al (2021) classify adoption barriers as cultural, market, regulatory, and technological.

While technological barriers are found by these studies not to be the most significant, helping firms develop and procure technologies related to circularity is one step towards meeting the SDGs. Mechanisms such as ‘green’ financing, ‘green’ bonds, and subsidies can help governments and firms develop the enabling infrastructure. At the same time, the aforementioned Kirchherr study (2018) also found that the greatest barriers for firms are cultural (both within firms and across markets), the underdeveloped market for reusable materials (given the low cost of virgin materials), and—most relevant for policymakers in SDG localization—obstructive laws and regulations (e.g., those that restrict how recycled materials can be used ‘downstream’). According to the authors, ‘(cultural barriers) are driven by market barriers which, in turn, are induced by a lack of synergistic governmental interventions’ (p 264). Additional challenges related to the transition towards a circular economy include complex scenarios and conditions across various sectors addressed by the SDGs and regional resource disparities that impact how the SDGs are understood and implemented. Regarding the latter, the emergent concept of ‘circular justice’ (Kirchherr 2021) calls for deeper consideration of the social impacts of the circular economy in low- and middle-income settings.

To meet profit expectations while pursuing corporate social responsibility, firms are increasingly signalling a commitment to sustainability principles in their production processes, infrastructure investments, and strategic plans. The SDGs are also being incorporated into corporate annual reports and key performance indicators (KPIs). While engagement of the private sector is seen as a crucial step in advancing SDG localization, progress on sustainability more generally is dependent on restructuring production systems and infrastructures—an endeavor in which public policy plays an indispensable role. Improved technologies have enabled firms to better manage industrial emissions and improve energy efficiency, but there remain unexploited opportunities to reconfigure the system-wide flow of materials in a way that minimizes waste throughout the production process—a task whose breadth calls on the coordinating power of government. For example, waste disposal presents substantial challenges for local governments regarding space for landfills, emissions and by-products from incineration, and the cost of collecting, sorting, and processing recyclable materials. Infrastructure systems to cycle waste materials back into production systems can help address these challenges but are unlikely to emerge without policy intervention.

On circular economy transition there is much progress yet to be realized, and infrastructure can accelerate it. The 2019 Circular Economy Gap Report states that the global economy is 9 percent circular. The report calls on governments to pay more attention to localization of sustainability principles, to be strategic and evidence-based in developing new policies, to promote knowledge-sharing, and to engage collaboratively. Relatedly, a concept document jointly produced by the UN General Assembly and the UN Economic and Social Council states that ‘the circular economy holds particular promise for achieving multiple SDGs, including SDGs 6 on energy, 8 on economic growth, 11 on sustainable cities, 12 on sustainable consumption and production, 13 on climate change, 14 on oceans, and 15 on life on land’. Given the embeddedness of industrial production systems within economic, infrastructural, and environmental systems at the global and local levels, progress towards more sustainable systems and the infrastructures that support them is crucial for sustainability transition.

There is evidence that the overlap between the circular economy and SDG implementation is gaining institutional purchase for broader issues. During the third World Circular Economy Forum in 2021, panelists emphasized the need for circular economy transition to not only focus on SDG realization but also be fairer and more inclusive. In considering new frameworks for integrating policy, infrastructure, and society, the emerging concept of the ‘social circular economy’ provides a vision around which cities can organize their infrastructure strategies. According to a 2018 report sponsored jointly by the Winston Churchill Memorial Trust and the Frank Jackson Foundation, the social circular economy ‘unites the circular economy and social enterprise concepts to deliver benefits for people, planet and profit. It allows a fully systemic view by drawing on the environmental principles of the circular economy and the societal vision of social enterprise, both of which are underpinned by a pursuit for economic prosperity’ (p 4). The report suggests that while circular

4 https://circularity-gap.world/.
5 https://un.org/ecosoc/sites/www.un.org.ecosoc/files/files/en/2018doc/Concept%20Note.pdf.
6 https://media.sitra.fi/2021/10/28235114/8017-wcef_finalreport_en.pdf.
7 https://socialcircularconomy.com/uploads/7/3/5/2/73522419/social_circular_economy.pdf.
economy principles offer a pathway for improving environmental outcomes, the integration of social enterprise introduces the crucial element of social impact—further aligning circular economy principles with SDG targets and broadening their applicability. Given the continually growing state of academic research about the circular economy, including concepts like ‘circular justice’ (Kirchherr 2021) that connect circular economy models with broader societal concerns, cities looking to adopt novel strategies for SDG localization will find copious guidance on implementation. However, making sense of the increasingly complex body of literature on SDG infrastructure and localization will remain a challenge for governments struggling to deliver basic services. These and other challenges are discussed in the following conclusion.

3. Conclusion: recognizing new challenges and creative solutions

It is appropriate to consider the comprehensive policy approach, at both national and local levels, needed to realize SDG targets and sustainability transition. G20 Insights, a policy research platform, published a 2021 report8 that provided three recommendations for integrating environmental criteria into infrastructure investment: harmonizing standards around the principle of biodiversity ‘net gain’, guidance for transparency and disclosure, and improvements in data-gathering capabilities at global and national levels. In addition to these recommendations, it is necessary also to consider what is relevant specifically to cities. The local impacts of systemic threats like climate change, forced migration, and geopolitical insecurity are bringing the SDG discussion to the urban scale. This turning point calls on city governments to recognize three types of challenges and potential solutions.

The first challenge is the local impact of phenomena originating beyond the scale. While cities may have limited policy influence over global forces that visit inconvenience and harm on localities, they must consider these factors in planning approaches that once myopically addressed only rudimentary local concerns (e.g., service delivery). Among possible solutions are commitment to and resources for monitoring global trends and their impacts, public education about the connection between global policy problems and their local impacts as a way to build policy legitimacy, and the collective assertion of an urban policy ‘voice’ in global policy discussions (see Acuto et al 2021 for a discussion of how city diplomacy is evolving in the 21st century).

The second challenge in planning sustainable infrastructure is the perpetuation of old ways of thinking about policy problems that lure policymakers into building their way out of problems—primarily through increasingly sophisticated forms of infrastructure. Indeed, the technology revolution has given rise to ‘smarter’ infrastructure that has the potential to improve efficiency, monitoring, and service coverage. At the same time, it is crucial for society not to indulge the moral hazard of believing that technology and infrastructure need only to stay one meter or one day ahead of growing policy problems. Underlying systems, behaviors, and epistemic orientations are implicated in the sustainability crisis and should be questioned as such. The development of new infrastructure ‘toys’ does not excuse society from the politically and economically challenging task of confronting decades of exploitative and selfish behavior—at both the individual and collective levels. Furthermore, it is crucial that the concept of the circular economy and other emergent paradigms not evolve into empty signifiers (i.e., nebulous terms without actionable meaning) or be appropriated in service to existing power dynamics and legacy ways of thinking. While there are specific principles defining the circular economy, the concept risks becoming a narrative that appears transformational while bearing the same problematic ideas (e.g., market-based solutions to sustainability problems) that have discursively infiltrated other narratives like ‘smart’ and ‘sustainable.’

The final challenge related to the role of infrastructure in sustainability is the limited ability of resource-constrained cities—often those in low-to-middle income countries—to adopt a comprehensive package of policy initiatives aimed at meeting the full breadth of the SDG mandate. One pathway towards more intricate and context-specific localization is what Patole (2018) labels ‘localization of SDGs through disaggregation of KPIs’ as facilitated by a supra-national authority. Patole further advocates for a process by which multiple targets and indicators are combined into ‘integrated key performance indicators’. In whatever way this process unfolds, it is appropriate to acknowledge that measuring progress on the SDGs and the contribution of infrastructure can be a costly task—presenting burdens that are higher for some cities than for others. Whether through a collectively funded aid program or high-level institutional superstructure, the global policy community must recognize that concepts of sustainability, governance, and state-society relations differ across contexts and will accordingly shape how the SDGs are interpreted and implemented.

8 https://g20-insights.org/policy_briefs/a-compass-for-global-recovery-integrating-environmental-criteria-into-infrastructure-investment/.
As one of humanity’s most historically ambitious collective policy efforts, the SDGs expose contextual differences in their tacit effort to normalize them. If something positive comes of the project, it will be the experiential lesson that coordination on broad existential goals is more complicated than optimistically imagined. In its ‘educational’ quality, the process of collectively mobilizing to achieve the SDGs may be as valuable for political and epistemic reasons as the benefits of actually achieving them.

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