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A Critique of the Application of Neighborhood Sustainability Assessment Tools in Urban Regeneration

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Abstract: Neighbourhood Sustainability Assessment Tools (NSA tools) are fast becoming the principal framework for urban planners and developers for promoting urban sustainability. The majority of NSA tools promote a specific type of urban development that effectively excludes regeneration projects from the urban sustainability conversation. Given that the world's megacities are mostly built, it is argued that it is essential that strategies for global sustainability consider that urban development is focussed internally to address existing, under-serviced communities in particular need of meaningful intervention and sustainable redevelopment frameworks. The paper uses existing knowledge on NSA tools to highlight the shortcomings of outcomes-based approaches to urban governance and builds the case that the technocratic “one-size-fits-all” approach adopted by many tools inadequately accounts for underlying institutional, social and economic arrangements that influence urban development, making them inappropriate for application in both planned and existing communities. The paper proposes that urban redevelopment strategies need to be derived from the urban realities of a particular place or context. Such strategies must be grounded in principles of urban governance, participatory action and an understanding of market dynamics. Without these collaborative procedural frameworks, urban regeneration projects will continue to inadequately transition towards more comprehensive sustainability.

Keywords: sustainability assessment; neighborhood sustainability assessment; urban regeneration; urban development; assessment tools

1. Introduction

Sustainable development has become the defining challenge of the 21st Century. The concept was conceived through the Brundtland Report, which defined it as development that “... seeks to meet the needs and aspirations of the present without compromising the ability to meet those of the future” [1] (p. 39). In essence, the concept sets out to reconcile two primary issues; environmental considerations and human development [2]. As human development is concentrated in urban areas, sustainability practitioners and policymakers have increasingly recognized that global sustainability needs to be addressed at the urban, and sub-urban level. Local Agenda 21, a product of the Rio Earth Summit in 1992, was the first document to set out implementing sustainability at the local scale. Since then, the concept of a sustainable city has gained significant political momentum worldwide [3]. However, there is still limited knowledge and consensus on how to measure sustainability in the urban form [4–6].

Nevertheless, attempts to evaluate urban sustainability have been demonstrated through the emergence of urban sustainability assessment ratings, such as Neighborhood Sustainability Assessment

Tools (NSA tools), which have become a dominant tool for urban management and environmental governance [7]. Whilst NSA tools have had a positive impact on the sustainability of the built environment and have mainstreamed green innovation in neighborhood development, recent studies have highlighted various issues with NSA tools. Essentially, the tools represent a technically based outlook of urban sustainability that prioritize measurable aspects that largely ignore strategies that pay wider recognition to the depth of issues related to sustainability [8]. The result is that NSA tools promote a rigid brand of urban sustainability which is characterized by green technologies and design. This has given rise to the proliferation of “green-rated” masterplanned neighborhoods inhabited by the fortunate few who can afford to live in them. The above raises important issues regarding the sustainability of existing communities, and those which lack the resources to employ interventions that meet the rigid criteria of rating systems.

In effect, this means that the role of regeneration in the pursuit of urban and global sustainability is largely ignored by NSA tools. Urban regeneration encompasses the redevelopment of urban environments that have experienced physical, economic and environmental decline [9]. Given the valuable opportunities that urban regeneration offers the promotion of urban sustainability [10], it is necessary to refocus policy attention on mechanisms of driving sustainable regeneration assessment and frameworks. La Rosa et al. [11] highlight the importance of evaluating the sustainability of regeneration projects, but viable approaches of performing such evaluation are lacking. Few studies have been conducted on assessment that focuses on sustainable urban regeneration, or specifically on urban regeneration frameworks [10]. Whilst tools for new developments are essential for accommodating global urbanisation, given that the world already has nearly 50 megacities, it is also imperative to address how we guide and assess the redevelopment of existing urban areas to ensure that they actively promote urban sustainability.

Using recent studies, this paper broadly critiques NSA tools in order to question the epistemological stance they advocate. Subsequently, the paper evaluates more specifically what the tools’ shortcomings mean for urban regeneration. In this vein, it questions the underlying ideals that support the development of tools as expert-driven, outcomes-based approaches that neglect the importance of institutional development, process leadership, empowerment and collaboration. This perhaps highlights a broader, more pertinent issue regarding the nature of urban governance and how information is acquired and used to steward urban development policy in an era of: “environmental governance that have fostered a preference for numbers as knowledge” [7] (p. 16).

Based on the critique of NSA tools, possible new avenues are suggested for NSA tools which focus more on the dynamic process of urban development, and the social and economic issues embedded within the urban context. This will ultimately be more appropriate for driving sustainability policy and practice, not only in existing communities in need of renewal, but also proposed ones.

2. Neighborhoods Are Pivotal in Driving Global Sustainability

Cities are the nucleus of human activity, and the majority of environmental degradation and consumption is concentrated within urban areas [12,13]. Despite this, cities and their inhabitants can play a pivotal role in achieving global sustainability [14]. This argument is based on the notion that sustainable development fundamentally centers around the interaction between human activity and the environment [2]. In this vein, it is logical to seek reparations at the centers of human activity. This is most appropriately promoted and examined at the sub-urban, or neighborhood scale, as it represents the basic unit of urban development [15], and the minimum scale to evaluate social, economic and institutional aspects of sustainability [12,16]. For the purposes of this paper, the definition for “neighborhood” will be that presented by Zheng et al. [10], who describe it as a geographically delineated sub-area of a city where residents interact and share services and facilities and are connected to a broader system of neighborhoods under the umbrella of a city.

The concept of sustainability at the neighborhood scale can be validated as a process where successes can become tangible aspects of daily life [17]. The value of this idea is that it places primacy

on the daily actions of citizens to champion sustainability, rather than relying on its delivery by centralized institutions. Local actions, implemented collaboratively with communities, individuals and groups on the basis of shared interests and values would appear to be a primary vehicle of humanizing, improving and transforming the quality of urban life. Further, the capacity for transformation is generated by the action of the community, and the true sources of urban change are rooted in civil society itself [18]. These concerns are central to sustainability, yet effective attempts to foster such urban change has largely eluded sustainability implementation over the past 30 years. Nevertheless, they are vital for the development of meaningful strategies for urban regeneration and sustainability, and in turn, global sustainability.

3. Urban Regeneration

Urban regeneration is commonly regarded as the most effective vehicle for solving a wide range of urban problems and devising lasting solutions for social, economic, physical and environmental concerns in modern cities [19]. As such, there is a growing body of knowledge that highlights the role of sustainability in defining policy and practices of urban transformation, and vice versa [20]. Urban regeneration, also known as urban renewal, or urban transformation, is defined by [19] (p. 18) as a: “comprehensive and integrated vision and action which seeks to resolve urban problems and bring about a lasting improvement in the economic, physical, social, and environmental condition of an area that has been subject to change or offers opportunities for improvement”.

Unprecedented population increases and its resulting complexities—in terms of economic growth and human well-being, resource and energy demand, as well as climate change—have illustrated the importance of sustainability with respect to urban regeneration [21]. Moreover, the urban environment plays a primary role in addressing social and economic sustainability [2].

Urban regeneration forms an integral part of global sustainability, and it is widely recognized that sustainable urban development needs to be directed inwards and promote strategies to regenerate the urban fabric of inner cities [22]. These strategies promote increased density, improved efficiency of infrastructure, improved accessibility, and reduce the spatial disassociation of urban functions including sprawl [22,23]. Sustainability in the existing city is deeply rooted in urban form; not only in its physical and environmental aspects, but socio-economic and institutional aspects [24]. As such, urban regeneration projects present additional complexities when compared to other urban developments [21] and require more sensitive approaches than new-build developments.

Regeneration also fulfills a vital socio-economic function central to urban sustainability regeneration as areas subject to regeneration are typically inhabited by the poorest and most vulnerable sects of the urban population. It is argued that it is impossible to conceive the notion of a sustainable world without addressing the social and economic needs of the rapidly growing pool of urban poor. Effective regeneration can serve to catalyze many urban solutions relating to deprivation in urban areas. This includes economic development and diversity, employment, social cohesion, citizen engagement and empowerment, and an overall improvement of well-being and quality of life [23,25].

However, like the broader concept of urban sustainability, urban regeneration projects are typified by a very high level of complexity. Regeneration is a complex process by which deteriorated buildings or neighborhoods are improved [25]. This creates tensions when translating the concepts around urban regeneration into sustainable outcomes which are influenced by various contextual forces, such as economic and market processes, various government policies, the physical state of an area, environmental considerations, and the social fabric of an area [26,27]. As such, the requirement for any model of urban regeneration is that its aims and objectives are calibrated with the circumstances within which it operates [19,28]. Furthermore, it must also be considered and implemented in terms of the broader urban system in which it is a part of [22]. This makes it essential to tackle the task of regeneration from an integrative and comprehensive approach [19].

However, there is no unifying concept to bridge the gap between actors involved in managing sustainability in urban regeneration processes [29]. There is also limited research regarding the

benchmarking of good practice of urban regeneration due to the local peculiarities of regeneration practices [24]. This issue is exacerbated by the manner in which urban regeneration is assessed and evaluated. Sustainability in urban regeneration is dominated by environmental aspects and performance of the built environment, with only a limited focus on easily quantifiable facets of socio-economic indicators [23]. Mateo and Cuñat [24] confirm this when voicing their concerns around recent expressions of urban regeneration through NSA tools which do not represent local realities. Successful urban regeneration requires strategically designed, locally based, multi-sector, and multi-agency partnerships [30].

This highlights how urban regeneration is principally concerned with the institutional and organizational dynamics of the management of urban change [19]. The following section will explore these concepts within the context of urban sustainability and regeneration.

4. Institutional Considerations for Urban Sustainability

Principally, the concept of sustainability is concerned with managing relationships between social systems and the environment in a way that provides development that is fair and economically feasible, without causing irreparable damage to the environment. This process necessitates trade-offs among groups or institutions with conflicting views, interests and priorities. Poor mechanisms to manage these contentious scenarios has created significant roadblocks for implementing sustainability [31]. Consequently, it was recognized that the traditional, three-pillar perception of sustainable development needed to be expanded to include a fourth dimension; institutional sustainability.

Institutional sustainability refers to the organisations, institutional mechanisms (policies and legal norms), implementing structures, societal norms, and practices that facilitate the implementation of sustainability strategies [6,32]. This concept is based on the idea that institutions build the frameworks for human actions in various settings, in addition: “they integrate individual behavior with general value orientations of societies” [33] (p. 85). Thus, it follows that much of the ideas around institutional aspects of sustainability are based on the idea that translating the concept into reality requires a relational social space that is inhabited by actor networks which are comprised of complex configurations of individuals and organisations [29]. Therefore, managing these networks and their interactions is an essential tool for addressing sustainable development as a multi-disciplinary, cross-sectoral concept.

The multi-dimensional and complex reality of urban development and their associated issues requires integrated strategies involving a wide range of actors. Single-sector, single-agency approaches present major limitations in addressing social, economic and environmental problems encountered in the urban environment [30]. The same sentiments hold for urban regeneration which is an activity that straddles public, private and voluntary sectors [34]. It is not possible to approach urban regeneration through the promotion of projects in isolation, and the emphasis needs to be on creating broad conditions for economic, social and environmental regeneration [35].

Managing the collaborative strategies across various actors is central to the quest of institutional sustainability.

5. An Overview of Neighborhood Sustainability Assessment Tools

NSA tools are typically represented by a set of indicators which are divided into categories that relate to certain aspects of urban sustainability [36]. Indicators are essentially used as targets for which points are awarded based on how well a development performs under certain categories [37]. A rating is then applied to the neighborhood based on the overall score across the various categories. The tools represent a third-party verification or rating system that is used to determine the “sustainability” of a neighborhood [6]. Whilst the tools share an overarching goal, they apply a variety of different approaches toward assessment [36].

NSA tools represent a new generation of environmental assessment systems expanded out of the success of the green building movement. These multi-criterion assessment systems (such as LEED-ND,

BREEAM-C, and CASBEE-UD) have seen an increased interest as they are easily understood and allow for a step-by-step implementation [38,39]. The emergence of NSA tools illustrates continual efforts to monitor and quantify urban sustainability in meaningful ways [2] and are essential to stimulate dynamic and open dialogue regarding urban design and practice [5]. Furthermore, the introduction of assessment has facilitated the communication of progress across various sectors and actors [31], which help share practices and objectives amongst sustainability professionals [6]. Additionally, the universal standardization of NSA tools is useful to compare successes and disseminate innovation [21]. Therefore, they create meaningful steps in developing a common language which serves as a point of reference to cities and communities around the world to improve strategies towards sustainability [5].

As such, urban sustainability rating systems are often regarded as objective, transparent ways of assessing progress towards sustainability. In turn, these assessment systems are used as a tool to inform policy and guide strategies and outcomes towards a sustainable direction [7]. This has significant impacts, both good and bad, for how sustainability is perceived, understood, and ultimately how interventions are formulated.

There are a number of concerns about approaching complex development challenges through the simplified application of metrics. Many argue that such mechanisms undermine meaningful attempts to examine the structures and processes that define urban development and sustainability [7,8]. The following section will outline and discuss the apparent shortcomings of assessment systems as a tool for prescribing urban sustainability.

6. Critique of Neighborhood Sustainability Assessment Tools

Numerous studies have investigated and examined NSA tools, identifying their strengths and weaknesses [4–6,16,21,36,37,39,40]. This section does not intend to highlight specific issues relating to the individual tools' context or structure, but rather uses existing studies to comment broadly on the main issues associated with the rating tools. Thus, the purpose is not to contribute directly to the large body of existing studies of NSA tool content and structure. Instead, the aim is to illustrate how the tools' shortcomings cast a shadow on the assertion that ratings and their indicators offer transparent mechanisms for assessing and directing urban environmental governance [7]. The use of existing projects, predominantly from LEED-ND- and BREEAM-C-certified projects, have been used to support this. Furthermore, this is then used to ground their application in the urban realities of degeneration and regeneration.

6.1. *Prescriptive, Static Nature of NSA Tools*

NSA tools fundamentally uphold a flawed assumption that neighborhood assessment can be based on a template, and factors affecting urban life are somehow fixed and can be predetermined [41]. This represents a highly simplified school of thought that is inappropriate for the vast variety of experiences and factors shaping urban systems that ultimately suggest that a neighborhood cannot be sustainable unless it fits the mold of these prescriptive models. The distinct development trajectories of different regions and countries around the world underline the notion that no single strategy for sustainability will apply equally in different cities [42]. This was illustrated in a study where three certified neighborhood projects from around the world were analysed and evaluated using three different NSA tools (LEED-ND, BREEAM-C, and CASBEE-UD). Applying the three assessment tools to each project led to them receiving different sustainability performance ratings [16]. This means that applying standardized NSA tools leads to entirely uneven implementation in different contexts [7] because frameworks have strong linkages to their originating building regulations, cultural heritage, climatic conditions, and building culture; and are not adaptable to environments outside of this [6,12,43]. Essentially this means that the weighting the tools apply to each aspect of sustainability is vastly different [12,36,37,41,43]. Due to the normative nature of the concept of sustainability, NSA tools are entangled with issues concerning subjectivism [36]. This has given rise to significant tensions between standardization and localization in the planning process which highlights the diversity of opinions and ideals surrounding urban sustainability. Furthermore, the different methodological

approaches, levels of development the relevance of indicators have make the tools difficult to use across borders [40]. Thus, the use of a global standard is undesirable [6,40].

Subsequently, there is a growing recognition by sustainability practitioners and academics that sustainability assessment needs to be more representative of local conditions, and more aligned with the values of that audience [44]. Context is the single most influential element of assessment [5], and it must be recognized in a comprehensive way by disaggregating physical and non-physical aspects of a neighborhood. NSA tools need to be customized to be sensitive to context and development type [36]. This issue has been addressed by some tools such as BREEAM-C and Green Star Communities [12,36,37]. However, there is still a lack of adequate mechanisms for local adaptability and participation [6,36], and the structure of the majority of assessment tools are such that they will never be able to adequately reflect the context of more than one place.

Essentially, sustainability assessment should be conceived as dynamic evaluation represented by “a moving target” [12] (p. 1587). Here, temporal aspects of sustainability acknowledge changes to the requisites and benchmarks that sustainability may require [45], which allows frameworks to adapt to changes and evolutions in the neighborhood and its perception of sustainability over time [6]. Very few tools mandate post-occupancy evaluations which means that they lack any ability to respond to changes over time [46]. Furthermore, the tools are rigid in their structure and there is a large degree of inflexibility relating to their requirements. This means that they exclude other important approaches to sustainable development [4], essentially lending themselves to a certain type of development and a certain type of end-user. The consequences of this are illustrated by a post-occupancy evaluation of the LEED-ND platinum-certified project in Southeast False Creek (Southeast False Creek is a platinum-certified LEED-ND neighborhood in Vancouver, Canada. Platinum is the highest certification achievable by LEED-ND and the neighborhood was the second ever platinum-certified project. The development was part of the city’s bid for the 2010 Winter Olympics), Vancouver, which found that “personal motorcar” was still the most popular mode of transport, and that 65.2% of the residents owned at least one motorcar [46]. This highlights an unfortunate irony that neighborhoods labelled by NSA tools as “sustainable” can be occupied by some of the world’s least sustainable inhabitants.

6.2. Environmental Bias and the Lack of Appropriate Socio-Economic Assessment

Various studies on NSA tools found that they are fundamentally dominated by environmental criteria [4,12,16,36,37,39]. As a result, NSA techniques “gloss over” considerations for social and economic aspects of sustainability [5], and the human factor of sustainability is vastly under-represented [8]. Hence, sustainability assessment has been unable to capture what makes the built environment sustainable for its citizens [14], and assessment rarely provides information that is relevant to manage the behavior of individuals [39,44]. Moreover, Berardi [12] found that rating systems poorly assess the importance of social life and sense of citizenship, whilst almost exclusively considering the physical and material properties of the built environment. There is a need to adopt a more anthropocentric position on sustainability which expresses it as a lasting measurement of quality of life focusing on social aspects of sustainability [47]. In False Creek, the three most important factors relating to a resident’s perception of livability were identified as: safety, affordability and a “sense of community”. None of the most popular NSA tools adequately address these concerns. Furthermore, a separate study of the Southeast False Creek development found that no considerations were made to address socio-cultural behavior towards reducing consumption of occupants [48].

NSA tools have also been criticised for misrepresenting economic sustainability [12,36,39]. This involves ways in which to assess how urban development promotes business and a supportive and diverse local economy [6]. Local businesses and economic activity are crucial in driving urban sustainability, and direct measures for both social and economic aspects of sustainability must be explicitly promoted as an integrated concept within the assessment of urban communities [12]. The effects of this oversight are demonstrated by the District Wharf in Washington, DC, a massive

urban regeneration project designed to achieve a LEED-ND gold certification, which has received criticism from the DC Fiscal Policy Institute for failing to use the redevelopment to promote meaningful economic development. The project has been hailed a lost opportunity to reduce the city's large income gaps as it did not provide enough quality jobs and benefits for local residents [49].

6.3. Data Reliant and Expert-Led Nature of Tools

NSA tools and their composite indicators are a technical means of measuring a neighborhood's "sustainability" that reduce the description of sustainable development to methods that are best suited for scientific endeavor [7]. This means that attempts to participate with the concept as a process are often ignored in favour of prioritizing quantifiable outcomes [42]. The result is that sustainability is often expressed in terms of what can easily be measured [50]. Assessment of sustainability must include parameters which go beyond quantitative measures [28]. There is a lack of equal knowledge on how to measure social, economic and institutional sustainability [6]. In essence, the tools reduce complex, dynamic and unique urban realities into a series of categories and sub-categories which separate dimensions of sustainability that are inherently co-dependent. The concern regarding reductionist approaches is its failure to generate a reliable understanding of reality as the basis for imagining transitions to a more sustainable future [51]. A major contribution to this shortcoming is the absence of attempts to directly address the behavior of community members and the affect they have on the sustainable reality of a community. Again, this is exemplified by the False Creek development where individual preferences were not considered and it was assumed, based partly on the assumptions made by the NSA tool (LEED-ND), that providing smart linkages and good access to public transit would create a car-free neighborhood. The percentage of False Creek's population that use a personal motorcar to commute to work is virtually the same as for Vancouver as a whole [52]. The reality is that reducing urban development to a checklist of transit nodes and walkable streets can be ineffective without meaningful attempts to understand the interests and motives of residents.

Data-intensive NSA tools also present issues relating to the viability of data collection. Garde [4] stressed that the "burdensome" data collection and documentation requirements of LEED-ND make the tool cost-prohibitive. Elgert [7] expands on this through her research on STAR Communities and found that data collection was too expensive and challenging, and the end result was insufficient to describe the "actual sustainability" of a neighborhood. She goes on to suggest that NSA tools more accurately measure a city's, or a neighborhood's, capacity for data collection rather than its sustainability. This is confirmed by a study of the Southeast False Creek development which found no quantifiable metric for sustainability such as maximum per capita ecological footprint or per capita greenhouse gas emissions. Further, the study went on to calculate the above and discovered that the actual reductions were significantly lower than required for certification [48].

The primary users of NSA tools are construction and property development professionals [37], and as a result, the development of the tools does not include a comprehensive assortment of urban stakeholders. Thus, they are mostly expert-led, top-heavy, and fail to adequately include the relevant actors [6]. Consequently, this means that the tools are based on criteria defined by urban designers and planners. Hence, frameworks are implemented using experts and largely ignore local knowledge or values [8,36,37]. The False Creek project was also criticised for its lack of engagement of youth and non-English speaking members of the public. Additionally, activists and interested citizens were not afforded the opportunity to be directly involved in the design of the neighborhood [53]. In essence, this embodies a mentality of "working on" a neighborhood rather than "working with" one, and there is a need for greater inclusion of citizens in the application of NSA tools [6].

6.4. Market-Driven Nature of the Tools

Neighbourhood sustainability certification has had a significant impact in providing environmental labelling and market recognition for sustainable neighborhoods [36,54]. Indeed, certification generates considerable publicity and marketing benefits for a project using an NSA

tool [4]. This was the original objective of NSA tools, nevertheless, there are a number of concerns relating to the success of their approach:

1. Firstly, and most notably, developers tend to “chase points” and prioritize criteria that offer the most points towards accreditation. These concerns have emerged out of a number of independent studies [4,6,7,16,36]. Furthermore, given the expert-driven nature of assessment, chasing points invariably means prioritizing aspects that relate to design and environmental aspects of urban development.
2. Secondly, neighborhood sustainability assessment is often promoted by developers alone, and their primary objectives do not fully correspond with the development of sustainable neighborhoods [12]. Thus, tools can be seen purely as a marketing strategy where projects get recognition through “green certification” [6,41]. Subsequently, neighborhoods can acquire a “sustainability” brand without meaningfully engaging with the dimensions of sustainability [36]. Further, audit-style assessment processes encourage “creative compliance” which frustrate original intentions and create dysfunctional behavior [55] (p. 115). This means that a neighborhood could acquire accreditation without any requirements on the occupants to change their behavior [4]. Again, the continued use of motor vehicles in Southeast False Creek serves as a prime example of this concern. This can confuse rather than promote sustainability initiatives and their subsequent outcomes, resulting in efforts that fall short of creating “lasting, meaningful, structural change towards sustainability” [7] (p. 22).
3. Thirdly, there is a vast market demand for green-certified neighborhoods. Thus, there is a premium associated with living in “sustainable communities”. As a consequence, higher-income groups are typically targeted as potential occupants by project developers (as they offer higher potential to be profitable), and poorer performing neighborhoods will not be considered for these tools. This creates elitist enclaves of “sustainable neighborhoods” surrounded by neighborhoods deprived of similar qualities and privileges [16]. This is exemplified by MediaCityUK; a regeneration project in Salford, England, the first neighborhood to receive the highest certification (excellent) from BREEAM-C. The development has no affordable housing and is surrounded by some of the countries most deprived communities [16,56].

6.5. Inadequate Recognition of the Complexities and Institutional Imperatives of Neighbourhood Development

The challenges of sustainability at the urban scale are far more complex and expansive than at the building scale [41]. Devising assessment vehicles for complex urban systems cannot be formulated by exclusively redistributing the categories and indicators of existing evaluation. To a large extent, NSA tools have simply expanded the scale of their assessment without acknowledging that a neighborhood is not a bounded entity and is intricately connected to a broader urban system [12]. In Loring Park, a LEED-certified neighborhood in Minneapolis, points were unable to be awarded for credit 5 (Housing and Jobs Proximity) because there were not enough full-time jobs within a half-mile of the project’s geographic center. However, on the outskirts of the neighborhood was Minneapolis’s central business district, which is one of the region’s largest employment hubs. So, whilst there was a significant amount of jobs in the proximity, which not only supported Loring Park but multiple other neighborhoods, this was not recognized and no points were awarded for that particular credit [57]. This highlights how approaches expressed by prescriptive NSA tools simplify and exclude important considerations for real-life situations and fail to fully integrate sustainability into the built environment as they do not consider the complex social and ecological functioning of the urban environment [5,6]. Comprehensive sustainability is achieved through the systemic considerations of many factors and their relationships, respecting the complexity and dynamism of urban contexts [58].

These considerations require the incorporation of various complex inputs involving competing interests and values of various concerns and stakeholders [10]. NSA tools have shown an inability to address the interaction between humans and their space, and the social structures that are the essence of a “neighborhood” [2]. Thus, many reports have highlighted that institutional sustainability

is the least emphasized category of NSA tools [6,8,36]. Whilst in theory the tools offer an integrative framework [37], in practice they lack enough procedural clarity to meaningfully guide interaction between the various urban role players. Essentially, they do not provide an adequate framework to support the collaborative processes inherent to community development [8]. MediaCityUK has also been criticised for its overt “top-down” narrative characterized by a lack of engagement with existing cultural infrastructure and creative community initiatives [59]. LEED-ND, which is objectively the most popular NSA tool, has no requirements to hold meetings with local communities, or to include the input of multiple stakeholders [37]. The above is supported by various studies which highlight that the tools do not adequately promote community engagement [6,12,39].

Nonetheless, there are NSA tools like Green Star Communities, which is used in Australia and South Africa, that have made genuine attempts to incorporate urban governance into their frameworks. Yet it is argued that the rigid, outcomes-based approach of NSA tools mean that they will always fall short of imperatives for governance as NSA tools further a dominant ideology that sustainable development is an outcome and not a process [8].

7. What This Means for Urban Regeneration

Measuring the sustainability of urban regeneration is important in stewarding declining urban precincts towards generating lasting contributions towards environmental, social, physical and social development [25]. However, the nature of conventional NSA tools makes their application ineffectual within the context of most urban regeneration projects. This section discusses how the shortcomings of NSA tools makes them inappropriate for application on renewal initiatives.

A major concern about the use of NSA tools for urban regeneration is that they are too prescriptive, and they rely on implicit assumptions about the nature of urban development. In the case of many tools, it assumes that cities have the financial and institutional capacity to facilitate the engagement of NSA tools. Most NSA tools have mandatory criteria which must be fulfilled to attain certification [4,37]. Further, the costs associated with applications fees, expert consultation and accreditation are prohibitively high [4,7,16,24]. Neighborhoods without the resources to fund such intensive data collection and evaluation end up subverting the certification process altogether. Essentially this indicates that rating systems are not equally accessible to all neighborhoods and they privilege localities, or groups that have greater financial and political resources to invest in them [60]. This restricts projects from certification that would otherwise have been sustainable [61]. Of the 370 LEED-ND applications submitted for the pilot programme in 2009, only 238 could afford the costs associated with accreditation and the other 138 projects rescinded their applications [62]. This is particularly pertinent to urban regeneration or areas without the fiscal base to support expert consultation, registration fees, and data collection required for accreditation.

Toli and Murtagh [21] found that NSA tools were unfavorable in urban regeneration projects as their context is too complex and demanding for the rigid nature of the tools. Urban regeneration engenders long-term effects on the built environment, in addition to environmental, social and economic development; therefore, assessment needs to be dynamic and based on time series data [25,36,46]. Current iterations of NSA tools do not adequately accommodate this.

Essentially, the tools assume that the sustainable city is governable in specific ways [7]. This assumption favors planned neighborhoods with high levels of technical and financial resources. Tools like LEED-ND apportion a large number of points for attributes related to a project’s location [4,16]. As such, the tool places primacy on acquiring the right site rather than acquiring the set of conditions that best unlock the potential of a site. For areas undergoing renewal, there is no choice where the site is located, and this puts them at a distinct disadvantage, and they are excluded from engaging with certification. This was demonstrated by a study on the neighborhood of Utica, New York, which found that the existing nature of the community and its spatial layout meant that LEED certification would require redeveloping the area almost entirely [63]. The Syracuse Art, Life and Technology (SALT) redevelopment in New York, which received a LEED-ND gold rating, had similar issues regarding the

existing nature of the neighborhood that meant that many credits were unattainable for the project [64]. These were mostly associated with LEED's smart location and linkage, and neighborhood pattern and design criteria, which make up a significant portion of overall points for accreditation.

NSA tools fit comfortably within the conventional, linear and quantitative understanding of policy processes but oversimplify and obscure means of measuring and governing urban sustainability [7]. The complexity of urban regeneration is very high and must include broader considerations of the urban fabric [22]. Local social structures and economic processes that significantly shape urban regeneration of an area extend far beyond the designated area of typical assessment models [28]. NSA rating tools do not accommodate the networks and complex interactions at this scale. This is highlighted by the urban regeneration projects in the Wharf Precinct project in Washington, DC, and the MediaCityUK, England project. These regeneration projects aimed to produce significant economic development opportunities for their respective regions whilst also reducing economic inequality. On both counts, these renewal projects failed to do this (and in some cases, exacerbated these issues) because the NSA tools they used to steward the projects did not mandate linking the broader urban system into the development of project objectives [49,65].

The strategic management of urban regeneration must place emphasis on creating a clear set of outcomes for regeneration, the provision of a supporting framework that can implement the outcomes, establishing links between policy systems, identifying the roles and responsibilities of the actors and organisations involved in regeneration, and generating a sense of common purpose and cooperation [19]. As stated earlier, successful urban regeneration requires strategically designed and multi-agency partnerships [30]. Thus, opportunities for urban regeneration also effectively depend on the existence and capacity of bridging organisations to play managing interactions within social-ecological systems [66]. Dominant assessment ideologies typified by NSA tools are also present in urban regeneration models, and lack intellectual sophistication and rigor in evaluation of these regeneration imperatives [28].

In summary, NSA tools are struggling to address the complex decision-making requirements of urban regeneration [21] and need to be complemented by better mechanisms for navigating complexity.

NSA tools' over-reliance on environmental aspects not only overlook socio-economic issues related to the success of a (re)development project, but it also propagates the negation of human behavior and its role in driving sustainable transitions. This is the case for both planned and existing neighborhoods but is particularly important in neighborhoods in need of regeneration as they present additional socio-economic complexities that new projects can avoid. Urban regeneration has to reflect the unique local context which defines it [34], and NSA tools have been proven to be inept at that. An example of this is illustrated in a study by Szibbo [46], who identified, in a study of four sustainable neighborhood development projects in North America, that local residents prioritised safety and affordability, aspects which are extended little to no direct attention in the majority of NSA tools. Criteria such as affordable housing, inclusive and safe communities, local economic development and livelihoods are still not adequately considered by the tools [6]. Given that urban degeneration is often proliferated by an absence of the above, it is argued that these factors must be central to the evaluation and stewardship of urban regeneration. The fact that LEED-ND projects can be certified as "sustainable" with little provision for affordable housing is a significant concern [4]. The lack of socio-economic consideration for NSA tools renders them only useful in helping define environmental indicators within the context of sustainable urban regeneration [21].

Additionally, NSA tools promote the use of virgin materials, which not only exclude the existing built form, but it also relegates the importance promoting lifestyles in harmony with nature [5,12]. Furthermore, the matter of promoting new developments accompanied by extensive construction rather than upgrading and restoring existing building stock brings into question the sustainable ideologies that underlie NSA tools. Based on this, criticisms have surfaced regarding the appropriateness of relying on tools developed by those whose livelihoods are dependent on increased

construction and development activities [46]. Less than 1% of the total points attainable for LEED-ND certification are assigned for the reuse of buildings instead of demolition.

The unequal opportunities that neighborhoods have in acquiring certification has material consequences as sustainable labels offer benefits in terms of attracting investment [7]. The irony is that neighborhoods in need of renewal, which are best positioned to gain from this type of accreditation, are largely excluded from them.

A key concern for frameworks or tools regarding neighborhood sustainability is that they rarely consider market forces. This is particularly the case in areas where adverse market conditions have catalyzed urban deprivation [28]. It is crucial that attempts are made to understand these forces in order to stimulate urban land and property markets to help form the foundation of regeneration.

Despite this, market recognition for green-led development is well-articulated and frequently intentional, as investors and public officials use this strategy to increase investment and raise property prices [67]. To this end, regeneration implications associated with market-driven sustainability tools are also linked to the processes of “green gentrification”. This refers to gentrification facilitated by the creation or restoration of environmental amenities [67]. This further highlights the way in which urban improvements can produce vast social and economic inequalities [68]. In the case of green gentrification, working-class and minority groups experience reduced access to environmental amenities as they are progressively priced back from them, in order to make way for wealthier residents. This negative redistributive policy can, ironically, create the conditions where the restoration of environmental amenities might be more correctly viewed as an environmental calamity [67]. The neighborhood profiles of many NSA-accredited projects confirm the above concerns. Hoyt Yards, a platinum-rated LEED-ND neighborhood in Portland, Oregon, has a Caucasian population of 88.2%, and 58.9% of the population have a graduate degree or higher [46]. False Creek has an average median household income of \$78,176 (Canadian Dollars), considerably higher than Vancouver’s average median household income of \$65,327 (Canadian Dollars) [52]. Hammarby Sjöstad, a development in Stockholm, Sweden, that was guided by the UN’s Agenda 21 Human Settlement Objective 7.5, has similarly been criticised for embedding issues of exclusivity and segregation in the city by creating a haven for “economically homogenous” residents [69].

Garde [4] found that projects that do not meet the prerequisites for LEED-ND certification, or do not meet the rating system’s criteria, will be overlooked even if the actual sustainability performance of the project is greater than that of a certified neighborhood. Thus, existing neighborhoods that excel in matters of social justice, economic diversity, and quality of life, but do not meet the mandatory performance requirements of tools would appear “less sustainable” than a certified neighborhood. This is particularly significant for urban regeneration where projects have excelled, and should be recognized for their efforts in promoting socio-economic sustainability in deprived inner-city areas. Yet, given the existing nature of the neighborhood, and the financial capacity of stakeholders involved in the project, certification is near impossible to achieve. Importantly, this brings into contestation whether typical rating tools are teaching us the right things about urban sustainability. This demonstrates that the reality of sustainability in the urban environment is nebulous, context-specific, and constantly evolving. Thus, the approaches need to correspond to these urban realities, and look beyond the technical and performance-driven prescriptions of generic NSA tools.

The following section looks at ways in which assessment techniques can be enhanced to better reflect comprehensive urban sustainability and regeneration requirements.

8. Policy Implications of Neighbourhood Sustainability Assessment Tools

Sustainability assessment tools and sustainability indicators have had a significant impact on efforts towards driving urban sustainability and pro-environmental policy [39,70]. However, they have created expectations and aspirations that guide decision-making, policy prioritization and resource distribution that promote particular urban trajectories. The over-reliance of metrics for urban sustainability can: “fundamentally impact the way in which policy problems and solutions are conceived, developed, and

implemented, and can profoundly influence the behavior of policy actors" [7] (p. 18). In the US, there is a strong relationship between the adoption of LEED frameworks and grants or planning bonuses [37]. However, the relationship between policy and knowledge is not simple or mechanical, and neither should the tools that link the two [71]. Empirical models have been found to deeply underestimate the impact of politics and strategy building in both politics and knowledge creation [7].

NSA tools and green building rating tools have endorsed this mechanistic link by proliferating a primacy of measurable aspects related to urban development, at the expense of less measurable dimensions [5]. Consequently, the political environment has been shaped by aspects such as building performance and design rather than process leadership, equality and multi-level governance. Thus, sustainability assessment and policy are "guided more by what can be measured (a technical issue) than by what should be measured (a normative issue)" [50] (p. 295).

In essence, the problem is that assessment tools do not convey a clear understanding of policy and programs yet are often used as a means of doing so. This has significant consequences for urban regeneration policy and practice. Enabling the source of urban change to be rooted in the neighborhood allows for the design of policies and structures that are sensitive to the contextual conditions inherent to a particular place [72].

9. The Way Forward for Urban Regeneration and Sustainability Assessment

Over two decades ago, Sachs-Jeantet [73] (p. 14) called for the reconceptualisation of the empirical and intellectual tools for the study of urban processes as they are based on a "radically different urban morphology" and are not applicable to emergent issues in urban areas. Despite the age of these notions, attempts to frame these sentiments within instruments that reliably mirror them has been missing in urban sustainability policy and practice. Whilst there is no doubt that there are positive externalities that stem from the proliferation of NSA tools, it is time to consider the evolution of these frameworks to better reflect the core imperatives of urban development and the complexities inherent to managing urban systems' interaction with the environment. NSA tools in their current iteration are not appropriate for the infinite configurations and development trajectories witnessed in cities and neighborhoods around the world. In response to this, what follows are some key suggestions that could guide the evolution of NSA tools, followed by a table that synthesizes the discussion around the tools, their role in urban development, and the way forward.

Firstly, it is imperative that a new iteration of an NSA tool is centered around institutional mechanisms that foster collaborative action at various scales and levels of expertise. Whilst there are process-oriented tools such as EcoDistricts that can assist the implementation of typical NSA-led development, it is argued that such strategies are likely to exacerbate institutional challenges as the ideologies of the two types of tools are fundamentally at odds. The search for human sustainability means activating processes of regeneration able to ensure that "expert knowledge" can interact with "common knowledge" [18]. This is needed to coordinate social and technical aspects of urban transitions [66]. It is critical to provide mechanisms in which individual actors at local scales can support and witness sustainability within that context. The results are frameworks and assessment tools that are civic-driven as opposed to market-driven. Here, frameworks act as a template for more engaged citizenship where local action can be encouraged and supported across neighborhoods and cities. "If sustainability is conceptualized as a concept which is communicated among actors with the aim of persuading them to adopt a specific vision of sustainability, the concept becomes methodologically more manageable and constructive than the dichotomy between discourse and practice" [29] (p. 289).

Frameworks such as EcoDistricts (USA) and HQE2R (France) have been developed to fulfill the above objectives, particularly around urban renewal, and have shown to be able to assist existing NSA tools. However, there is very little academic research on these "plan-embedded" tools, and the dominance of mainstream NSA tools overshadows the procedural equity and demonstrated by such tools.

Secondly, urban sustainability and regeneration frameworks require the incorporation of qualitative tools to support decision-making. It is argued that this will better account for the numerous issues

inherent to urban development and sustainability that simply cannot be quantified by typical assessment methodologies. These include cultural aspects, sense of place, happiness, social cohesion, empowerment and well-being. Hemphill et al. assert that assessment metrics need to be complemented by qualitative information on impact and performance from the perspectives of users and beneficiaries [28]. This paper suggests that this notion should be viewed the other way around. Under this paradigm, metrics can complement qualitative processes of generating specific knowledge about the sustainability of a local area. Similarly, Sharifi and Murayama [36] suggest the introduction of an iterative participation process, intertwined with the assessment practice, which will enhance the reliability and accuracy of assessment, build mutual understanding, and provide opportunities for stakeholders to learn from one another. This mandates that neighborhood sustainability assessment needs to be dynamic rather than static and cater to the needs of a neighborhood and its surrounding systems.

Thirdly, assessment tools and frameworks that promote sustainable urban development and regeneration need to be adaptive and flexible in nature. Further, temporal aspects of assessment need to be incorporated so that assessment becomes a continuous, interactive process, which can be used to map the evolution of urban development [12,45]. Through a process where different conceptions of a locality can be constructively engaged into developing a shared vision [74]. Sustainability must be supported by appropriate decision-making frameworks [21], and there is an urgency to delve deeper into decision-making by exploring the strategies, priorities and capacities of role-players at the urban level [31]. This means that decision-making reflects the indeterminate realities of the human experience in the built form where goals and outcomes emerge out of an iterative process of learning and inclusive negotiation rather than predefined standards [5,75]. This requires a change in thinking, marked by integrated solutions able to blend policies of sustainability and public acceptance focusing on the role of “local preferences” in the implementation of concrete sustainability strategies [18]. The fact remains that urban issues require the development and implementation of location-specific responses [34]. Thus, the challenge for frameworks is to strike a balance between being flexible enough to remain relevant in various contexts, whilst offering enough guidance to support meaningful transitions toward sustainability.

Finally, frameworks need to shift away from standardized, outcomes-driven urban (re)development. The complexity, diversity and peculiarities of different neighborhoods and cities make it very difficult to determine better or worse performance as they represent indeterminate manners of achieving a livable urban environment [24]. Hence, it is worth asking the question: what is the outcome or goal of NSA tools? Global sustainability or “bragging rights”?

It is argued that the proliferation of NSA tools encourages a “race to the finish line”, where points are chased to achieve the final goal; accreditation. Kyrkou and Karthaus [41] (p. 204) speak of the tension that exists between “the commercial desire for certification of achieving a prescribed standard, and the more open process of education and behavior change”. Nevertheless, Toli and Murtagh [21] found that universal standardization is desirable for sustainability practitioners. The value of having a universal set of data cannot be ignored; however, this must be seen as a by-product of approaches that collectively explore what should be measured with reference to a particular community. Failing to do so will result in NSA becoming an exercise of comparing bad apples with bad apples. Thus, the point is to not see a set of standardized metrics as an outcome, but instead to standardize a process of collaborative decision-making. This supports the notion that the pursuit of sustainability is not an “end-state” but rather a dynamic process that requires continuous improvement and reflection.

To this end, urban sustainability frameworks for both planned neighborhoods, and those existing ones in need of renewal, need to focus on the process of iterative and dynamic development that supports comprehensive urban sustainability in complex and uncertain environments, rather than assessing a series of measurable aspects that cannot possibly account for the complexities that exist across neighborhoods and cities. Table 1 below tracks the development of the case presented throughout this paper and provides possible policy interventions that can support the suggested way forward for sustainable urban development frameworks.

Table 1. Development of the argument for the evolution of NSA tools.

NSA Shortcomings	Impact for Urban Regeneration	How to Address These Impacts	Policy Requirements
Prescriptive, Static Nature	Prescriptive tools are largely inapplicable for vastly complex regeneration projects, and oversimplify the process of regeneration. Tools do not offer any post-occupancy assessment.	Flexible, neighbourhood-sensitive frameworks; introduce time dimensions so that assessment is continuous, iterative, and remains relevant.	Disassociate policy development from prescriptive, mechanistic tools toward dynamic, iterative assessment and analysis. This entails allowing better articulation and experimentation with policy at local level.
Environmental Bias and Lack of Socio-Economic Criteria	Inadequate recognition of socio-economic aspects inherent to existing communities. Prescribe environmental interventions inappropriate for these contexts	Refocus urban sustainability frameworks to better represent a balanced approach toward sustainability that sees aspects as interacting and codependent, and better incorporate local socio-economic conditions.	Overcoming environmental bias requires mandating an increased role of civil society in the design and implementation processes. Thus, encouraging inclusive negotiation for urban regeneration projects.
Data Reliant and Expert-Led	Application of these tools is accessible only to the few neighbourhoods that can afford the consultation fees and data collection.	Create a balance between expert-knowledge and local-knowledge by relying less on technical/data driven outcomes. Furthermore, divorce policy from the idea that standardization offers widespread solutions.	Embed more qualitative/culturally oriented methodologies into sustainable urban development frameworks. In other words, use less comparable “softer” data, such as sense of well-being, to influence policy.
Market-Driven	Tools attract “homogenous” high-income residents rather than more diverse population groups typically represented by inner city neighbourhoods in need of renewal.	Shift away from accreditation being the “final goal” and place emphasis on collaborative and inclusive engagement. Thus, representing a shift from “market-drive” to “civic-driven”.	Offering grant prioritisation, density bonuses, and other incentives for projects that display more meaningful urban governance practices. The current policy favours market-driven sustainable development.
Inadequate Recognition of Complexities and Institutional Aspects	The template-approach of tools simplifies urban regeneration processes whilst also not allowing for adequate collaboration between stakeholders.	Frameworks should look specifically at the processes, trade-offs, decision-making, and actors involved in urban regeneration to develop holistic approaches.	Introduce policy that prioritises projects that can provide evidence of collaborative approaches and consider a holistic strategies that consider a multitude of stakeholders across various sectors.

The suggestions listed above are intended to offer policy direction that could support an evolution of NSA tools into more effective methodologies for sustainable urban development. Note, the term methodology is critical here. What is put forward is not a set of definitive criteria, to do so could be contradictory to the intended message of this paper, that urban development needs to be flexible, iterative, varied, inclusive and not pre-defined. Therefore, what is important is the promotion of methodologies that promote key aspects of sustainable urban development, such as: procedural equity, systemic strategy development, and collaboration. To this end, a logical next step would be how to assess the efficacy of such a methodology in an operative sense; experimenting with actual projects and putting into practice the techniques described in this paper, and refining them where necessary.

10. Conclusions

Urban regeneration offers vital opportunities for the promotion of global sustainability. However, NSA tools largely ignore the importance of these projects in favour of more “fashionable” masterplanned neighborhoods that meet selected imperatives of sustainable development. Given the instances of urban poverty and sprawl which are a common feature in cities around the world, the case is made to shift the urban sustainability focus inwards onto existing areas that require restoration in order to reach their full, sustainable potential: restoration in terms of social fabric and justice; material restoration of buildings and infrastructure; economic restoration in terms of cultivating market forces that influence local economic development and sustainable livelihoods; restoring local urban authorities and organisations that facilitate neighborhood interests and values; and environmental restoration in terms of protecting and promoting biodiversity and resource efficiency. NSA tools speak to but a few of the issues represented above as does assessment around urban regeneration approaches. Elgert [7] voices her concern about the social and political impact of processes of quantification, and stresses that neither policy nor knowledge is clear-cut. This highlights a broader concern regarding the interaction between policy, theory and practice. In the era of “Big Data” and the “Internet of Things” it is important that we forge a path that deviates from the over-reliance on quantitative data for advising decision-making on inherently complex and qualitative issues. The paper builds the case that the prescriptive and quantitative nature of these tools makes them inappropriate for the complexities of urban regeneration. More specifically, the paper outlined how NSA tool shortcomings affect regeneration. In doing so, it presents the question: why are these tools not devising strategies for existing neighborhoods in need of regeneration? Hence, the paper calls for a shift in dominant policy practices to become more socially oriented and locally relevant. By highlighting the policy issues associated with NSA tools, the study has put forward meaningful suggestions that can more appropriately guide policy for sustainable urban regeneration and development.

To this end, the paper proposes an evolution of current NSA tools to shift focus away from technocratic, quantitative rating systems towards realigning their imperative reflect inclusive decision-making processes where measurement and accreditation is not the end in itself, but complementary to a process of collaborative inquiry and problem-solving. The practicality of these propositions needs to be researched and better understood within operative projects and hence build on the limited body of knowledge on sustainability frameworks specific to urban regeneration. This is vital for cities and their citizens in making more meaningful strides toward sustainable urban transitions.

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