THE BUSINESS OF ACCELERATING SUSTAINABLE URBAN DEVELOPMENT IN CANADA

Draft Report for the SSHRC Knowledge Synthesis Grant*:
Living Within the Earth's Carrying Capacity

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BACKGROUND: THE ISSUE

Given the rapid pace of population growth, urbanization and hence construction and development, businesses within the built environment industry play a critical role in ensuring a more sustainable future. Transformative and innovative changes in how neighbourhoods, districts or even cities will be designed, planned and built to meet mounting social and environmental concerns is critical, and yet our understanding of the role of the business sector in sustainable urban development (SUD) remains elusive. To address this issue, we have engaged in a comprehensive review of the empirical literature on business and SUD, presenting a synthesis of our findings, an evidence-based theoretical model and implications for policy, research and practice.

OBJECTIVES

The specific objectives of the knowledge synthesis literature review are to:

(1) Document the existing empirical research regarding business' role in sustainable urban developments (SUDs) and like constructs at the macro scale, including, but not limited to: eco-villages, resilient communities, green cities, eco-cities, net-zero neighbourhoods, carbon neutral development projects, One Planet Living developments, etc.
(2) Classify the disciplinary, theoretical and methodological approaches used in these studies to identify existing areas of synergy and overlooked variables and relationships through a critical assessment of the state of knowledge about business drivers from multiple disciplines
(3) Provide encouraging examples of successful sustainable urban transformations globally that illustrate enabling determinants for business involvement and help consolidate recommendations related to practical implementation pathways
(4) Map obstacles that will need to be addressed by multiple stakeholders from the private, public and third sectors, so that more rapid progress can be made in the governance and capacity building required to shift our urban built environments towards more sustainable models.

METHODOLOGY

We conducted a comprehensive analysis of the empirical research on the construction and development sector's role in sustainable urban built environments using a combination of both systematic and narrative literature review processes. We used a multi-phased approach that included: 1) initial scoping of the literature, 2) targeted systematic review, 3) detailed screening of abstracts, 4) narrative review, compilation and validation of the master list; and, 5) data analysis and synthesis. Our final master list included 59 empirical research studies that explicitly examined the link between the built environment sector and SUDs. These articles were coded and analyzed using Nvivo software, beginning with labelling fragments of data (e.g. barriers, drivers, legislation, etc.) and constantly comparing sections of data with the emerging nodal structure. The nodes from the qualitative coding process were then compiled into an interpretive evidence-based synthesis and a multi-level, multi-stage model of SUD from a business perspective.

RESULTS

This model provides a framework that situates built environment businesses as both affected by top-down, macro-level factors such as governmental legislation, incentives, power and control, as well as influencing more bottom-up, meso-level dimensions such as cross-sector partnerships, experimentation and community engagement. It also highlights the importance of establishing the business case, mitigating risk and prioritizing sustainability knowledge & learning at the company level, as well as the leadership visioning and championing roles individuals within the built environment sector can play. Moreover, we discuss the paradox of scale and time in SUDs, where urgent change is required yet difficult to implement in practice. In so doing, we not only present implications for policy and practice, but also hope to stimulate further longitudinal, cross-level research into the important role that the business sector can play in conceptualizing, designing, planning and building a more sustainable future.

KEY MESSAGES

Our multi-level, multi-stage model of the role of business in SUD found that:

- ***Macro Level (National, Regional, and Municipal Governments):*** A stabilization and harmonization of legislation, regulation and policies across and within governmental departments over time is the greatest lever in accelerating private sector involvement in SUDs. Coupled with financial (and non-financial) incentives, and standardized sustainable building certification processes, these top-down mechanisms can work to mitigate the perceived business case risks of engaging in SUDs.
- ***Meso Level (Networks, Communities, and Companies):*** Despite their complexity, cross-sector partnerships and other community engagement processes are also effective means of alleviating the business case risks associated with sustainability experimentation at the neighbourhood or city scale over time. Within the construction and development industry, however, a persistent knowledge gap about sustainable building design, financing and construction principles remains. In combination, these factors contribute to powerful inertial forces in this sector that favour simpler, less costly and less lengthy developments. Increased training and education, as well as greater clarity and specificity regarding sustainable building requirements and their social and environmental impacts, is therefore required.
- ***Individual Level (Leadership):*** Innovative developers and other built environment sector companies nonetheless play a critical role in championing visionary projects through the concept/bid, design/plan and construction phases. These forward-looking developers seek out opportunities to learn and incorporate lessons from more advanced projects to craft sustainability visions with local partners; they are also more adept at creating new collaborative platforms in concert with macro-level stakeholders to advance sustainability objectives. In conjunction with learning and development then, innovative and visionary leaders must also tackle perceptions regarding the business case and risk associated with SUDs to propel bottom-up sustainable change in this sector moving forward.

Given that academic research on the drivers of SUDs is only in its infancy and primarily examined from technical disciplines, future management research is required to better situate the agentic role of the built environment business sector in designing, planning and building more sustainable neighbourhoods that will allow us to continue to *live within the Earth's carrying capacity.*

KNOWLEDGE SYNTHESIS REPORT

1. INTRODUCTION AND BACKGROUND

To accommodate the world's growing population, the UN estimates that 230 billion square meters of new construction will be added to the built environment over the next 40 years– that is the equivalent of adding another Paris to planet every week (UN-EIEA, 2017). And yet, the construction and development (C&D) industry has been notoriously slow to adopt sustainable building principles, consuming around 50% of all global resources, 40% of all produced energy and contributing approximately 40% all carbon emissions globally (UN-EIEA, 2017). Without transformative and innovative changes in built environment planning, research shows that the current rate of urban expansion alone could raise global temperatures by 1-2C (Georgescu et al., 2014), drastically worsening climate change related risks such as drought, floods, extreme heat, species loss and poverty for hundreds of millions of people (IPCC, 2018). Corporate climate change inaction is therefore particularly salient in the context of urban development where today's infrastructure, technology and built environment choices will have a substantial impact on sustained resource use and therefore carbon reduction and mitigation efforts for the next 40 years (Georgescu, et al., 2014; Rosenzweig, et al., 2010).

Many programs have sprung up globally to address this important issue. For example, the UN has set a number of urban development guidelines such as the Local Agenda 21 processes and more recently the 'Sustainable Cities' and 'Responsible Consumption and Production' Sustainable Development Goals (SDGs). In parallel, movements such as building with regenerative design principles (McDonough and Braungart, 2009), enabling local sustainable communities (Forrest & Wiek, 2015) and imagining One Planet Living neighbourhoods (Mazutis & Abolina, 2019; Wiktorowicz et al., 2018) are growing in popularity. From an academic perspective, management researchers have only just recently begun to examine business involvement in the governance and capacity building required for these urban sustainability projects (Loorback & Wijsman, 2013). For example, Hebb et al, (2010) examined the financial implications of integrating environmental and social considerations such as affordable housing, urban revitalization and brownfield redevelopment into real estate investment decision-making processes in Canada. Similarly, Clarke and colleagues have investigated the collaborative strategic management processes involved in sustainable cross-sector partnership arrangements between municipal governments, businesses and other sectoral actors (Clarke & MacDonald, 2019; MacDonald et al., 2018a; MacDonald et al., 2018b).

Yet empirical research into the role of the business sector in driving social and environmental changes at the neighbourhood, city, district or systems scale remains underdeveloped (Alkhani, 2020; Dyllick & Muff, 2016; Loorbach, et al., 2010; STRN, 2019). Rather, research in this domain remains highly fragmented and siloed in disciplines such as engineering, sociology, policy studies, economic geography, and urban planning/modeling (Markard et al., 2012) where the role of business is often treated as non-agentic (Fischer & Newig, 2016; STRN, 2019). By business sector, we mean specifically the private sector actors that play a significant role in the design, planning and construction of the built environment, including individual professionals and companies such as: real estate developers and contractors, architects, infrastructure engineers, urban planners, investors and landowners (Alkhani, 2020). Our focus is on the businesses contributing to the construction and development of sustainable neighbourhoods as opposed to those businesses supplying technology (e.g. solar or wind) or services (e.g. waste or water management) to these developments given the greater control the former have over the "*form and function of urban landscapes directly through [their] construction activities*" (Turner, 2017). Within the sustainability transitions literature these private

sector actors are part of what is referred to as the "development regime" (Williams, 2016); alternately, they have been defined as part of the "property industry" (Dixon, 2008), the "building and construction industry" (Fastenrath & Braun, 2018) or simply the "built environment sector" (Newton & Newman, 2015). We use these terms interchangeably throughout.

2. OBJECTIVES

The purpose of this knowledge synthesis review is to analyze existing research pertaining to the empirical determinants of sustainable urban built environments from a business perspective. That is, how do we accelerate business' role in sustainable urban development beyond new, greener technologies to greater involvement in the design, development and construction of sustainable urban neighbourhoods, mixed use developments or sustainable districts that incorporate regenerative, 'net zero' or positive development principles? The focus of the review will be on what differentiates business involvement in various approaches (e.g. eco-villages, green cities, One Planet Living communities, etc.) and what lessons we can learn from these developments globally to accelerate business participation in sustainable urban transformations allowing Canada to "Live within the Earth's Carrying Capacity" in the coming decades. The specific objectives of the knowledge synthesis literature review are therefore to:

(1) Document the existing empirical research regarding business' role in sustainable urban developments and like constructs at the macro scale, including, but not limited to: eco-villages, resilient communities, green cities, eco-cities, net-zero neighbourhoods, carbon neutral development projects, One Planet Living developments, regenerative regional sustainability projects etc.
(2) Classify the disciplinary, theoretical and methodological approaches used in these studies to identify existing areas of synergy and overlooked variables and relationships through a critical assessment of the state of knowledge about business drivers from multiple disciplines
(3) Provide encouraging examples of successful sustainable urban transformations globally that illustrate enabling determinants for business involvement and help consolidate recommendations related to practical implementation pathways
(4) Map obstacles that will need to be addressed by multiple stakeholders from the private, public and third sectors, so that more rapid progress can be made in the governance and capacity building required to shift our urban built environments towards more sustainable models.

We begin by situating this project within the broader contextual literature on sustainable neighbourhoods and sustainable cities before explaining our systematic and narrative literature review methodology. We then describe our data analysis and synthesis process before outlining our findings, having coded the research papers in our final data set into thematic categories and deriving a multi-level, multi-staged model of SUD. We conclude by outlining the implications of this knowledge synthesis exercise on policy, practice and research.

3. LITERATURE REVIEW: CONTEXT

Cities and urban areas around the world have been engaged in a multitude of initiatives aimed at upgrading urban infrastructure and services in order to create better environmental, social and economic conditions for enhancing cities' SUDs (de Jong et al., 2015; Geng et al., 2019; Sodiq et al.,

2019; Zhang et al., 2018). To reflect these developments, new categories of cities have emerged, such as "sustainable cities"; "green cities"; "eco cities"; "low carbon cities"; "ubiquitous eco cities"; "resilient cities" and many other terminologies (de Jong et al., 2015). These terms are often used interchangeably throughout the academic literature and by policy makers, planners and developers, making the application of terms very context-dependent and subjective (Bottero et al., 2019; de Jong et al., 2015; McCormick et al., 2013). As such, the conceptual relationships between the varying categories of "cities" in and of themselves presents significant challenges in how SUD is understood and what related approaches, innovations and solutions are offered (Bottero et al., 2019; de Jong et al., 2015).

For example, Zhang and colleagues (2018), identified various dimensions of sustainable urban transformations across different scales ranging from "buildings", "neighbourhoods", "eco-neighbourhoods", "districts", "villages", "eco-villages", "communities", "regions" to "eco-urban projects" and beyond. There is an urgent need to transform urban areas to be more sustainable and to make more progress in reducing global carbon emissions (Zhang et al., 2018). In the sustainability transitions literature, the pathways toward sustainable neighbourhoods, eco-villages, and other local SUD phenomenon are considered to be the result of evolving grassroots social innovations aimed at having socially inclusive representation in the process of planning and development (Liu et al., 2018; Wolfram, 2018; Zhang et al., 2018), with obstacles to implementing SUDs comprising a wide variety of interrelated institutional, regulatory, individual and group behaviours.

However, knowledge about the attributes or determinants on how SUDs are undertaken in practice is scarce, as the existing literature has primarily focused on reactive measures taken to address infrastructure problems rather than more proactive measures in infrastructure and urban planning (Malekpour et al., 2015; Yigitcanlar & Teriman, 2015; Li et al., 2019). There is a considerable amount of literature regarding sustainable buildings and technologies and its importance for sustainability efforts in the building and construction sector (Sodiq et al., 2019; Zhang et al., 2015). This literature primarily discusses and focuses on specific elements and technologies of sustainable buildings, such as renewable energies and energy efficiency, emissions reductions, efficient waste and water management, assessments of construction materials and lifespans and certification programs like LEED (Sodiq et al., 2019). There is evidence for a need to shift from addressing climate change, green buildings, infrastructure design and urban planning in isolation to working with them simultaneously and holistically in support of more SUDs (Yigitcanlar & Teriman, 2015; Zhang et al., 2015).

While many of these studies allude to the important role the business sector can play in designing, planning and building SUDs, this role is often researched implicitly rather than explicitly (Holden et al., 2015). For example, when considering urban environmental governance, Geng and colleagues (2019) concluded that governance and regulatory mechanisms should take into consideration not only the adoption of effective enforcement of environmental regulations, but also the use of market and incentive mechanisms such as tax redesigns, financial subsidies, disruptive technologies and business models to finance and capitalize on sustainable urban transformation projects. Yigitcanlar and Teriman (2015) urged the need to take an integrated approach and rethink investments in the built environment and urbanization process as it ultimately affects long term capacities for innovation, adaptation and competition. A review on eco-urban neighbourhoods included the use of strategies to engage with the private sector to fund such projects (Holden et al., 2015) but the analysis of the role of business in these developments does not go any further. SUDs require a variety of stakeholders to make transdisciplinary efforts, requiring technical, scientific, institutional, and social efforts to address emerging sustainability problems (Geng et al., 2019), yet there is little to no mention of including business or management as a transdisciplinary effort. Further empirical research is needed to focus on the role of the private sector in designing, planning and building SUDs, with evidence not just from local administrators, but also from key actors, managers

and institutions from the private sector (Alkahani, 2020; D'Auria et al., 2018; Loorbach et al., 2013). A systematic literature review is therefore warranted to take stock of what is known to date and what knowledge gaps remain.

4. METHODOLOGY

In order to provide an unbiased and critical review of the literature, a comprehensive analysis of the empirical research on sustainable urban built environments from a business management perspective was conducted using a combination of both systematic and narrative review processes. The combination of systematic and narrative review methods ensures the review criteria to be explicit and replicable, while also allowing for the capture of studies referenced in key articles that may be elusive to systematic coding (Mazutis & Zintel, 2015). The combination of both methods also makes it possible to isolate the most complete set of articles for further analysis.

We followed the systematic review process outlined by Tranfield et al. (2003), with the objective of capturing all of the empirical research relating to the businesses sector's role in driving sustainable urban built environments in order to answer the research question. We used a multi-phased approach to arrive at our final database of empirically based articles that included: 1) Initial scoping of the literature, 2) Targeted systematic review, 3) Detailed screening of abstracts, 4) Narrative review, compilation and validation of the master list, and (5): Data analysis and synthesis.

Phase 1: Initial scoping of the literature. The first step involved a more general screening of the literature in order to refine our search terms and screening criteria. As described by Tranfield et al. (2003): "Within management it will be necessary to conduct scoping studies to assess the relevance and size of the literature and to delimit the subject area or topic. Such studies need to consider cross-disciplinary perspectives and alternative ways in which a research topic has previously been tackled" (p. 214). As such, we began the review process by keeping our search terms intentionally broad in order to capture all of the various conceptualizations of our dependent variable of interest: sustainable urban developments. Previous reviews in this domain were used to create our initial search terms (de Jong et al., 2015; Holden et al., 2015; Joss et al., 2013) which related to two broad categories, one descriptive and one contextual: "sustainable" and "urban development". We then ran dozens of combinations and permutations of the descriptive category (eco, sustainable, green, resilient, low carbon, net-zero, climate neutral, climate positive, one planet) with the contextual (villages, districts, communities, neighbourhoods, urban developments, cities, transformations) in multiple databases (ProQuest, Scopus, Web of Science, Google Scholar).

This initial scoping process netted more than 100,000 articles and cursory scan illustrated that most were not relevant to our research question. For example, this broad scoping included studies that look at the effects of specific technologies (e.g. heating systems) on sustainability related outcomes (e.g. GHG emission reductions) but did not necessarily treat the sustainable development (or eco village, or green city etc.) itself as the dependent variable of interest. In addition, we found that using separate descriptive terms such as "green" and "transformation", yielded articles that had little to do with our research domain (e.g. web site transformations etc.). Most importantly, this preliminary scoping review revealed that the majority of research in this domain emanates from the environmental or physical sciences, engineering, geography or urban studies disciplines. As such, we were hard pressed to find many articles that looked at the role of business or industry specifically in driving (or hindering) these urban sustainable development projects.

Phase 2: Targeted Systematic Review. As such, the second step of our review process focused on narrowing down our search terms to arrive at a more appropriate search string for a targeted systematic review (Cooke et al., 2012; Moher et al., 2009; Tranfield et al., 2003). Incorporating our

learnings from Phase 1, we opted to combine the descriptive categories (eco, green, sustainable, etc.) with the type of development (neighbourhood, village, city, etc.) to create a dependent variable search string as detailed in Line 1 of Table 1 found in the appendix (our *context*). We then specifically identified our Independent Variable of Interest (our *population*) as: "business" OR "management" OR "construction" OR "development" OR "industry" OR "developer" OR "real estate" OR "private sector" in order to better try to capture the role of businesses specifically in these sustainable developments. We then added a methodological filter to ensure that the articles that we captured contained either quantitative or qualitative evidence of a study into the business determinants (our *intervention*) of sustainable urban developments (David & Han, 2004; Newbert, 2007). For all filters, we searched only for articles (document type) in English (language) to limit our findings to peer reviewed publications that could be assessed. The *population, intervention, context* framework used herein mirrors best practices in systematic review processes (Cooke et al., 2012; Moher et al., 2009). While the "PICO" method also includes *outcomes*, because our research question pertains to the how and the why behind businesses involvement in sustainable urban developments rather than the outcomes of these developments, specific search strings for outcomes variables (e.g. GHG reduction) were omitted.

We ran our search in both Scopus and Web of Science, using the broader TITLE-ABS-KEY in the former and the narrower abstract review (AB) in Web of Science. While we were able to narrow the inclusion criteria to yield 6,149 articles in Scopus and 1,148 in Web of Science, attempting to narrow this down further to only the business research area worked only in Scopus, with the Web of Science netting only 3 articles in the management field, none of which were relevant to the present study. As such, we retained the 501 articles from Scopus and the full 1,148 from Web of Science for our full title/abstract review[1].

Phase 3: Detailed Screening of Abstracts. At this stage, the combined 1,649 articles titles/abstracts were exported to an excel spread sheet and manually reviewed to ensure that the articles uncovered during the systematic review actually captured only empirical papers that involved the role of the business sector in driving sustainable urban transitions at some level (individual, firm, community, village, city, system). For example, our search query returned many theoretical, editorial or review papers, which, while useful, were not themselves empirical studies on the business determinants of sustainable urban developments. Similarly, multiple studies were purely descriptive in that some measure of eco-villages were compared across contexts without presenting an investigation into the determinants of these differences. As such, these types of articles were not able to shed any light into role of the business sector in enabling and/or derailing these sustainable developments. Furthermore, despite our attempts to narrow the field to only business determinants as an independent variable, the search results still yielded a great deal of technical or scientific studies comparing the efficiency or effectiveness of particular technologies (e.g. waster water systems) on specific outcomes (e.g. land erosion). In addition, our inclusion of the search term "resilient" surfaced hundreds of articles about designing earthquake, flood or fire resistant buildings, which, while important, were also outside the scope of this review. Table 2 in the appendix details the inclusion/exclusion criteria used during the title/abstract review process. In those instances where it was not obvious from the title of abstract alone if the paper dealt with some aspect of sustainable urban built environments from a business perspective, the articles remained in our master list until the full articles were reviewed.

This screening process netted 52 of articles from Scopus and 85 from Web of Science, which were combined and duplicates removed, netting a list of 135 articles to be included in our master list.

[1] We also ran our search using ProQuest, but could not get below 13,188 results as ProQuest did not allow us to narrow the search criteria down to our research areas of business or management (See Table 1: Substantive No. 6).

Note that this cull rate is similar to other systematic reviews published in the field of management (Crossan & Apaydin, 2010; David & Han, 2004; Mazutis & Zintel, 2015; Newbert, 2007) and yet, did not surface several pertinent articles of which the principle investigators were either involved (Mazutis & Abolina, 2019) or aware (Alwan et al., 2017). As such, the systematic review was then complemented with a narrative review in Phase 4.

Phase 4: Narrative Review. Following the systematic review, we returned to several key papers which discuss the role of business in sustainable urban developments and any citations from these papers were then further consulted. We also returned to several of the review and theoretical articles that surfaced during the systematic review in order to ensure that we did not miss any important studies. Finally, specific empirical business journals were targeted and searched using the DV search terms to verify our preliminary findings that sustainable urban development research was largely absent from the management literature. We focused on the top empirical business management journals including: *The Academy of Management Journal, Administrative Sciences Quarterly, Journal of Management, Journal of Management Studies, Organization Studies, Organization Science and the Strategic Management Journal*. In addition to the top empirical management journals, several more targeted peer-reviewed journals were also searched for empirical research including: *Journal of Cleaner Production, Sustainability, Organization and Environment*. At this stage, an additional 70 articles were added, reviewed, and searched again for relevant citations until we felt that a satisfactory level of saturation was achieved and no new citations were forthcoming.

The combined systematic and narrative reviews (less duplicates) thus resulted in a database of 204 studies that were then retrieved and reviewed in detail to ensure that they adhered to our inclusion criteria as presented in Table 2 of the Appendix. At this stage, an additional 49 papers were removed for failing to meet one or more of Criteria 1 – Deals with SUDs (14 articles), Criteria 2 – Deals with drivers of or determinants of SUDs (23 articles) or Criteria 3 – Is an empirical study (12 articles). The remaining 155 articles were read in full to ensure they fit with Criteria 4 – Explicitly discusses the role of the built environment business sector in SUDs. At this last filtering stage, 96 articles were removed, leaving a final master list of 59 papers meeting all 4 search criteria.

Phase 5: Data Analysis & Synthesis. This final master list of 59 papers was then analyzed using Nvivo software. We began by looking for descriptive trends by treating each research study as an individual case and coding for: Author Faculty Affiliation, Journal, Year, Methodology, Dependent Variable, Level of Analysis, Location of SUD, Independent Variable and Theory. We also attempted to code for the SUD name, SUD funding and degree of project completion, however found that these were not always applicable and/or relevant attributes.

In order to proceed to the empirical analysis and synthesis, all 59 studies were then read in full and the research findings manually coded to thematic nodes in Nvivo. We followed an abductive approach, beginning with labelling fragments of data (e.g. barriers, drivers, legislation etc.) and constantly comparing sections of data with the emerging nodal structure (Glaser & Strauss, 1967; Gioia et al., 2013). This initial coding netted a high number of nodes (n=80) which were then reviewed and coded in a second-order analysis to obtain more theoretical, explanatory categories (Gioia et al., 2013). The objective of this second-order analysis was therefore to begin to look for patterns in the data that would help to answer our research question regarding the role of the built environment sector in the sustainable urban development process. At this stage, we began to connect the second-order codes to the literature in the domain and the multi-level and multi-stakeholder model emerged where 10 aggregate dimensions or higher-order concepts were found (Strauss & Corbin, 1990). We explore these aggregate dimensions in detail in the following section, after an elaboration of the descriptive findings.

5. FINDINGS

5.1. Descriptive Findings

Having collated the existing empirical research regarding business' role in sustainable urban developments and like constructs (research objective #1), we began our analysis with a descriptive overview of the articles in our dataset in order to identify existing areas of synergy and overlooked variables (research objective #2). We began by noting that more than half of the studies in our dataset were published in the last 5 years, indicating that research into the role of business in SUD is indeed a new phenomenon (See Table 3 in the Appendix). This is in line with several other recent literature reviews on sustainable cities (Bottero et al., 2019; Wang et al., 2019) and sustainable urban transformations (Fisher & Newig, 2017) that have established that the literature in this area has exploded in the last ten years. We were then interested in documenting the disciplinary origins of the studies in order to isolate and begin our analysis with articles originating from business scholars. We found only 7 articles out of our 59 were from the management discipline (See Table 4), with the majority emanating from Schools of Architecture, Building & Planning or Engineering & Technological Research departments. As further support for the lack of research from a business perspective, none of the articles in our dataset were published in the top scholarly management journals (See Table 5).

We then examined the papers by "dependent variable" (as identified by the authors) in a first attempt to classify the papers by "type" of SUD (e.g. eco-village, green city, sustainable community). We found a great deal of variety in the terminology used to describe SUDs, documenting 38 different names for the phenomenon of interest amongst our 59 articles, ranging from low carbon communities to brownfield redevelopments (See Table 6). As such, we regrouped like constructs by level of analysis in order to better understand the scale at which these studies occurred finding that the city level (37%) and neighbourhood level (34%) were fairly equally represented, with a handful of studies looking at variables such as sustainable construction or private sector investment in responsible real estate from the company level (22%); even fewer articles looked at specific individual professionals involved in SUDs (7%) (See Table 7).

We also noted that almost all of the studies were qualitative in nature, based primarily on case studies involving some combination of semi-structured interviews, archival material analysis and/or informal surveys (95%), suggesting a greater possibility for quantitative methods (See Table 8). Similar to previous studies (Blatter, 2000), we found that the majority of the case studies were located in Europe (55%), followed by Asia (20%) and North America (12%) (See Table 9), with only 4 studies in Canada indicating the need for more regional examples.

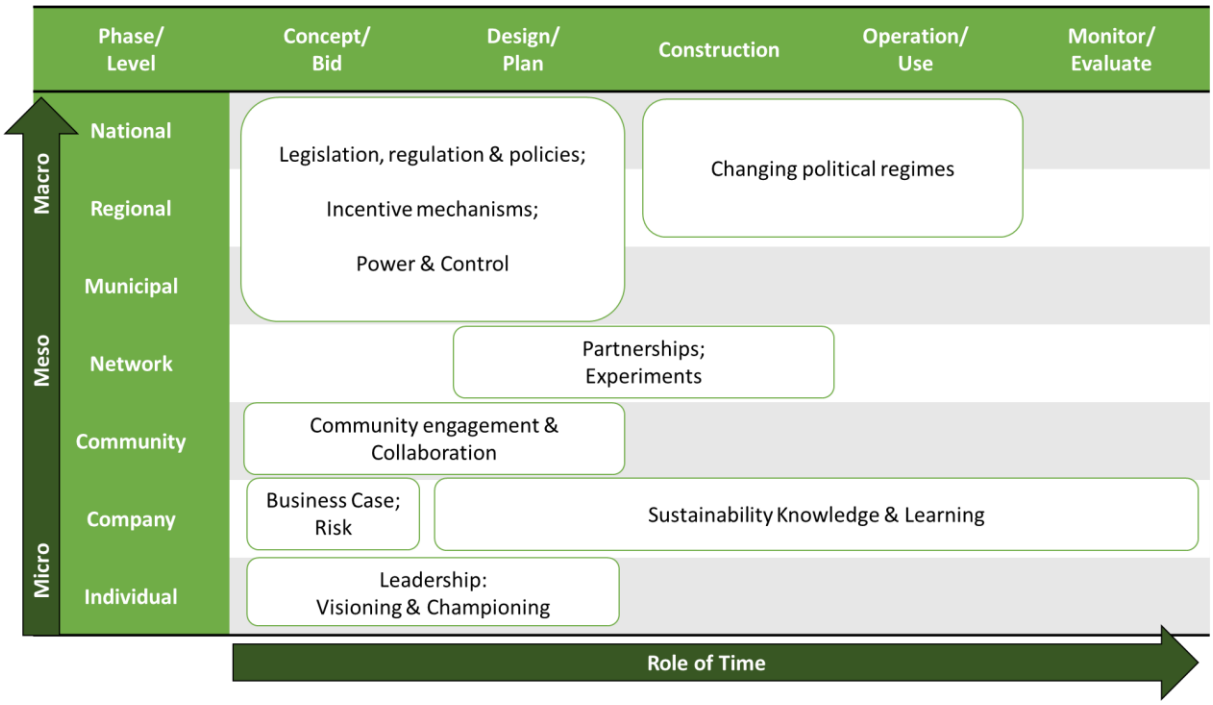
5.2. Analytical Findings

In order to synthesize the findings from the final list of peer-reviewed articles, we compiled the data from the qualitative coding process described above into an "interpretive" evidence-based synthesis (Hoon, 2013). That is, given that the vast majority of the studies in our final sample used qualitative methods, a quantitative meta-analysis that reports aggregate effect sizes was impossible. Rather, an interpretive synthesis "entails extracting and analyzing insights from primary studies to identify categories and patterns that emerge across the studies while attempting to preserve the original studies' integrity" (Hoon, 2013: p. 526). Note that while we acknowledge the important role of context - which indeed featured prominently in all of the case studies reviewed - we have deliberately chosen not to configure our analysis by geographic region, date of construction or other quantifiable study

attribute as these descriptive categories would not allow us to yield an interpretative synthesis of the role of the construction and development sector in creating sustainable neighbourhoods in general.

In building our synthesis, we first considered multiple organizing frameworks from previous studies related to the drivers of SUDs including: Ahmad et al, 2018; Bayulken & Husingh, 2015; Fastenrath & Braun, 2018; Liu et al., 2018; Martiskainen & Kivimaa, 2018; Shi et al., 2016; and, Yu et al., 2015 amongst others. However, many of these studies focused on just one element (e.g. specific legislation) and/or were at just one level of analysis (e.g. municipal government) and could therefore not be adapted directly to our research objectives given the interconnectedness found between the actors in the system. As such, in the process of constant comparison between the evidence and the literature (Gioia et al., 2013), we induced a multi-level, multi-stage model of SUD from a business perspective as illustrated in Figure 1 below.

Figure 1: A Multi-Level, Multi-Stage Model of Sustainable Urban Development



Our model identifies the different phases of the construction and development process involved in conceptualizing, designing/planning, construction, use and monitoring SUDs (Fastenrath & Braun, 2018; Martiskainen & Kivimaa, 2018). Note that many of the qualitative case studies that we reviewed were still in the design/plan or construction phase as we were explicitly looking for determinants of SUDs, hence fewer variables in the operational or monitoring phases were found. We then cross referenced these phases with the different stakeholders found to be involved in this process by level of analysis (Shi et al., 2016), with the most macro players at the top (national, regional and municipal governments) to the more micro-level constituents on the bottom (individual professionals). Our primary phenomenon of interest lay at the meso-level, where built environment companies engage with the communities they are building, including through cross-sector networks that operate at multiple levels (Clarke & MacDonald, 2019). In what follows, we detail our findings by grouping them within these three levels of analysis; our lens for the interpretive synthesis, however, remains at the level of the businesses involved in the construction and development sector (company level).

5.2.1. Macro Level: The Role of National, Regional and Municipal Governments

Unsurprisingly, within the studies reviewed, the greatest influence by far on the role of business within the process of SUD lies with governmental: a) legislation, regulation and policies, b) financial incentive mechanisms and c) power and control. We also found enough evidence regarding the significant impact of changing political regimes on sustainable urban construction that we detail our findings for this dimension separately. We aggregated our findings between the National, Regional and Municipal levels as many cases documented the inter-locking influence (Martiskainen & Kivimaa, 2019), overlapping requirements (Liu et al., 2018) and conflicts arising between competing jurisdictions (e.g., Dixon, 2008; Fastenrath & Braun, 2018; London & Cadman, 2009; Ma et al., 2018). For example, a recurring complaint from the construction and development sector was that the objectives and requirements from one level of governmental authority diverged or even contradicted the requirements of another, making the concept, design and planning phases of new developments overly time-consuming and complex (e.g., Ahmad et al., 2018; Liu et al., 2018; London & Cadman, 2009; Nielsen et al., 2019). We examine each of these governmental barriers and enablers to more SUD below.

5.2.1.1. *Legislation, Regulation & Policies*

Legislation, regulation and policies set by National, Regional and Municipal levels of government primarily served as barriers to private sector involvement in SUD (e.g. Dixon, 2008; Shi et al., 2016). In some contexts, stakeholders from the built environment sector found the 'myriad of legislation' and the 'hierarchy of assessment bodies' overly complex and the sector over-regulated in general, voicing concerns such as: "*getting development approvals is getting harder and harder…it's getting to the point where they're [government agencies] asking for more and more…more and more time consuming, more expensive – more and more documentation*" (London & Cadman, 2009). In other cases, researchers concluded that there was a complete lack of government legislation that might encourage the construction and development sector to adopt more sustainable procurement practices (Ruparathna & Hewage, 2015), design more low-carbon communities (Zhang et al., 2013) or tackle difficult brownfield redevelopments (Ahmad et al., 2018). In both scenarios, however, developers agreed that the multiple governmental constituents involved in the development or redevelopment of urban neighbourhoods rendered navigating project approval, regulatory and compliance hurdles overly bureaucratic and difficult (Dixon, 2008; London & Cadman, 2009).

With regards to the content of governmental policies, in several cases, the national building regulations were actually seen as a disappointment in that they catered to minimum sustainability requirements as opposed to real transformative changes; the nationally set targets were seen as too easy to reach and having little impact in practice and hence lacked credibility (Persson & Gronkvist, 2015). Similarly, Smedby & Neij (2013) found that even well-intentioned government-led multi-stakeholder dialogues set considerably lower targets than envisioned as consensus-seeking negotiations eliminated the most ambitious along with the least ambitious ideas (Smedby & Neij, 2013). Coupled with overly bureaucratic processes, this type of regulatory 'limiting' narrowed the sustainability impact of the planned developments, making it close to impossible to plan for communities that set higher standards (e.g. zero emissions) than national laws mandated (Dixon, 2008; Nielsen et al., 2019; Williams et al., 2017). Other studies found that regulations lacked sufficient clarity and specificity hence hindering both efficient decision-making in the design and planning process as well as efficient conflict resolution between stakeholders when rules embedded in planning instruments were interpreted subjectively (London & Cadman, 2009).

Only in rare cases did government legislation across multiple jurisdictions align to provide clear and actionable guidance for sustainable building codes (Dixon, 2008; Fastenrath & Braun, 2018; Williams, 2016). Here, case studies describe the impact of specific pieces of legislation and policy instruments (e.g. national carbon emission reduction targets; federal renewable energy laws) as sparking innovation in the construction and development sector as well as the renewable technologies sectors (Williams, 2016). In Brisbane, for example, an alignment of municipal and regional government guidelines around greener building design in the mid-2000s, coupled with leading by example through their own 'sustainable built environment policies' for the municipality's own buildings, spurred a flurry of activity in the green building sector (Fastenrath & Braun, 2018). However, even this momentum was short lived as we will discuss below.

Rather, it was more common to find construction and development companies breaking with established procedures to invent new ways forward and counter legislative gridlock. For example, in a Dutch case, the housing corporation (the contractor) had to hire its own spatial law specialists to illustrate that their more sustainable housing concept was indeed consistent with existing legislation (Woolthuis et al., 2013). An interviewee from this organization said: "*[we are] the only one that is in the position and has the power to break through the malfunctioning old system*" (Woolthuis et al., 2013). Similarly, other sustainable developers chose to bypass National regulations and look to more pan-regional sources of authority (e.g. European Union) to establish building efficiency codes that were more future-ready than national or local guidelines (Persson & Gronkvist, 2015). In yet other cases, developers had to negotiate new cross-level governmental oversight bodies to guide their sustainable developments through legislative systems that were ill-equipped to steward such forward-looking projects (Mazutis & Abolina, 2019).

This kind of policy complexity and legislative maneuvering, however, required a lot of time and resources which, for many private real estate investors, came with too much risk and uncertainty (Alkhani, 2020). Industry players have therefore, on occasion, united to form networks such as the London Energy Transformation Initiative (LETI) which gathered over 1000 built environment professionals (planners, developers, contractors, engineers, architects, housing association, academics, sustainability professionals and facilities managers) to lobby for more forward-thinking policies together (Alkhani, 2020). Similarly, local project developers, real estate agencies and housing associations have been formed with support from the municipality in order to incorporate more sustainable plans into regional development master plans (Ernst et al., 2015). However, some industry players still found that, when coupled with regulations which were constantly in a state of flux during the project time line, existing regulatory frameworks were not really well suited for 'true' cross-disciplinary collaboration and innovation (Nielson et al., 2019). More on the important role of these partnerships is described at the meso-level below.

Given this situation, in several cases we studied, we found evidence that construction companies would actually like to see more rigorous governmental policies in place to help standardize building practices. For example, built environment specialists would welcome the introduction of performance labels in energy generation technologies in line with national carbon emission reduction goals (Newton & Newman, 2015) as well as clear governmental standards for what qualifies as low-energy vs. passive vs. zero-energy buildings (Persson & Gronkvist, 2015). "*This bottom-up request for harder energy regulations from companies can be considered somewhat unique*" as conventional taken-for-granted norms suggest that top-down approaches to legislating sustainable developments are already efficient (Persson & Gronkvist, 2015) and that the built environment sector would actively resist more top-down policy instruments, weary of further restrictions and bureaucratic hurdles to development (Fastenrath & Braun, 2018).

5.2.1.2. *Incentive Mechanisms*

Given that SUD projects are generally perceived as high-risk investments, evidence supports that coupled with clear, consistent and unencumbered government regulations, economic incentives also play a significant role in building more sustainable neighbourhood or city designs and master plans (Adair et al., 2000; Alkhani, 2020; Fastenrath & Braun, 2018; Williams, 2016; Zhan et al., 2018). Financial incentives ranged from grants, to subsidies and from taxation allowances to compliance fees. For example, in the UK, a series of local financial instruments including renewable heat incentives and capital grants for low carbon buildings helped spur zero-carbon real estate developments (Williams, 2016), while municipal, regional and national budgets also included financing for a myriad of low carbon projects (Alkhani, 2020). Similarly, in Germany, various subsidies and feed-in tariffs supported the diffusion of energy efficient buildings and solar technology across the country (Williams, 2016). Political support in the form of funding has also been connected to the development of eco-cities (Yu et al., 2015), positive energy districts (Bossi et al., 2020), and innovative cross-sector partnerships in support of sustainable urban planning projects (Alkhani, 2020). In general, local grant regimes were found to increase private sector investments in urban regeneration projects (Adair et al., 2000).

Financial incentives came both in the form of carrots and sticks. Taxation allowances, for example, were a common form of financial incentive used to promote SUDs, lowering the cost of investment (e.g., Adair et al., 2000). In other cases, the public sector acting through an arms-length agency offered a guaranteed return-on-investment (ROI) top-up to larger institutional real estate investors looking to mitigate the risks associated with urban regenerations projects; if the development project proved to be financially successful, than the top-up charge wasn't levied (Adair et al., 2000). These kinds of positive financing incentives (funds, subsidies, taxation allowances, ROI top-ups) served as a type of insurance, reducing developer risk. In a much smaller number of cases, disincentives were also effectively implemented. For example, some eco-cities have imposed water use or pollution fees (Yu et al., 2015) or impact fees that developers must pay if they chose not to pursue low impact construction processes (Lu et al., 2013). Lastly, some financial incentives were a combination of both 'reward' and 'punishment'. For example, mandatory but partially reimbursable environmental audit fees, have been used to further finance environmental projects proposed by companies within the municipality (Yu et al., 2015). While the environmental audit is an expense, it opens up the opportunity to more municipal funding, a source of revenue (Yu et al., 2015).

However, not all financial incentives have been universally successful and must also be coupled with properly structured debt financing mechanisms at the company level (Adair et al., 2000). They would also be more effective if the capital budgeting plans used by banks incorporated environmental policies (Persson & Gronkvist, 2015). There was a perception amongst the development and construction sector in general, that governmental financial incentives were underused (Persson & Gronkvist, 2015). In discussing the lack of significant motivating incentives, one study concluded that: "*many investors regard the accessing of public sector funds as highly bureaucratic and time consuming, whereas the private sector is looking for simple and direct procedures. This finding suggests that current grant administration procedures may act as a disincentive in attracting private sector investment [for urban regeneration projects]"* (Adair et al., 2000).

The nature of the incentives, however, need not be purely financial. At the concept formation/biding phase of development, risk reduction measures such as land assembly powers increased private sector confidence in urban regeneration projects (Adair et al., 2000). In a study into the development of a brand new eco-city in Portugal, Carvalho & Campus (2013) outlined how one developer obtained a special designation from the federal government for their project as a 'Priority Investment' (PIN) which offered not just tax cuts, but also "tailor-made regulations" and "bureaucracy exemptions" and paved the way for the municipality to grant the developer exclusive rights to the land

at reduced prices. PIN status is granted to projects that are expected to deliver significant labour (job creation) and research (technology development) benefits to the municipality (Carvalho & Campus, 2013) and could be an effective tool in re-appraising the financial valuation of a project (Adair et al., 2000). On a smaller scale, other studies have found that private developers valued faster processing times and more influence on the final project design over reduced processing fees or other financial incentives which they considered insignificant (Nielsen et al., 2019).

Of course, there were many examples of SUD projects that were in and of themselves partially financed by governmental bodies through public-private partnerships at multiple levels (municipality & provincial) and with multiple stakeholders (future inhabitants; private enterprises) (Woolthuis et al., 2013). While engaging in this type of long-term project is challenging, participants recognized that it is an effective way to ensure the private sector of the continuity of political support for a regeneration program (Adair et al., 2000).

5.2.1.3. *Power and Control*

The regulatory and economic instruments detailed above are clearly also linked to issues of power and control. In China, were almost a quarter of our cases were situated, the government's role in conceptualizing, designing, planning, building and monitoring of eco-cities cannot be understated (Bao et al., 2014; Yu et al., 2015; Zhan et al., 2018; Zhuang et al., 2019). Described as a "top-down" and "centralized", the power and control wielded by authorities related to the Chinese eco-city movement has had paradoxical effects. On the one hand, this top down and centralized power has led to the rapid, large scale construction of de-novo eco-cities which arguably should support a more sustainable future. However, the rapid pace of the eco-village developments have also created a plethora of issues related to the overlooked rights of its citizens (Bao et al., 2014) in cases where city authorities would appropriate communally owned land as part of the power that accompanied the eco-city designation (Williams, 2017).

Local governments also wielded power by maintaining tight control over the entire construction and development process. In some situations, this power was used to prevent foreign sustainability experts from making a meaningful contribution to the eco projects when these companies were invited to participate in the conceptualization and design of new eco-cities, only to find out later that their involvement was only for window-dressing (Bao et al., 2014). In other cases, the power and control exercised was more direct. In redeveloping and industrial park into an eco-city, local authorities in Suzhou, for example, imposed numerous strict environmental regulations (e.g. mandatory energy audits; banning coal-fired boilers) that resulted in the rejection of hundreds of business licenses and the expulsion of energy-intensive and polluting companies from the district (Yu et al., 2015). As such, rapid progress towards sustainable development could be had. However, even within China, the decision making authority did not always fall with the municipal environmental departments such that national and local administrations still held more power to control (or not) environmentally important issues related to eco-city developments (Yin et al., 2016).

Outside of China, we also found evidence regarding municipal, regional and federal governments wielding significant 'positional' power to dictate priorities (Alkhani, 2020) or technologies (Gauthier & Gilomen, 2016) as well as 'coercive' power that can be exercised (or not) to propel sustainable development (Yazar et al., 2020). For example, in Istanbul, municipalities in Gaziosmanpasa were authorized to seize property to accelerate construction activity which prioritized revenue sharing arrangements between powerful parties over the region's original sustainability goals (Yazar et al., 2020). In this case, the municipality partnered with the 'development regime' (or what the researchers labelled the 'constructocracy') to implement the new local government's economic

objectives. In contrast, in London, municipal planning authorities used heavy handed energy efficient building policies as an effective tool to mandate more sustainable development in the private sector (Williams, 2016). Also in the UK, the judicial use of "compulsory purchase order" powers were considered to be useful mechanisms through which local authorities could intervene in the urban regeneration projects (Adair et al., 2000) and in France, to dictate specific energy solutions to be integrated by all of the project organizations from architects to builders (Gauthier & Gilomen, 2016).

Evidence of the detrimental effect of the opposite – the lack of power – on sustainable outcomes was also abundant in the case studies. For example, in documenting a local sustainable transition process in Sweden, Isaksson & Heikkinen (2008) found that the municipal department charged with leading the process (the Environment Department) lacked the power, resources and political mandate to initiate radical innovation. Rather, they were dependent on colleagues from other departments within the land use planning process for funding and initiative execution greatly effecting the outcome of the project (Isaksson & Heikkinen, 2018).

5.2.1.4. *Changing Political Regimes*

While in some cases, in specific times, national policies were seen as generally supportive of SUDs (e.g. the UK's zero-carbon building objectives and Brisbane's Plan for Action on Climate change, both in 2007), changing political regimes meant that building policies also changed, hence dampening sustainable construction of urban development projects with long time lines (Fastenrath & Braun, 2018; Martiskainen & Kivimaa, 2019; Williams, 2016). The impact of changing political regimes and the uncertainty that comes with inconsistent government legislation were identified as two of the key challenges for the built environment sector's involvement in delivering green or eco-cities (Newton & Newman, 2015; Nielsen et al., 2019; Yazar et al., 2020; Yin et al., 2016), brownfield redevelopments (Ahmad et al., 2018) and even cross-sector university-city sustainable urban transformation projects (Trencher et al., 2013). The introduction of new legislation and/or the reversal of previous regulations were seen as particularly disruptive when actors who come into power disregard previously established environmental objectives (Alkhani, 2020; Williams, 2016; Yazar et al., 2020; Yin et al., 2016), cut previously negotiated incentives (Fastenrath & Braun, 2018) or simply fail to uphold promises made by earlier governments (Nielsen et al., 2019). In some instances, entire governmental departments charged with coordinating renewable energy or energy efficiency programs in new (and retrofit) building projects were abolished, creating long-term detrimental consequences in the design, planning, construction and use of the built environment (Fastenrath & Braun, 2018).

Perhaps the best evidence for the role that changing political regimes have on SUD is in those rare instances when they don't occur. In the London borough of Sutton, for example, the Liberal Democrats have controlled the city council for almost 40 years, allowing for a series of 'ground-breaking' environmental policies to be enacted and implemented including the first Local Agenda 21 "Vision for a Sustainable Sutton" in 1994 through to their "Climate Action Plan" and "One Planet Sutton" plans in 2009 (Williams, 2017). These policy documents, and more importantly, the consistency of these policy documents, provide private sector actors insurance against the inherent risks and uncertainties involved in real estate development.

The above macro-level dimensions, of course, do not act in isolation and have many significant systemic connections. Importantly, Shi et al. (2016) found that removing the two most critical barriers to sustainable urban neighbourhood development - the untenable speed of urbanization and the lack of supporting government policies – from the their development model had a cascading effect on removing the rest of the barriers in the system, including real estate sector related barriers such as high capital costs and uncertainty of revenue. This critical finding illustrates the significant impact that

macro-level governmental policies, incentives, power and control have in the sustainable construction and development process.

5.2.2. Meso Level: The Role of Partnerships, Community Groups and Businesses

The meso-level of analysis included studies that examined the role of cross-sector partnerships, communities and private sector companies in the design, planning and building of SUDs. We synthesize the role of the built environment sector at each level below.

5.2.2.1. Network Level: Partnerships & Experimentation

Given the plethora of stakeholders involved in SUDs, it is not surprising that many cases around the globe have necessitated cross-sector partnerships or other kinds of voluntary networks to shepherd a development project through the many stages of concept, design, plan and build. For example, Alkhani (2020) illustrated how the ambitious Barking Riverside district in London (from brownfield site to sustainable urban mix-use development) emerged from a partnership formed by the residential developer (business) and the Mayor (government), including involvement from National Health Services (public sector). Another British development, One Brighton, was the result of a sustainability consultant (individual) brokering relationships and partnerships with City Council (government), the local community (community) and the developer (business), BioRegional (Martiskainen & Kivimaa, 2018). In the Netherlands, the Kop van Zuid project was a top-down development which involved municipal, national and business sector partners (Ernst et al., 2015). Non-governmental organizations (NGOs) and academic institutions were also involved in many cross-sector partnerships as well (e.g. Alkhani, 2020; Clarke & MacDonald, 2019; Loorback & Wijsman, 2013; Pizarro, 2015; Trencher et al., 2013; Wiktoriowicz, 2018).

Given the diversity of cross-sector partnership models found, we focused on the role of the built environment actors in the formation, participation, leadership or governance of these partnerships as well as the role of these partnerships as urban sustainability 'testing grounds'. We found that most cross-sector partnerships were either top-down initiatives, driven by municipalities (e.g. Bayulken & Husingh, 2015; Clarke & MacDonald, 2019; Ernst et al., 2015) or bottom-up, private sector-led partnerships (e.g. Carvalho & Campus, 2013; Loorback & Wijsman, 2013; Mazutis & Abolina, 2019; Williams, 2016; Wiktorowicz, 2018). The exception to this were partnerships formed to create eco-villages and similar constructs (e.g. permaculture villages) which were largely ideological endeavors initiated by a group of concerned citizens (Magnusson & Palm, 2019; Westskog et al., 2018; Woolthuis et al., 2013). In these instances, case studies profiled individual environmental or social champions and their efforts in bringing together municipal and/or provincial resources in pursuit of a sustainable development which were then co-funded by the stakeholders involved (government, private enterprises and future residents) (Woolthuis et al., 2013). The role of business enterprises in these cases were mostly transactional and hence not reviewed in detail here.

In those cases where built environment sector organizations joined municipality driven cross-sector partnerships this was done for a variety of reasons, including to build relationships, gain influence, and access business opportunities (Clarke & MacDonald, 2019). For example, although the complexity of private-public partnerships is often considered a critical barrier to sustainable urban redevelopment, it is nonetheless acknowledged as a key institutional platform through which the private sector can gain strategic profits by implementing public sector plans (Ahmad et al., 2018; Alkhani 2020; Isaksson & Heikkinen, 2018; Williams, 2016). Cross-sector partnerships also allow private sector actors to increase their visibility, build legitimacy and gain credibility by signaling that

their organization values sustainability (Alkhani, 2020; Clarke & MacDonald, 2019; McDermott et al., 2017), especially in cases where the partnership provided direct access and support of local politicians (Yin et al., 2016) or the opportunity to test new technologies at a larger scale (Bao et al., 2014). In yet other cases, built environment businesses joined partnerships for the learning and development opportunities provided (Martiskainen & Kivimaa, 2018) including the capacity to leverage the organizational skills and abilities of the various partners (McDermott et al., 2017). The partnerships offered "neutral ground" in which stakeholders could share information and build relationships (Clarke & MacDonald, 2019).

On the other hand, when private sector actors initiated cross-sector partnerships themselves, this was primarily done to spread the risks associated with sustainability experimentation (Gauthier & Gilomen, 2016; Kriese, 2009; Trencher et al., 2013; Williams, 2017). For example, in Basel, industry practitioners initiated and co-ordinated a public-private partnership (Novatlantis) with the academic sector to link researchers and scientists with businesses to test and diffuse innovative technologies that would push sustainable mobility, construction and urban development forward (Trencher et al., 2013). This organization then brokered an alliance with the local government which provided additional funding, legal and administrative assistance and to implement supporting policies to realize the project (e.g. building codes, energy policies and fiscal incentives) (Trencher et al., 2013). A similar approach was taken with the PlanIT development as described above, where international partners, with the support of the local municipality, were working together to experiment, develop and showcase green building innovations (Carvalho & Campus, 2013). In Denmark, several industries came together with shared resources to create an innovation hub with the goal of experimenting with sustainable and flexible energy systems to inform building policy and practice (Alkhani, 2020). Because urban sustainability project conceptualization, design and planning processes are so lengthy, time-consuming and resource intensive (Nielson et al., 2019), private sector involvement in cross-sector partnerships, or even joint-ventures, provides additional access to funding and reduces individual actor risk in the launching of new products, programs or entities (Clarke & MacDonald, 2019; Dixon, 2008; Trencher et al., 2013).

In time, these cross-sector partnerships in which the private sector drove experiments or pilot projects between private actors, public entities, and city councils became important pathways to more SUD (e.g. Fastenrath & Braun, 2018; Loorback & Wijsman, 2013; Trencher et al., 2013; Williams, 2017) and have successfully changed building processes and regulations (Loorback & Wijsman, 2013). For example, in Rotterdam, a successful business-led green-roof demonstration project led to new partnerships, new enterprises, new training programs, new professions (e.g. roof gardeners) and eventually new norms that have been adopted as national policy (Loorback & Wijsman, 2013). Similarly, in the UK, the zero carbon community first pioneered by private developer at BedZed, eventually led to further experimentation in zero carbon developments by municipalities in partnership with construction and energy sectors; this in turn stimulated innovations in supply chains, training and development, skills and expertise and spurred new regional, national and even international diffusion of sustainable construction (Williams, 2016 & 2017).

However, these cross-sector partnerships and experiments need to be balanced against the legislative and regulatory challenges at the macro-level described above in order to scale, otherwise construction companies failed to alter their existing development models in any meaningful way (Williams, 2016). In some cases, the partnership process itself became marred with bureaucracy, conflicting interests, a lack of transparency and trust, resulting in complete failure to move the project forward (Ernst et al., 2015). In general, when demonstration projects were not part of the long-term sustainable transition plans for a city, nor supported by national and/or regional rules and regulations, cross-sector partnerships and sustainable pilot projects were less likely to succeed (Ma et al., 2018; Martiskainen & Kivimaa, 2019; Whiteman et al., 2011; Williams, 2016).

5.2.2.2. Community Level: Community Engagement and Collaboration

Of course, many of the cross-sector partnerships described above also included members of the communities themselves. However, while we found that community engagement & collaboration were critical to the SUD process, the built environment actors were not necessarily driving this process. Rather, in many cases, municipalities initiated and lead the site concept, design and planning consultation processes; builders and developers were included as one of the many stakeholders involved (e.g., Berry & Portney, 2013; Ernst et al., 2015; Smedby & Neij, 2013; Williams, 2016).

Many different forms of community consultation processes were documented across the case studies reviewed including: networking events, guided dialogue sessions, collective brainstorming sessions, public meetings or hearings, town halls, citizen advisory group or task force working group meeting, visioning workshops, study visits, external guest lectures, design charrettes, focused training and development sessions and even 'eco days' or 'green day's that created fun ways to learn about a project's energy saving or sustainable construction methods (e.g., Borstorm, 2014; Clarke & Macdonald, 2019; Dixon, 2008; Kriese, 2009; Martiskainen & Kivimaa, 2018; Mazutis & Abolina, 2019; McDermott et al., 2017; Pizarro, 2015; Smedby & Neij, 2013; Trencher, 2013; Trudeau, 2018; Wiktorowicz, 2018). McDermott et al., (2017) categorized the plethora of community engagement mechanisms available as "process-based mobilizing structures" which are designed to encourage dialogue, establish stakeholder roles, initiate agreement, build understanding, deal with conflict or power imbalances and facilitate group decision-making. Importantly, these processes were seen to be very different than one-way information sharing meetings alone which were less effective at achieving participatory community engagement and knowledge transfer (McDermott et al., 2017; Nielsen et al., 2019).

Most developers of sustainable neighbourhoods considered early and frequent consultation with the local community critical to the success of a project (Dixon, 2006 & 2008; Mazutis & Abolina, 2019; Wiktorowicz, 2018). In several cases, especially those development projects utilizing the guiding One Planet Living (OPL) framework, the developer-community relationship involved multi-faceted, multi-stakeholder, multi-year engagement processes designed to create open forums for community input, engagement and involvement (Mazutis & Abolina, 2019; Wiktorowicz, 2018; Williams, 2016 & 2017). As a result, these cases surfaced innovative partnerships with local not for profits such as public housing providers (Wiktorowicz, 2018) or indigenous groups (Mazutis & Abolina, 2019) that strengthened the social side of sustainable development over and above the environmental one. For built environment businesses, being part of the community consultations led to more influence in the execution of municipal sustainability plans (Clarke & Macdonald, 2019) while leading these processes helped ensure that builders' sustainable design vision, assembled with community collaboration, carried through over the long time horizons involved in neighbourhood development projects (Mazutis & Abolina, 2019). In summary, well managed community engagement processes, centered around collaboration, are critical to the SUD process (Bossi et al., 2020; Trudeau, 2018; Woolthuis et al., 2013).

5.2.2.3. Business Level

At the business level, we've aggregated the findings into two principle dimensions: a) the business case and risk assessment processes; and, b) the role of sustainability knowledge and learning across the built environment value chain.

5.2.2.3.1. The Business Case & Risk

The inherent uncertainties and risks involved with a SUD project, from assembling land rights to obtaining planning permission and successfully implementing the project, means that the private sector must have a solid business case to support the perception of high risk/low returns (Adair et al., 2000; Dixon et al., 2007; Newton & Newman, 2015; Zhang et al., 2013). Many studies argued that the lack of interest in SUD stemmed from real estate developers who were only interested in maximizing short-term economic interests (e.g. Bugul et al, 2012; Dixon, 2008; Fastenrath & Braun, 2018; Hebb et al., 2010; Shi et al., 2016; Yazar et al., 2020; Zhang et al., 2013; Zhuang et al., 2019). Given the large upfront costs of sustainable developments, coupled with slow investment recovery, rational developers would choose to invest and build a 'traditional' commercial residential community rather than a low-carbon urban one (Zhang et al., 2013). In fact, to counter this risks, real estate developers may seek returns that are *in excess* of those that could be achieved through non-urban non-sustainable regeneration projects: "*The rules of the market inevitably encourage developers to go to the least difficult sites*" (Adair et al., 2000).

Perceptions regarding the business case and risk assessment related to the cost/benefit of the project originates from multiple issues. First, there is a general perception that there is a lack of demand for more sustainable developments limiting revenue generation opportunities (Fastenrath & Braun, 2018; Newton & Newman, 2015; Nielsen et al. 2019; Williams, 2017) and that the benefits of sustainable neighbourhoods are intangible, difficult to measure and hence monetize (Shi et al., 2016). Second, there is the perception that designing and building more sustainable districts is more expensive or labour intensive - whether it is introducing waste-recycling mechanisms at the neighbourhood scale or implementing an environmental sustainability auditing processes - every sustainability initiative requires additional financial, human or operational resources (Ruparathna & Hewage, 2015; Shi et al., 2016). Importantly, there is also the perception that the deliberation, planning and consensus processes around environmental governance issues can significantly delay project timelines and hence affect payback periods (Adair et al., 2000; London & Cadman, 2009; Nielsen et al., 2019; Shi et al., 2016; Smedby & Neij, 2013) especially in cases where existing bidding processes do not mandate social and/or environmental criteria in their evaluation processes (Ruparathna & Hewage, 2015; Williams, 2017).

However, other investors, developers and planners have been able to justify the "extra" costs involved in sustainable construction in a myriad of different ways. For example, sustainable buildings can extract higher rents and lower total running costs while providing a more attractive and more marketable living environment (Dixon, 2008), as well as healthier work environments that reduce sick-leave and increase productivity (Woolthuis et al., 2013). 'Pre-letting' schemes can also be used to generate demand and hence, cash, prior to construction (Adair et al., 2000). Other built environment businesses have recognized that there are monetary savings to be had with sustainable design in the form of either reduced expenses in line items such as materials or landfill taxes (Alwan et al., 2017) or in cost savings due to new technology and equipment (Clarke & Macdonald, 2019). Others still have recognized that there are costs associated with *ignoring* environmental or social considerations when investing in real estate development projects (Hebb et al., 2010).

Forward-looking built environment businesses also perceived standardization and certification processes as one mechanism or tool that had the potential to reduce risk and bolster the business case for sustainable design. For example, Woolthuis et al. (2013) documented a case where innovative companies gained competitive advantage by actively influencing and setting standards gaining valuable knowledge that made it difficult for other players to catch up. In developing economies, international certification schemes and labels are used to market services (Yu et al., 2015) and contribute prestige to projects which are being exploited for higher rents (Shi et al., 2016; Yazar et al.,

2020). Industry-developed certification systems in particular were found to be a key driver for the construction and development industry to adopt more sustainable practices (Fastenrath & Braun, 2018). For example, Fastenrath & Braun (2018) found that developers reacted very positively to the introduction of the 'GreenStar' certification system in Australia which provided clear guidance with regards to multiple sustainability parameters and that allowed developers to market their properties as 'premium buildings' that reduced vacancies and generated higher rates of return on investment. Rather than being a bureaucratic, top-down government legislated policy, the voluntary 'GreenStar' rating program was developed with support of the property industry first through the Australia Green Building Council and then the Property Council of Australia which linked its property rating processes to the new certification system (Fastenrath & Braun, 2018).

Therefore, several studies suggested the need to correct the misconception that sustainable build projects are de facto more expensive (Bugul et al., 2012; Persson & Gronkvist, 2015). "Pockets of value", with the potential to produce above normal profit levels, can be identified (Adair et al., 2000), especially in relation to the risk-sharing benefits of cross-sector partnerships described above (Dixon, 2008).

5.2.2.3.2. Sustainability Knowledge and Learning

The construction and development industry has been described as notoriously slow to innovate, specifically as it relates to incorporating sustainability principles throughout the development process (Martinaro & Liu, 2017; Persson & Gronkvist, 2015; Ruparathna & Hewage, 2015). This has been attributed partially to the lack of knowledge within the sector about sustainable building design, construction and financing (Dixon et al., 2007; Persson & Gronkvist, 2015) which is most pronounced on the construction end of the design, plan build continuum (Newton & Newman, 2015). Design firms, on the other hand, are significantly more advanced in incorporating sustainability objectives into their plans given that at this phase of the project the "*sustainable innovation potential is highest, with capacity to eventually impact all parts of a building or construction project*" (Newton & Newman, 2015). Architects and engineers were found to be able to be more visionary (Bao et al., 2014) and flexible with their conceptual designs (Gauthier & Gilomen, 2016) and thus best positioned to drive more ambitions sustainability objectives (Rapson et al., 2007). As such, developers acknowledged that the building design phase was the most important phase in which to consider the potential impacts of sustainability issues such as climate change (Dixon, 2006).

Unfortunately, the lack of knowledge and lack of expertise were cited as the two most important barriers to sustainable urban regeneration (Dixon et al., 2007). Several studies suggested that there was a lack of training and education in relevant environmental building techniques (e.g., Dixon et al., 2007; Persson & Gronkvist, 2015) and that greater guidance regarding the sustainability impacts of construction and development were required (Always et al., 2017; Dixon et al., 2007). However, in other cases, the sheer volume of knowledge required to keep up with the changing sustainable building guidelines, policies and regulations was seen as a barrier to sustainable urban design and a burden on continuing professional education programs (Dixon et al., 2007; London & Cadman, 2009; Nielsen et al., 2019); keeping up with all of the technological advances in sustainable construction was also seen as a challenge (Persson & Gronkvist, 2015) although green technology itself was perceived to be relatively easy to acquire (Newton & Newman, 2015). Here, the academic sector was seen to have the capability (although not the incentive structures) to bridge the gap between industry practice and a more holistic understanding of sustainability (Alwan et al., 2017) or to facilitate living labs where the sector could learn to innovate together (Wiktorowicz, 2018).

Studies also suggested that there was a lack of information, methods and tools (e.g. life cycle analysis) available to guide sustainable construction processes (Ruparathna & Hewage, 2015). In some cases, this was the result of a lack of knowledge amongst the macro-level stakeholders such as municipal governments where the awareness and understanding of the importance of environmental considerations in construction had yet to materialize (Ahmad et al., 2018; Yin et al., 2016) or become integrated into planning processes in any systematic manner (Williams, 2017). In other cases, it was a lack of knowledge transfer down the value chain from the design team to the implementation team, with ambitious sustainability targets getting watered-down as construction neared (Isaksson & Heikkinen, 2018; Neilsen et al., 2019). As such, there was a sense that design professionals needed to engage more and more in sustainability education and training down the value chain as well because: "*Behind every good project is an educated client*" (Alwan et al., 2017).

The above lack of knowledge, training & development eventually resulted in lack of sustainable building experience which reinforced the cycle of innovation inertia. Sadly, while previous experience was considered a critical lever in propelling change within the sector, contractors were rarely asked for their experience in sustainable construction when bidding on urban development projects (Ruparathna & Hewage, 2015). Even within cross-sector partnerships that were forged to create knowledge transfer between actors in the built environment sector, collaboration and communications challenges remained. Proper knowledge sharing between business units or across organizations in the supply chain, for example, were found lacking (Martinaro & Liu, 2017; Whiteman et al., 2011). Studies showed a distinct need for more systemic planning from design to demolition, as opposed to treating knowledge about sustainability issues like energy efficiency and pollution separately (Alwan et al., 2017). To counter this lack of knowledge, increased training, development and education in environmental building practices was identified as one of the key levers to influence developers (Alwan et al., 2017; Smedby & Neij, 2013).

Despite this pessimistic outlook, we found evidence that many forward-looking developers did in fact embrace a learning approach. For example, in some cases, developers orchestrated learning trips to other communities, sustainable developments and regeneration projects that were already integrating renewable energy sources or low carbon options into their design plans (Dixon, 2008; Martiskainen & Kivimaa, 2018; Mazutis & Abolina, 2019). In others, construction companies made large investments in educating their workers on sustainable building techniques (London & Cadman, 2009; Persson & Gronkvist, 2015). Occasionally, a developer would hire a 'sustainability integrator' whose job it was to ensure that sustainability criteria were met at all stages of the construction process, educating project participants, translating and implementing sustainability learning as well as promoting and facilitating a culture of sustainability throughout the project (Martiskainen & Kivimaa, 2018). In those instances where the most sustainable path forward was not available, innovative developers created their own opportunities through investments in research and development (Mazutis & Abolina, 2019).

Other forward-looking developers/contractors sought out external knowledge creating teams of experts to guide the projects that included: architects, engineers, architecture students, building specialists, certification assessors, academics, suppliers, manufacturers and fabricators (Alwan et al., 2017) occasionally sending these teams on training and development courses together (Persson & Gronkvist, 2015). In Malmö, for example, "*the knowledge exchange within the diverse building developer group constituted a very important outcome of the programme where building developers new to sustainable construction could learn a lot from the more experienced ones*" (Smedby & Neij, 2013). These types of innovative knowledge sharing business models required organizations to develop new skill-sets to create value from within the process where technological skills existed but were not necessarily organized to be exploited (Gauthier & Gilomen, 2016).

By engaging in these learning activities, built environment businesses committed to continuous learning, training and development where lessons from previous projects were analyzed, refined and incorporated into the next job thereby flattening the very steep learning curve associated with sustainable builds (Persson & Gronkvist, 2015). Once educated, sustainability practitioners took on the role of passing on their knowledge to others in the organization as well as gathering feedback in situ to continuously improve processes (Persson & Gronkivst, 2015). Several developers continued to be involved in learning and knowledge sharing activities post-construction by integrating monitoring and auditing processes within their portfolio of activities (Martiskainen & Kivimaa, 2018; Mazutis & Abolina, 2019; Wiktoriwicz, 2018). Because of these knowledge and relational resources, private sector entrepreneurs became more successful in influencing the urban planning process (Isaksson & Heikkinen, 2018).

In this manner, there was quite a bit of evidence that early movers from the built environment sector gained competitive advantages related to knowledge and expertise. Woolthuis et al. (2013), for example, described how key players turned their knowledge of sustainable construction into opportunities to train and educate others in the sector (e.g. suppliers, installers) on more sustainable solutions, opening up new revenue streams. After the successful learning pilot of BedZed in London, the developer Bioregional created the One Planet Living framework (a strategic decision-making tool) and spun-off a design tool called the Zed Design System (ZDS) (a carbon footprint calculator) that are now being used to master-plan sustainable villages and cities around the world (Martiskainen & Kivimaa, 2018; Williams, 2017). Within the UK, BedZed was the inspiration for the voluntary BREEAM Code for sustainable homes as well as the mandatory zero carbon target for all new homes (Williams, 2016), placing Bioregional at a competitive advantage.

5.2.3. Micro Level: The Role of Individuals

A small group of case studies examined the role of individual professionals or members of the built community sector in driving SUD projects. For example, Tabassi et al, (2016) examined individual leadership traits and behaviours, finding that a project manager's intellectual competence, skill and knowledge are most important to the sustainability of construction projects (in line with knowledge and learning section above). However, we found that the majority of the micro-level findings focused specifically on the critical leadership roles of visioning and championing which we group under the leadership dimension and explore below.

5.2.3.1. *Leadership: Visioning & Championing*

Given that most construction and development companies do not report on their sustainability goals, direct statements regarding the importance of environmental considerations in urban development projects from private sector CEOs are scarce (Ionascu et al., 2020). However, several case studies documented the critical role individual innovative developers and other built environment sector companies had in championing visionary projects through the concept/bid, design/plan and construction phases (e.g. Martiskainen & Kivimaa, 2018; Mazutis & Abolina, 2019). For example, Mazutis & Abolina (2019) documented the 'hard work of leadership' from the Windmill Development Group which included five critical leadership tasks: 1) inspirational work, 2) integrative work, 3) identity work, 4) implementation work and 5) institutional work. The first, inspirational work, related to creating and co-creating a sustainable vision for the Zibi development project in Canada. This vision then required championing through multiple jurisdictional (municipal, provincial and federal), cultural (aboriginal land rights) and environmental (brownfield site remediation) minefields in pursuit of

developing Canada's most sustainable neighbourhood (Mazutis & Abolina, 2019). Similarly, in the case of the One Brighton development in England, the visioning and championing role was first played by a sustainability consultant who brought together key actors and brokered important relationships; the visioning and championing role was then carried forward through the design and planning process by the CEO of the development company (Martiskainen & Kivimaa, 2018).

Within the concept and bidding phases, entrepreneurial individuals were able to frame their visions for SUDs by appealing to different aspects of sustainability from simply 'doing things differently' to more conceptual future-oriented design philosophies (Bao et al., 2014; Isaksson & Heikkinen, 2018) including 'Cradle to Cradle' (C2C) (Woolthuis et al., 2013) or One Planet Living (OPL) frameworks (Mazutis & Abolina, 2019; Wiktorowicz, 2018). Organizations using C2C design tools believed that all materials used in a project should be selected so that they can either be returned to suppliers, re-cycled or used as an input to other parts of the value chain (Woolthuis et al., 2013), while OPL principles are built around living well within the earth's carrying capacity (Mazutis & Abolina, 2019). Sustainability champions overall endorsed more multi-pillar social and environmental goals than less visionary individuals (Alexandrescu et al., 2106). Importantly, while the framing and visioning tasks involved educating stakeholders about the social/environmental issues (McDermott et al., 2017), it was important that the visions developed around positive emotions (e.g. rooted in place, peace, health) or contributing to solving important societal challenges (Loorback & Wijsman, 2013; Trencher, 2013; Trudeau, 2018), as opposed negative reasoning such as countering environmental degradation (Woolthuis et al., 2013) or accommodating homelessness (Borstorm, 2014; Trudeau, 2018). Visions would therefore often highlight ideal futures where stakeholder motivations and objectives overlapped in win-win scenarios (McDermott et al., 2017).

Visioning, of course, was insufficient in and of itself (Bao et al., 2014); individual professionals involved in the built environment sector often needed to champion their visions up across levels throughout the concept, design and planning phases of sustainable projects (Carvalho & Campos, 2013; Martiskainen & Kivimaa, 2018; Mazutis & Abolina, 2019; Whiteman et al., 2011; Woolthuis et al., 2013; Yin et al., 2016). Woolthuis et al. (2013), for example, found across several cases, that a direct developer - municipal councillor relationship was necessary to facilitate the approval of sustainable development projects as well as helped unlock other important support from the civil sector (e.g. permitting, safety monitoring). Similarly, Carvalho & Campos (2013) demonstrated how one particular entrepreneur championed his project to garner the support of local authorities in the creation of a de-novo u-eco city pilot. In some cases, champions had to push their visions beyond existing legislation to invent new business practices (Mazutis & Abolina, 2019; Woolthuis et al., 2013). Individual commitment to more sustainable outcomes was therefore found to be a critical driver of more sustainable development (Persson & Gronkvist, 2015). Importantly, however, individuals championing their projects needed to be able to embed and institutionalize their environmental visions in order to ensure the strong sustainability visions did not dissipate with time (Mazutis & Abolina, 2019; Whiteman et al., 2011).

5.3. Discussion: The Paradoxical Role Of Scale and Time

We have presented our multi-level, multi-staged findings above across different scales (from micro to macro) and across time (from the project conception to construction, use and monitoring). As evidenced by the findings, both the scale and the time involved in sustainable construction and development projects are therefore critical dimensions underpinning the role of the private sector in driving SUD projects (over and above context). While we have classified our findings across these different scales in the previous section, the positioning of the role of the business sector itself as both

passive recipients of top-down policies and active champions of bottom-up change, nonetheless itself presents an interesting paradox. Similarly, while we have documented the negative effects of time at a macro level in discussing changing political regimes, we found that effect of time on the relationship between the private sector and SUDs is more pervasive and has been identified in and of itself as a key challenge in many studies (e.g. Adair et al., 2000; Nielsen et al., 2019; Shi et al., 2016). The role of both scale and time in SUD thus presents some interesting dilemmas which we explore below.

5.3.1. The Role of Scale

As meso-level actors within sustainable transformation processes, businesses within the built environment sector are caught between being recipients of (largely inefficient) top-down legislative policies while also expected to be bottom-up agents of change despite a lack of market demand; these conflicting pressures contribute to the general level of inertia in adopting sustainable urban construction and development practices. Many studies in our review described this situation as a failure of the business sector rather than as a failure of the governmental sector (e.g. Rapson et al., 2007), depicting community activism against developers (London & Cadman, 2009), calling business driven SUDs a 'weaker form of governance' (Bayulken & Husingh, 2015) or labeling real estate developers themselves as the cause of a 'systemic pathology' within the sector (Turner, 2017). Fischer and Newig (2016) describe the role of innovative firms within this sector as outsiders to the development regime with limited agency. This presents a dilemma in that the business sector is both seen as the cause of un-sustainable development, but also, paradoxically and simultaneously, its solution. As one study concluded:

> *"In light of all stakeholder perspectives and interests in the residential building sector, the situation must be interpreted as a dilemma. Even though experts and stakeholders widely agree that the residential building sector is lagging behind and sustainability transitions are required, both policy makers and industry actors resist innovative forms of building regulation and planning approaches. The situation can be understood as an industry-policy lock-in: both sides identified the other side as the one responsible for driving sustainability forward. The debates about transitioning the residential building sector are dominated by the discussion on whether the sector needs to be driven by a regulatory push or by industry-driven demonstration projects."* (Fastenrath & Braun 2018)

Turner (2017) called the failure of real estate developers to adopt alternative, more sustainable forms of development as a "rigidity trap" where "*norms of practice within the real estate development industry combine with market and regulatory factors to favor existing practices and limit innovation"*. Others described this macro-meso scale finger-pointing as the 'circle' or 'cycle' of blame (Alexandrescu et al, 2016; Dixon, 2006; Rapson et al., 2017). The 'circle of blame' is a phenomenon where developers claim that they would build SUDs, but that investors won't fund them. In turn, investors claim they would fund SUDs, but there is no demand, while consumers claim they would like more sustainable buildings but there is little selection, and construction companies claim they would build more sustainable neighbourhoods but that developers don't ask for them. This creates a perpetual 'circle of blame' that maintains a state of inertia within the sector when it comes to sustainable development (Alexandrescu et al, 2016; Dixon, 2006; Rapson et al., 2017).

This cycle of inertia is also illustrative of the role of power and control as detailed in section 5.2.1.3 above, but at the meso-level. Having found in our review that it is the architects and the

designers at the front end of the construction and development value chain who show the most promise in terms of incorporating sustainable design principles (in combination with the clean/green technology-driven entrepreneurs not studied), this group nonetheless is not part of the development sector 'power-base' (Rapson et al., 2007). This group is thus paradoxically in the best position, yet unable, to effectively influence this cycle of inertia - resulting in long term sustainability implications for the structures and urban environments built today (Sev, 2009).

Importantly, many studies also supported the notion that the public sector as a whole has yet to reach the tipping point in terms of demand for sustainable developments which is also hindering progress (Ahmad et al., 2019; Liu et al., 2018; Newton & Newman, 2015). For example, in a study of critical success factors for eco-city developments, Liu et al, (2018) found that residents' behaviour and awareness of environmental protection is low and hence support from the market for sustainable development is also low. This group also has a significant amount of power in this relationship by keeping demand low, further contributing to a glacial adoption of more sustainable building practices in the development sector. As such, despite the clear segmentation of drivers of SUDs by scale within this review, the paradoxical role of scale, where construction and development companies are caught between fighting top down, inconsistent, bureaucratic and cumbersome legislation while at the same time fighting a lack of demand driven forces cannot be underestimated. Forward-looking builders and developers are hence, indeed, rare.

5.3.2. The Role of Time

From the conceptual stage to securing land rights, financing, designing, planning, building, selling and monitoring stages, SUDs are a time-consuming and complex process; the period from concept to completion can be anywhere from ten to thirty years (Magnusson & Palm, 2019), with private actor financing tied up for at a large part of this time (Adair et al., 2000). Coupled with the inherent pressures to build on time and on budget (London & Cadman, 2009), the long duration of these projects render sustainable neighbourhood development fraught with uncertainty, at the mercy of shifting spheres of influence and characterized by a lack of controllability (Shi et al., 2016). Paradoxically, the only thing that is certain, is that before completion, built environment actors can expect revisions in policies, regulations and legislation that will in turn require revisions to the project that will undoubtedly add additional costs and effect execution timelines (Shi et al., 2016). Given the lack of training in this sector described above, many developers are not well placed to take on this level of volatility, uncertainty and risk (Shi et al., 2016). Patient capital is elusive, yet required (Trudeau, 2018).

Many macro-level actors are also ill-equipped to lead transformational sustainability projects given their own short histories of tackling social and environmental issues in the built environment (Yin et al., 2016). The impetus for change is particularly problematic where professional norms are deep-rooted (e.g. established, traditional, siloed, sectoral, technical requirements), (Turner, 2017), rendering systemic cross-sector sustainability solutions more difficult (Yin et al., 2016). Committing to pilot projects or sustainability experiments as part of the planning and development process are paradoxically both the most efficient way to make progress, but also perceived as adding to already lengthy build cycles (Nielsen et al., 2019). In addition, the time lapses between experimentation and the implementation of support structures to enable new SUDs effectively prevents efficiency in scaling up processes (Williams, 2016).

Over and above macro-level barriers, extensive stakeholder and community engagement processes as the meso-level not only add to project timelines as described in the previous section, but are also peppered with issues relating to changing constituencies; "*During a project planning timeline,*

the citizen participation is not a static entity. Who participates, both from implementing stakeholders and citizens, can change over time. There is more support for a project at the beginning and that this changes as the project becomes closer to realization. Time also influences what type of insights are available through participatory approaches" (Nielsen et al., 2019). The changing role of stakeholders involved, and the persistent need for consensus and compromise, also leads to a watering down of the social and environmental goals of projects over time (Isaksson & Heikkinen, 2018; Magnusson & Palm, 2019). Paradoxically, despite this uncertainty, stakeholders acknowledged that spending additional time in consultation processes at the beginning of the planning process is essential, as this saved time later on in the project through shortened administration time and fewer appeals (Smedby & Neij, 2013).

Perhaps the greatest paradox is that time itself will dictate whether or not the forward-looking construction and development organizations described herein were actually in the end, forward-looking. That is, SUD is in and of itself a moving target in that "*what we see as a 'success' today, could be viewed in a few years as a failure*" (Ernst et al., 2015). There is a danger that even the most sustainable developments will get knocked down again in 30 years because they are no long considered sustainable enough, thus contributing to the very problem they are trying to solve (Dixon, 2008). Longitudinal, cross-level, continuous research into the role of the built environment sector and SUDs is therefore warranted.

6. IMPLICATIONS

Of course, our multi-level, multi-stage model of sustainable urban development is not meant to be an exhaustive mapping of all existing evidence of the role of the private sector in sustainable urban development, but rather a comprehensive overview of the state of knowledge that can inform both policy and practice, as well as spur further academic research in this domain. We discuss the implications of our findings for policy, practice and research below.

6.1. Implications for Policy

Similar to other studies, we find that a harmonization of legislation, regulation and policies set by national, regional, and or municipal levels of government is the greatest lever in accelerating private sector involvement in sustainable urban development projects (Ahmad et al., 2018; Alkhani, 2020; Fastenrath & Braun, 2018; Newton & Newman, 2015; Shi et al., 2016; WEF, 2016; Yu et al., 2015). Having more clear and rigorous governmental policies in place, along with performance labels in line with national carbon emission reduction goals has the potential to encourage the construction and development sector to adopt more sustainable procurement practices and standardize sustainable building practices. This includes a standardization and harmonization of certification systems and building performance labels, including the administration of these certification programs, across levels of government. Importantly, these sustainability requirements should focus on narratives built around positive futures and avoid a consensus seeking race to minimally beneficial building codes and neighbourhood designs (Loorback & Wijsman, 2013).

Governmental financial (e.g., grants, subsidies, taxation allowances) and other incentives (e.g. simplified permitting processes) are also useful levers to encourage private sector participation in SUDs by bolstering the business case for sustainable development and/or mitigating the perceived risks of more sustainable construction (Adair et al., 2000; Bayulken & Husingh, 2015; Fastenrath & Braun, 2018; Newton & Newman, 2015). These incentives can work to equalize or even neutralize the large upfront costs of SUDs with their inherent long term environmental and social benefits by

rendering the Return on Investment (ROI) of SUD projects similar to, or better than, non-SUD builds. Incorporating requirements for sustainable procurement in public procurement practices and/or mandatory reporting on sustainable practices in municipal bidding processes could also help stimulate private sector involvement in greener community builds (Ruparathna & Hewage, 2015). These requirements should be aligned with federal/ministerial mandates, federal budgets and programs relating to infrastructure/construction/job creation that's innovative, sustainable and circular to help reach Paris agreement targets.

Lastly, given the long time frames involved in SUD projects, governments have a role to play in guaranteeing the continuation of policies and regulations beyond their current mandates (Alkhani, 2020). The volatility of changing legislation that accompanies changes in political regimes, coupled with conflicts between local, regional and federal guidelines, have been identified as key barriers to increased private sector participation in sustainable build projects (e.g., Ahmad et al., 2019). Municipal participation in cross-sector partnerships around sustainability goals must be accompanied by some type of guaranteed commitment to these collaborative process for the municipalities' long-term urban sustainability transitions plans (e.g., Alkhani, 2020; Bayulken & Husingh, 2015). Encouraged by governmental green stimulus funds (Trencher et al., 2103), several studies suggested that cross-sector partnerships (Clarke & MacDonald, 2019), temporary local administrative organizations (e.g. Yin et al., 2016) or academic institutions could play this bridging role to counter the paradoxical issues of scale and time that accompany SUDs (e.g. Fastenrath & Braun, 2018; Weisenfeld & Hauerwass, 2018).

6.2. Implications for Practice

As one interviewee from the property industry is quoted as saying "*A sustainable development is a mixture of regulation, guidance and best practice, and developer's response and leading the way. You won't achieve a sustainable patterned development unless the development industry brings it forward themselves, because they are the guys who build*" (Dixon, 2008). The implications for the building sector of this review are thus direct in terms of collaborating with macro-level governmental actors, within and across network and community levels as well as individually visioning and championing more sustainable neighbourhoods to lead the way.

Many of the articles reviewed herein included long lists of recommendations for developers ranging from the simple incorporation of more sustainable construction methods in both the design and building of projects to measuring sustainability components across the project life cycle (Dixon, 2008; Liu et al., 2018; Newton & Newman, 2015; Sev, 2009). The built environment sector is also expected to create pilot demonstration projects and experiments to test new business models and building practices (Bayulken & Huisingh, 2015; Loorback & Wijsman, 2013). These can then be used to better document the business case and financial sustainability of SUD projects (Newton & Newman, 2015) that can be scaled to increase both demand and supply of green products and services within the construction and development value chain (Ahmad et al., 2019). Institutional investors also have a critical role to play in terms of insisting on, and integrating, sustainability criteria into their real estate portfolios (Hebb et al., 2010).

However, this review surfaced an additional critical barrier to more sustainable construction and development which is the general lack of expertise and knowledge within the construction industry to achieve sustainability goals (Dixon et al., 2007). Increasing training and education in relevant environmental building techniques as well as providing greater guidance regarding the sustainability impacts of construction and development is therefore required (Alkhani, 2020). This key driver can certainly be aided by governmental incentives but must also be promoted and encouraged at a sectoral

level by industry associations and individual businesses within the built environment system (London et al., 2009; Ruparathna & Hewage, 2015; WEF, 2016). Improving knowledge of specific methods and tools such as passive design principles, life cycle analysis and circular economy principles would help foster a greater understanding of how environmental building practices, from design to demolition, need to work together in pursuit of more sustainable development (as opposed to a technologically siloed solutions approach) (Alkhani, 2020; Alwan et al., 2017; Bayulken & Huisingh, 2015; Sev, 2009). Cross-industry collaboration along the value chain, accompanied by an industry-wide commitment to harmonized sustainability standards, would propel a sustainability transformation in the sector.

Individual businesses (developers, contractors, planners, etc.) can also commit to the increased training and education of their employees, data and knowledge sharing between value chain players, and learning from best practices globally. Effective communication of sustainability goals between businesses and municipalities and between different units within organizations is required to develop innovative systemic solutions to urban climate issues (Whiteman et al., 2011). Importantly, tackling perceptions regarding the business case and risk associated with SUD must occur (Neweton & Newman, 2015); more visionary business sector leaders willing to champion sustainable developments despite the barriers documented herein are thus required (Martiskainen & Kivimaa, 2018).

6.3. Implications for Research

As one of the first studies to explicitly examine the role of the construction and development sector on SUDs, this synthesis offers a direct and unique contribution to the sustainability literature. While management scholars have long been interested in why and how organizations engage in, and integrate, corporate sustainability into their business practices (e.g. Bansal & Song, 2017), it is surprising that so few empirical studies exist into the sustainability practices of businesses that belong to the built environment sector. This is even more surprising given the central role that construction and development organizations have in not only responding to pressing issues such as climate change today, but also in shaping how neighbourhoods, districts and cities respond to these issues in the future (IPCC, 2018; UN-EIEA, 2017). Our study thus answers the call for sustainability scholars to go beyond exploring internal organizational antecedents to variances in corporate sustainability, to understanding how and why some firm's chose to pursue sustainability agendas that have a greater impact on larger scale systems (George et al., 2016; Waddock et al., 2015; Whiteman et al., 2013). More research from a business perspective, however, is greatly warranted, especially where the business sector is considered explicitly as an agentic actor in sustainable urban transition processes (STRN, 2019).

As observed in our Descriptive Findings, research in this domain is very new and developing rapidly (See Table 3 in the Appendix). As this body of knowledge grows, there will also be the need to build more in-depth case studies of 'successful' and 'unsuccessful' SUDs, especially in Canada, as well for more quantitative studies in this domain. Note that our original systematic review found an abundance of studies that measured the outcomes of sustainable cities (e.g. tracking city level GHG emissions) which were excluded from this review given our focus on drivers or determinants of SUDs. Our findings thus support additional research focus on the antecedents (vs. the outcomes) of sustainable communities and like constructs, including a greater understanding of planning practices (Malekapour et al., 2016) as well as the measurement of city-level input and process indicators which are currently underutilized (Huovila et al., 2019). It also supports an eventual call for consolidation and construct clarity pertaining to the dependent variable such that future reviews can more precisely separate the effects of independent variables on specific dependent variables (e.g. sustainable communities vs. green cities) (Bottero et al., 2019; de Jong et al., 2015).

As with all studies, however, ours is not without its limitations. First, despite using a combination of both systematic and narrative review methodologies to cast a broad nomological net, it is possible that we nonetheless missed important case studies given that we focused only on published, peer-reviewed articles (vs. conference presentations, book chapters or grey literature). Future research could build on this review and look to other sources for additional case studies on innovative business-led SUDs. In addition, we examined only those articles where the role of the business sector was explicit; the vast majority of the literature in this domain treated real estate developers and other businesses in this industry as non-agentic. As such, ours is an interpretive synthesis from a very specific, management point of view and a closer examination of literature where built environment actors are included less explicitly could yield additional insights into the barriers and enablers of SUDs from a business perspective.

Second, we deliberately chose to de-contextualize our findings which could be seen as both a strength as well as a weakness of the model derived herein in that we have traded specificity for generalizability. For example, we do not make any comments regarding the differences across cases in and within Europe, Asia or North America. Rather, we chose to focus on common factors across case studies. Similarly, our review surfaced very specific articles that could not be generalized. For example, we found a small number of studies pertaining to financing SUDs in specific jurisdictions which could hold interesting insights, but were too specific to generalize. This limitation thus also presents opportunities for future research within more specific contexts (e.g. Canada) or within particular dimensions (e.g. impact of specific financial incentives).

Lastly, given that our primary research interest was the role of business in driving SUDs, we have not made any attempt to comment on the efficiency of specific building technologies and/or the actual sustainability outcomes of these green/eco/sustainable neighbourhoods, districts or cities. However, given that our initial scoping of the literature found an abundance of studies on both green technologies as well as the sustainability outcomes of SUDs, our contribution lies within examining the antecedents vs. the outcomes of SUDs from a business perspective. Within our review, there were nonetheless several calls for future research to investigate the macro, meso and micro level drivers of not only of positive environmental impacts but also potential negative environmental (e.g. greenwashing) or social impacts (e.g. homelessness, gentrification) of planned green neighbourhoods (Bao et al., 2014; Trudeau, 2018; Yazar et al., 2020).

7. CONCLUSIONS

In conclusion, this project provides a systematic review and synthesis of the extant empirical research on the role of the business sector in driving SUDs. We derive an evidence-derived multi-level, multi-stage model that provides a framework to situate built environment businesses as both affected by top-down, macro-level factors such as governmental legislation, incentives, power and control, as well as influencing more bottom-up, meso-level dimensions such as cross-sector partnerships, experimentation and community engagement. It also highlights the importance of establishing the business case, mitigating risk and prioritizing sustainability knowledge & learning at the company level, as well as the leadership visioning and championing roles individuals within the built environment sector can play. Moreover, we discuss the paradox of scale and time in SUDs, where urgent change is required yet difficult to implement in practice. In so doing, we not only present implications for policy and practice, but also hope to stimulate further longitudinal, cross-level research into the important role that the business sector can play in conceptualizing, designing, planning and building a more sustainable future.

8. KNOWLEDGE MOBILIZATION ACTIVITIES

Despite the upheaval caused by the current global pandemic, the knowledge mobilization (KM) plan for this research project is largely in-line with the original proposed strategy, including:

a) ***A KM workshop (May, 2021)***: A KM workshop targeting a cross-sector executive audience is being planned for May, 2021 and will be orchestrated using Zoom or MSTeams (instead of a live event at Telfer's Center for Executive Leadership (CEL) as originally planned due to COVID restrictions). This workshop will not only present the results of the knowledge synthesis project, but also include a panel discussion featuring sustainability leaders from the construction and development sector, followed by roundtable visioning exercises designed to stimulate immediately implementable action plans for participants across sectors. The objective of this workshop is also to stimulate collaboration across the University of Ottawa and its Institute for the Environment as well as newly established Research Chair on Urbanism and the Anthropocene in the Faculty of Social Sciences. The workshop outputs will also feed the application of a SSHRC Connexion grant to extend the KM plan beyond the term of the KS grant.

b) ***Academic Conference Presentations and Symposiums (Summer, 2021 & 2022)***. A version of this KS report in paper format has been submitted to the Administrative Sciences Association of Canada (ASAC) conference to be held online in June, 2021. A symposium targeting management scholars working in the domain of sustainable urban developments will be crafted for submission to the 2022 Academy of Management (AOM) conference (location TBD). Grounded in the knowledge synthesis report, this panel will explore research gaps carving out a future research agenda for the role of business scholars in a domain primarily dominated by architects, urban planners and engineers.

c) ***Academic and Practitioner Journal Submissions (Summer, 2021)***: Given that almost half of the studies reviewed for this research synthesis emerged from the *Journal of Cleaner Production (JCP)*, following conference presentation and workshop feedback, a research paper will be submitted for JCP. A proposal will also be submitted to the academic-policy journal *The Conversation* as well as to specific industry journals such as *Building Excellence* (the magazine for Canadian Homebuilders Association members) and organizations (e.g. UN sustainable cities working group) to stimulate the conversation with the business community about sustainable design, plan and build projects.

d) ***Media Releases (Spring/Summer 2021)***: Given the anticipated general interest of the findings to an increasingly concerned citizenry, we will also work with the media team at Telfer to draft a press release, secure radio and/or TV interviews as well as contribute to local and national newspapers that are closely following the corporate response to mounting sustainability concerns.

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10. APPENDIX

Table 1 - Summary of Selection Filters for the Systematic and Narrative Review

Filter	No.	Description	Scopus (TITLE-ABS-KEY)	Web of Science (AB)
Substantive (DV)	1	"eco city" OR "eco cities" OR "ecocity" OR "ecocities" OR "eco-city" OR "eco-cities" OR "sustainable city" OR "sustainable cities" OR "sustainable urban" OR "resilient city" OR "resilient cities" OR "resilient communit*" OR "eco village" OR "eco villages" OR "ecovillage" OR "ecovillages" OR "low carbon city" OR "low carbon cities" OR "eco village" OR "eco villages" OR "ecovillage" OR "ecovillages"OR "green city" OR "green cities" OR "écoquartier" OR "one planet living" OR "one planet community" OR "one planet communities" OR "eco district" OR "ecodistrict" OR "eco districts" OR "ecodistricts" OR "zero carbon city" OR "net-zero neighb*" OR "eco-urban*" OR "ecourban*" OR "climate positive development" OR "carbon neutral development" OR "sustainable neighb*" OR "ecopolises" OR "ecobarrios".	14,295	2,761
Substantive (IV)	2	"business" OR "management" OR "construction" OR "development" OR "industry" OR "developer" OR "real estate" OR "private sector".	>13M	>3M
Substantive	3	Nos. 2 & 1	11,137	1,928
Methodo-logical	4	"data" or "empirical" OR "test*" or "statistic*" OR "finding" OR "result*" OR "evidence"	>35M	>18M
Substantive	5	Nos. 3 & 4	6,149	1,418
Substantive	6	Research areas: business or management	501	3
Subs. & Method.	7	Abstracts reviewed to ensure fit with search criteria (see table 2 for inclusion/exclusion criteria)	52	85
		Sub-Total (Scopus + WOS)	137	
Method.	8	Removal of duplicates	2	
		Sub-total	135	
Substantive	9	Articles discovered during narrative review	70	
		Sub-total	204	
	10	Articles removed during detailed reading of abstracts/papers	49	
		Subtotal	155	
	11	Articles failing exclusion criteria #4	96	
Total		Articles included in review	59	

Table 2 – Inclusion/Exclusion Criteria

	Screening questions and possible response	Yes	No	Unclear
1	Does the article discuss sustainable urban developments or like constructs?			
2	Does this article discuss the drivers or determinants eco/green cities/towns/ neighbourhoods or what approaches are taken in the creation of these developments?			
3	Is this an empirical study (qualitative or quantitative) published in a peer-reviewed academic journal?			
4	Does the article explicitly discuss the role of the built environment business sector in sustainable urban developments?			

*Note: To remain within the final database of selected articles, papers had to meet inclusion criterion 1, 2 & 3. For many abstracts reviewed, however, it was unclear if the business sector was deliberately included as part of the study (e.g. either in the methods and/or variables explored) or only referenced in passing. After adding the papers from the narrative review, a detailed reading of the 205 abstracts/papers was required. At this stage, additional articles were eliminated for failing to meet either criterion 1, 2 or 3, and the remaining articles were coded as either having included the built environment sector explicitly as part of the research or not. This final step excluded a further 96 papers leaving 59 papers as the complete data set for the data analysis and synthesis.

Table 3 – Number of Articles by Year

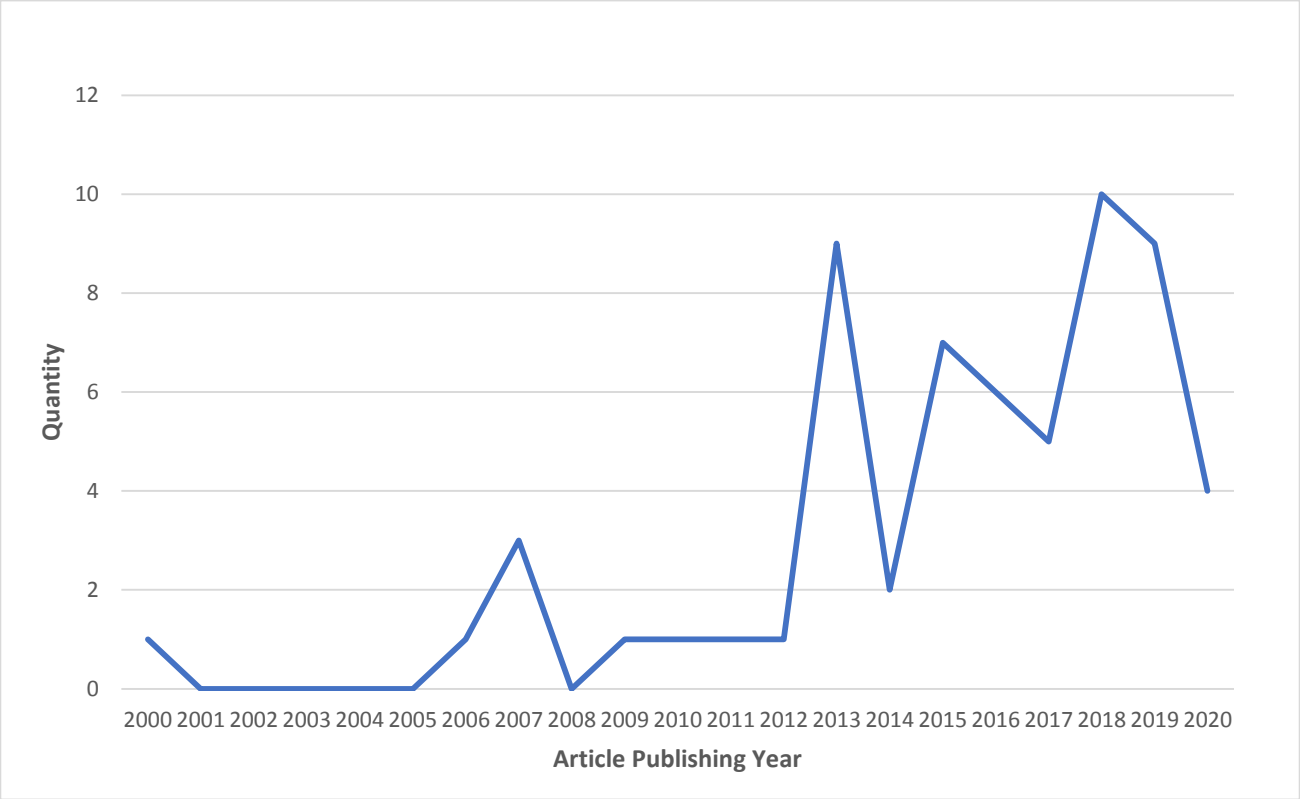
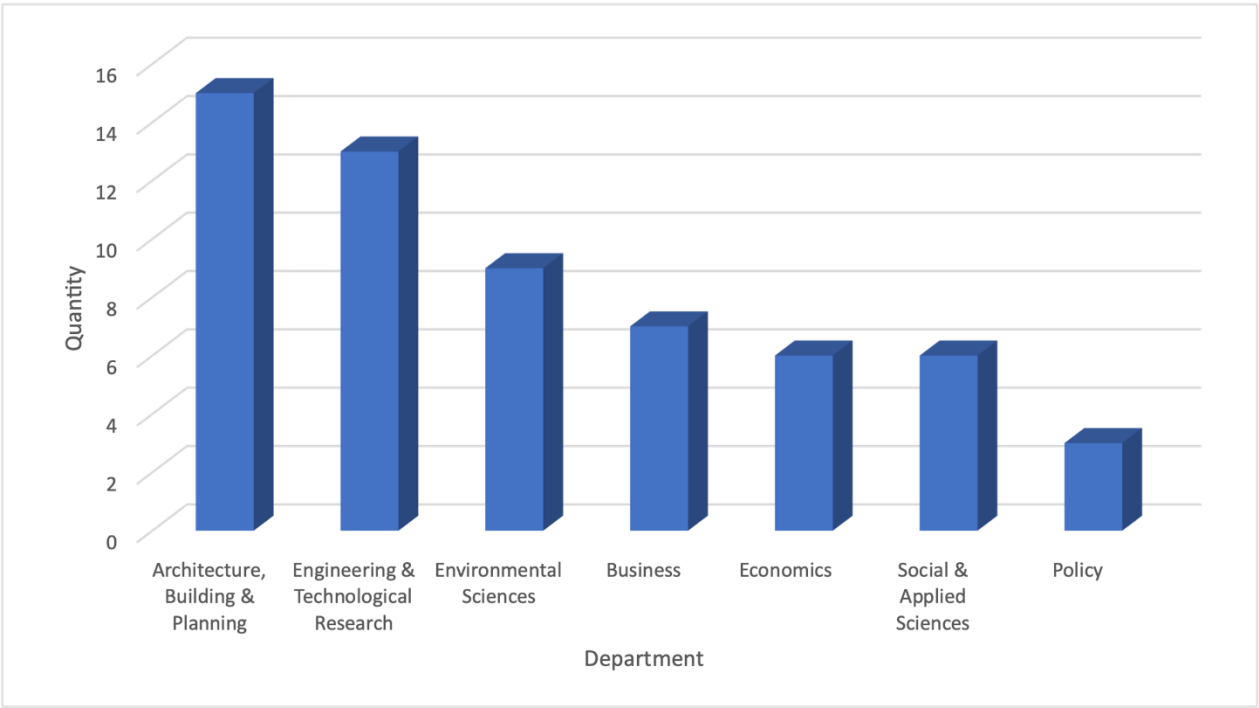


Table 4 – Number of Articles by Academic Discipline



Note: Based on the department affiliation of the first author.

Table 5 – Number of Articles by Publication

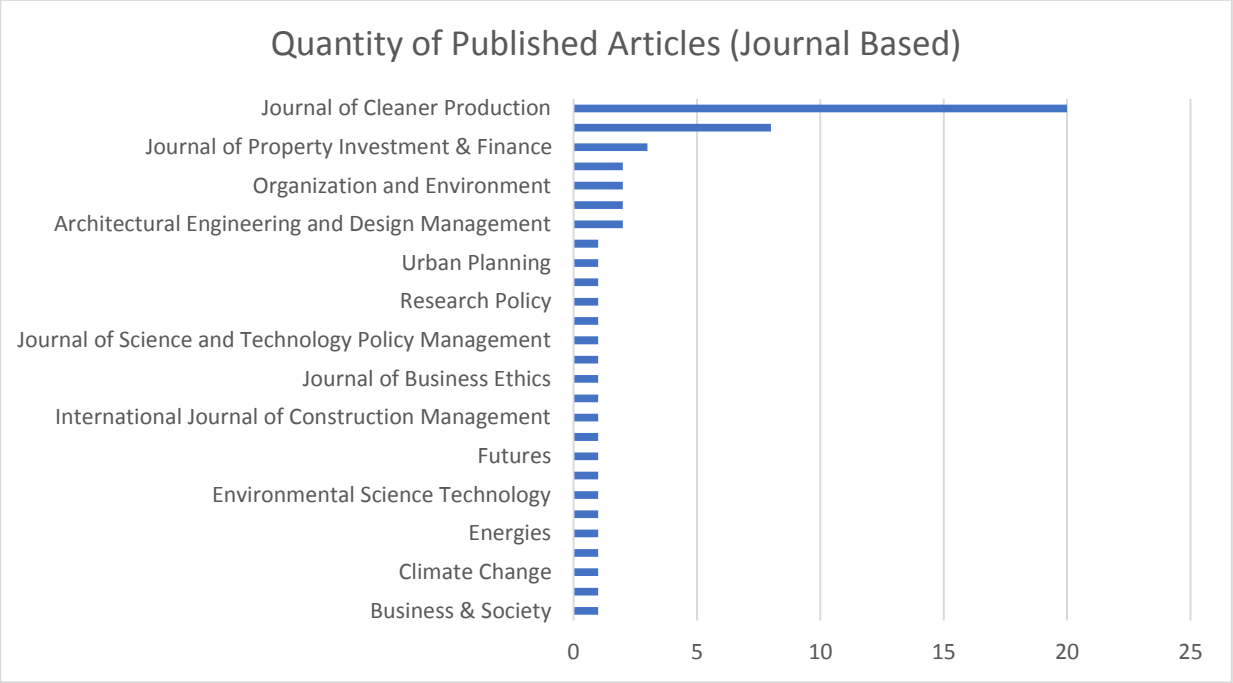


Table 6 – Number of Articles by Dependent Variable

Dependent Variable	**Quantity**
Sustainable Urban Development	8
Sustainable Development	4
Eco-City	4
Sustainable Cities	3
Sustainable Urban Transformations	3
Brownfield Redevelopment	2
Sustainable Urban Transitions	2
Sustainable Construction Project	2
Private Sector Investment	2
Urban Generation Network, Sustainability and Economic Development, Positive Energy Districts and Neighborhoods (Peds), U-Eco City, Community Sustainability, Brownfield Regeneration, Green Building Transitions, Responsible Property investing, Sustainable Development Reporting, Low Carbon City, Low Impact Development, Energy Communities, Zero Carbon Buildings, Low Energy Housing Projects, Sustainable Construction, Sustainable Neighborhood, Cross-Sector Social Partnerships, Green Cities, Energy Ambitious Neighborhoods, Low Energy Buildings, Socially Responsible Property Investment, Sustainable Neighborhood Development, Sustainable Built Environment, New Urbanism, Ecovillage, Development Regime, Low Carbon Urban Transition Experiment, Low Carbon Community	1

Table 7 – Number of Articles by Level of Analysis

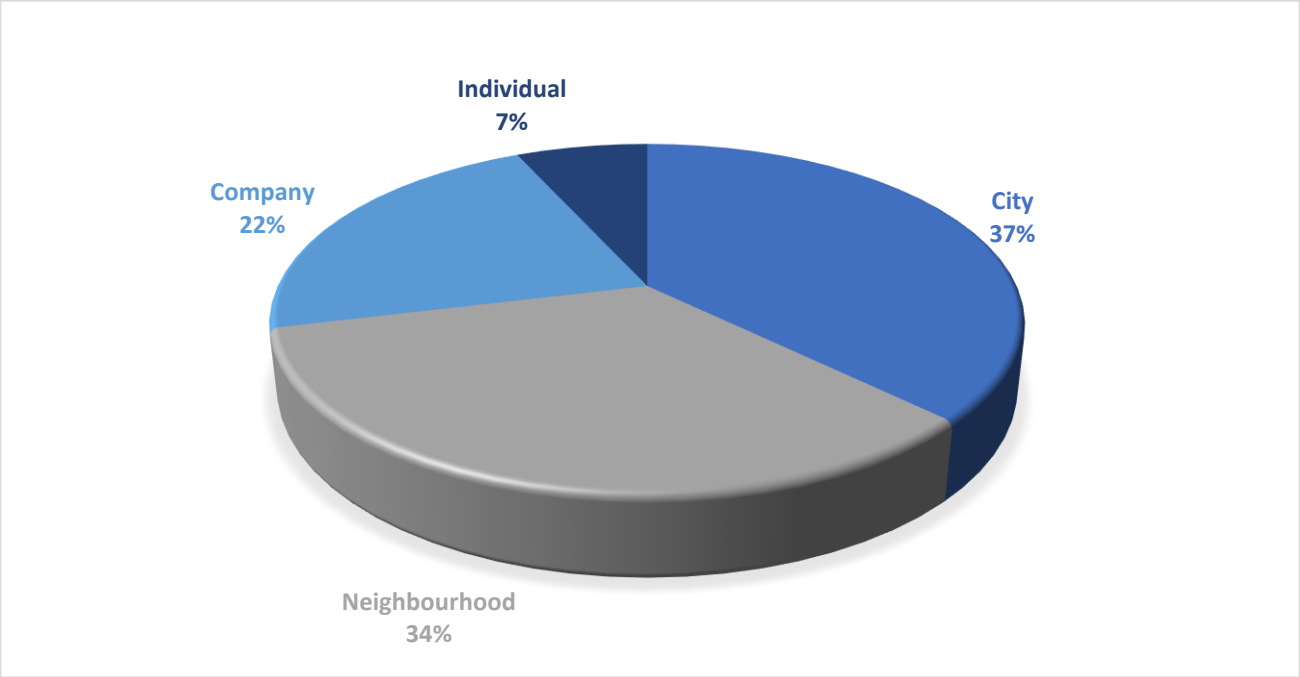


Table 8 – Number of Articles by Methodology

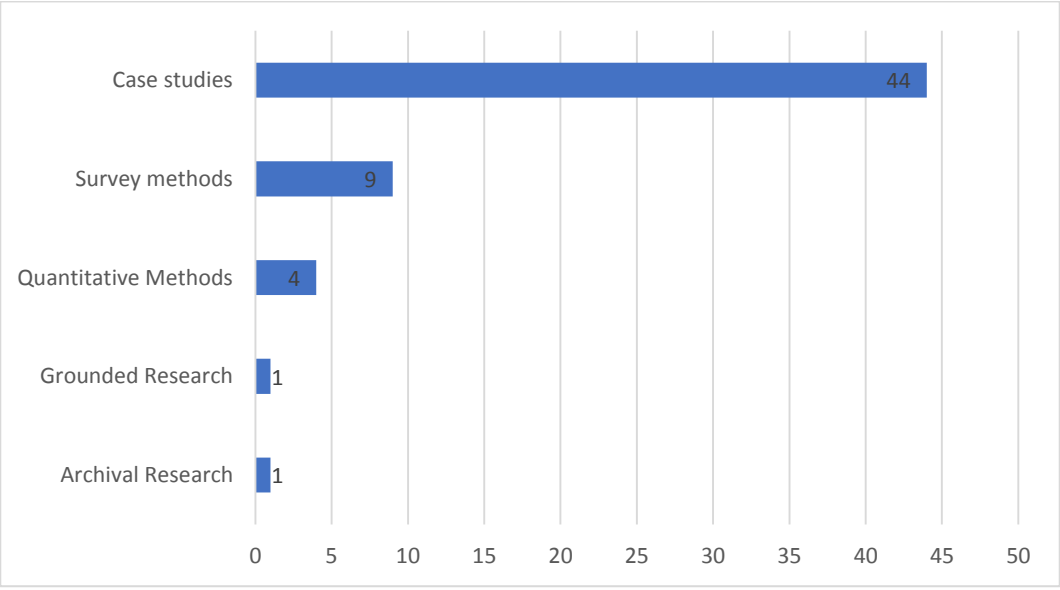


Table 9 – Number of Case Studies by Geographic Location