Title

The Controversies of Market-Driven Sustainable Neighborhoods: On communication, indicators, and the ecology of actors

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The Controversies of Market-Driven Sustainable Neighborhoods: On communication, indicators, and the ecology of actors

By

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DISSERTATION

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Abstract

The recent diffusion of urban sustainability concepts has pushed new developer-driven master-planned models of sustainable neighborhoods to emerge around the world. Once built, project assessments usually reported higher-than-expected resource consumption and various operational challenges, which kept these neighborhoods from fully meeting their sustainability goals. Many experts have attributed such challenges to wrong design decisions and lack of accountability post-operation, while social scientists criticized developers for greenwashing their projects. I draw from communication studies, actor-network theory, and urban studies to frame these new projects as an eco-system of dynamic cultural iterative processes rather than a linear design, construction, and delivery process. I recognize sustainable neighborhoods as spaces with multiple identities and actor interrelations. They are spaces produced through various overlapping stories. Hence, the assessments and indicators used to evaluate these neighborhoods must be based on different actors' expectations and use-values. This dissertation is comprised of three standalone articles that make independent scientific contributions to the same problem. In the first article I conducted textual analysis on popular press articles portraying new master-planned sustainable neighborhood projects in three countries. In the second and third articles, I carried in-depth go-along interviews with 46 residents, developers, designers, and various professionals involved in developing and managing a sustainable neighborhood. I developed an actor-indicator matrix map, connecting preferred evaluation indicators with different actor groups. In addition, I mapped the fundamental controversies that might affect the performance of market model of sustainable neighborhoods according to different actors. The results in the first article indicate that the press often represents such projects as utopians ignoring issues related to performance and management, which might create unrealistic expectations. Findings from the second article suggest that users and diverse local actors will prioritize different metrics than expert-based models when allowed to express their opinions. In the third article I mapped five main controversies fundamentally associated with the performance of privately developed sustainable neighborhoods: branding, innovation, behavior, governance, and market dynamics. I develop recommendations that can limit the rise of similar controversies in future developments. Recommendations include tax deductions for residents who choose to live in a sustainable neighborhood, a code of conduct to regulate behavior in sustainable neighborhoods, and resident representative committees to enhance the civic agency of the residents. Taken together, these 3 articles suggest a need for new analytical lenses to address the practical challenges that face market driven sustainable neighborhoods post operation. It is evident that operational success is not only limited to executing optimal designs and technologies; factors such as communication, expectations, choice of indicators, and competing priorities within the ecology of actors all interfere with the success of a market-driven sustainable neighborhood.

Keywords: Market-driven; sustainable; neighborhood; communication; indicators; controversies.

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Co-Authorship and Publication Statement

Each of the manuscripts contained within the dissertation has been submitted for/will be submitted for publication in peer-reviewed journals. Nermin Dessouky is the principal author of all chapters and conducted research conceptualization, data collection, and analysis. All three committee members contributed advice on the process, content, and framing of the research. Professor Stephen Wheeler specifically helped in chapter 2 by providing input to restructure the literature review and major text edits. In addition, Professor Stephen Wheeler has provided academic manuscript editing in chapters 3 and 4. Below is a list of journal destinations for each of the manuscripts.

Chapter 2: Is accepted by the Journal of Urbanism: International Research on Placemaking and Urban Sustainability
Chapter 3: Is prepared to be submitted to the Journal of Sustainable Cities and Societies.
Chapter 4: Is prepared to be submitted to the Journal of Urban Geography.

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Chapter 1. Introduction

Urban sustainability across all scales is widely seen as one of the most pressing needs in urban development. However, despite such importance and consistent efforts across years, developing and maintaining sustainable communities faces multifaceted challenges that jeopardize the notion of urban sustainability and its success. Challenges range from the fluidity of the term 'sustainable,' the involvement of a more comprehensive array of urban development actors with different expectations and needs, disagreements related to indicators of success and long-term performance.

A critical problem with a fluid term

The term 'sustainability' on its own has done quite a good job in infiltrating almost all fields of knowledge. There is always a place for the term to be used in academia, from STEM, humanities, social sciences to applied sciences. However, even beyond academia, in practice, and the day-to-day interactions, the term sustainability is one of the most used buzzwords in the 21st century. This trend makes it worthwhile to pause and think about the nature of the term that allows it to be used fluidly in an array of conflicting ways and ideologies.

The first time the term sparked a wider pool of interest was in the early seventies when Meadows and her team called for altering the current growth trends to be able to achieve sustainable economic and ecological stability. In her book *Limits to Growth*, Meadows modeled the world's industrial output, food, resources, population, and pollution. The model concluded that if the world continued with the current consumption practices, it would collapse by 2100. The book

called for a more sustainable approach that is achieved by enduring a state of equilibrium. For this to be attained, there is a need for changing the values and goals at the individual, national, and world levels (Meadows et al. 1974).

Meadows' call sparked attention in different organizations, as it simply illustrated a mismatch between what the earth can supply and what we as humans demand. This call was coupled with the extensive criticism of the international development organizations and the environmental, social, and economic failure of their development programs. This led the UN secretary to create a new commission for setting a new international agenda that promotes social, economic, and environmental goals. This new commission published a report introducing the new definition of sustainable development that is most widely used until now (McDonogh et al. 2015). 'Our Common Future' the published report of the Brundtland commission has helped in providing the most famous image of sustainability by intertwining it with development and introducing it as "development that meets the needs of the present without compromising the ability of the future generation to meet their own needs" (WCED 1987).

This relatively new notion back then was attractive to a set of entirely diverse groups who adopted the idea of sustainability through time in different and contradicting ways, as it complemented their ideologies. The first group focused on the equity and justice needed to be able to achieve sustainability. Environmental justice groups linked environmental degradation to issues of human equality. For environmental justice groups, a sustainable society should be a just society between different generations and species on all scales. The second group stresses understanding sustainability as an economic model through perceiving nature as capital or asset.

The third group emphasizes the ecological approach to sustainability. Groups such as environmentalists and deep ecologists have a biocentric approach that criticizes the mainstream anthropocentric approaches to sustainability (Williams and Millington 2004). The fourth group focus on transforming human values, behavior, and mindsets to better coexist with nature. This group stresses human ethics, consciousness, and spiritual connection with nature (Wheeler 2013).

With so many interest groups and interpretations of sustainability to suit different ideologies, the term is sometimes heavily criticized, especially when associated with development. Robinson (2004) criticized the term for being vague, attracting hypocrites, and fostering delusions. McDonough et al. (2015) argued that sustainability has turned into a naturalized myth where no one agrees on what it is, yet it is widely legitimized as a scientific concept. Such legitimacy is advocated by an exclusive system of environmental knowledge that privileges and measures the need of some against the other (McDonough et al. 2015). The more the term became popular, the more it became vague, fluid with many disenchantments and definitions. Perhaps best described and redefined as *"a political fudge, a convention form of words, promoted though not invented, by the Brundtland Commission which is sufficiently vague to allow conflicting parties, factions, and interests to adhere to it without losing credibility. It is an expression of political correctness which seeks to bridge the unbridgeable divide between the anthropocentric and biocentric approaches to politics." (emphasis added) (Baker 1997, 42).* Baker's definition highlights the vast difference in worldviews that were loosely linked under the notion of sustainability.

There is a vast effort in the international scene to push for translating sustainability into tools, strategies, and goals to address such critiques. A prime focus in the application of sustainability strategies is on the urban setting. This push for a sustainable built environment is easily justified since more than half of the earth's population currently lives in cities, contributing about 80% of global GDP, 70 percent of global carbon emissions, and 60 percent of resource use (The World Bank 2020).

The rising interest in the sustainability of the built environment was further induced by introducing "Sustainable Cities and Communities," the 11th goal of the Sustainable Development Goals (SDGs) in 2015. The goal aimed to make cities and human settlement inclusive, safe, resilient, and sustainable. By looking at the interest overtime graph (Fig 1), it is clear how searching the phrase 'sustainable cities and communities' increased post-2015 with the introduction of the SDGs.

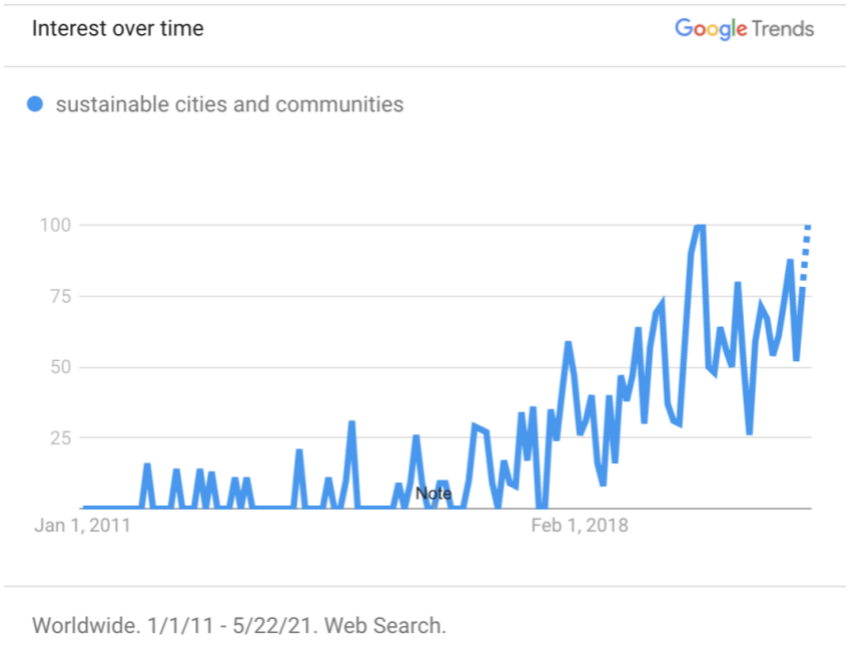

Figure 1 Search trends interest of sustainable cities and communities over time (Created by author using google trends 2020)

In general, the urbanization of the earth at a rapid rate coupled with the escalating social and environmental aches that are unique to the nature of the urban communities have made cities very central in the notion of sustainability. Moreover, threats of globalization and the loss of the local urban qualities have made the notion of sustainability which prioritized local solutions even more attractive. The link between sustainability and the built environment emerged under many labels and on different scales ranging from green buildings, green cities, eco-cities, ecovillages, eco-districts, sustainable cities, and sustainable communities. The definitions of all these labels– beyond the scale dimension– overlap and can be described as vague in many cases. Moreover, the performance of these cities, along with the motives behind them and the responsibilities of different actors involved in them remains subject to many debates.

The international scene is stressing urban sustainability as a vital and critical need and it is gaining enough momentum, which is making it attractive to both policymakers and private investors. Policies and regulations are creating a more welcoming environment for developers to adopt urban sustainability measures. Such new interest reintroduced the abstract idea of a sustainable city or community as a set of regulations, frameworks, criteria and toolboxes. However, even by this positivistic criterion of understanding sustainability, research on such efforts indicates that adopting urban sustainability measures have not yet led to a drastic change (Gielen 2014).

Krueger (2017) explained that the early literature on sustainability resembled recipe books and manuals presenting a set of discrete interventions, without contributing to a body of theoretical literature. As a result, when some of these interventions did not work the criticism of these interventions directly led to questioning the whole notion due to the lack of a theoretical basis.

The question remains, should we deem the whole notion as a failure or try to look closer to understand? Krueger (2017) recommends examining the notion and its application on a deeper level to gain a sense of direction. *"Sustainable Urban Development represents an ideal metropolis and yet has been bastardized through the process of implementation. Perhaps a close examination of these processes and their material manifestations will reveal a new metropolitan ideal?* "(Krueger 2017, 299). Focusing on the process, not the end result will enable us to better understand the whole notion. The challenges range from uncovering the motives, definitions and indicators used to explain sustainability till the pure contradiction of combining it with the urban development process embedded within an ecology of conflicting actors.

Even though the idea of achieving urban sustainability and developing a perfect equilibrium remains to some extent unreachable, it should be acknowledged that it managed to catalyze much innovation and collaboration, through introducing an interdisciplinary multiscale lens that is continuously helping in transforming our built environment (Campbell 2016). To continue the positive transformation of the built environment we should start addressing urban sustainability as a process, not an end state. Such a process is embedded with values, preferences, beliefs that contradict and overlap but have been widely ignored. Understanding the values of all the actors involved and acknowledging the contradictions will not make our communities instantly sustainable but it will help us in understanding how to navigate these conflicts for the sake of a better-built environment.

Study purpose and scope

This research highlights a new genus of sustainable neighborhoods around the world that is market oriented, and developer driven. The neighborhood scale is seen as small enough to avoid

the political and economic challenges of citywide programs but large enough to achieve efficiencies in terms of urban systems related to district energy, transportation, water, sewage, and landscape (Marique and Reiter 2011). It is also a scale at which urban design ideals related to dwellings, streets, and small-scale public spaces can be fully realized. Developing a sustainable neighborhood that is competing with market prices and commodities brings a diverse set of challenges and competing interests. The research aimed to identify such challenges starting from how they are communicated, and how can they be evaluated while respecting the needs and expectations of different actors.

Study overview

The study is divided into three main chapters followed by a general conclusion. The chapters are designed to stand alone as individual papers with three separate academic contributions but still contribute to the overall question of the dissertation.

1. Lines of inquiry

Overall, this research asks how the expectations and use values of the professionals and residents involved in developing, designing, managing, and living in a sustainable neighborhood affect progress towards project goals? This packed question comprises several complex lines of inquiry starting from what the expectations and values are, how progress is affected and what are the metrics of progress? To answer this broad question different chapters, unpack different angles of the question.

The first paper asks which values and design features the popular press emphasizes when portraying master-planned sustainable neighborhoods and the frames associated with such

values. This question mainly focuses on identifying the expectations associated with sustainable neighborhoods, how the popular press can create them. The article is rooted in and contributes to communication geography literature and urban studies.

After identifying expectations and addressing their importance in setting the sustainable neighborhood imaginaries, the second paper initiates a method to better translate them to indicators measuring progress. The second paper asks how the expectations and use values of the professionals and residents involved in developing, designing, managing, and living in a sustainable neighborhood can be better incorporated into indicators that measure progress towards project goals. The article is rooted in human ecology literature and contributes to urban indicators literature.

Despite understanding expectations and unpacking participatory indicators, the third article highlights gaps in identifying sustainable neighborhood challenges. The third paper asks what challenges are associated explicitly with market-driven sustainable neighborhoods through the eyes of different actors and how such challenges can be addressed in future development. The third paper highlights a need for new methodological approaches to unpack complex socio-technical challenges. The article is rooted in actor-network theory literature and contributes to post-occupancy evaluation studies.

2. Methods of inquiry

Those complex and integrated lines of inquires needed various methodological approaches. I borrowed and expanded on multiple methods from other disciplines that are not commonly used in urban and design studies throughout the different articles.

In the first article (see chapter 2), I conduct a qualitative textual analysis on 18 press articles to track how the popular press portrayed three master-planned sustainable neighborhoods between 2014 and 2020. This data-driven inductive coding led to the formation of thematic categories divided into design characteristics and values. All 18 articles were analyzed using the same set of codes to understand how the press communicated these different projects and which values are affiliated with which design characteristics. The codes were then grouped under common overarching themes to understand the mainstream framing of such projects. The analysis ends with a discussion of the implication of such framing in creating sustainable neighborhood imaginaries.

In the second and third articles, I used a single case study approach and analyzed data from 46 go-along qualitative interviews with various actors. The actors I interviewed included residents, local business owners, project developers, architects, landscape architects, town planners, sustainability officers, community managers, sales representatives, and operation team members. The interviewees were asked to give me a tour of the neighborhood. During the tour, I asked the interviewees questions with regards to how they use, perceive, and evaluate the neighborhood. The go-along technique, or what is also referred to as walking interview, was selected due to its ability to nudge the environmental memory of the interviewees resulting in a discussion that is highly informed by the landscape and the built environment (J. Evans and Jones 2011). This go-along method has been used in several previous studies rooted in urban and landscape disciplines to answer questions related to attitude, use of spaces, and environmental perception and evaluation (Bergeron et al. 2014; Kusenbach 2003).

The transcripts resulting from the interviews were analyzed in two different ways for the second and third articles. In the second article (see chapter 3), I analyzed answers for one specific question in the go-along interviews. The question was, "As a (… role of actor…), what kind of indicators do you think should be considered in the evaluation of the performance of TSC". I transcribed and then inductively coded answers to this question by indicators' themes while keeping track of different actor identities. Finally, I developed a matrix from the coding which highlighted all the indicators mentioned in the interviews and separated the actors by type. Overall, the fieldwork highlighted indicators and performance dimensions that matter to different actors and might not be present in mainstream assessment systems.

In the third article (see chapter 4), I followed the actors, their statements, and their own interpretations of the project to map the most common controversies in which different actors of market-driven sustainable neighborhoods disagree. I used inductive coding in search of challenges or what can be called controversies expressed by different actors. In addition, I kept track of the different actor identities involved in each controversy and double-coded linkages between different actors and controversies.

3. Contexts of Investigation

The following chapters present multi and single-case studies that were picked purposely to answer the complex inquiries presented. The first article exhibits a collective case study approach in which I selected multiple case studies around the world to illustrate the problem better. More than one case study was chosen because I seek to understand the values that the public press stories convey to the public with regard to sustainable neighborhoods around the

world. The case studies were intentionally chosen to highlight a new genus of sustainable communities that are developer driven. Hence, the common older sustainable communities in Europe, such as BedZED, Vauban, and Bo01, were excluded. Instead, I chose to focus on new contexts that have not been heavily studied; but still indicate a rising interest in sustainability.

A quick google trend search highlights that the high rates of search trends related to sustainable cities and communities are not coming from northern Europe; instead, they are coming from countries such as the Philippines, United Arab Emirates, Singapore, and India (see figure 2). Hence, there is a need to understand case studies from such contexts. The neighborhoods chosen in the first article are located in the UAE, Japan, and the USA. I chose three projects that portray a new but very similar model of market sustainability. The first is a privately developed master-planned community in Dubai, UAE, under the name of The Sustainable City (TSC). The second project is Fujisawa SST (for Smart Sustainable Town), a 1000-unit community located in Fujisawa city, Japan. The third project is Babcock Ranch in Florida, USA. This master-planned community is advertised as Florida's sustainable solar town. Despite the vast difference in geographic and cultural conditions, TSC and the other neighborhoods share similar sustainability goals, design approaches and are communicated in a similar fashion.

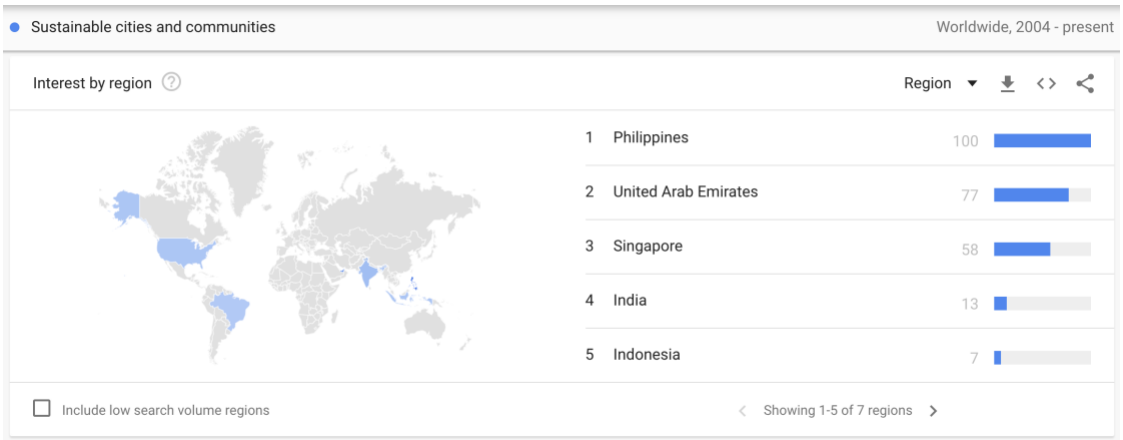

Figure 2 Search trends of sustainable cities and communities by region (Created by author using google trends 2021)

For the second and third articles (chapter 2 and 3), I chose one out of the three case studies presented in the first article. I take a single instrumental case study approach to better help me develop an in-depth understanding of the research question (Creswell et al. 2018).

I had three main incentives behind choosing a case study in the UAE. First, the location of TSC in the United Arab Emirates (UAE) – a country that was once declared as having the world's largest ecological footprint per capita – evokes a new connotation for the application of sustainable neighborhoods. Such interest in sustainability in the UAE and other gulf countries came as a consequence of years of unregulated construction and expansion; hence there are political efforts to regulate the construction industry better to ensure a more sustainable future (Al Khalifa 2015; Rahdari et al. 2019).

Second, as a city in the United Arab Emirates, Dubai's local Emirati population forms only ten percent while the other ninety percent of the population are expatriates of different nationalities (De Bel-Air 2015). Hence the case study provides an understanding of sustainability expectations in a very diverse global community.

Third, choosing a case study in the global south came intentionally to address the urban sustainability north-south knowledge gap. Since, the majority of urban sustainability knowledge is predominantly shaped by research on and from the global north. In addition, the most influential and mainstream urban knowledge on sustainability emanates from the global north. (Nagendra et al. 2018). Hence, I believe that the contexts addressed in this research will play a role in shedding light on case studies in the global south.

Thesis significance

This study responds to the need to establish a more theoretical base for understanding sustainable neighborhoods performance post-occupancy. The need for a theoretical approach to post occupancy evaluation of neighborhoods has been pointed out by many experts. Churchman and Ginosor (1999), called for post-occupancy neighborhood evaluation that factors in social, physical and cultural influences while acknowledging the needs of multi-actors. Almost a decade after Chruchman and Ginosor's call, Canter (2008) asked for a model that understands places as a combination of human actions, physical forms, and conceptualizations. Leaman and Stevenson (2010) also pointed out the lack of discussion concerning the assessment of housing sectors and the need for a better understanding of expectations, attitudes, and perceptions. Aiming to fill this gap, this research captured how different actors perceive, assess, and represent these spaces while using them as a base for project assessments.

Elaborating on the ability of sustainable neighborhoods to meet their goals validates the applicability of concepts of sustainability on the urban scale. Consequently, it is vital to pause and reconsider how these neighborhoods should be assessed. Instead of deeming them as unsustainable, it might be more practical to ask sustainable in doing what, for who and under which world view.

By intentionally choosing to study a sustainable neighborhood in the global south for two of the papers presented, the study responds to a major need to better understand the urban contexts of the global south. Since recent research highlighted that urban sustainability knowledge is predominantly shaped by research on and from the global north, the study contributes to the

efforts of renewing research focus on urbanization in the south and correcting structural biases in the knowledge production systems (Nagendra et al. 2018).

Theoretically, the research introduces the possibility of looking at and assessing sustainable neighborhoods as a relational process of multiple actor realities instead of a product with a single reality. In practice, the research appeals to the need for a more rigorous multi-dimensional assessment for sustainable neighborhoods that consider the use-values, perceptions, and representations of space through the eyes of different actors.

The different phases of the research aim to identify gaps between theory, perceptions, and practice of sustainable neighborhoods. Because these sustainable neighborhoods are often perceived as experimental or demonstration flagship projects, cities and developers often focus solely on building technology and physical indicators, often overlooking the social, political and managerial dynamics that impact the performance. Bringing attention to such dynamics will help existing sustainable neighborhoods in prioritizing and meeting their own goals, making the idea of developing sustainable neighborhoods more attainable.

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Chapter 2. Communicating Sustainable Neighbourhoods: Happy, Innovative, Ecological, or Resilient?

Abstract

The recent diffusion of urban sustainability concepts has pushed new developer-driven master-planned models of sustainable neighborhoods to emerge around the world. This model of market sustainability is no longer aimed at early adopters but aims to mainstream sustainability in the residential market. While academia has either focused on measuring the technical performance of such models or has criticized them for greenwashing sustainability, the popular press has been influential in portraying them to the public as the future of urbanism. This paper asks which values and design features get emphasized by the popular press when portraying master planned sustainable neighborhoods and what are the frames associated with such values. The paper analyzes how the popular press portrays three new master-planned sustainable neighborhood projects located in three different countries. Through qualitative textual analysis we aim to understand the values and patterns of meaning that these stories convey to the public. We find that coverage of these developments emphasizes their convenience and economic savings while downplaying sustainability narratives related to changes in lifestyle, affordability and inclusion. Media coverage creates four repeated frames for such communities: the happy community, the innovative community, the eco-community, and the resilient community. The press often represents such projects as utopian ignoring issues related to performance, management, and the complexity of urban systems which might create unrealistic expectations of such projects.

Introduction

“Unlike in bustling Tokyo, it is easier to make friends here while there are also many events that foster the community spirit.”(Sim 2016)

“I like that it is so easy to make friends. In the evenings the kids can take their bikes and just go around the community. It's just so easy to find friends.”(Lavars 2018)

“Homes are designed to create community. It’s even better than we could have imagined.”(Zeitlin 2019)

These three very similar quotes might seem to be from the same article describing the same place. However, the first quote is from *The Straits Times* newspaper about a new sustainable neighborhood in Tokyo, the second quote is from the *New Atlas* magazine describing a new sustainable neighborhood in Dubai, and the third is from the *Washington Post* in reference to a new sustainable town in Florida. These articles are all doing the same thing: framing the sustainable neighborhood imaginary—the collective vision or understanding of what a sustainable neighborhood is or ought to be—in a particular way that may not represent the full visions of project designers or developers.

This paper asks which values and design features get emphasized by the popular press when portraying master planned sustainable neighborhoods and what are the frames associated with such values. Frames are narrative borders around the presentation of an issue that emphasize some dimensions of it rather than others. Through the identification and analysis of such values

four distinct frames emerge that are combined within the emerging sustainable neighborhood imaginary. The sustainable neighborhood imaginary is not solely created by the popular press but by the residents, designers, developers, and marketers of these communities. As the first of a tripartite paper series, this paper focuses on how the popular press takes information from these stakeholders and conveys it to the broader public. Two forthcoming papers address the roles of developers and residents.

I focus on the neighborhood scale because many urban designers believe that this is an important scale at which to address urban sustainability (Fraker 2013; Barton 1998). The neighborhood scale is seen as small enough to avoid the political and economic challenges of citywide programs but large enough to achieve efficiencies in terms of urban systems related to district energy, transportation, water, sewage, and landscape (Marique and Reiter 2011). It also is a scale at which urban design ideals related to dwellings, streets, and small-scale public spaces can be fully realized. I define planned neighborhoods as custom-built master-planned mixed-use developments with 500 residential units or more.

Background

Historically the framing of new development types has been important in shaping public preferences and establishing new community design trends. In the mid-nineteenth-century the writings of Andrew Jackson Downing helped popularize cottage architecture and early Victorian suburban form (Schuyler 1996). At the turn of the nineteenth century the work of John Ruskin, William Morris, Ebenezer Howard, and Raymond Unwin spread garden city ideas in Britain and later in North America (Harrison-Moore and Rowe 2006). Designers associated with the Congrès Internationaux des Architecture Moderne (CIAM) promoted modernist design ideas beginning in

the 1930s. In the late twentieth century the New Urbanism movement sought to promote more compact, walkable communities (Calthorpe 1993; Duany, Plater-Zyberk, and Speck 2001). In each era the popular press and mainstream developers picked up on the ideas of urban design pioneers and helped spread them, although not necessarily emphasizing the same mix of values.

Many publicly initiated sustainable neighborhood projects emerged in the early 2000s. Such neighborhoods were presented as learning labs and urban models of what a sustainable neighborhood should look like. Models like Vauban in Germany, Bo01 in Malmo Sweden, BedZED in the UK are all evolving examples of sustainable neighborhoods. These models were mostly supported by the governments, overwhelmingly European. These projects aimed to diffuse novel design approaches and sustainable technologies to the market, and attracted wide media and academic attention with a focus on their technical performance (Smith 2006). Once built these projects performed relatively better than mainstream developments; however, project assessments usually reported higher-than-expected resource consumption and various operational challenges, which kept these neighborhoods from fully meeting their sustainability goals (Hodge and Haltrecht 2009; Austin 2013). Such challenges led to doubts about whether urban sustainability is in fact feasible (Saiu 2017; Whitfield 2017).

Much literature on sustainable neighborhoods focused on particular best practices, interventions and technologies (e.g. Beatley, 2000; Fraker, 2013). When some of these interventions did not work the way intended, the criticism of these interventions directly led to questioning the whole notion of urban sustainability as Krueger (2017) explains, “Sustainable Urban Development represents an ideal metropolis and yet has been bastardized through the process of

implementation. Perhaps a close examination of these processes and their material manifestations will reveal a new metropolitan ideal?" (Krueger 2017, 299). Rather than focusing on the product, this research seeks to focus on the process of creating sustainable neighborhoods, including how we portray and communicate them. Focusing on the process enables us to better understand the expectations and performances of such projects. The challenges range from uncovering the motives, values, definitions, and indicators used to explain urban sustainability.

In the last 10 years, the concept of sustainable neighborhoods started gaining wider attention from the private sector all over the world. Private developers in places such as Tokyo, Victoria, Florida, and Dubai have built new neighborhoods that publicly claim to be sustainable. The development of privately built sustainable neighborhood demands closer attention, as their purpose is no longer meant to attract the early adopters. In contrast, they aim to mainstream sustainability in the market. While academia has either focused on measuring the technical performance of earlier models or criticizing particular examples for greenwashing sustainability (Sze 2015; Greenberg 2015), the popular press has been influential in portraying them to the public as the future of urbanism (Thekkepat 2015; Williams 2016). These new privately led developments are contributing to redefining public notions of sustainability, creating what has been described as 'the mainstream green'(Fosket and Mamo 2009). Understanding how urban sustainability is communicated is crucial to understanding how it will perform. As scholars of communication geography would say, communication should be analyzed as a separate dimension of place (Adams 2009).

1. Communicating the Sustainable Neighborhood

There has been a steadily increasing attention to the impacts of communication on our daily lives ever since McLuhan (1964) explored the role of media in producing structural patterns that effects the human understanding. The connection between performance, space, representation, and communication has been advocated for years especially by communication geographers. Different forms of media have gained an influential role through time as a producer of space (Adams 2009; Lindell 2016). Mass media such as television shows, films and newspapers played an important role in constructing notions of idealized places and the life qualities associated with such places (Burgess and Gold 1985). This notion has been noted globally. Greenberg (2000) for example looked at how lifestyle magazines played a role in restructuring different American cities and the lifestyle of their residents. Cherry et al. (2015) highlighted how the media discourse is normalizing and marginalizing specific aspects of law carbon housing in the UK. While Salama's (2013) showed how the print press played a critical role in manufacturing the image of El Doha as an international hub.

The representation and performance of places have been increasingly intertwined (Adams 2018). This is largely due to the huge increase of images and messages constantly bombarding the public through different forms of mass media. For example, Raynor et al. (2017) noted that the mass media in Brisbane, Australia played an important role in conditioning the stakeholder's attitudes around housing through shaping their 'common sense' understanding and evaluation of projects. Communication does not only act as a passive transmitter of ideas and information about places, but communication on its own is an event that can alter the relationship between people and place, slightly or substantially (Adams 2017).

This process of altering what we know about sustainable neighborhoods can convert them into fantasies and help the reader make assumptions about what is present and what is absent in them. Hence the communication of sustainable neighborhoods might be altering the environmental experience and expectations of their residents. This makes the analysis of how such projects are communicated a separate dimension of the performance of such projects. In a way, they are a dimension of the place not just about the place.

The communication of discrete design characteristics and their repetitive linkage to attractive values is creating what can be called sustainable neighborhoods framing. In his analysis of how media addressed environmental sustainability in Switzerland, Bonfadelli (2010) noted that the media frames the social reality and select some aspects of perceived reality while dismissing other aspects. The frames established are often embedded in text and influence how the reader perceives the topic being framed. Entman defined the act of framing as "to select some aspects of a perceived reality and make them more salient in a communicating text, in such a way as to promote a particular problem definition, causal interpretation, moral evaluation, and/or treatment recommendation for the item described" (Entman 1993, 52). Gamson (1992) explains that the general public might not be so well informed or cognitively active on so many public issues, so how a new topic is framed and communicated can heavily influence the social construction of shared definitions that can stimulate actions.

2. Imagining the Sustainable Neighborhood

Media communication and framing does not only help in developing casual interpretations, but it ultimately leads to shaping our shared understanding of sustainable neighborhoods or what can

be called ‘sustainable neighborhood imaginary.’ Castoriadis (1997) first used the concept of the social imaginary to explain the ability of societies to create and recreate their perceptions of institutions, norms and social relationships. This happens through creating shared ideas, understanding and meaning about the reality of these institutions. Jasanoff and Kim (2009) reintroduced social imaginaries as sociotechnical imaginaries, associating the concept with nation-specific and technological projects. They later expanded the sociotechnical imaginaries beyond the nation-state to include organized groups, corporations, social movements and professional societies (Jasanoff and Kim 2015). In this case, a privately built sustainable neighborhood can be a sociotechnical imaginary and different actors participate in developing a collective image of the social life that takes place in it.

Having one single social imaginary that unites the public is rare; multiple and competing imaginaries often coexist, as a result of different framings. The role of powerful institutions such as media is to elevate some imagined future over the others. The imaginaries not only focus on how life ought to be but it frames how it ought not to be as well, it pushes a shared understanding of both what is acceptable and what is not acceptable (Jasanoff and Kim 2015). In the case of sustainable neighborhoods, this can reflect social pressures and community norms of acceptable commuting choices or consumption decisions. The popular press often dictates this by visualizing the lifestyle in such neighborhoods. In a way, they stabilize a collectively shared understanding of the desirable lifestyle in such neighborhoods.

Imaginaries also address the expectations that need to be met, the notions and images that underline such expectations. These imaginaries are conveyed through images, stories and

common popular writings that get to be highly influential if compared to theoretical or technical writing that addresses only a few experts. Taylor defined these imaginaries as “that common understanding that makes possible common practices and widely shared sense of legitimacy” (Taylor 2003, 23).

The process of creating a shared vision of a sustainable and desirable society is perhaps the most critical challenge facing humanity (Van der Ryn and Calthorpe 1986; Costanza 2000; Daly 1990). As such these imaginaries can be highly influential and pushing for change, direction, planning, actions and behavior (Wiek and Iwaniec 2014). The importance of understanding these imaginaries is not a means to an end. The formation of new imaginaries also forms new practices that evolve to be taken for granted, reinterpreting the original theoretical understanding of a concept. Taylor (2003) explains that it is not a one-sided process when theories disseminate to the public and transform into actions and practices such actions can be a basis for a modification of the theory. Taking the idea of a sustainable neighborhood as abstract but schematizing and building it in the market transforms it into a common practice that is discussed on the daily news. Such discussions may change the whole ideology of sustainable neighborhoods. For example, focusing solely on the energy savings of sustainable neighborhoods as features of mainstream sustainability might, in the long run, flatten the term sustainability to the public, turning it to a concept that equates only to energy saving. Untangling these casual interpretations that link values with design features can help us better understand what the public expects from such projects and how these expectations can influence the performance and reconceptualization of such projects.

Methodology and Case Study Rationale

To better understand the mainstream imaginaries of sustainable neighborhoods, I analyzed the popular press communication and framing of such projects. I narrowed the pool of case studies down to communities that are privately developed as a reflection of the new market-led sustainability and looked for projects in various geographical contexts that have been occupied within the last 5 years. I chose three projects that portray a new but very similar model of market sustainability. The first is a privately developed master-planned community in Dubai, UAE under the name of The Sustainable City (TSC). The neighborhood has 590 residential units, a school, and a commercial area with mixed-use services. The first resident moved in 2015 and the development was 92% occupied in 2020 with a population of 3000 residents. As its name implies, TSC is promoted as a sustainability showcase, and its promotional materials emphasize solar production, urban farming, on-site water recycling and pedestrianized car-free streets.

The second project is Fujisawa SST (for Smart Sustainable Town), a 1000-unit community located in Fujisawa city, Japan. The first resident moved in 2014 and the project is now approaching completion with over 600 units occupied. Fujisawa SST has on-site solar energy production and storage, a wellness center, smart mobility choices and a multi-generational approach that plans for 100 years of operation and attracts multiple generations.

The third project is Babcock Ranch in Florida, USA. This master-planned community advertised as Florida's sustainable solar town. The first resident moved in during January 2018, and by 2020 250 residential units had been occupied. Babcock Ranch includes a school and services such as farm-to-table restaurants, a health center and coworking spaces. The community produces its

own energy through a large solar energy field and offers alternative mobility services, community gardens, energy-efficient housing, and connections to a natural preserve.

All three of these neighborhoods applied various design strategies in their quest for sustainability and have been recognized for their efforts by local and international awards. Such global recognition has helped them gain the attention of the popular press as successful models of sustainable communities.

Being relatively new and privately developed as compared to governmentally led large-scale initiatives, these three projects have not yet elicited much academic attention. Using the names of the projects as keywords I performed Google searches to identify relevant popular press articles. In many cases, the articles I found were passive reproduction of projects' press releases and promotional materials. After a general review of online popular press content, I disqualified personal blogs and articles that simply repeated early design briefs. I aimed for articles that had in-depth coverage of the projects complemented by quotations from residents and developers. This narrowed our pool to a handful of articles on each of the three projects. Six articles were compiled on each project. These articles were published between 2014 and 2020. The articles analyzed ranged from regular daily news websites such as *The Washington Post*, *Khaleej Times* and *The Straits Times* to more local lifestyle coverage such as *Gulf Shore Life* and *Friday Magazine*.

I conducted a qualitative inductive content analysis for each article using MAXQDA software. This data-driven inductive coding led to the formation of thematic categories divided into design

characteristics and values (see table 1). The design characteristic codes present design features and infrastructure that were emphasized through the text such as renewable energy, waste management, or outdoor design. The value codes convey ideals that are embedded in the text and attached to the description of the design. For example, values such as self-sufficiency, sense of community or business leadership all appeared repetitively in the text of many articles, whether expressed in these exact words or not. The coding targeted explicit design characteristics mentioned in the text and the implied use values attached to the text. All 18 articles were analyzed using the same set of codes to understand how the press communicated these different projects and which values are most commonly affiliated with which design characteristics. The codes were then grouped under common overarching themes to understand the mainstream framing of such projects. The analysis ends with a discussion of the implication of such framing in the creation of sustainable neighborhood imaginaries.

Table 1 Inductive coding categories

Value Codes	Design Characteristics Codes
1. Harmony with nature	1. Water management
2. Decreased vulnerability	2. Waste management
3. Business leadership and replicability	3. Building design and materials
4. Knowledge creation	4. Urban agriculture
5. Innovation	5. Clean mobility
6. Resource efficiency	6. Clean energy
7. Change in lifestyle	7. Outdoor design and vegetation
8. Safety and security	8. High tech
9. Convenience	9. Services and amenities
10. Sense of community	
11. Wellness	
12. Economic savings	
13. Cultural connections	

Analysis and Discussion

Popular press articles communicated different design characteristics in each community linked to different use values that would matter most to potential readers and residents. Features such as the use of high tech and clean energy were constantly highlighted in the three projects, while

values such as sense of community, convenience, safety and wellness were frequently promised explicitly and implicitly.

Many values conveyed in the articles were consistent across the three projects despite associating them with different design features. Stories emphasized the use of high-tech features, for example, but linked them to values of convenience and safety in Fujisawa SST, resource efficiency in TSC and decreased vulnerability in TSC. In Fujisawa SST, the articles present home control features and virtual assistance as features that would make the life of the residents more comfortable and convenient. In contrast, for TSC the use of high tech emerged through the provision of controlled environments to enable food production and decrease the community's vulnerability. One article explains, "They are continually experimenting with new technologies couched in green living aspirations. One example of this is a shipping container…where French startup Agricool tries to raise strawberries in the desert with greater efficiency than conventional farming practices…." In Babcock Ranch, technology was linked to resource efficiency since the community was commonly portrayed with building technology features that saved resources.

A sense of safety was a value that was promised across all three projects, but the articles describing each community attributed safety to different design features. In TSC, the outdoor design that restricted car access leaving the core of the community car-free was presented by the press as something that creates a safe community. Like TSC the focus on safety as a value of a sustainable community was emphasized in Fujisawa but it was attributed to the heavy use of high-tech features. This following sentence from the Friday magazine article explains how Fujisawa created a virtual gated community through the use of high-tech sensors: "street lamps

lit up automatically, sensing her movement. Unobtrusive security cameras followed her and the other pedestrians, monitoring the area to ensure they were safe" *(Thekkepat 2015)*.

Clean energy through solar panels was a prominent design feature in each community. The presence of clean energy was mostly linked to values such as economic savings, resource efficiency and decreased vulnerability. Writers highlighted the presence of solar panels as a feature that would decrease vulnerability in the case of Fujisawa SST since the community had batteries to store energy up to 3 days. In TSC, the articles linked the presence of solar panels to cost savings. An article in *The Daily Mail* describes this attractive feature: "Buildings and car parks are topped with solar panels that feed into the grid, meaning that residents only pay the difference between what they produce and consume" (Randall 2019). The clean energy produced in Babcock Ranch was linked to a bigger social cause, portraying the community as a business leader with a strong local impact. Babcock Ranch's 74.5-megawatt solar field export energy to power southwest of Florida. Such linkage allowed a design parameter such as clean solar energy to be presented as something with multiple use values related to resource efficiency, local impact and business leadership.

Wellness, a sense of community and positive change of lifestyle are values that were promised in each of the three communities, yet each community attributed these values to a different design feature. In TSC, the outdoor design was presented by the press as something that helps create a sense of community, a value that is highly desirable in Dubai – a city with a high transient expatriate population. The limited car access is also portrayed as something that encourages community interaction since people are forced to walk and meet their neighbors instead of

parking in their private garage. In Babcock Ranch, wellness was mostly presented as a value that emerged, as a result of connection to natural vegetation, since Babcock Ranch is linked to a natural preserve that emphasizes its connection to nature. The connection to nature was seen as something that would encourage hiking and outdoor activities. In Fujisawa, lifestyle apps and health monitors were promoted as a design feature that would assure the wellness of the community, as one article describe, "she headed for the smart washroom where the mirror, equipped with sensors and monitors, quickly displayed her heart rate, weight, BMI, scalp condition, and blood pressure readings" (Thekkepat 2015). Regardless of the design strategy implemented in each of the three communities, living in a sustainable community was portrayed as a choice of wellness.

Figure 2 presents the analysis of code co-occurrences frequencies in each community. By analyzing which codes co-occurred together in the same passages I visualized the repetitive linkages between codes that highlights specific design characteristics and use values communicated in each project. The visual linkages reflect how the popular press distills the social imaginary of a sustainable community to specific design characteristics in each community and correlates them to attractive use-values.

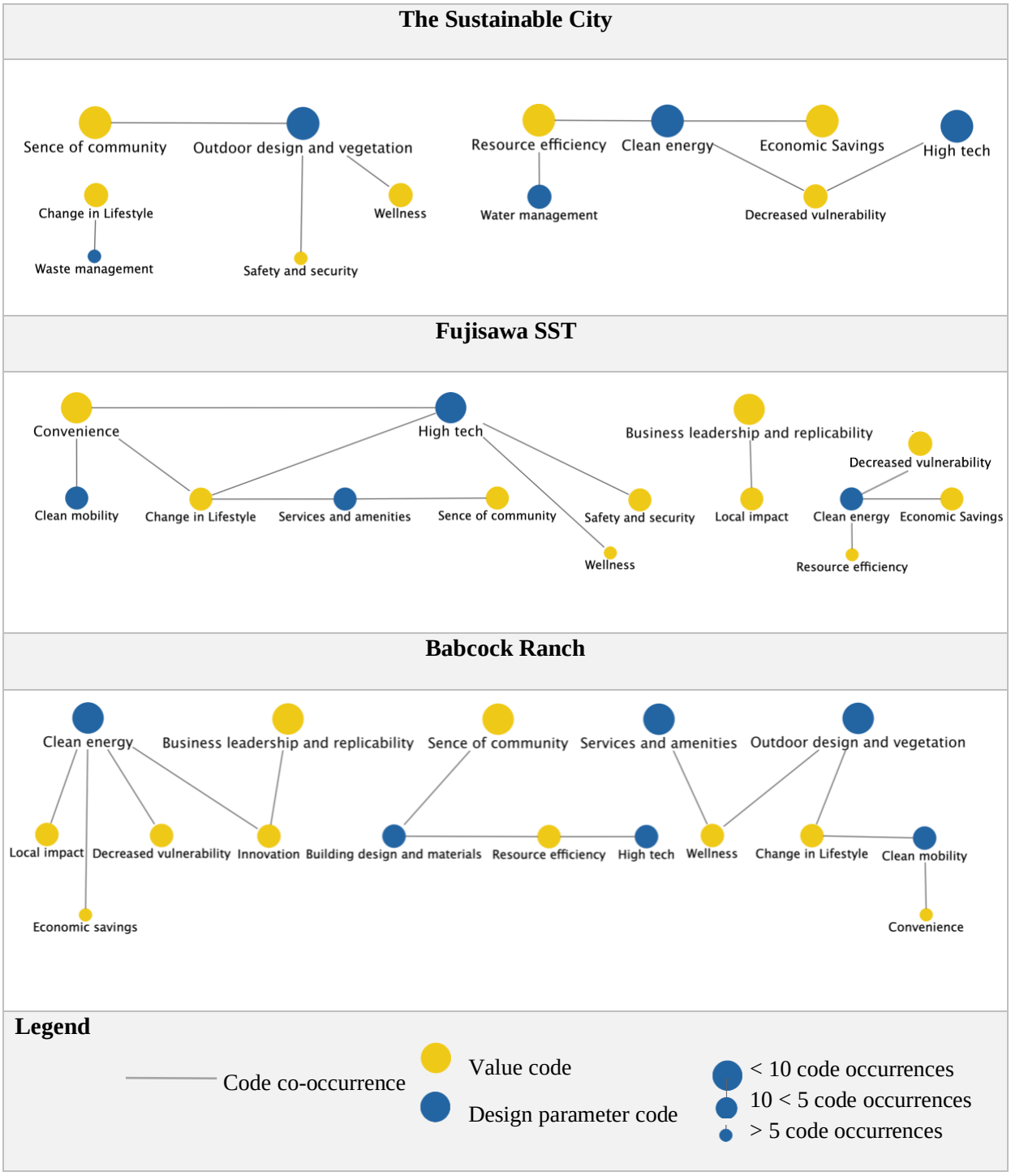

Figure 3 Code co-occurrence frequencies highlighting values and design characteristics associated with the three case studies

The visualization of values and design characteristics in each community reveals how some values that can be commonly interpreted under sustainability are diminished or completely left

out. There is some mentioning of a change of lifestyle, but it plays a minor role compared to clean energy. There is no mention of aspects related to social equity and inclusion. The code co-occurrence analysis reveals how often different design features are presented and discussed as remedies to desirable values. A plaza is there to make the residents more social, the solar panels are there to save the environment. These casual interpretations of design features and their embedded values turn to be highly influential in the understanding of such projects, how their features are perceived and at a later stage, forming unmet expectations.

How the popular press shapes the sustainable neighborhood imaginaries is not just through the repetitive mentioning of values and design parameters. There is an overall framing of the concept of sustainable neighborhoods being shaped by the popular press through these repetitive linkages of use values and design elements. In a way, all these embedded values subscribe under larger desirable lifestyle frames. The analysis of articles from the three neighborhoods showed that they are constantly framed as innovative communities, eco-communities, happy communities and resilient communities.

The innovative community frame is highlighted through stressing values such as business leadership, knowledge creation and local impact. Such a frame stretches the role of these communities as a model that not only benefits from its innovation but extends the positive impact to its surroundings. For The Sustainable City, the popular press describes it as something that “will inspire new communities;” in Fujisawa SST it is “:expected to be a model replicable elsewhere in Japan;” and Babcock Ranch is presented as having “the potential to sway developers toward preservation.”

The eco-community framing is highlighted through values such as harmony with nature and resource efficiency. This resonates attractively to residents telling them that they are doing their part of saving the environment by choosing to live in these communities. The efficiency with relevance to building design and technologies are emphasized while dismissing values related to behavior change or conscious reduction of consumption. In Babcock Ranch one article explains, "solar field is projected to save more than a million British Thermal Units worth of natural gas," another article introducing TSC explains "the settlement is built to use as little energy and water as possible." Such a phrase is subconsciously telling the readers that the problem of consumption is a problem of building design not a problem of individual consumption.

Despite the urbanized identity of the three projects all three of them are presented by the popular press as communities that aspire to harmony with nature. For example, Fujisawa SST which was built on the site of an old Panasonic factory is described by the popular press as a business for "Promoting Town Development in Harmony with the Environment." While Babcock Ranch which was built on an old ranch land is described as a "community rising from cattle land and wildlife habitat." Undermining the fact that this is a development on a greenfield, the development is portrayed as something rising naturally out of the wildlife.

The happy community framing emerged through values such as livability, sense of community, wellness, connection to culture and comfort. These values use keywords that appeal to all humans regardless of their environmental interests. Everyone wants to live in a happy community, a community that makes life easier, a community that is safe and will encourage

their wellness. Such new projects are not experimental, or government-led, they are private and making a profit is crucial to their success, therefore they must be framed in a way that would appeal to a range of interests without limiting their lifestyles. Presenting TSC, the press magnifies the fact that sustainability can be achieved without sacrificing comfort– “There is this thinking … that you have to sacrifice to live sustainably, but we've busted that theory.” In Fujisawa SST the easy living is highlighted– “A place which made for ‘very easy living.” While in Babcock Ranch, the focus is on convenience– “It is an old-town feeling with all of those modern conveniences and technology of today.”

The striking similarity of phrases emphasizing values such as safety and the sense of community describing the three communities almost feels like a recipe book that has been implanted by the popular press to tell the readers what a happy life in a sustainable neighborhood means. To emphasize the safety values the press describes Babcock Ranch's efforts as “focusing on the family core, a comfortable and safe place to bring your children.” In TSC the article quotes a TSC resident saying, “I've got two very small kids and the best thing about it is how safe it is for them.” Another article narrated the safety provided by Fujisawa’s technology “50 closed-circuit television cameras in the estate that creates a ‘gateless security system’, giving him more reassurance over the safety of his two boys.” It can be noticed how each time safety as a value is mentioned it is directly assuring the parents that their kids will be safe. These three phrases almost present child safety as a universal feature of a sustainable neighborhood.

A happiness frame also emphasized the sense of community intentionally created through the design of these projects. Some phrases specifically highlight specific inputs such as “many

events that foster the community spirit," "kids can take their bikes and just go around the community" and "Homes are designed to create community". Through highlighting different community features such as the presence of bikes, kids, home design and community events, the above quotes establish an embedded connection between specific design characteristics and the attractive lifestyle values that they create–in this case, a sense of community. TSC is described as a project that offered a "family-friendly environment and sense of community," Fujisawa SST was designed with great efforts to "ensure that residents also enjoy community-style" and Babcock Ranch is described as "a real hometown… a sense of community, a real place." Vague terms such as "a community style" or "a real hometown" are used as well-defined values while in reality, they might be nudging completely different imaginaries for different readers.

Lastly, a resilient community framing is created through emphasizing values such as self-sufficiency and decreased vulnerability. This framing is increasingly attractive with the increasing threat of climate change and natural disasters. Potential residents would appreciate a community that makes them feel less vulnerable towards such threats. So, the press highlights design features that would minimize such threats, which is different from one community to the other depending on their location. In TSC the threat is mostly heatwaves and stand storms, therefore a green belt barrier is emphasized. One article explains, "10-meter-tall trees that purify the air and act as a line of defense against air contaminants… the Dubai settlement is the first in the region — which is particularly vulnerable to extreme heat, droughts, and rising sea levels" In Fujisawa SST with the memory of the Fukushima nuclear disaster the emphasis is on the self-sufficiency of electricity in case of disasters, one article assures the readers "Residents need not fear if there is a natural disaster or power outage - the town can cope with their needs." The location of Babcock Ranch in Florida, a state that witnessed many alarming hurricanes directed

the focus to resiliency against hurricanes and water levels, one article explains “Hurricane resiliency is another selling point…Babcock sits beyond the storm surge at about 30 feet above sea level…In Florida, that’s a virtual mountain.”

The popular press framing of these three projects as happy communities, eco-communities, resilient communities and innovative communities can be heavily influential on the social construction of sustainable communities. Thirty years ago, there might not have been one single imagination of how a sustainable community would look like, but now most descriptions of sustainable communities fall under these four frames. Even though these three communities share nothing in common other than their sustainability vision, the way they are described and framed by the popular press across the globe is increasingly repetitive, despite their different locations, sociopolitical contexts and resources. Table 2 presents quotes describing each community from the articles analyzed and links them to their embedded values and overall arching popular press frames.

With all these frames and attractive idealized values, the popular press is presenting these sustainable neighborhoods as a sort of fantasy. One article describes Fujisawa as “a town seeking the ultimate ideal” and “area for dreamers only.” While Babcock Ranch is described as “a director’s take an eco-utopia.” These continuous buzz words beyond complementing the projects might be creating a trend that is hurting the projects in the long run. Fantasies about an idealized future can be directly linked to poor achievements because they do not generate the energy needed to pursue the desired future (Kappes and Oettingen 2011).

While the press has focused on the high technical solutions, the cutting-edge design and the socially desirable community values, many sustainability narratives have been left out. Attributes

that might also be subscribed under the sustainability concept such as social inclusion, affordability and urban regeneration are missing while discussing all three projects. Through this lens, it might not only be important to understand what is present in the framing of the sustainable neighborhood but also what is absent. The design deterministic approach that associate positive changes with design characteristics disregard needed lifestyle changes that can be perceived as disruptive. The focus on the reduction of needed resources disregards the embodied energy of the projects and their lifecycle compared to existing projects. Lastly, the focus on affordability stemming from lowering the utility bills disregards the initial costs of investments. All these incomplete images of sustainable neighborhoods leave the audience with the cup half full.

Table 2 Quotes describing each community as an example of sustainable community framing by the popular press

Popular Press Frames	Sub Frames	Example Quotes from the popular press		
		The Sustainable City	**Fujisawa SST**	**Babcock Ranch**
The Innovative Community	Business leadership and local impact	"We hope that this will **inspire** new communities that are propagating across the planet to look at us and think 'you can build sustainably and you can build smart."	"The development is expected to be **a model replicable** elsewhere in Japan and overseas."	"Babcock has the potential to **sway developers** toward preservation"
	Knowledge creation and innovation	"Dunn describes the Sustainable City as **a living laboratory**, where they are continually experimenting with new technologies."	'This is a preview of how energy will be brought to life in a sustainable smart town that will open doors to a new **age of hope**.'	"Like other attributes of Babcock, this technology will be monitored and used to **guide** the development of other projects."
The Eco Community	Change of lifestyle	"Within these borders are solar-shaded communal carparks with EV chargers, placed in a way that **forces residents** to walk through at least some of the city to reach their villas"	"It's a base for **inspiring residents** and visitors to the Shonan area, nurturing new lifestyles, and making this lifestyle known to people outside the town."	"Does living in a community designed for walkability and recreation **inspire healthy habits**?"
	Resource efficiency	"The Sustainable City is a private settlement built to use as **little energy** and water as possible."	"Fujisawa SST, goals are set **to reduce carbon**-dioxide emissions and residents are alerted to potential wastage in their power and water use."	"The data on energy savings are encouraging. The 75-megawatt solar field is projected to **save** more than a million British Thermal Units worth of natural gas."
	Harmony with Nature	"The buggy ride takes us past a set of **beehives**, an animal sanctuary with rescued donkeys."	"The sky turns crystal clear and **Mount Fuji** becomes completely visible from the windows of the makeshift pavilion on a former Panasonic home appliance factory site."	"Babcock Ranch, an 18,000-acre community rising from cattle land and **wildlife habitat**. Here and there, you'll come across big old oaks; some 140 of them were saved from earthmovers and replanted."
The Happy Community	Livability and Sense of community	"Alongside sustainability, the city also offered a family- friendly environment and **sense of community** that was rare to find among Dubai's high rises."	"Great care has been taken to ensure that residents also enjoy **community-style** living by encouraging them to depend upon and cooperate with one another."	"It's a real hometown. There's a real downtown … **a sense of community**, a real place."
	Wellness	"A **running track** made from recycled rubber tires and 10-meter-tall trees that purify the air"	"There is also a **Wellness Square** offering eldercare and childcare."	"If you live in a **healthy community** and in a healthy environment, you're gonna live longer, you're gonna be healthier and you're gonna be happier"
	Safety	"I've got two very small kids and the best thing about it is how **safe** it is for them."	"Unobtrusive security cameras followed her and the other pedestrians, monitoring the area to ensure they were **safe"**	"They're focusing on the family core, a comfortable and **safe** place to bring your children."
	Cultural Connection	"Don't forget about the **local culture**, the local habits and the local architecture," says Radaideh. "You can't put a sustainable community in place, and have it look like an alien entity. It also has to work with nature, work with the culture and it has to inspire."	"As far as entertainment and culture are concerned, the Shonan T-Site has something to satisfy everyone. From films to events, residents are spoilt for choice. We foresee the houses being used by **three family generations** in a 100-year cycle."	"He has made a laboratory out of a place where **traditional models** of community and family life are central."
	Convenience and comfort	"There is this thinking … that you have to **sacrifice** to live sustainably, but we've busted that theory,"	"A place which made for **very easy living"**	"They think they'll come in and [it'll be] like George Jetson, but it's not. It's an old-town feeling with all of those modern **conveniences** and technology of today."
The Resilient Community	Self Sufficiency	"The city aims to be a **'net-zero'** settlement, producing all the energy it needs." "This plaza serves as a sort of economic engine room, with some of the revenue siphoned off to entirely cover the city's maintenance and service costs."	"The town's goal is to be able to provide **for its own energy needs** for up to three days in the event of a disaster." "Excess solar power generated by the home can be sold to the town council for extra credits."	"This is the nation's **largest solar storage** system." "Kitson & Partners, he says, is chasing companies large and small. Babcock cannot become its intended **work-live-play community** as long as residents have to commute to well-paying jobs."
	Decreased vulnerability	"10-meter-tall trees that purify the air and act as **a line of defense** against air contaminants…According to Diamond Developers, the Dubai settlement is the first in the region — which is particularly vulnerable to extreme heat, droughts and rising sea levels — to become fully operational."	"Residents **need not fear** if there is a natural disaster or power outage - the town can cope with their needs."	"Hurricane **resiliency** is another selling point…Babcock sits beyond the storm surge at about 30 feet above sea level, Kitson said. 'In Florida, that's a virtual mountain.'"

Conclusion

There seems to be a DNA of market sustainability that is stretching internationally. The terms and phrases repetitively used by the popular press to describe such communities are creating a shared understanding between readers and potential residents about what does it mean to live in a sustainable community. These shared understandings might sometimes be misleading, raising expectations and fantasies, that are often met with the reality of operation, management and failed technological novelties that are rarely discussed by the popular press.

Places are increasingly mediated through communication. The fluidity of urban sustainability as a concept allows it to be portrayed in various and sometimes conflicting imaginaries. This article analyzed the sustainable neighborhood imaginary conveyed by the popular press as a way to understand the expectations being set to such projects. Future research will aim to analyze other imaginaries held by the developers, designers and residents of these communities. There seems to be a big appetite to describe such communities with values that may seem attractive to large sectors of the population even if they are contradicting. A high focus on high tech, for example, can make these communities very fragile in case of system failures, which contradicts their resilient identity. The focus on innovation and change might be also contradicting the focus on embracing tradition and the old town feel. The focus on harmony with nature contradicts the nature of these developments as enclaves. The focus on a sense of community disregards needs for diversity, inclusion and equity. This might be a good time to question what the values of a sustainable neighborhood are, can it be framed as a melting pot of all attractive lifestyle values or there should be a demarcation of contradicting values.

This paper contributed to the notion of urban imaginaries by analyzing the role of the popular press in creating 'The sustainable neighborhood imaginary'. These imaginaries seem to create a shared understanding of what a sustainable neighborhood is and the values that it generates regardless of its location and sociopolitical context. Although attractive, these imaginaries might be threatening the whole notion of sustainable neighborhoods in two ways. First, by linking them with unrealistic fantasies that raise the expectations in a utopia like setting. Second, by focusing on some sustainability narratives and leaving others out, which might be contributing to redefining public notions of sustainability. In a way, this virtual reality created by the communication of urban sustainability is impacting the physical reality.

The role of unphysical messages and media framing in constructing our expectations is a problem that often goes unnoticed when discussing notions of urban sustainability. This article aimed to critically assess such messages conveyed by the popular press. The increased complexity of urban systems and existing uncoordinated frameworks for assessing the design and management of such projects makes assessing them challenging. This highlights a need to start by studying the expectations of such projects. The mass media and popular press are increasingly acting as the popularizing agents of urban sustainability projects. The popular press can have a great role in constructing these expectations by framing the urban imaginary.

To continue the positive transformation of the built environment we should start addressing urban sustainability as a process, not an end state. Such a process is embedded with values, preferences, beliefs that contradict and overlap but have been widely ignored. Understanding these values and acknowledging the contradictions will not make our communities instantly

sustainable but it will help us in understanding how to navigate these conflicts for the sake of a better-built environment.

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Chapter 3. Multiple Trajectories of Neighborhood Sustainability: Participatory Indicators for Dubai's Sustainable City

Abstract

Existing Neighborhood Sustainability Assessment (NSA) tools are widely criticized for a lack of transparency in the selection process of indicators and an unbalanced focus on specific sustainability dimensions. In addition, there is a general lack of commitment to such tool, as they are used by a limited number of projects and many developers find them an add on feature that does not indicate the success of the project. This paper asks how the expectations and use values of the professionals and residents involved in developing, designing, managing, and living in a sustainable neighborhood can shape sustainability indicators that affect progress towards project goals. The paper looks at The Sustainable City (TSC), a newly developed neighborhood in Dubai UAE. The paper uses In-depth go-along interviews with residents, developers, designers and various professionals involved in the development and management of the community. Interviewees were asked to give the researcher a tour of the neighborhood. During the tour they were asked about how they use, perceive, and evaluate the neighborhood. Interview transcripts were coded and used to develop an actor-indicator matrix map, connecting preferred evaluation indicators with different actor groups. The matrix highlights indicators that are commonly agreed upon between various actor groups and suggests potential opportunities to reconcile conflicts in use-values. Findings indicate that when given the opportunity to express their opinion, users and diverse local actors will prioritize different metrics than expert-based models. For example, the residents focused on good governance and maintenance as an indication of operational sustainability, while the design and operation teams focused on maintenance, recognition and

media attention. More importantly, the fieldwork revealed that global NSA tools might be dismissing many indicators that are vital in local contexts, such as resident longevity, while highlighting other indicators that local actors see as meaningless in specific contexts, such as food production. The findings suggest that NSA tools should place greater emphasis on local factors, public engagement and operational concerns. Practically, the paper provides a method that any community can replicate to better understand the different use-values of diverse local actors and establish its own NSA tool. The paper recommends that developers and managers of neighborhoods aiming at sustainability hold focused conversations with diverse local actors to determine context specific indicators that matter to them. Initiating an open conversation about shared community indicators will help align user expectations and result in more meaningful progress goals.

Introduction

The steadily increased interest worldwide in developing planned sustainable neighborhoods has been coupled with an expansion in sustainability accreditation systems, ranging from building rating systems to neighborhood and community rating systems. Proponents of large-scale sustainable neighborhood development argue that this scale allows addressing complex systems such as district infrastructure , food production, and transportation (Fraker 2013; Berardi 2013). However, validating its success is hindered by two main issues: First, the diversity of neighborhoods and site contexts is making it harder to determine what aspects should be measured in each project and how they can be measured, especially post-occupancy. Second, the fluidity of the term ‘sustainable’ coupled with the diversity of actors involved in developing and living in a neighborhood makes it hard to agree on what aspects of sustainability matter the most.

This paper asks how the expectations and use values of the professionals and residents involved in developing, designing, managing, and living in a sustainable neighborhood can be better incorporated into indicators that measure progress towards project goals.

I define planned sustainable neighborhoods as custom-built master-planned mixed-use developments with 500 residential units or more and publicly stated goals of sustainability. Examples of such neighborhoods are Bo01 in Malmo Sweden, Fujisawa Smart Sustainable Town in Japan, and Dockside Green in British Columbia, Canada.

Often sustainability as a label is attached to projects based on design intentions rather than actual performance since it is much easier to claim sustainability than to demonstrate it (Whitfield 2017). The widespread use of neighborhood sustainability assessment (NSA) tools such as LEED-ND and BREEAM Communities may be a good step towards guaranteeing the sustainability intentions of such projects; however, these tools are based on design specifications rather than actual performance of projects (Westerhoff 2016). Modeling and then tracking the performance of a complex system such as a neighborhood is challenging and proves easier in theory than in application, resulting in what is called a 'performance gap' (Boarin et al. 2018). The performance gap was obvious in a study that measured the energy consumption of West Village–a net zero energy neighborhood in Davis, CA–which revealed a need for better understanding of user behavior (Hammer et al. 2014).

The challenge is not only to get such projects to measure their performance, but also to determine which indicators are most valuable on the scale of a neighborhood. Different studies

have pointed out a conflict between building managers, architects, and system assessors, government officials, academics and developers in the way they prioritize sustainability indicators (AlWaer, Sibley, and Lewis 2008; Gan et al. 2017). This makes it critical to acknowledge that the priority levels of NSA tools are largely subjective depending on who is carrying out the evaluation. Often, the actors involved in the process of designing and planning for sustainable neighborhoods significantly influence the choice of using NSA tools (Oliver and Pearl 2018). Recent research has identified that there is a need to understand the multifaceted interests and alignments of sustainable neighborhoods' actors (Hamdan, Andersen, and de Boer 2021a). Studies have shown that plenty of sustainable neighborhoods worldwide do not end up reporting their performance. Barriers related to measuring and reporting performance range from lack of financial and human resources to monitor, fear of accountability, and a general dissatisfaction with the current mainstream indicators that are not usually an indication of success in the eyes of the local community (Whitfield 2017).

To further investigate such dissatisfaction and the potentials of developing an alternative to mainstream standardized NSA tools this paper presents an intensive study of one sustainable neighborhood. It proposes using the priorities of different local actors to reshape how certain elements of these neighborhoods should be assessed. Elaborating on the ability of sustainable neighborhoods to meet their goals validates the applicability of sustainability concepts on the urban scale. Consequently, it is vital to reconsider how these neighborhoods should be assessed. Instead of using a positivistic binary lens, it might be more practical to ask sustainable in doing what, for who and under which worldview.

Background

1. Limitations of mainstream sustainability indicators

Interest in validating the sustainability of neighborhoods has led to the development of many NSA tools that specifically look at the neighborhood scale. The pros and cons of NSA tools are widely known and covered in the literature (Sharifi and Murayama 2013; 2015; Szibbo 2016; Oliver and Pearl 2018; Boarin, Besen, and Haarhoff 2018). NSA tools such as LEED-ND and BREEAM Communities are valued for being easily understood, offering a guide to minimizing impact and maximizing efficiency, and incentivizing more sustainable development practices (Berardi 2013; Sullivan 2014). Although widely used, they are criticized as insufficient due to the absence of long term performance measurement and their focus on energy and transportation needs rather than the social experience of the neighborhood (Szibbo 2016). While examining the use of LEED ND, Garde (2009) concluded that a certification alone cannot guarantee a sustainable neighborhood development, and that the costs of the certification can outweigh its benefits. The Living Community Challenge is another neighborhood-scale sustainability system that focuses on the actual performance rather than the design. However, it is criticized for being idealistic and hard to achieve (Boarin, Besen, and Haarhoff 2018). NSA tools are seen as static without much flexibility towards a diversity of local contexts, development types and phases(Komeily and Srinivasan 2015). Such tools are also criticized for claiming international status while still being unresponsive to many local conditions (Rogmans and Ghunaim 2016).

In general, moving beyond the building scale makes it harder to control some aspects of the performance and to measure performance on all claimed goals. Despite the existence of so many NSA tools, Whitfield (2017) still found that out of 27 sustainable communities worldwide only

six reported that they monitor one or more sustainability indicators. Even while trying to achieve some goals that are relevant to sustainability, such projects are often subject to criticism due to focusing on some aspects of the sustainability agenda while ignoring others (Barton 1998; 2000). There is also a call for expanding what is meant by performance when looking at sustainable neighborhoods. For example, a successful performance is not just a minimization of environmental impacts, but also success in creating livable and social spaces (Boarin, Besen, and Haarhoff 2018). In general, these new neighborhood projects, although ambitious, face many challenges including the lack of monitoring due to the complexity of goals, fear of accountability, and publicizing the failure of performance. Sustainable neighborhoods also struggle with deciding what should be monitored and what counts as an indicator of success due to the complexity of the interdepended issues and the number of stakeholders (Whitfield 2017; Barton 2000).

2. From Occupants to Actors

One consistent theme in evaluations of housing projects, especially ones with a sustainability agenda, is rising focus on users' perceptions, behaviors, and needs. This movement goes back to the 1970s. For example, when Boudon (1972) looked at Pessac -- a housing project designed by Le Corbusier in the 1920s -- he highlighted the conflict between the designer's conception and the user's reaction. Boudon introduced the residents as active and creative agents and emphasized the importance of assessing projects throughout their lifetime. Cooper (1975) did the same in her review of a social housing project in Richmond, California. She emphasized discrepancies between the architect's intentions and users' needs, especially related to privacy, layout, and safety.

There have also been many recent discussions about how important it is to account for the occupants' behavior and perceptions when evaluating the sustainability of projects and specifically residential projects (Berry et al. 2014; Janda 2011; Dezfooly 2013; Dryden 2004; Westerhoff 2016). There is now more understanding that investing in technology and design alone rarely leads to a successful project. Aspects such as leadership, collaboration, setting goals, whole systems technical expertise, and engagement of homeowners are proving to be vital for the success of sustainable neighborhoods (Fraker 2013).

Beyond the focus on the residents, understanding the needs and roles that other actors play in such sustainability projects is vital. Actors in the development process come with different expectations of how the project should look and function. The role and influence of these actors in shaping the projects can vary based on the type of project and the context. In addition, the values and roles of the actors and their relationship with each other can often change through time (Weiss 1987).

The development of NSA tools rarely incorporates a diverse array of stakeholders. In an evaluation of 5 NSA tools, Komeily and Srinivasan (2015) found that none included a comprehensive set of stakeholders in their initial development. All of them excluded the involvement of citizens initially and were mostly expert-led. Sahrifi and Murayama also criticized lack of resident involvement in NSA tools and recommended that residents should be involved in three stages: defining the core criteria; weighting of different criteria; and developing feedback loops to regularly update the system (Sharifi and Murayama 2013).

Recent research has attempted to identify and categorize the range of stakeholders involved in the development of sustainable neighborhoods across time. The primary stakeholders identified in different case studies of housing projects are mostly residents, developers and architects and property managers (Czischke 2018). Hamdan et al. (2021a) listed a range of stakeholders that get involved in different stages of sustainable neighborhood projects from conceptualization to closure. These stakeholders included central governments; local authorities; nonprofit housing developers; philanthropic organizations; R&D institutions; private housing developers; consulting companies; design companies; constructions companies; material supplies; and financial institutions. However, this comprehensive list address sustainable neighborhoods as a linear process that ends with finishing construction without addressing stakeholders involved in operation.

Identifying the ecology of actors involved in projects is crucial because people either tend to romanticize the stakeholders involved in projects or assume that they are only interested in gaining profit. It is easy to assume that all actors are stewards of the environment and have consistent interests, which is far from being true. Even when actors are interested in sustainability goals there are often plenty of economic and institutional pressures that may make It difficult to follow through. There might be also intangible returns such as professional satisfaction of advancing new concepts or enhanced reputations in their fields (Miles, Netherton, and Schmitz 2015). Preserving the environment is often a goal as long as it is convenient and does not conflict with daily routines. However, issues of sustainability are often pushed aside once faced with political or economic constraints. The incorporation of different actors into

design and evaluation of a project does not guarantee its success. What is needed is to go beyond the acknowledgment of actors and start focusing on analysis of their common interests, differences, and how they overlap and contradict (P. Evans 2002). In other words, an analysis of stakeholder alignments and multifaceted interests related to neighborhood sustainability is a highly desired research avenue (Hamdan, Andersen, and de Boer 2021b)

> "*Focusing on sets of actors is useful not because interconnections are the solution in themselves but because it allows us to distinguish patterns of interconnection that enhance livability from patterns of interaction that undercut it. An understanding of urban livability must begin with the analysis of the variations among different ecologies of agents in different urban settings, always looking for possibilities of synergy but always sensitive to the possibilities of negative sum interactions*." (P. Evans 2002, 23)

This research recognizes sustainable neighborhoods as spaces with multiple identities and actor interrelations. They are spaces produced through various overlapping stories (Logan and Molotch 1987; Massey 2005). Hence the assessment and indicators used to evaluate these neighborhoods need to be based on the expectations and use values of different actors.

Methodology

To elaborate on how such an actor-based participatory assessment can be applied, I present the process of developing participatory indicators in a single case study. The paper then discusses what can be learned from this approach. I focus on the assessment of The Sustainable City (TSC), a privately developed master-planned community in Dubai, UAE. The neighborhood has

590 residential units, a school, and a commercial area with other mixed-use services such as a rehabilitation center, an innovation center, and an equestrian club. The first resident moved in during 2015, and the development was fully occupied in 2020 with a population of 3000 residents. As its name implies, TSC is promoted as a sustainability showcase, with 10 megawatts of on-site solar production, urban farming, onsite water recycling, waste sorting, and pedestrianized car-free streets.

I conducted 46 in-depth semi-structured go-along interviews in The Sustainable City with different actors (see figure 1). The interviews were conducted between January and March 2020. The actors I interviewed included residents, local business owners, project developers, architects, landscape architects, town planners, sustainability officers, community managers, sales representatives, and members of the operation team. To recruit the interviewees, I sent a general email to the resident listserv and posted on the community Facebook page. All residents, professionals and business owners who showed interest were interviewed. I used a snowball technique with the initial interviewees suggesting a wider pool of actors. Those who self-identified as professionals that worked on the project or are still working on it were individually approached.

The interviewees were asked to give me a tour of the neighborhood. During the tour I asked the interviewees questions with regards to how they use and evaluate the neighborhood. I specifically asked them *"As a (… role of actor…), what kind of indicators do you think should be considered in the evaluation of the performance of TSC?* A typical interview time spanned between 20 to 90 minutes. The go-along technique or what is also referred to as walking

interview, was selected due to its ability to nudge the environmental memory of the interviewees resulting in a discussion that is highly informed by the landscape and the built environment (J. Evans and Jones 2011). This go-along method has been used in several previous studies rooted in urban and landscape disciplines to answer questions related to attitude, use of spaces, and environmental perception and evaluation(Bergeron, Paquette, and Poullaouec-Gonidec 2014; Kusenbach 2003). This interview style is also a useful tool to balance the power dynamics between the researcher and the community by allowing the interviewees to lead the walk (Bergeron, Paquette, and Poullaouec-Gonidec 2014; J. Evans and Jones 2011).

This method provides an initial window into the use-values and indicators that matter the most to the key actors of the community; however, it has some limitations. First there might be biases in the sample. Individuals who volunteer may be either overly excited about the project or negatively opinionated; focusing analysis on them may leave out an unopinionated majority. Conducting the interviews while walking may exclude potentially interested participants with mobility limitations. Also, the weather can sometimes make it hard to have an outdoor interview. To make the method more inclusive for participants, an alternative indoor location inside the neighborhood was offered for those who preferred a seated interview. In a community with a population of over 3000, the small pool of interviewees (46) might not be representative enough to reflect the use-values of all members. However, it does provide an indication of values that matter the most to many key actors. Since the method and approach were crafted to be context-specific, they might not be able to be repeated in the same way in other contexts. However, they are flexible enough to be crafted in different ways depending on context and needs.

I transcribed and then inductively coded the interviews by indicators' themes while keeping track of different actor identities. I developed a matrix from the coding which highlights all the indicators mentioned in the interviews and separates the actors by type (see table 3). I grouped the actors into six types: Residents; local business owners; designers' team; sustainability team; operation team. and developers. To avoid vagueness whenever an actor mentioned an indicator, I encouraged them to give an example of a question that can help in operationalizing such an indicator. Examples of questions provided are presented in table 4. Overall, the fieldwork highlighted indicators and performance dimensions that might not be present in mainstream assessment systems.

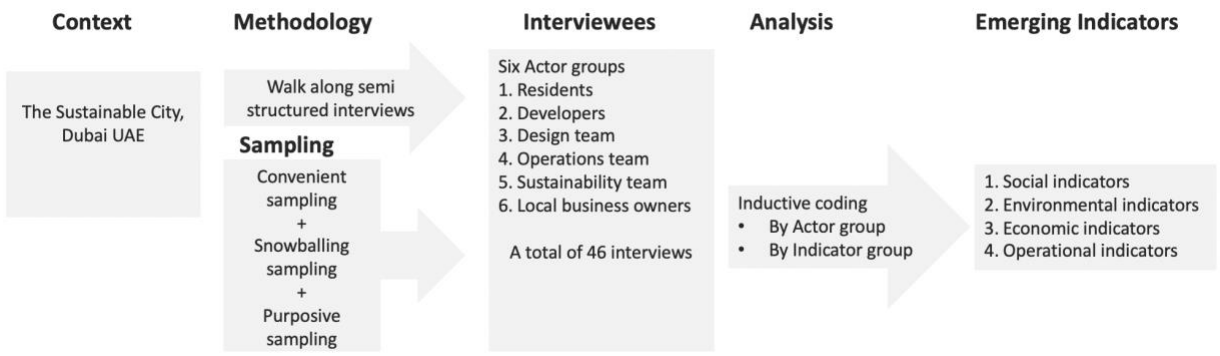

Figure 4 Methodological framework

Findings

The interviews revealed that different actors highlighted a need for diverse socially, economically, and environmentally rooted indicators, which is common in many sustainability rating systems. However, the interviews also revealed a fourth group of indicators which I have termed operational indicators. Such a group reflects indicators that can mostly be validated through the operation and management of the community in the long run. Operational indicators include factors such as frequency of maintenance, good governance, on-site services, and

resident retention. Many of such indicators can change drastically throughout the lifetime of the project; hence they are not one-time indicators but can continuously reflect the value of operational success. The new indicators that emerged in my fieldwork reveal that people might care about indicators other than those dictated to them by experts. Overall, the findings reveal that within the context of TSC, there are 30 indicators that are deemed important by different actors.

In terms of social indicators, different actor groups emphasized a sense of community and ownership most heavily, but for different reasons. For the residents, a sense of community meant knowing your neighbors, interacting with them and depending on them. A sense of community was also presented as an indicator of reduced consumption. One resident explained, *"It is about maximizing the opportunity of a shared society…For two villas to be friends and buy one lawnmower and share it, that would be helpful.*" Actors from the design team stressed that a strong sense of community can attract people to a better lifestyle. "*It draws people to a lifestyle; it is a positive spiral. To create a community that is sustainable is one thing, but to create a community where its members have a sense of pride. This is what makes it different."* Actors from the operation team explained that a sense of community nurtures a sense of ownership which benefits the whole community through mobilizing social responsibility.

Among social indicators, inclusion and diversity were the least popular indicators, only mentioned a few times by residents and the sustainability team, and then with a focus on cultural inclusion and diversity rather than social equity. A member of the sustainability team explained *"for inclusion, it is good to ask how many nationalities do I have here."* For the residents,

inclusion was mostly about being open to outside visitors. One resident gave an example, *"It is more about the number of non-residents visiting."*

The most frequently mentioned environmental indicators were those associated with resource consumption. Energy, water, and carbon footprint were the main consumption indicators stressed by different actors. The sustainability team picked Energy Use Intensity (EUI) per square meter per year as a valid indicator. Both the residents and the sustainability team agreed that gross energy use and direct on-site production of solar panels would also be a good indicator. The Interviewees focused on the importance of measuring water consumption on an individual basis along with measuring the greywater output of the community as a whole. Operational and embedded carbon footprint were also importantly agreed-upon metrics. Vegetation as an indicator of sustainability appeared across different actors. In contrast, food production was only seen as an important sustainability metric by members of the sustainability team.

The single economic indicator that the majority of actors agreed on was the occupancy rate. While the residents were more concerned with indicators that economically benefit them like savings in living costs and affordability all other actors stressed the importance of occupancy rate as an indicator. One of the developers explains, *"The occupancy rate is the most important KPI for any developer, am I selling hotcakes or not."* Members of the sustainability team also agree on this, *"we can be great on sustainability but if we don't have people here it's useless*." An economic indicator that was deemed important only by residents was affordability. Residents seemed to agree that affordability is vital to ensure the longevity of residents, "*Yes sustainability is an element that people consider but I do not think it is number one. Your wallet*

is number one." Affordability as an indicator seemed to be more important to residents who rent their units rather than residents who own their units. Owners seemed to focus more on cost savings and return on investment.

An operational indicator that seemed to matter to the majority of actors is resident satisfaction. One resident explained, *"Satisfaction can be how comfortable people are, how relaxed people are, do they feel more or less at home when they are around a community?"* In contrast, good governance as an indicator was only mentioned by residents among all different actors. For residents, good governance meant management transparency and feeling heard. One resident explained, *"perhaps taking a more civic stand, maybe having a community town hall, listening to the community members rather than dictating them."* Transparency appeared specifically within two directions: the transparency in decision making and community performance data.

Although many of the indicators mentioned in the interviews are already present in NSA tools, others such as resident longevity, environmental attitudes and sense of ownership are rarely mentioned in these rating systems. By comparing the list of indicators that emerged from the interviews to indicators used by LEED-ND and The Living Community Challenge it was evident that almost 50% of the indicators proposed by the actors of TSC are not present in these NSA toolsets. The findings indicate that when given the opportunity, users and diverse local actors will prioritize different metrics than expert-based models.

Table 3 An analysis of indicator preferences by actor type. These six groups agreed on very few indicators of sustainability.

An indicator is mentioned by more than 4 actor groups. An indicator mentioned by the actor group. A highly stressed indicator was mentioned by more than 50% of the actor group interviewed.		Residents	Local Business owners	Design team	Sustainability team	Operation team	Developers
Social Indicators	Sense of community	■		■	■	■	▒
	Sense of ownership	▒			▒	■	▒
	Sense of safety	■				▒	▒
	Walkability	▒		▒		▒	
	Wellness	■	▒		▒		
	Inclusion and diversity	▒			■		
Environmental Indicators	Energy production and consumption	■		▒	■	▒	▒
	Water consumption	■		▒	▒		▒
	Waste production and diversion	■		▒	▒		
	Food production				▒		
	Air quality	▒					
	Materials choice and lifecycle	▒		▒			
	Carbon footprint	▒		▒	▒		▒
	Impact on ecosystem	▒		▒			
	Environmental attitudes	▒	▒		▒		
	Vegetation	▒	▒	■	▒		
Economic Indicators	Savings in living expenses	■		▒	▒		
	Affordability	▒					
	Commercial viability	▒		▒		▒	▒
	Local job opportunities	■			▒		
	Occupancy rate		▒	▒	■	▒	■
	Local business support		■		▒		▒
Operational indicators	Resident satisfaction	■		▒	■	■	■
	On-site amenities and services	▒	▒		▒		
	Recognition and media attention			■		▒	
	Local benchmarking				▒	■	
	Community maintenance	▒		▒			
	Resident longevity	■	▒			■	
	Good governance	■					
	Continued Technical advancement	▒				▒	

Table 4 Sample metrics provided by the interviewees for each indicator category

Social Indicators	
Sense of community	· Number of social events initiated by the management · Number of community groups and communication platforms · Rate and distribution of social spaces that allow interaction
Sense of ownership	· Are community members proud to be part of the community? · The number of events and activities initiated by the residents · Are residents committed to shared community goals and vision?
Sense of safety	· Willingness to let kids play outside alone
Walkability	· Number of steps per day · Time spent walking outdoors · Ability to access basic services on foot
Wellness	· Number of health and wellness facilities · Number of health and wellness facility visitors
Inclusion and diversity	· Number of different nationalities in the community · Number of outside visitors using community facilities
Operational indicators	
Resident Satisfaction	- The resident continued satisfaction from management - Resident prolonged comfort in the community
On-site amenities and services	- Number of trips made to outside services - Time spent commuting to outside services
Recognition and media attention	- Number of awards - Number of media features
Local benchmarking	- Overall metrics compared to neighboring communities
Community maintenance	- The ease and efficiency of requesting maintenance services - The frequency of maintenance work to upkeep the community
Resident longevity	- The rate of resident turnover
Good governance	- Management transparency - Open communication channels - Community participation in decisions
Continued technical advancement	- Rate of optimization experiments - Rate of new innovations coming out of community

Environmental Indicators	
Energy production and consumption	- Energy utilization index - Energy produced by the community - Energy consumed by the community
Water consumption	- Water consumption per person and household
Waste production and diversion	- Waste produce per household - Rate of waste diversion from landfill
Food production	- Amount of food produced on-site
Air quality	- The quality of air onsite vs. off-site - Number respiratory problems within the community
Materials choice and lifecycle	- The use of local building material - The toxicity of building material - The lifecycle of building material
Carbon footprint	- Annual and embedded carbon footprint of the community
Impact on ecosystem	- The biodiversity on site - Percentage of native plants
Environmental attitudes	- Changes in the resident's environmental awareness - Number of awareness events in the community - The number of people adopting pro-environmental habits after moving in.
Vegetation	- Vegetation ratio - Amount of water used for irrigation - Amount of fertilizers and chemicals used
Economic Indicators	
Savings in living expenses	- Savings in utility bills - Savings due to benefiting from local amenities
Affordability	- Unit price compared to similar communities
Commercial viability	- Changes in property value - Return on investment - Perceived value for money
Local job opportunities	- Number of local business owners - Number of on-site jobs created
Occupancy rate	- The rate of occupied residential units through the project lifetime
Local business support	- Percentage of residents using local shops; - Number of management incentives to support local businesses

Discussion

1. Contextualizing Indicators

These findings highlight how mainstream global indicators may not be fit local contexts, and that engagement of local actors may be necessary to produce the best overall set of sustainability indicators for a given project. Project indicators in general can be seen as metrics of success. A successful project should fulfill the use values and needs of various actors involved as well as more universal needs such as for carbon-neutral development; therefore the process of producing indicators should be rooted in local context and different actor use values as well as global concerns.

A sense of community is strikingly an important indicator to all different actors in Dubai because it speaks to Dubai's expatriate population base. When asked how a sense of community can be measured one resident explained, *"I think it has a lot to do with the social activities. How many activities do you have in this property compared to other properties*?" Another resident added, "*I would look at the way people interact here and the opportunities for interaction compared to other places I lived in."* This reflects how a sense of community is increasingly an add-on amenity that needs to be carefully planned into the design of communities in Dubai and probably many other places. For the management a sense of community also enhances the sense of ownership. This is an important indicator because it reflects how much residents are involved in planning for social events, making the management of the community easier. The community manager explains, "*We wanted people to build a sense of community, … Now we got a good foundation… a committee of the residents [can] take care of the social events."* There seems to

be an agreement that a sense of community matters a lot in such context. For expatriate residents, it provides a warm community base away from their home countries, for actors working in managing and operating the community it can be mobilized for smoother community management.

The highly segregated semi-gated nature of neighborhood development in Dubai explains why indicators such as inclusion and diversity were not popular among different actors. In a highly transient context, actors seem to anticipate a diversity of culture rather than income in their neighborhood.

Vegetation as an indicator of sustainability in Dubai might be controversial considering the hot climate and lack of fresh water in Dubai. For residents who are mostly western expats, they appreciated the 'Lush' feeling that "makes Dubai more livable" as one of the residents explained. In contrast, some residents were concerned with the high-water consumption of vegetation, *"let's ask what the water usage is. Yes, you can grow a garden but how much water does it use in a place where water is not available?"* For the design and operation team, they were more concerned with the needs and impacts of the vegetation in place. The landscape architect explained that considering the maintenance needs of vegetation and its impact on the ecosystem is vital, *"the type of plants whether they are native or not, the type of soil… the maintenance frequency and schedule, the needs to fertilizers and chemicals, how this affects the actual economics of things as far as taking care of it".* Members of the operation team seemed to be concerned with the operational costs of vegetation, *"We have a lot of biennials, so we need to always replace them. It is a lot of labor, waste and carbon footprint going and coming."*

Although all of the above actors mentioned vegetation as an indicator, it was evident that once asked to explain more they all had different concerns of what needs to be measured.

The harsh climate in Dubai can also explain why food production was not seen as an important indicator. TSC diversifies its food outputs by hosting community gardens for residents along with biodomes and container farms for startups. Although residents appreciated such initiatives, they did not think that measuring food output is critical. For some residents it was more of social activity, "*Farming is helping people socialize.*" Local food production as a road to self-sufficiency was not seen as possible in Dubai due to the harsh weather. According to one of the residents, *"this place can't exist if there is no massive import of food and water."* Having food production as an indicator is common in many rating systems, yet its application in harsh climates can be more of an aesthetic add-on than a sign of sustainability or a real contribution to food self-sufficiency.

The competitive housing market in Dubai can explain why the occupancy rate was deemed as the most important economic indicator. When speaking with different actors, the occupancy rate was always put with reference to neighboring communities. *As one of the developers explains, "for you to be able to tangibly quantify the success of what you have developed, it is how it is occupied in comparison with your neighbors*." Occupancy rate is especially important for the developers of TSC, because their business model depends on generating money from renting a portion of the units throughout out the lifespan of the project. For the residents, they appreciate the chance of building a community with the neighbors in the surrounding occupied units. Even for local business owners, occupancy rate matters because it ultimately provides a customer base

to the local businesses. As an indicator, the occupancy rate appears to be a simple but vital indicator for so many actors.

Affordability was an indicator that mattered only to tenants not owners. This can be self-explanatory since the other actors are potentially more interested in a higher exchange value such as resale or return on investment. Affordability to tenants is especially important for expats. One resident explained, **"***People come out of their country to Dubai to earn more. Otherwise they would stay home. So, if it is not going to be financially beneficial it won't work. You can live in an amazing community for 5 years but go home with nothing, but you can live somewhere else that is not as nice and go home with some savings."* In contrast, expat residents who own the units are more interested in a return on investment as an indicator. One owner justifies, *"It is expensive as a one-off ticket, but it is cheaper to maintain. It is like a good return back on investment."* Another resident added, *"When you look at your [utility] bill you will know that in the range of 5 or 6 months you are making your money back."* This shows that even for the same actor group there might be some division, for owner residents they are more interested in the long-term return on investment versus renter residents who are more interested in affordability.

Indicators like resident retention or longevity can be important for TSC due to its location in an expatriate-dominated country. These would also apply to many projects in other global cities. A member of the operation team highlighted such need, *"Longevity, we should track how long people are staying here."* The turnover is perceived as something that affects the sense of the community. The community manager explains, *"I think the amount of people that move in and move out is not sustainable."* For the residents, resident retention is important because it's about

maintaining their connections, *"When we first arrived here, we made friends, but [it is] Dubai's nature, people leave and then you suddenly left to start from scratch again."* For the business owners, resident retention is about maintaining their customers. The owner of a local coffee shop explains, *"In December, a lot of people left …It affected me… New tenants will take time to make us their habit."* While the occupancy rate can stay stable, a high rate of resident turnover can be an indication that time, energy and resources are being wasted in reestablishing new community norms, new local business customers, and new neighbor friends. Resident longevity might not be an indicator that comes to mind when discussing sustainability, but for the case of TSC, it does impact all the pillars of sustainability – the economic, social, and environmental performance.

The dominance of operational indicators reveals that actors have developed an experience-based awareness of the importance of managerial decisions post-operation and how such decisions can be very critical to sustainable performance. Such operational indicators may not be common in mainstream NSA tools because these cannot be validated except after operation and are hard to measure.

Satisfaction as an indicator for example is multifaceted. Some of the residents presented much more solid explanations of what satisfaction means to them than others. One resident explains, *"it is important to see if people are happy, comfortable, enjoy homes, enjoy the actual community spirit, and [are] happy with the management."* In contrast, *for a* member of the operations team *"community satisfaction is [so] wide a feeling I cannot put my fingers on it.*" A member of the sustainability team tried to further break it down, *"Of course the happiness,*

satisfaction and well-being of the residents. You see that and you feel it with much lower complaints." Few residents doubted the importance of satisfaction as an indicator due to its subjectivity, *"[Universal] resident satisfaction is never going to happen. There [are] always going to be people that grumble. They are the ones that you can hear the most."* This indicates that different management and governance models of sustainable neighborhoods require different indicators. When neighborhood development is corporate-driven, the residents might situate themselves as the customers of the management who demand customer satisfaction.

Another operational indicator theme that can be linked with the specific management model of the case study is good governance. This was widely mentioned by the residents as a key indicator for a sustainable community. The most important aspect of good governance for residents was transparency. One resident clarified, *"I would like to see some data about our consumption telling us what we use. Sharing of information: to know how much we are doing and how much more can be done."* Another resident added, *"Maybe there should be more transparency around decisions…We don't necessarily know why the changes were made."* Good governance seemed to be rather vital for most of the residents as a determinant of resident retention, "*If people are unhappy and they feel unheard then they won't stay."* Good governance might be a theme of global sustainability practices, but it is rarely highlighted as an indicator of success in NSA frameworks.

There is a need to rethink some of the standard indicators that come to mind when discussing sustainable neighborhoods worldwide. Although something like local food production is often promoted when planning for sustainable neighborhoods, the interviews showed that metrics

associated with it might be more about socialization, aesthetics, and resource consumption than the quantity of food. In other instances, the residents might be more interested in metrics such as good governance that might not be considered by design and sustainability professionals. This highlights the need to localize indicators and include diverse actors when discussing indicators of success.

2. Learning from local nonmainstream indicators

Many of the indicators that different actors emphasized as important are rarely highlighted as vital within mainstream indicators. In the case of TSC, the majority of indicators emphasized by the actors are important due to the context of the case study. However, some of the indicators emphasized by the actors shed light on vital issues that can affect the performance of sustainable neighborhoods worldwide, yet rarely considered by mainstream indicators.

Comparing environmental performance with local benchmarks—rather than abstract international norms—was a common theme between different actors. One resident explained, *"you would want to take a look at consumption …compare it to different communities in Dubai and establish a metric or scoring system from it."* A member of the sales team explains the significance of local benchmarking as follows, *"There are lots of things that you can measure, but it becomes more significant in what you are measuring it against."* This highlights a need for requestioning how regional points work in global indicator systems through offering regularly updated local benchmarks.

Resident behavior can greatly affect the performance of many sustainable neighborhoods. As one resident puts it, "*The infrastructure is sustainable, but it is really behavioral dependent."* This

might be difficult to measure in terms of metrics. Discussing commitment can stretch from efforts for education and awareness to attracting residents who already subscribe to the values of the community. One of the sustainability officers explains "*I think you need to find people that actually want to do it. So social commitment of the community towards the goal should be an indicator.*" While another sustainability officer advocated for measuring efforts invested in education and awareness, *"Let us look at the impact of knowledge sharing on energy and water demands…We started out with certain targets based on the design, and those targets continued to improve because of demand management due to awareness from the residents' side."* The above statement explains that performance post-occupancy can be drastically different depending on the behavior of the occupants. Hence, the success of sustainable neighborhoods should not be verified except after occupancy.

Creating sustainable neighborhoods and communities is a complex and challenging mission. One way of untangling such a mission is to stop looking at the built environment as the final deliverable of the mission. Assessing the built environment throughout its lifetime performance is what is needed to verify the success of the mission (Boudon 1972). Most of the already established sustainability rating systems provide a robust base for designing sustainable communities. However, they should not be the only tool used to validate sustainability, especially performance-based metrics. In many cases, when developers decide to embrace a sustainability accreditation system, they become driven by the numbers not by the output behind it. One of the developers interviewed justified his lack of interest in the accreditation system saying "*We don't believe in gold and platinum market ranking indicators. They assess features that may be useless in our context."* As humans, we optimize for what we measure, which can

lead to adding design elements that prove useless after operation in certain contexts just because of the points gain. The well-known Goodhart's law summarized this problem perfectly by declaring, "*When a measure becomes a target, it ceases to be a good measure."(Strathern 1997).* The human mind wants to win whatever game is being played and this is what makes rating systems trendy. In this paper, I highlighted how inputs from various local actors could shape a post-occupancy NSA tool. Assessing neighborhood sustainability post-operation will help experts learn from the initial design decisions and understands how it impacts different actors.

Conclusion

This research revealed three important findings. First is the need to establish benchmarks for sustainability performance that reflect the desires and needs of local actors. In the case of TSC, measuring and comparing aspects such as consumption, a sense of community, maintenance, satisfaction, and resident turnover seem vital to validate performance. For many of the NSA tools, this comes through offering local credits or weighting criteria. This example shows that maybe existing efforts to localize global NSA tools are not enough. Global NSA tools can omit many indicators that are vital in local contexts while highlighting others that are unimportant or meaningless in some contexts. For each neighborhood, their needs to be solid local benchmarks for indicators to be meaningful.

Second, my analysis revealed that almost in all pillars of sustainability there are few common indicators that almost all actors are keen on measuring. Also, the actors can agree on the importance of one indicator but still be driven by different motives. These dynamics are

important to consider within community processes to develop indicators that matter for the majority.

Third, it was clear that within each project there will be indicators that only matter to one set of actors but still can have a huge impact on the community as a whole–such as good governance and affordability in the case of TSC. Giving special attention to all voices of the community and having discussions of why such indicators can impact the performance of the community as a whole can help unite different worldviews around common goals. Using global sustainability goals such as SDGs as a reference can help community members understand the importance of certain indicators, even if they were not originally endorsed by all actors.

Many of the indicators discussed in the paper are outcome and operation focused rather than design focused. In comparison, many global NSA tools provide design guidelines and focus on pre-occupancy accreditation. Hence, the indicators presented in this paper are not a comparison with or a replacement of established NSA tools because the intent is different. For example, adding public and green spaces is important for accreditation pre-construction, but what matters at the end is whether the people are using such spaces and whether they are contributing to a sense of community or not.

For the case of TSC, future assessments should focus on energy production and consumption, a sense of community, occupancy rates, and resident satisfaction as agreed-upon indicators by various actors. The new indicators that emerged in my fieldwork reveal that people might care about indicators other than those dictated to them by experts. Aspects such as return on

investment, and resident longevity highlight that there may be a need to listen more to the needs of different actors when trying to demark what does a sustainable community mean.

What this paper presents is a call for more attention to localization, participation, and implementation when it comes to indicators of sustainable neighborhoods. In contrast, sustainability accreditation systems emerged as the product of an expert-dominated field with a global ambition. The paper recommends that developers and managers of neighborhoods aiming at sustainability hold focused conversations with diverse local actors pre- and post-operation to determine context-specific indicators that matter to diverse local actors. Initiating an open conversation about shared community indicators that matter to different actors will assist in aligning expectations and improving progress goals and indicators.

Through a participatory approach additional priorities can emerge from those undergoing the experience of developing, designing, operating, and living in a sustainable community. Including more voices can add a range of indicators rarely considered by experts. The indicators that emerged from this case study might not work for other case studies. Yet, the methodology can be replicated by other communities to better understand the different use-values of diverse local actors and establish context-specific indicator systems.

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Chapter 4. Five Controversies of Developer-Driven Sustainable Neighborhoods: A different approach to post occupancy evaluation

Abstract

The increased involvement of the private sector in building sustainable communities is often met with skepticism from sustainability experts and academics. While environmental experts and engineers focus on the technical design features and green rating of such projects to validate their sustainability, data is sometimes lacking, and social scientists may criticize projects' social impacts and portray them as greenwashing sustainability. More holistic and evidence-based attempts to understand post occupancy performance in a way that gets at core obstacles to sustainability are needed. This paper investigates the fundamental challenges of the market model of sustainable neighborhoods by presenting a qualitative post-occupancy evaluation of a privately developed sustainable neighborhood. The method focuses on mapping controversies, identifying core challenges through the eyes of different actors and asking how such challenges can be addressed in future development. I interviewed 46 actors in The Sustainable City – a 590-unit residential development in Dubai. Through inductive analysis, I mapped five main controversies: The Branding Controversy; The Innovation Controversy; The Behavior Controversy; The Governance Controversy, and The Market Controversy. Such controversies appeared to be fundamentally associated with the performance of privately developed sustainable neighborhoods. I analyze and discuss the different actor positions related to each controversy and develop recommendations that can limit the rise of similar controversies in future developments. Recommendations include tax deductions for residents who choose to live in a sustainable

neighborhood, a code of conduct to regulate behavior in sustainable neighborhoods, and resident representative committees to enhance the civic agency of the residents.

Introduction

The early generation of sustainable neighborhoods such as Bo01, Vauban, and BedZED were all initiated by governments and public institutes to act as models for best practices. Lately, there has been an increased emphasis on the private sector's crucial role in enabling sustainability practices through enabling investments and fostering innovation (Alkhani 2020).

The increased diffusion of sustainability practices along with political pressure through regulations and incentives has led to the emergence of new private models of sustainable neighborhoods such as Dockside Green in Canada, TSC in Dubai, and Fujisawa SST in Japan. This model of market sustainability is not meant any more to attract the early adopters; in contrast, it is based on heavily marketing and place branding campaigns to stand out as trendsetters or gain 'The Sustainability Edge' (Greenberg 2015). Such a process might be the early phase of diffusing sustainable neighborhoods to the real estate market, moving the concept from early adopters to the majority (Rogers 1982). Sustainability experts and engineers usually focus on the technical design features and green rating of such projects to validate their sustainability intentions pre operation. In contrast, social scientists have been widely focusing on the social process and impacts associated with such projects, criticizing them for greenwashing sustainability (Sze 2015; Greenberg 2015; Günel 2019). The ongoing increased involvement of the private sector in developing and building sustainable communities demands more hybrid evidence-based attempts at understanding how such projects perform post-occupancy and what particular challenges they face. The paper asks what challenges are associated with market-driven sustainable neighborhoods through the eyes of different actors and how such challenges can be addressed in future development.

Very little monitoring and evaluation of sustainable neighborhood development post-occupancy is occurring (Whitfield 2017). The few extensive post-occupancy evaluations of older sustainable neighborhood developments have focused on consumption related performance metrics such as energy, transportation choices, along with urban design and development process with some focus on the social agenda (Fraker 2013; Francis 2002; Corbett et al. 2000; Hodge and Haltrecht 2009; Schoon 2016). Many of those reviews have indicated an increasing role of social and political exchanges in impacting the performance of the projects, such as the role of regulations, residents' preferences, and management decisions. As the development of sustainable neighborhoods becomes more mainstream, conflicts related to residents' values, social and political dynamics and will probably increase because the sustainable neighborhood is presented as a market product that may or may not attract residents with similar values. This is rarely the case in eco villages which act as a counterculture, initiated, designed, and inhabited by a group based on shared values (Smith 2002).

In reviews of sustainable neighborhoods, social and political dynamics are mostly presented and understood as hurdles in the making of sustainable neighborhoods (Mehta 2014). In this paper, I present the social and political dynamics that impact the performance of sustainable neighborhoods as 'controversies.' I define *controversies* as situations of disagreements between different actors that can impact the performance of a sustainable neighborhood (Latour 1987; Venturini 2010; Yaneva 2011).

By looking at sustainable neighborhoods as a process and ecology of actors, I understand how the social, political, and technical aspects of a sustainable neighborhood are intertwined. The

approach focuses on the complexity of different views rather than narrowing the idea of a sustainable neighborhood into solid metrics. This research recognizes sustainable neighborhoods as a space with multiple identities and the product of actor interrelations; it is a space produced through various overlapping stories of technical and social dimensions (Massey 2005). Hence the post-occupancy assessment presented in this study aims to trace and map those various dimensions and stories.

Background

1. Evaluating neighborhoods through mainstream post-occupancy studies

Attempts to evaluate projects post-occupancy--what is now called post-occupancy evaluation (POE)--first started to emerge in the late 1960s. The focus at that time was mainly university dorms. Evaluations focused on understanding the performance of the building from the users' point of view. The first time the term POE appeared in a publication was in the mid-70s in an analysis of hospital buildings (Preiser et al. 2018). The interest in evaluating buildings expanded from hospitals and dorms to social housing projects. Many great attempts of evaluating housing in this way emerged in the 1970s. Becker (1974) evaluated a number of multifamily housing projects and generated comparative data on users' choices, physical characteristics and management decisions. Cooper (1975) evaluated Easter Hill Village as a case study of social housing, highlighting discrepancies between the architect's intentions and the user's needs. The conclusions made from interviewing both architects and residents did not just inform the physical design, but it also contributed to the sociology of residential architecture and the social consciousness of architects (C. Cooper 1975).

Many other publications have contributed to expanding the lenses used for evaluating projects, although some of these publications are not necessarily labeled as POE studies. Boudon's (1972) evaluation of Pessac – a housing project designed by Le Corbusier in the 1920s– highlights a different lens for looking at POE's. Instead of assessing the design performance physically and socially, Boudon structured his assessment to highlight the conflict between the designer's conception and the user's reaction. Boudon introduced the residents as active and creative agents that contributed to the design. Brand (Brand 1994) evaluated buildings by examining their transformation through time, moving beyond the preoccupation with space and physical performance. Brand tracked how users altered buildings formally and socially, for example by moving walls, repartitioning units, and changing facades. The longitudinal account of buildings demonstrates how architects, contractors, homeowners, and professionals involved in building, financing, contracting, and maintaining the buildings all contributed to creating buildings that poorly adapt to the needs of the users (Brand 1994). Such examples might not be POEs in a strict sense of the term but similarly illustrate how the built environment can be evaluated from the subjective perspective of the user.

Through time and further development, calls to make POE more systematic and rigorous emerged from the social sciences, e.g. Arnold Friedmann's statement that *"if we are to improve the practice of design, our appraisal must be careful and systematic"* (Friedmann 1978, 2). POE studies moved from a focus on user satisfaction to a full set of criteria including clients, process, environmental and historical context with data triangulation (Friedmann 1978). The most commonly used definition of POE is "The process of evaluating a building in a systematic and

rigorous manner after it has been occupied" (Preiser et al. 2015), which reflects the move towards systematic data-driven project evaluations. POE is now criticized by some for being a technocratic exercise to measure physical performance using ready quantitative methods to optimize economic outcomes and user comfort (Brown 2018).

One of the main original functions of POE was the accumulation of information to utilize it to improve the building industry and benefit different stakeholders involved from users, architects building managers and owners (Preiser et al. 2015). However, we rarely see POE that brings information that can be of value to the different stakeholders. Cooper (2001) criticized the body of literature on POE for never critically exploring the relationship between designers, decision-making management, and other stakeholders. More importantly, through the collection of information, there is always the question of what priorities should be evaluated, whose priorities will be taken into consideration, and how the data will be used.

Despite all the academic progress in POE studies, evidence still suggests that POE's use across the architecture industry is still low with exceptions of some elite architecture firms (Hay et al. 2018; Eke, Aigbavboa, and Thwala 2013; Hadjiri 2008; Brand 1994). Upon interviewing 12 architects, Hay et al. (2018) found that POE is defined differently among practitioners, and its importance range from commercial values, field development, and legitimacy. Hay et al. revealed dissatisfaction among practitioners who expressed a need to start moving beyond the preoccupation of limiting POEs to energy efficiency. The practitioners highlighted a need to start engaging with users to understand how occupants experience and evaluate the space (Hay et al. 2018). The barriers to use POE are mostly related to high expenses, fear of accountability and

risking reparation (Oseland 2018). POE studies are more common for commercial, health, and office buildings than residential buildings. This is because such buildings are developed by bigger organizations and chain developers, hence there are more incentives and funds available for measuring how the building performance can affect the occupants' health or productivity (Brown 2018).

In contrast, there are fewer attempts at conducting extensive POEs on housing projects, and the same applies for sustainable neighborhoods (Whitfield 2017; Fraker 2013; Barton 1998). This leaves the sector with minimum insight into how projects worldwide are meeting their targets, whether the design and management strategies used in them are successful, and whether these projects are meeting the users' demands and expectations (Leaman and Stevenson 2010). This might be explained by the difficulty of gaining access to people's homes, the lack of incentives, and organizational structures less dependent on professional facility management. This leaves us with little known information on the actual performance of sustainable neighborhoods beyond a few flagship projects.

The idea of evaluating the built environment is still, to a great extent, unexploited and can be of great benefit if put to maximum use. A POE that links research, design, and management while measuring occupant's perceptions against the original design can provide plenty of lessons learned. A well-developed POE can lead to, improving designs and commissions of future projects, improving user requirements and management procedures, target refurbishments, and provide knowledge for design guidelines and regulatory prosses (Whyte and Gann 2001). A POE

that is capable of taking the long-term changes and the different consequences for building developers, designers, owners, and users can have a great influence on shaping future decisions.

2. Sustainable neighborhoods through actor-network theory and controversies

Actor-network theory (ANT) is an approach that is increasingly used by academics to look at and evaluate urban development projects. The ANT approach advocates for understanding people together with their technologies as one big social network that influence each other. ANT can potentially be useful in evaluating sustainable neighborhood development projects. The use of ANT stems from a need for a more situation-based analysis of urban projects that would look at the various entanglements of every project instead of solely relying on stable systematic technical information. The use of ANT allows looking holistically at the interactions between different urban systems through various project phases while asserting the importance of perceptions and actions performed by different actors in a network. It stems from an understanding that actors in a network are constantly transforming while having different agendas and interests. ANT emphasizes the lack of boundaries between social, natural, and technical worlds, making it ideal for assessing urban projects with a sustainability agenda (Rydin 2013).

Many studies have used ANT in the past ten years to analyze urban and design projects. Jones and Card (2011) employed ANT to explore the different understandings between actors of social architecture; their analysis highlighted tensions, rejections, and uncertainties regarding the expected outcomes. Ryding (2013) used ANT to understand the role of planning practices in regulating low-carbon development, finding that energy modeling and assessment systems were

used as a scientific evidence to block discussions and negotiations of constituent element in the development. Kaeeholm (2013) used ANT to investigate how building types are produced through different actors' practices and power relations. More recently, ANT has been used to decode urban development dynamics on the neighborhood level (Cvetinovic, Nedovic-Budic, and Bolay 2017).

Mapping controversies is one methodological approach of ANT (Latour 1987). As noted previously, controversies can be defined as situations of disagreements between different actors; they are not necessarily fierce disputes but simply shared uncertainties (Venturini 2010). Yaneva (2011) defined controversy as *"The series of uncertainties that a design project, a building, an urban plan or a construction process undergoes; a situation of disagreement among different actors over a design issue."* (Yaneva 2011, 122). Controversies describe various issues that administrators, architects, users, and a range of other actors deal with on a daily basis. Actors are defined as entities that play various roles in making and using the project. Mapping controversies is about investigating the web of connections and interrelations between different points of view from different actors (Latour 1987). Mapping controversies focus on the actions conducted by different actors while looking at their implications and changing positions (Yaneva 2011). Hence, mapping controversies allows looking at projects as a dynamic and complex cultural ecosystem, rather than a result of a linear or static construction process (Mehta 2014).

Mapping controversies look at projects as a whole without separating technical problems, political forces, and budgeting challenges. This makes it ideal as a fresh lens of evaluating sustainable neighborhoods, since many evaluations are usually criticized for being remote from

the user's daily lives, the local politics, and culture that might shape the building performance (Till 2009). There is still much room for theoretical and practical development within the scope of evaluating sustainable neighborhoods beyond basic quantitative consumption metrics. The neighborhoods are complex systems that include a range of smaller systems of environments. There is a range of users and contributors to the built environment and excluding them when evaluating the projects can lead to missing a range of priorities. Using mapping controversies as a method to evaluate a sustainable neighborhood may not uncover the technical problems of the design. However, it can shed light on issues arising from interactions between the entire web of actors, and so open a dialogue that can positively impact current and future projects.

Methods and Case Study Introduction

I use a case study approach to map controversies that reveal post-occupancy challenges in The Sustainable City (TSC), a privately developed master-planned community in Dubai, UAE. The neighborhood has 590 residential units, a school, and a commercial area with other mixed-use services such as a rehabilitation center, an innovation center, and an equestrian club. The first resident moved in 2015, and the development was fully occupied in 2020 with a population of 3000 residents. As its name implies, TSC is promoted as a sustainability showcase, with 10 megawatts of on-site solar production, urban farming, on-site water recycling, waste sorting, and pedestrianized car-free streets.

I conducted 46 in-depth semi-structured go-along interviews in The Sustainable City with different actors. The interviews were conducted between January and March 2020. The actors I interviewed included residents, local business owners, project developers, architects, landscape

architects, town planners, sustainability officers, community managers, sales representatives, and members of the operation team. I sent a general email to the resident listserv and posted on the community Facebook page to recruit the interviewees. All residents, professionals, and business owners who showed interest were interviewed. I used a snowballing technique with the initial interviewees suggesting a wider pool of actors. Those who self-identified as professionals that worked on the project or are still working on it were individually approached.

I asked the interviewees to give me a tour of the neighborhood. During the tour, I asked the interviewees questions about how they perceive, use, and evaluate the neighborhood (Appendix 1). I used a grounded theory approach asking more general questions; hence the controversies emerged from the analysis and were not predetermined. I followed the actors, their statements, and their own interpretations of the project to map the most common controversies in which different actors disagree.

Interviews ranged in length from 20 to 90 minutes. The go-along technique, or what is also referred to as walking interview, was selected due to its ability to nudge the interviewees' environmental memory, resulting in a discussion that is highly informed by the landscape and the built environment (Evans and Jones 2011). This interview style is also a helpful tool to balance the power dynamics between the researcher and the community by allowing the interviewees to lead the walk (Bergeron et al. 2014; Evans and Jones 2011).

I transcribed the interviews and coded them using MAXQDA. I used inductive coding in search of challenges or what can be called controversies expressed by different actors (See figure 4). I kept track of the different actor identities involved in each controversy and double coded linkages between different actors and controversies. To highlight controversies, I looked for

challenges and conflicts in opinions that different actors expressed regarding the sustainable city. My coding revealed 9 main actor groups involved in 5 main controversies.

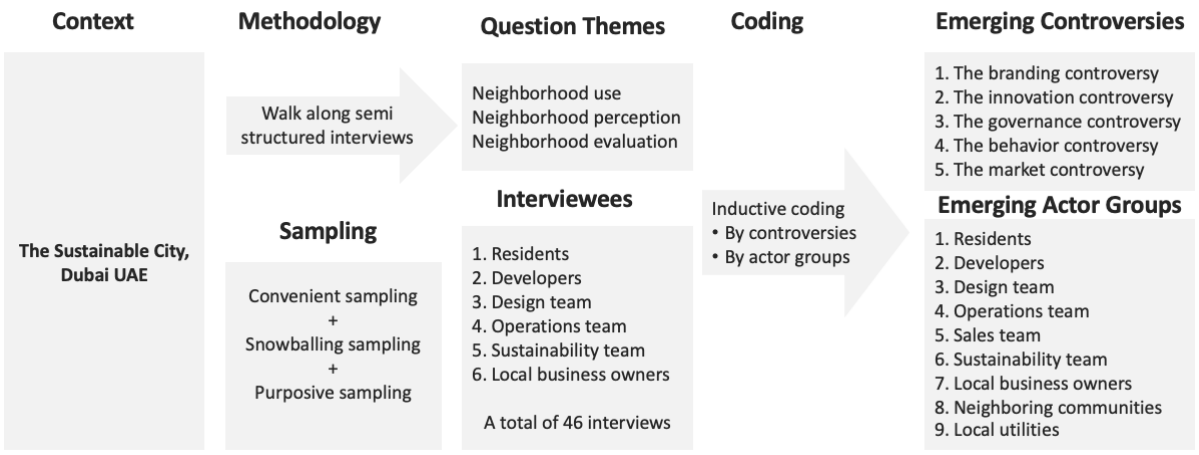

Figure 5 Methodological framework

Analysis and Discussion of Key Findings

The qualitative coding revealed 5 different types of controversies which mark fundamental challenges that impact the long-term performance and operation of the sustainable city. The linkages between different actors and each controversy revealed how operation and management issues are complex and intertwined. Such complexity is rarely highlighted in systematic post occupancy evaluations. Figure 5 reflects the network of linkages between the controversies and actors which emerged after the coding. The figure was generated using MAXQDA code map automated feature. The lines reflect each time two codes overlap, showing interconnections between controversies and actors. The line width reflects the frequency of overlaps. The location of each code demonstrates the strength of their connection; the more two codes overlap, the closer they are placed together on the map. (e.g., The governance controversy is closely related to the residents and the operation team). The analysis and discussion below will dissect each

controversy and the actors involved in it. This will be followed by recommendations on how each controversy can be addressed.

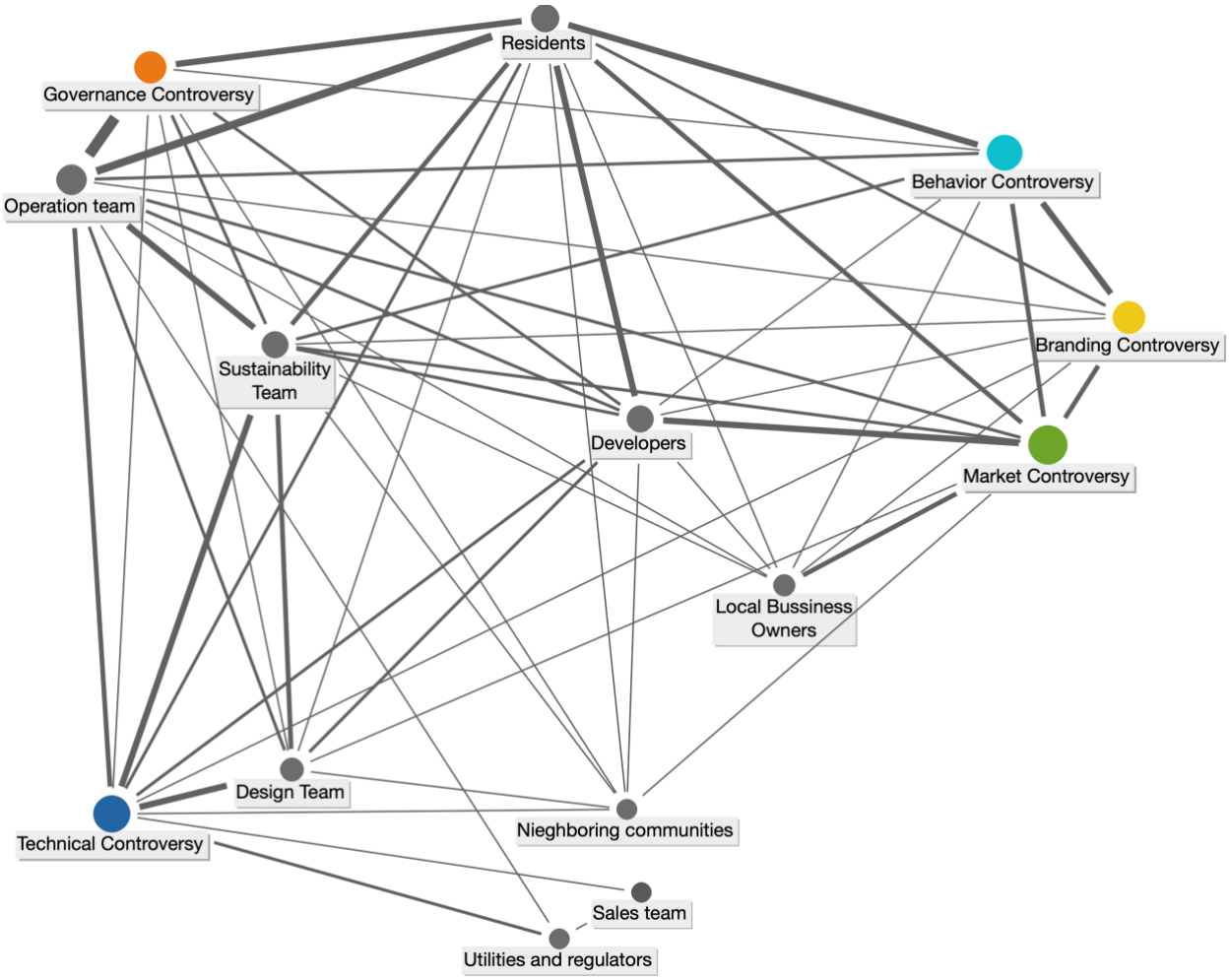

Figure 6 Mapping the controversies of TSC and the different actors involved to highlight how the complexity and strength of each interaction.

1. The Branding Controversy: Identity, motives, and commitment

With a name such as 'The Sustainable City,' it might be evident that the project is branded as a sustainable community. The project website also states a goal to be the first operational net-zero energy community in Dubai, reflecting a strong environmental commitment. The conversations with different actors revealed that this identity might not be branded as clear as it should be, sending conflicting messages and attracting residents for different reasons. This can be

problematic because the commitment of the residents to the environmental and social goals of the community reflects their choices, consumption level, social norms, and impacts the overall performance of the community

Many residents view the environmental commitment and sustainability agenda as a nice add-on or 'extra.' One resident commented on the community's sustainability goals: *"It was a really nice extra for me. The sustainability thing is secondary for me, but it all played in and made it attractive."* Another resident added, *"Mostly it was about safety for kids. I think that what prompted us to come here from the beginning."* More residents expressed that they've chosen TSC because of the high sense of community and the pleasant environment and not particularly anything related to environmental consciousness. While this might seem ok in any other community, in TSC this forms a challenge because achieving a goal such as net-zero energy needs a strong social commitment to reducing consumption. This leaves other residents demanding a stronger environmental branding from the start. One resident explained that diluting the environmental goals stems from a need to attract residents, *"I think they don't want to brag their identity as environmental because they want to please a broader range of the residents*." This left some residents demanding selectivity and intentionality. One resident grumbled, *"They are attracting the wrong people; we need to start being selective with people."*

While speaking with the design team, operation team, business owners, and the developers, more sides of the controversy were uncovered. For the design team and the management, the focus is not attracting people with already high environmental commitment; it is about transforming people while living in TSC. A member of the design team explained, *"We socially engage with*

people to get them engaged with sustainability. We are providing them with the community and the economic benefits which actually attracts them to the concept in a social way." One of the developers seemed to confirm that branding a sustainable community should be flexible enough to attract a broad range of people, *"I taught my team to learn about the person asking and bring out keywords that would appeal to him. An educator we will talk about education facilities and spreading awareness. An athlete we will talk about sports facilities and health and wellness approach to sustainability."* From talking to other residents, this seems to be a successful approach where many residents expressed a transformation in their values and knowledge after living in TSC. One resident explained, *"We did choose this community for its pleasant environment not sustainability, but it is teaching us about sustainability."*

For the developers and the design team branding the community with an attractive, comprehensive package of sustainability attractions rather than a strong focus on environmental goals seems to be the right decision. The challenge lies in understanding such transformation and how it takes time, resources and impacts the rest of the community. One business owner explained, *"They need to be intentional, as a business owner, the fact that we are living in the sustainable city should mean that everybody wants green products, but it does not actually. The community is not as supportive … This is an indictive of the commitment of the community towards the environment."* Another business owner added, *"They don't push enough about what the community is trying to achieve so it does affect my business in way."*

The commitment seems to be growing upon a group of residents, but it is slow in impacting residents and business owners. As one resident suggested, "*We need to create a faster and a*

more focused hype." It is essential to understand that not every resident will transform and socially commit to the norms of the community; some people do leave or just ignore the internal environmental branding. The flexibility of sustainability as a concept seemed to be feeding this controversy. Yet, the challenge is crafting a broad enough brand to attract a wide range of residents without sacrificing the community's expected environmental values and social norms.

2. The Innovation Controversy: Technology, pride and guinea pigs

Innovation and technological advancement were from day one attached to the concept of TSC. For many other rising sustainable communities worldwide, innovation and technology are integral in the urban development process. While most actors appreciate the sense of innovation in the TSC, it created some obstacles and induced disagreements between actors.

In general, residents appreciated the sense of innovation and perceived it as one of the pillars of TSC's identity. When asked to pick a keyword that reflects TSC, one resident chose '*Experimental'* he explained, "*They keep innovating, trying to coin things, measure things.*" This sense of innovation generally gave the residents a sense of pride. As one resident describes, "*It is continuous improvement. Every few months I see something new open. It gives you a feeling that life is moving, you are part of and in progress*." The innovative identity which the residents well received seemed to align with the management vision. A member of the operation team confirmed, "*The ability to change and improve over time is at the core of this community.*"

At TSC, the appreciation of innovation is expected to come with an understanding that it is a trial and error process which is the initial spark of the controversy. A member of the operation team clarifies, "*We tell people here that TSC is a living laboratory. You need to be constantly testing*

and experimenting." Another design team member explains the motives behind this continuous testing as follows "*We don't want to be left behind as an outdated development so that's our main goal. Its continuous learning process…we are open to new ideas and technologies that we did not see or not have the chance to evaluate while we were designing."*

A few residents did not receive this high sense of innovation positively; it made them feel like they are part of an experiment or a guinea pig which was not always appreciated. One resident complained, *"You need to phase in innovations….I know they are trying to do many things, but sometimes I feel like they are trying too many things and it is too much.*" Another resident confirmed, *"They need to be a little bit wise in terms of not pushing people a lot as they are always trying."* This guinea pig dilemma portrays another core dynamic of the innovation controversy. This highlights how in a market-oriented development the choice of convenience and functionality can restrain efforts for innovation.

A sense of innovation in the design comes with its own package of challenges, such as dealing with new regulations, finding skilled labor, and trying untested technologies that usually cause delays or failures, hence negatively impacting the community's performance. One of the developers explains, "*We had lots of limitation when the team was pushing for solar, the limitations were mostly getting approvals and regulations.*" A member of the sustainability team further reflected on the trouble caused by such delays, "*If we knew how much time it will take to connect them[solar], we would probably buy them once we are ready to connect, they would have been newer and more efficient panels.*" An innovative water recycling system also caused delays and financial loss due to the inability to find competent, skilled labor to operate it. A

member of the design team illustrates, "*The water has been something that had not come to meet what we envisioned it to be…purely this is because the management of it was a bit channeling in terms of finding skilled labor.*" Overall innovation at TSC, although vital yet challenging to all actors involved. A member of the operation team explains, "*It is us all by ourselves trying to change all this. We change and go up to regulators*."

With the above core dynamics, innovation might need to be more calculated and phased from the management side, yet some residents still demanded more progress and innovation. One resident reflects, "*I think they could have done more as far as pushing the innovation factors, I think it needs to be a bit smarter*." Another resident added, "*It needs more innovation, in all the details, people should be impressed by all the small details.*" More residents demanded a faster-paced innovation. One resident commented, "*You can't be stagnant. They need to constantly keep pushing the boundaries."*

With constant growth and maturity in the community, there might be a moment where there is a general understanding of how much innovation is enough; until this moment comes, it will remain an iterative process. A member of the sustainability team described the current phase of operation and trial as a dual force relationship.

> *"Here there is a different relationship that happened between the residents and the developer. Where there is a push and a push back, so the developer is trying new technologies and solutions, changing stuff in a continuous pace, the residents are vocal about it too. So, they talk about the changes if they like it they say we like it, if not they*

ask for a change which I think it should be like this, if you are thinking continuous development you should always approach it in this way."

3. The Governance Controversy: Participation, regulation and customer satisfaction

In a privately developed neighborhood, details of the governance structure are often figured out post-construction, and may be complicated by shifting roles of the developer and management companies. After five years of operation, the structure of governance in TSC is still controversial with many different points of view, expectations, and considerations.

Expectations regarding the role of the management and the residents varied widely, even among residents. Some residents demanded a more participatory structure and rejected a top-down structure. These individuals asked for a change in the structure of management towards a more civic community. One resident explains, *"I think perhaps taking a more civic stand, maybe having a community town hall, listening to the community members rather than dictating them, will have a huge difference."* Another resident agreed, *"They should have an open house for community to bring their ideas or the things that they want to discuss."* Pressure from the residents created an increasing internal conversation within the management about handing over aspects of the operation to the residents. A member of the operation team explained how this handover is planned, *"Next week I will call a committee of the residents to take charge of the events. I'll tell them these are the resources that we have you guys between yourselves work out events. I'll let them take it over themselves, because it is not sustainable for me to do it."* Handing over partial operation to residents had two internal motives, the first is lowering operational costs and second is giving more power to residents.

In contrast, some residents demanded the management to take full leadership, expand regulations while providing more information, more guidance, and more hand-holding. One resident expressed, "*People need rules and enforcement to abide by them."* Reflecting on what the community needs to be successful, one resident said, *"Sharing of information: to know how much we are doing how much more can be done."* Many residents seemed to agree that information sharing is vital for the success of the community. One resident elaborated, "*I don't feel like we get told enough. I think it would be really nice to understand a little bit more about what are they trying to achieve. There is not enough information…. little bit hand holding, what things are being done how to do things."* Residents demanded more transparency, engagement, and better communication around decisions rather than full power.

Many residents acknowledged that taking a civic stand might be harder within a private development. One resident explained, *"This is not a city; it's a private development*." The concept of living in a privately developed and managed neighborhood meant that some residents expected a corporate structure with a complaint system and client satisfaction approach. One resident explained that the management should be driven by resident satisfaction, *"We are living here; we pay money*." Members of the operation team understood that the residents of TSC expect more, "*It is a new project; it is very unique; and it needs more of the costumer care role*."

In contrast, other residents highlighted that being responsive to the needs of the residents might be the problem, *"I think that the management has such a drive to make this place a special place but sometimes they've been very reactive to criticism, where they've should have brushed it away*

and let them deal with it. Some people will never be happy and you can't make everyone happy." This reflects how a client-centered approach towards managing this community might never be a viable solution.

Issues of governance, control, and responsibilities surfaced in every interview, although there was no specific interview question that focused on governance. One group of residents demanded top-down regulations and guidance, another group envisioned a civic community, a third group demanded to be treated as dependent clients within a corporate environment, and others reflected that seeking client satisfaction will never be possible. All these understandings of how a governance structure should be shaped the sense of ownership among the residents, along with how the residents behave and evaluate the community. Disagreement regarding how the community should be governed impacts the overall performance post-occupancy; for example, this impacts how residents are willing to abide by the community norms when they feel like they are dictated on them. Hence, governance structure demands to be addressed in future post-occupancy evaluations.

4. The Behavior Controversy: Awareness, enforcement, and norms

Occupant behavior is always a challenge within communities and buildings with targeted consumption goals. To a great extent, occupants' behavior is a factor that impacts the performance of the building and can hinder the ability to reach project goals. In the case of TSC, for example, an increased use of chemical-based detergents impacted the internal water recycling process of the community. Interviewee opinions about how the project is impacting and can be impacting occupant behavior varied widely. Moreover, there were mixed opinions with regards to the role of management in altering and enforcing behavior.

Many residents believed that living in TSC supported them in adopting a more pro-environmental behavior. One resident explained, *"I love it because it helps you be sustainable. It helps you make good decisions with your lifestyle."* Many specific design elements were perceived as enabling and nudging behavior. One resident expressed, *"Having the bins already installed inside the house is pushing me to think more about what to recycle and how to recycle and the children as well."* Some parents noticed that living in TSC was impacting their kids too. One resident explained that his kids have changed due to living in TSC, *"I could see it in their classwork, in their shift in the way they lead their life. They became more conscious on how to consume, how to waste, how to minimize the waste."* This opinion represented many people who thought of TSC as a successful behavior change tool. Envisioning TSC as a transformative experience even extended to businesses. One resident explained that TSC could help the local businesses develop a sustainability agenda *"What you should be doing is making a big basket capturing people then drive them to sustainability…. The business does not need to be sustainable. Actually, you are much more sustainable if you go to mainstream businesses and drive them towards sustainability."*

In contrast, other residents did not specifically perceive TSC as a behavior-changing tool. They referred to plenty of community norms and behavior patterns unaligned with the original vision of TSC. Residents criticized the behavior of other residents and labeled it as the main challenge towards reaching sustainability. One resident expressed, *"The concept is sustainable, but the application is not, the people are the main problem."* Another resident agreed, *"It is designed to be sustainable, safe and car free; but partially is not achieving it because some people are not*

doing their share. The goals are not achieved because of people's behavior not the actual design." Some residents put the blame entirely on other residents *"I feel that they [the management] are trying to do more when it comes to sustainability but us [the residents] are not encouraging or helping them… The idea was initiated on stronger values, but they [the management] can't apply it as intended because of the lack of support from the residents."* In contrast, others blamed the management and expressed that it is the responsibility of the management to handle the behavior of the residents. One resident expressed, "*It comes from the people, but it is still the responsibility of the management to handle that."*

Other actors believed that residents' behavior needs to be addressed with more education and awareness efforts. A business owner explained, *"I defiantly see opportunities for better education for the residents to stop them from using all the chemical stuff*." Another resident agreed, *"I think there is more that they can do in terms of encouraging good practices, in terms of behavior."* Members of the management team seemed to have a similar realization *"The idea is perfect but it is really behavioral it depend on the education of the people. We are working with the sales office so that they tell people what is included and what is expected from them."* A sustainability officer explained that education and awareness are vital and expressed that the team is already observing positive change after awareness sessions.

> "*The public awareness programs that we have done and the dissemination of information that we have done actually showed improvement. You can see it in the dashboards. The demand is less, per capita per square meter. We started out with certain*

targets based on the design, and those targets continued to improve because of demand management due to awareness from the residents side."

On the other side, many actors demanded more regulations, laws, and enforcement, *"They need to make things compulsory,"* said one resident. Other residents demanded fines. *"There are no fines that people get for not doing things*." However, few residents doubted the ability of the management to force any regulations, *"You can't force people to do it, can you is another problem. Because you can't control people."* Members of the operation team seemed to struggle with delineating how many rules can be enforced in an acceptable way. A member of the operation team posed the question, *"How to enforce rules and eliminate residence resistance to rules and regulation."* The problem was described by few actors as economically driven, blaming the management for fearing to repel people or potential customers with so many rules. A resident and a business owner in TSC expressed, *"I told the management you need to put it in the contract mandate people, in the beginning they just wanted to sell, it is economics that rules…I hope that they put more rules. You can't make changes if you just want to make money."*

Between enforcing rules and spreading awareness, the management's role and the expectations from the residents are still controversial when it comes to adopting pro-environmental behavior. As a privately developed community with an economic agenda, there remains a gap in the transition of residents from paying customers to law-abiding members of the society.

5. The Market Controversy: Economy, access, and profit.

As a privately developed sustainable neighborhood, the extent to which the project should be profitable appeared to be controversial between actors. The affordability and profitability of TSC

are two market dynamics that the actors did not seem to agree on. Between renters, owners, developers, and designers all actors seemed to have different interests to justify or criticize the market value of TSC.

One of the original goals of developing TSC was to introduce a sustainable neighborhood within market ranges, in other words, to prove that sustainability is not expensive but still profitable. A member of the design team elaborated on this goal, *"I think the biggest achievement is that a commercial developer is making money by producing a city that is more sustainable, socially successful…People are not yet ready to make the number of decisions that need to be made for a more sustainable living, unless it is economic."* Some residents seemed to agree that that is the case; one resident explained, *"It's a pioneer in introducing that it is doable, it is feasible, you can have a happy, profitable business but still subscribe to sustainability, respect the environment and be sustainable."*

The cost of owning and renting residential units in TSC started within the average market price, but with the real estate market crashing in Dubai, many communities lowered their prices. For the developers of TSC, due to the high demand for units and ongoing operational costs, they decided not to lower the rent prices. The high demand for units was justified by offering a better quality of living, for some sustainability has its own desirable market value. The increased market value caused a divide between residents. This meant a great return on investments for owners, and for renters, this meant an unaffordable community.

> One resident explained, *"When we first moved here it was an expensive community but everywhere was expensive. But now this is way more expensive than other places… We are owners so we stayed, but a lot of our friends left because it is cheaper down the road. …Yes sustainability is an element that people consider but I do not think it is number one. Your wallet is number one."*

The price increase repelled many of the old renters. A resident commented, *"I think there is a huge amount of people who left already, they are annoyed with the rent…For some of us it is (sustainability) on our forefront of our agendas, for others it is rent."* Another resident confirmed, *"People who don't live here are impressed…But everyone knows that this is city expensive which is true."* A member of the operation team justified the increase in price as pure market dynamics*, "how to make it more affordable, how to bring down the cost even more, so that sustainability becomes mainstream... Collectively developers and housing programs need to supply more, when you supply more the house will drop so more people will have access to it, so we have to really work with market forces. Sustainability must not be subsidized."* As a community with high life quality, TSC is perceived as a high-value commodity. The developer and private owners are both reselling and renting their units higher than their market value.

For owners, the price of units in TSC can be justified. Owning a unit in TSC is perceived as a good return on investment and lower living savings. One owner explained, *"Financially you look at zero service charges and huge electricity savings. It is impressive."* Another owner justified the high prices. *"Yes, you pay more but you also save a lot of money for not paying maintenance and utilities. It is expensive as a one-off ticket, but it is cheaper to maintain; it is like a good*

return back on investment." Another owner confirmed, *"Let's talk numbers, financially, it pencils out. If I wanted to buy any house in the neighboring community, I would have been paying at least two times the utility feels. So that's saving. There are savings in the maintenance fees too. On paper, it cancels out."* The sustainability team confirmed that "When you talk about the OPEX that you can save by living here, you are saving around 20-25 thousand per year that can go for electricity only."

Many actors in TSC seemed to attribute the dispute over the unit price to the nature of TSC as a privately developed community. A local business owner commented, *"This is a commercial venture; the value is to make money and there no harm to make money in a sustainable way. It is not a charity. it has to make business sense for the owner…It has to be environmentally sustainable and commercially sustainable."* Many residents confirmed that money generation and profitability are vital for the project's overall success, *"You have to think those people need to stay float as well they need to generate revenue and pay salaries."* Another resident explained, "It is a for profit company….they do care about sustainability but number one is making the project a profitable one."

With so many opinions, it is hard to strike a clear conclusion. The market dynamics play an important role in determining the value of a sustainable community. Such a role expands when the community is a commercial venture. According to a member of the design team, an intermediate indicator to judge the community's success is a balance where there is a financial gain for both residents and developers, *"Do people really benefit economically by living in a sustainable city….Does the developer benefit economically from the project? is it commercially*

viable and attractive as a business mode?" By observing the market controversy in TSC, one might start questioning the likelihood of a successful affordable market model sustainable neighborhood. The profit interests might always override pillars of social sustainability related to accesses and affordability unless there are in place market strategies to control such profit.

Conclusion and Recommendations

Branding, behavior, governance, innovation, and market are all topics that are rarely highlighted in technical post-occupancy evaluations. Nevertheless, it was apparent that they can have a long-term impact on the performance of the community. Using controversy-mapping to evaluate TSC post-occupancy revealed how many lingering disagreements impact all actors involved. This method is not a replacement for the technical evaluations, yet it does contribute to delivering a more holistic and realistic image of the performance of such communities. By mapping the controversies of TSC, it was obvious that sustainable neighborhoods are an eco-system of dynamic cultural processes rather than a linear design, construction, and delivery process.

The branding controversy showed that a focus on the environmental brand of the community can succeed in initially attracting a small pool of residents with pro-environmental commitment, which helps the performance of the community in the short term. In developer-driven sustainable communities, there is a need for a continuous high occupancy rate to preserve the community's economic success. The economic agenda pushes for a dilution in the community's environmental brand to attract a broader range of residents with various interests and expand the pool of potential clients. Although this might negatively impact the consumption rates and the social norms of the community in the short term, with enough educational resources it can allow for a transformation of norms among various members. Success in transforming the community's

norms might be more valued as a long-term positive impact on society. This changes the idea of sustainable communities from selective utopian communities appealing to particular members of the society to market-oriented communities appealing to the mainstream.

1. Recommendations to tackle the branding controversy

A broad branding identity for sustainable communities that communicates attractive life quality commodities for a wide array of residents should be enhanced with planned long-term awareness and educational campaigns.

I. Developers should collaborate with real-estate marketing agencies and the sales team to ensure constant but broad sustainable identity is communicated to potential buyers and tenants.
II. The operation team should plan long-term awareness and educational programs about the identity of TSC that are constant to deal with residents' turnover.
III. Local business owners should collaborate with the developers of sustainable neighborhoods to develop a shared sustainability identity that reflects both the goals of the business and the community as a whole.

A closer look at the innovation controversy showed that expectation of progress and innovation varies widely among actors. With the move between sustainable communities that appeal to early adopters to communities that appeal to the majority, different actors might be less willing to experiment with new innovative technologies. Although residents do appreciate and take pride in the continued progress and innovation within the community, yet for technologies that impact

their daily lives, they demand complete solutions, convenience, and involvement in decision-making.

2. Recommendations to tackle the innovation controversy

A sense of innovation and ongoing technical trials in mainstream sustainable communities is still pretty appreciated and encouraged by most actors as long as it does not impact their convenience. For larger, more vital systems such as water and energy, it might be better to use widely tested technologies that can be supported by available local skilled labor.

I. The design team, including architects and engineers, should refrain from deploying high end innovative untested technologies in vital large-scale infrastructure within market-oriented sustainable communities to avoid operational failures.
II. Operation teams in market-oriented sustainable communities should be trained in advance on operating and maintaining sophisticated green technologies.
III. Developers should plan in advance a budget for incorporating new technologies and innovative trials throughout the project's lifespan to maintain the innovative identity of the project.
IV. Community managers should train residents on instructions for special use needed while interacting with new technologies. Training the residents will limit frustrations resulting from interacting with new systems.

Decisions around governance are complicated at any scale. Within a privately developed and the managed sustainable community, it is easy to slip into a corporate-like structure that treats

residents as costumers with a focus on client satisfaction. However, there is a need for understanding that a sustainable neighborhood is not a product or a one-time single customer service; hence achieving total satisfaction is a challenge within a neighborhood scale. A participatory approach towards governance and an investment in building self-agency within the community can be beneficial socially, economically, and environmentally. A participatory approach can increase the sense of ownership among residents, which can positively influence their consumption patterns. A participatory approach will encourage communicating community goals and action plans transparently, hence increasing the social acceptance of community rules and regulations. Involving the residents in managing aspects of the community will also help in decreasing the operational expenses of the community.

3. Recommendations to tackle the governance controversy

Investing in building civic agency among the residents of a sustainable neighborhood can prove to be rewarding on the long-term performance of a sustainable neighborhood. Socially, a civic agency can increase the sense of community among residents. Environmentally, it increases the sense of ownership, which can induce pro-environmental behavior. Economically an active civic agency can reduce operation expenses by transitioning some of the responsibilities to the residents.

I. Community managers should focus from the start on building civic agency within a sustainable neighborhood, like initiating resident representative committees. Such efforts should be reoccurring on the lifespan of the project to count for turnover.

II. Real-estate marketing agencies responsible for marketing units in a sustainable neighborhood should communicate early on the community's governance structure to potential buyers and renters. Early communication will limit long-term conflicts of expectations with regard to management, responsibilities, and regulations.

The analysis of the behavior controversy showed that rules and regulations can also be used to enforce basic acceptable behavior and social norms that can impact the performance of the community. In a developer-driven sustainable community, there might be fears of dictating too many rules that can repel potential residents, impacting the developer's profit. Regulations such as chemical-free detergents or limited car use can be well received if residents are informed from the start with community goals and performance data targets. In the case of TSC, awareness sessions had an initial positive impact on the consumption patterns, yet it demands a continuous constant effort to combat the resident turnover. The challenge is drawing a clear line between what is acceptable as community rules and what can be perceived as interference in personal freedom. Understanding such demarcation is more pressing in the context of market and privately developed communities since residents might be less willing to abide by inconvenient regulations.

4. Recommendations to tackle the behavior controversy

A focus on establishing behavior expectations and initiating behavior change models can prove very fruitful to the overall performance and consumption of the community.

I. Community managers and the operation team should collaborate early on to develop a code of conduct that abides the residents. The code of conduct should illustrate baseline community norms related to consumption and behavior should be communicated early to potential residents and enforced with regulations.

II. Developers should allocate funding and resources for awareness sessions throughout the project's lifespan. This should be budgeted in advance as part of the operational expenses.

III. Community managers should ensure that sessions related to community goals and the impact of individual behavior are regularly offered throughout the project's lifetime to dimmish the impact of resident turnover.

The market controversy might be the biggest challenge facing developer driven sustainable communities. Overall, based on market demand, it might be apparent that developing a sustainable neighborhood as a commercial venture can be a success. This is more likely due to the multiple life quality commodities that can be attached to the concept. Values such as child safety, a healthy environment, and fresh food are all attractive to a broad resident market segment. Although this increases the likability of expanding such a model commercially, it diminishes the possibility of developing affordable, sustainable neighborhoods since more people are willing to pay for such high-value commodities. This situation is currently counteracting the initial vision of the community as an accessible average price sustainable community.

5. Recommendations to tackle the market controversy

The financial model of a market-driven sustainable community needs to be closely considered in advance to balance the need to stay within market prices but maintain profitability and affordability.

I. Developers and funders should consider long-term strategic profit plans with different market scenarios to avoid strike changes in market prices impacting the financial stability of the project.

II. Local officials and regulators should support the developers of sustainable neighborhoods with partial subsidies in exchange for limiting the profit cap. This will initially encourage the developers to develop sustainable communities but ensure that the unit pricing remains within market needs in the long run.

III. Local official and regulators should develop special rent control schemes for market oriented sustainable neighborhoods. This will protect the residents from strike changes in rent prices and secure an affordable portion of units.

IV. Local government can also offer tax deductions to residents who choose to live in a sustainable neighborhood to encourage potential buyers for choosing to decrease their impact.

The presented controversies might not be solvable by a single design change and might vary and different contexts. However, analyzing and learning from them can allow future similar communities to plan in advance for strategies that can limit the impact of similar controversies.

The controversies that emerged from the analysis of TSC are not all based on wrong design decisions or outside market forces; they were a mix of politics, culture, technology, and market dynamics. Nevertheless, it must be noted that such projects are contributing to redefining the diffused version of sustainability which might become a mainstream commodity or what has been described as 'the mainstream green' (Fosket and Mamo 2009). Hence it is vital to understand early on how the image of sustainability can be diffused to the mainstream without losing its essence due to market demands and pressure. The recommendations below highlight the main lessons learned from mapping the controversies of TSC. In the situation of TSC and similar mainstream commercial sustainable communities, such projects are no longer singly led by activists or visionaries; they now contain a wide array of actors involved in the process with complicated values, motivations, and rationales. Hence, the recommendations above tried to address the role that different actors can play to avoid such controversies.

Through looking at the case of TSC it is evident that the process of developing and operating a sustainable neighborhood that is not directed to a niche market is still iterative and challenging mixed with many expectations and market dynamics. Such challenges are hard to identify in a systematic POE that only counts for numbers and consumption levels. Hence comes the importance of this research through providing an alternative way of conducting POE that captures larger dynamics related to technologies, cultures, markets, and expectations.

There is a research need to study and document all the potential controversies and obstacles that can emerge in such a special model within different contexts—addressing this research gap crucial to open a conversation on the challenges of transitioning urban sustainability to the

mainstream. Moreover, it will provide lessons learned to future similar market-oriented sustainable neighborhoods, hence reviving the role of POE as a learning tool in the market that inform practice and benefit different stakeholders.

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Conclusion

The process of designing, developing, and operating sustainable neighborhoods is, without a doubt, a challenging mission. Up until now, most of the existing operating sustainable neighborhoods are discussed as unique models or niche products. This research was more concerned with the process of transitioning sustainable neighborhoods to a mainstream urban development model. Such transition starts by asking how the sustainable neighborhoods are communicated, evaluated and what kind of problems can emerge in the long run. I focused on market-driven sustainable neighborhoods that market developers drove as one indication of mainstreaming sustainable neighborhoods into the market.

Although market-oriented sustainable neighborhoods can yield criticism for being money makers or greenwashing sustainability, these projects are happening, consuming resources, attracting high investments, and gaining popularity with those who can afford them. In other words, these new privately led developments are contributing to redefining public notions of sustainability. Hence, it is vital to assure that they are operating, delivering to their goals, holding up to their sustainability image, and can develop metrics that can hold them accountable.

In all phases of this research, there was an intentionality to understand the process of developing sustainable neighborhoods in a holistic approach beyond discipline limitations. Such a holistic approach was evident in the theoretical frames and literature used, such as communication geography, urban imaginaries, POE studies, actor-network theories, and mapping controversies. The holistic approach was also evident in the methods chosen for the three papers, such as textual analysis and go-along interviews with diverse actors. The intention was to bring as many

voices as possible and mix as many approaches as possible to convey that sustainable neighborhoods' challenges stretch way beyond technical metrics and scorecards. Instead of having individual conversations about sustainable neighborhoods as architects, engineers, and planners, this research tried to dissect sustainable neighborhoods through the eyes of all different actors. Such a process revealed many findings that would not have been possible without such a holistic approach.

An Inquiry of Communication and Expectations

First, I started by asking which values and design features the popular press emphasizes when portraying master-planned sustainable neighborhoods and what frames are associated with such values. From my analysis, it was obvious that there is an emphasis on convenience and economic saving while downplaying sustainability narratives related to changes in lifestyle, affordability, and inclusion. Many of the sustainable neighborhoods are often represented as utopian by the press, ignoring performance and management issues, which might create unrealistic expectations for potential residents. The findings revealed that the popular press is shaping an overall framing of the concept of sustainable neighborhoods through these repetitive linkages of use-values and design elements. The findings also contributed to the notion of urban imaginaries by analyzing the role of the popular press in creating ‘The sustainable neighborhood imaginary’. It was evident that the imaginaries are creating a shared understanding of a sustainable neighborhood regardless of its location and sociopolitical context. Such shared knowledge might create unrealistic fantasies, raise expectations, focus on sustainability narratives, and leave others out. In a way, this virtual reality created by the communication of urban sustainability impacts physical reality. Hence comes the contribution of this research by emphasizing the role of

unphysical messages and media framing in constructing expectations which is a problem that often goes unnoticed when discussing notions of urban sustainability.

An Inquiry of Perceptional Success Metrics

Second, I asked how the expectations and use values of the professionals and residents involved in developing, designing, managing, and living in a sustainable neighborhood can be better incorporated into indicators that measure progress towards project goals. The findings indicated that users and diverse local actors would prioritize different metrics than expert-based models when given the opportunity to express their opinions. For example, many actors were more concerned with operation-focused indicators rather ran design-focused indicators. It was evident that there is a need to rethink some of the standard indicators that come to mind when discussing sustainable neighborhoods worldwide. The dominance of operational indicators reveals that actors have developed an experience-based awareness of the importance of post-operation managerial decisions and how such decisions can be critical to sustainable performance. The contribution of this research was a new approach to shaping local indicators based on the needs, priorities, and local expertise of different actors in sustainable neighborhoods.

An Inquiry of Operational Challenges and Controversies

Third, I asked what challenges are associated with market-driven sustainable neighborhoods through the eyes of different actors and how such challenges can be addressed in future development. The research process highlighted five main challenges that are rarely addressed in technical post-occupancy evaluations. The challenges ranged from issues related to branding, behavior, governance, innovation, and the market forces. The theoretical contribution of this chapter lies in introducing the method of mapping controversies as a new approach to conducting POE studies of sustainable neighborhoods. This approach helped in delivering a more holistic

and realistic image of the performance of such communities. Furthermore, using such an innovative method to capture post-operation challenges helped in framing sustainable neighborhoods are an eco-system of dynamic cultural processes rather than a linear design, construction, and delivery process.

Developing sustainable neighborhoods is a critical need facing urban communities around the world. However, such need cannot be met by delivering a prototype of sustainable communities with fixed sustainability agenda. This dissertation lays the foundation of understanding the process of developing sustainable neighborhoods as a complex, iterative, and challenging mission mixed with many expectations and market dynamics. Hence comes the importance of this research through providing alternative lenses to understand sustainable neighborhoods in a way that captures larger dynamics related to technologies, cultures, markets, and expectations.

The case studies and data analyzed in this dissertation are relatively limited. There is a research need for more holistic and evidence-based attempts to understand a broader range of sustainable neighborhoods around the world. New patterns and understandings can emerge from more attempts of studying and documenting all the potential controversies and obstacles in the developer-driven sustainable neighborhoods within different contexts. Addressing this research gap is crucial to open a conversation on the challenges of transitioning urban sustainability to the mainstream. Moreover, it will provide lessons to future similar market-oriented sustainable neighborhoods, hence reviving the role of POE as a learning tool in the market that informs practice and benefits different stakeholders.

Appendices

Appendix 1: Interview Guide

The main objective behind conducting the interviews is to document and identify what do you think of The Sustainable City, how do you use it, value it and how do you evaluate it. All interviewees will remain anonymous (where your statements will inform the project and can be quoted but will not be referred to by name). The interviews might take from 30 to 45 minutes average. The interview will be audio recorded and spatially tracked. You should answer the questions based on your own perceptions and not representing your household (there could be more than one response per household). Your participation is completely voluntary. Your response will help in identifying how to better develop indicators to evaluate The Sustainable City. If you have any questions or concerns, please contact me at nadessouky@ucdavis.edu.

For this interview, I would like us to take a walk in TSC and I would like you to lead the walk as if I am your friend visiting TSC and you are showing me around the place. I am wearing a GPS tracker so this walk will be also tracked to help me remember where we went.

Demographics:

Name:

Relation to TSC: Resident / Professional (Developer / Architect / Urban planner / Landscape Designer / Community Management / Funding and Finance / Operation / Technical / Public Relation, Others ……)

For nonresidents: Living in TSC: Y / N

If yes– Tenant or Owner: T / O

How long have you been living in TSC?

Questions of the interview

1. **Use value questions**
    - 1.1. What is your main reason for choosing to live/work/fund/ design/develop TSC?
    - 1.2. In your day-to-day routine which services and places in TSC do you use the most?
    - 1.3. To what extent do you socialize within TSC?
    - 1.4. To what extent do you think the values behind TSC matches your own values?

2. **Perception questions**

    2.1. If you are introducing TSC to a friend what are the main keywords that you would use to describe it with? (Potentially Nominal)

    2.2. In what ways do you think TSC is or is not sustainable?

    2.3. How would you define sustainability?

3. **Physical design questions**

    3.1. What aspects of the physical design of TSC are your most favorite? (Nominal)

    3.2. What aspects of the physical design of TSC are your least favorite? (Nominal)

    3.3. What aspect of the design of TSC makes it more sustainable than other communities? (Nominal)

4. **Performance expectations questions**

    4.1. As a (…role of actor…), what kind of indicators you think should be considered in the evaluation of the performance of TSC?

    4.2. To your own knowledge, what are the goals of TSC? Do you think it is achieving these goals?

    4.3. Looking 20 years ahead, how do you think TSC will be performing? What transformations will take place in the community?

5. **General context question:**

    5.1. How do you think TSC fits within the bigger context of the UAE and the region?

6. **Snowballing:**

    6.1. Do you know someone else that you think might be willing to talk to me?

Appendix 2: Recruitment Email

Dear TSC resident:

I am writing ask if you would agree to be interviewed in person for a research project entitled "Places of Anticipation: On Design Use Values and the Ecology of Actors in Sustainable Neighborhoods". This research aims to Identify the use-values and expectations of different actors in the development of this community and their potential role in reshaping how this neighborhood can be assessed while influencing progress towards project goals. I hope you will be willing help us with our study. If you agree to participate, I will interview you for about thirty minutes. The interview will take place in the neighborhood. We will meet at the blue chair area and have a walk around the neighborhood.

If you are interested, please click on the link below and pick your availability time. If you have any questions or concerns feel free to call or email me at (will insert phone number).

Sincerely,

Nermin Dessouky

Ph.D candidate, University of California Davis

عزيزي المقيم بالمدينة المستدامة

أكتب إليك اسأل عما إذا كنت توافق على إجراء مقابلة شخصية معك لمشروع بحثي بعنوان "أماكن التطلعات: عن قيم استخدام التصميم وبيئة ممثلي الجهات الفاعلة في الأحياء المستدامة". يهدف هذا البحث إلى تحديد قيم الاستخدام وتوقعات الجهات الفاعلة المختلفة في تطوير هذا المجتمع ودورها المحتمل في إعادة تشكيل كيفية تقييم هذا الحي مع التأثير على التقدم نحو أهداف المشروع. آمل أن تكون على استعداد لمساعدتنا في دراستنا. إذا وافقت على المشاركة، فسوف أقابلك لمدة ثلاثين دقيقة. ستجري المقابلة في المدينة المستدامة. سنلتقي في منطقة الكرسي الأزرق ونتنزه حول الحي.

إذا كنت مهتمًا، فيرجى النقر على الرابط أدناه واختيار وقت التوفر. إذا كانت لديك أي أسئلة أو استفسارات، فلا تتردد في الاتصال بي أو مراسلتي عبر البريد الإلكتروني على (ستدخل رقم الهاتف).

نرمين

Appendix 3: IRB Exemption

UNIVERSITY OF CALIFORNIA, DAVIS

BERKELEY • DAVIS • IRVINE • LOS ANGELES • MERCED • RIVERSIDE • SAN DIEGO • SAN FRANCISCO SANTA BARBARA • SANTA CRUZ

OFFICE OF RESEARCH
IRB Administration
TELEPHONE: 916 703-9151
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SACRAMENTO, CALIFORNIA 95817

December 30, 2019

Nermin Dessouky
Department: Human Ecology
Phone: 5307608934
Email: nadessouky@ucdavis.edu

On December 30, 2019 the UC Davis IRB Administration reviewed the following protocol:

Type of Review:	New Project
Title:	Places of Anticipation: On Design Use Values and the Ecology of Actors in Sustainable Neighborhoods
Investigator:	Dessouky, Nermin,
IRB ID:	1524545-1
Funding:	Departmental
Grant ID and Title:	None
IND, IDE or HDE:	None
Documents Submitted:	• Advertisement - translated recruitment email.docx • Advertisement - Recruitment Email.docx • Application Form - HRP-226-FORM-Administrative-Approval.pdf • Consent Form - Translated consent script.docx • Consent Form - Consent script.docx • Letter - support letter.pdf • Protocol - HRP-503-TEMPLATE-PROTOCOL-Surveys-Questionnaires-Focus-Groups-Observations (1).docx • Questionnaire/Survey - Interview guide.docx • Questionnaire/Survey - Interview guide in Arabic.docx • UC Davis - Initial Review Application
Determination:	Exempt *[2]*
Comments/Conditions:	This determination applies only to the activities described in the IRB submission and does not apply should any changes be made. If changes are being considered and there are questions about whether IRB review is needed, please submit a modification request to the IRB for another determination.
	In conducting this protocol you are required to follow the requirements listed in the INVESTIGATOR MANUAL (HRP-103).

This Assurance, on file with the Department of Health and Human Services, covers this determination:

FWA No: 00004557
Expiration Date: April 12, 2024
IORG: 0000251