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## Article

# The Five Controversies of Market-Driven Sustainable Neighborhoods: An Alternative Approach to Post-Occupancy Evaluation

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**Abstract:** The increased involvement of the private sector in building sustainable communities is often met with skepticism from sustainability experts and academics. Although environmental experts and engineers may wish to focus on the technical design features and green rating of such projects to validate their sustainability, data are sometimes lacking, and social scientists may criticize projects' social impacts and portray them as greenwashing sustainability. More holistic and evidence-based attempts are needed to understand post-occupancy performance in a way that targets the core obstacles to sustainability. This paper investigates the fundamental challenges of the market model of sustainable neighborhoods by using a qualitative post-occupancy evaluation method. We map core controversies through the lenses of different actors and ask how such challenges can be addressed in future developments. We interviewed 46 actors in The Sustainable City—a 590-unit residential development in Dubai. Through inductive analysis, we mapped five central controversies: The Branding Controversy; The Innovation Controversy; The Behavior Controversy; The Governance Controversy, and The Market Controversy. Such controversies appear fundamentally associated with the performance of privately developed sustainable neighborhoods. We present recommendations to resolve such controversies in future developments, including the clearer communication of goals and behavior expectations to residents, the ongoing education of residents, careful testing of technologies, the necessary steps by developers and local municipalities to promote affordability and equity, and resident representative committees in order to enhance civic agency.

**Keywords:** actor–network theory; sustainable neighborhoods; branding; governance; market; innovation; behavior

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## 1. 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 practice. Lately, the private sector has created new models of sustainable neighborhoods, such as Dockside Green in Canada, TSC in Dubai, and Fujisawa SST in Japan. These developments use heavy marketing and place branding campaigns to stand out as trendsetters or gain 'The Sustainability Edge' (Greenberg 2015; Alkhani 2020), and, in some cases, such as Parisian eco-districts, involve the 'greentrification' of lower-class neighborhoods (Machline et al. 2018; Salama et al. 2017). The increasing involvement of the private sector in developing and building sustainable communities demands research to understand

how such projects perform post-occupancy and what specific challenges they face. Therefore, this paper investigates market-driven sustainable neighborhoods through the eyes of different actors and asks how their conflicts of values and needs can be addressed in future developments.

Very little monitoring and evaluation of sustainable neighborhood development post-occupancy is occurring (Whitfield 2017). Mechanisms such as LEED-ND and BREEAM Communities are potentially useful but have not been employed for most neighborhood-scale sustainable developments to date and are complex to apply. Ensuring sustainable neighborhood performance during operations requires centralized tracking of energy and resources which often does not exist. The few extensive analyses to date of older sustainable neighborhood developments are often journalistic in nature

(Fraker 2013; Francis 2002; Corbett and Corbett 2000; Hodge and Haltrecht 2009; Schoon 2016; Dessouky and Wheeler 2022). Some of these reviews have analyzed the role of regulations, resident preferences, and management decisions. However, as the development of sustainable neighborhoods becomes more mainstream, a deeper analysis of how management decisions, technologies, cultures, residents' values, and governance affect their performance will be needed.

This paper presents the social and political dynamics impacting the performance of sustainable neighborhoods as 'controversies.' These tensions between different actors and their values may be among the most important long-term determinants of sustainable neighborhood success (Latour 1987; Venturini 2010; Yaneva 2011). By looking at sustainable neighborhoods as a process and ecology of actors, the paper examines the way in which the social, political, and technical aspects of a sustainable neighborhood are intertwined. The approach recognizes sustainable neighborhoods as spaces with multiple identities and as the products of actor interrelations, spaces 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 the associated narratives.

## 2. Evaluating Neighborhoods through Mainstream Post-Occupancy Studies

Attempts at post-occupancy evaluation (POE) first emerged in the late 1960s (Sanoff and Cohn 1970; Churchman and Ginosar 1999). The focus at that time was mainly university dorms. Evaluations focused on understanding the performance of the building from the users' perspective. The first time the term POE appeared in a publication was in the mid-1970s 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 at 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. Marcus (1975) evaluated Easter Hill Village as a case study of social housing, highlighting discrepancies between the architect's intentions and the users' needs. The conclusions made from interviewing both architects and residents contributed to the sociology of residential architecture and the social consciousness of architects (Marcus 1975).

Many other researchers have expanded the lenses used for evaluating projects. Boudon and Onn's (1972) evaluation of Pessac—a housing project designed by Le Corbusier in the 1920s—highlights the conflict between the designer's conception and the users' reaction. Boudon and Onn introduced the residents as active and creative agents that contributed to the design. Brand (1995) 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 1995). Such examples might not be POEs in a strict sense of the term but illustrate how the built environment can be evaluated from the subjective perspective of the user.

Calls to make POE more systematic and rigorous emerged from the social sciences, and studies moved from a focus on user satisfaction to a full set of criteria including clients, process, and environmental and historical context (Friedmann et al. 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. However, 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 improve the building industry and benefit different stakeholders, including users, architects, building managers, and owners (Preiser et al. 2015). However, Cooper (2001) criticized the body of literature on POE for never critically exploring the relationship between designers, decision-making management, and other stakeholders. 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.

Evidence suggests that POE’s use across the architectural industry is still low, with the exception of some elite architecture firms (Hay et al. 2018; Eke et al. 2013; Hadjri and Crozier 2009; Brand 1995). Upon interviewing 12 architects, Hay et al. (2018) found that POE is defined differently among practitioners and revealed dissatisfaction among those who saw POEs as limited to energy efficiency. The practitioners highlighted a need to start engaging with users to understand how occupants experience and evaluate space (Jones and Card 2011; Hay et al. 2018).

The barriers to use of POE are mostly related to high expenses and a fear of accountability and repair requirements (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 or master-planned neighborhoods (Whitfield 2017; Fraker 2013; Barton 1998). This leaves sustainable neighborhood developers 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 (Stevenson and Leaman 2010).

With the absence of standards regarding what qualifies as a sustainable community (Smith 2002), the idea of evaluating sustainable neighborhoods is still, to a great extent, unexploited. However, it can be of great benefit if put to maximum use by understanding the views and perceptions of various actors involved in their planning, development, and management, as well as their users. A well-developed POE can lead to the improved design of future projects, improved user requirements and management procedures, targeted refurbishments, and improved knowledge for design guidelines and regulatory processes (Whyte and Gann 2001; Adewumi et al. 2021). As cities strive to become more environmentally friendly and sustainable, real estate developers are increasingly incorporating not only green building construction, but also broader strategies and initiatives related to urban greening (Garcia-Lamarca et al. 2022). However, the motivations and role of real estate developers in this context have been relatively unexplored. Therefore, it is crucial to examine how greening efforts are sustained and how real estate development can become a legitimate factor in realizing sustainable neighborhoods.

The achievement of sustainability in urban development is not solely dependent on governmental regulation or voluntary standards developed within co- or self-regulatory

processes. While these factors play a significant role, it is equally important to understand the perceptions, attitudes, and views of developers and various stakeholders towards regulations and voluntary assessment tools. Additionally, exploring the priority of assessment parameters is critical in the context of sustainability assessment through robust post-occupancy evaluation (POE) studies (Dessouky et al. 2023). By conducting thorough examinations of these aspects, we can gain valuable insights into how real estate developers can contribute to sustainable practices and shape the future of urban development. Understanding the motivations and perspectives of stakeholders involved in sustainable urban development will enable the creation of effective strategies that support the integration of greening efforts into real estate development processes. This, in turn, will contribute to the realization of sustainable neighborhoods and the overall environmental well-being of cities.

### 3. Actor–Network Theory and Controversies: An Approach to Examining Sustainable Neighborhoods

Actor–network theory (ANT) can be viewed as a sociological framework that seeks to understand and analyze social phenomena by examining the relationships and interactions between actors (Latour 2005). ANT is increasingly used by academics, professional planners, and researchers to look at and evaluate urban development projects (Farías and Bender 2011; Rydin 2013; Cvetinovic et al. 2017; De Munck 2017).

The ANT approach advocates for understanding people together with their technologies as one big social network with interdependent influences. The use of ANT looks 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 (Creswell and Poth (2017). 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 (Kärrholm 2013; Rydin 2013).

Mapping controversies is one methodological approach of ANT (Latour 1987). Reflecting disagreements between different actors, controversies are not necessarily fierce disputes but are 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, p. 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 facilitates looking at projects as dynamic and complex cultural ecosystems, rather than results of a linear or static process (Mehta 2014).

Mapping controversies provides a fresh lens for evaluating sustainable neighborhoods, since many traditional evaluations are criticized for being remote from the user’s daily lives, the local politics, and culture that might shape the building performance (Till 2009). Mapping controversies as a method to evaluate a sustainable neighborhood may not uncover technical problems of the design (Cvetinovic et al. 2017). However, it can shed light on issues arising from interactions between actors, and so open a dialogue that can positively impact current and future projects.

### 4. Introducing the Methods and Case Study

We used a case study approach to map controversies that reveal post-occupancy challenges in The Sustainable City (TSC) (Figure 1), a privately developed master-planned community in Dubai, United Arab Emirates. The Sustainable City (TSC) exemplifies compound-like communities and is surrounded by housing stock that adopts a similar residential typology which caters to skilled expatriate professionals. For several years, Dubai has been actively integrating sustainable practices into its construction industry.

Commencing in 2011, the Dubai municipality made it mandatory for governmental buildings to adhere to the green building regulations and specifications, while private buildings were encouraged to comply voluntarily. Since 2014, these regulations have become compulsory for all new constructions in Dubai, demonstrating the city's commitment to sustainable development. In a significant achievement, the city became the first in the MENA region to receive the prestigious platinum rating in the LEED (Leadership in Energy and Environmental Design) for Cities Certification from the US Green Building Council in 2019 (MEED 2022). While The Sustainable City (TSC) is a private sector initiative, it reflects the government interest, aspiration, and commitment to reduce its carbon footprint by continuously updating sustainability standards for buildings, roads, transportation, and housing.

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 in 2015, and the development was fully occupied in 2020 with a population of 3000 residents (Dessouky et al. 2023). 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 (Figure 2).



**Figure 1.** Aerial view of the Sustainable City (TSC), Dubai, UAE. Source: Permission from and courtesy of The Sustainable City (TSC).



**Figure 2.** Site plan of the Sustainable City (TSC), Dubai, UAE. Source: Permission from and courtesy of The Sustainable City (TSC).

The lead author conducted 46 in-depth semi-structured walking interviews in The Sustainable City with different actors. The interviews were undertaken between January and March 2020. The actors included residents, local business owners, project developers, architects, landscape architects, town planners, sustainability officers, community managers, sales representatives, and members of the operations team. A general email to the resident listserv and posts on the community Facebook page helped recruit interviewees. All residents, professionals, and business owners who showed interest were interviewed. Those who self-identified as professionals that worked on the project, or were still working on it, were individually approached. A snowball approach then led to a wider pool of actors. The overall sample included interviewees from 24 countries, with 41 living in TSC, 20 of which also work in TSC. A total of 12 of those living in TSC are owners. In total, 34% of interviewees were living in the residential cluster 1, 12% in cluster 2, 29% in cluster 3, 11% in cluster 4, and 15% in cluster 5. However, the study is premised on the notion that the geographical element would not significantly affect responses, because all portions of the development have approximately the same physical form and mixture of units, were constructed at approximately at the same time, and have a similar mix of residents.

The interviewer asked interviewees to give her a tour of the neighborhood. During the tour, she asked questions about how the interviewee perceives, uses, and evaluates the neighborhood. The interviews ranged in length from 20 to 90 min. Following a grounded theory approach, the interviewer asked relatively general questions aimed to avoid predetermining controversies. The actors, their statements, and their own interpretations of the project were traced to map the most common controversies about which different actors disagree.

The walking interview method was selected due to its ability to nudge 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.

The interviews were transcribed and coded using MAXQDA; this included the inductive coding of challenges or controversies expressed by different actors (Figure 3). We kept track of the different actor identities involved in each controversy and double coded linkages between different actors and controversies. To highlight controversies, the analysis looked for conflicts in opinions that different actors expressed regarding the sustainable city. The coding revealed 9 main actor groups involved in 5 main controversies.

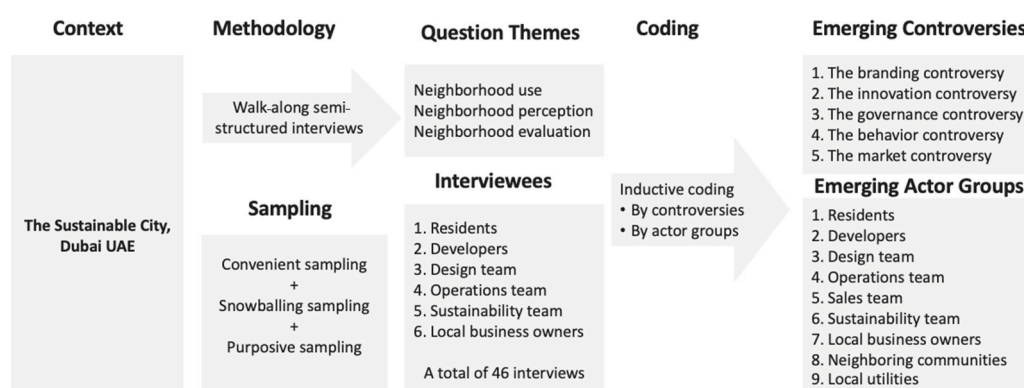


Figure 3. Methodological framework. Source: authors.

## 5. Analysis and Discussion of Key Findings

The qualitative coding revealed five different types of controversies which mark fundamental challenges that impact the long-term performance and operation of the sustainable city. The linkages between the 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 4. reflects the network of linkages between the controversies and actors which was driven by the coding. The figure was generated using the 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).

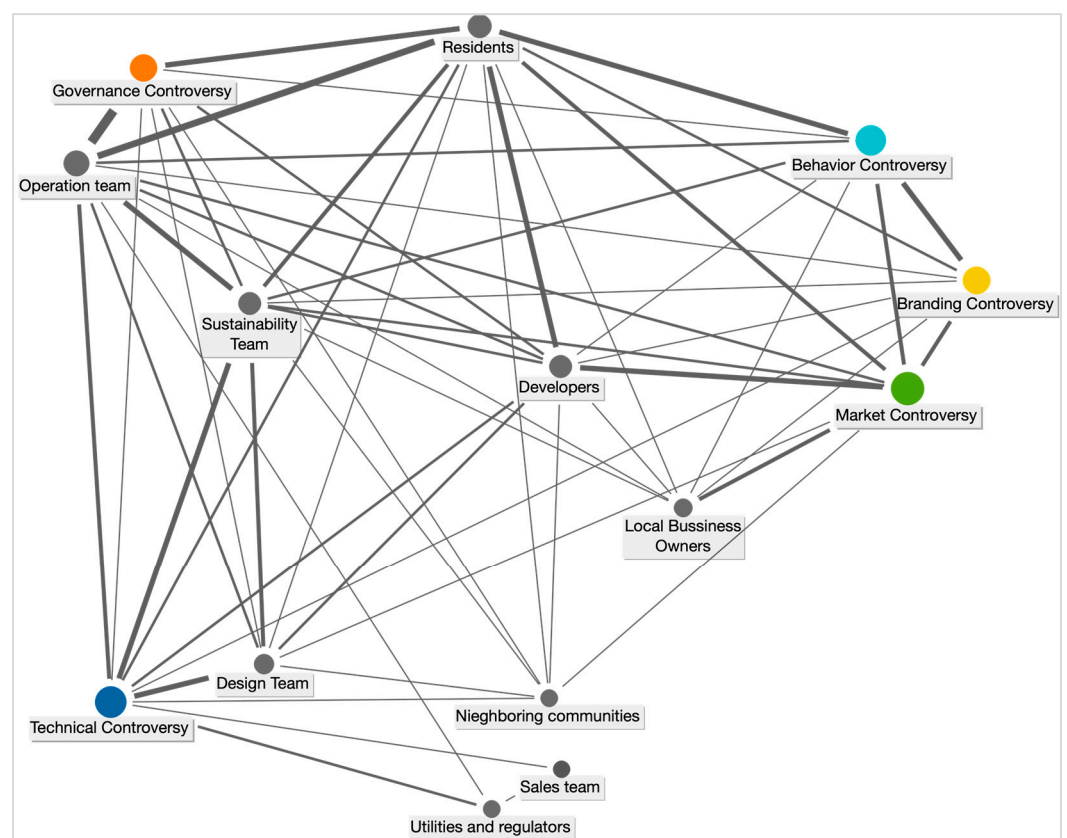


Figure 4. Methodological framework. Source: authors.

### 5.1. 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 be confusing to some, sending conflicting messages about sustainability, 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's what prompted us to come here from the beginning.*" More residents said that they chose TSC because of the high sense of community and pleasant environment than because of its low environmental impacts. While this might seem acceptable 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."* But another 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 this controversy were uncovered. For the design team and the management, the focus is not on 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. [To a]n educator we will talk about education facilities and spreading awareness. [To a]n 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, as 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 a transformation and how it takes time and resources and impacts the rest of the community. One business owner explained, *"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 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 with some residents, but it is slow in impacting others as well as business owners. As one resident suggested, *"We need to create a faster and a more focused hype."* The flexibility of sustainability as a concept seems to be feeding this controversy. 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.

### 5.2. The **Innovation** Controversy: Technology, Pride, and Guinea Pigs

Innovation and technological advancement were, from day one, attached to the concept of TSC. While most actors appreciated the sense of innovation in the TSC, it created some obstacles and disagreements. When asked to pick a keyword that reflects TSC, one resident chose *'Experimental.'* He then explained, *"They keep innovating, trying to coin things, measure things."* This sense of innovation generally gives residents a sense of pride. As one described, *"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 [it] and in progress."* The innovative identity, which the residents well received, seemed to align with the management vision. A member of the operations team confirmed, *"The ability to change and improve over time is at the core of this community."*

At TSC, innovation is expected to come with an understanding that it is a trial-and-error process. A member of the operations team clarified, *"We tell people here that TSC is a*

*living laboratory. You need to be constantly testing and experimenting.*" Another design team member explained 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. It's a continuous learning process...we are open to new ideas and technologies that we did not see or did not have the chance to evaluate while we were designing."*

A few residents did not receive this sense of innovation positively—it made them feel like they are a guinea pig in an experiment. One 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 highlights how, in a market-oriented development, residents' preferences for convenience and functionality can undercut efforts for innovation.

Innovation comes with other challenges, such as dealing with new regulations, finding skilled labor, and trying untested technologies that cause delays or failures. A member of the sustainability team commented, *"If we knew how much time it would take to connect [the photovoltaic panels], we would probably have bought them once we were ready to connect, and 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 operations team explained the overall problem: *"It is us all by ourselves trying to change all this. We change and go up to regulators."*

Although, from the management side, innovation might need to be more calculated and phased, some residents demanded yet more progress and innovation. One resident reflected, *"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 come a moment where there is a general understanding of how much innovation is enough. However, until then, innovation will remain contested. A member of the sustainability team described the current phase of operations like this:

*"Here there is a different relationship that happened between the residents and the developer. There is a push and a push back. The developer is trying new technologies and solutions, changing stuff in a continuous pace. [But] the residents are vocal about it too. They talk about the changes they like; if not they [say] 'I think it should be like this.' If you are thinking continuous development, you should always approach it in this way."*

### 5.3. 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 the 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.

The expectations regarding the role of the management varied widely among residents. Some 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 explained, *"I think perhaps taking a more civic stand, maybe having a community town hall, listening to the community members rather than dictating [to] 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 led management to consider handing over aspects of the operation to the residents. A member of the operations 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." For this member of staff, handing over partial operation to residents had two internal motives, the first being lowering operational costs and the second being giving more power to residents.

In contrast, some residents demanded the management take full leadership, and expand regulations while providing more information, more guidance, and more handholding. 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 shared governance might be hard within a private development. One resident explained, "This is not a city; it's a private development." Some expected a corporate structure with a complaint system and client satisfaction approach. One argued that the management should be driven by resident satisfaction, since "we are living here; we pay money." Members of the operation team understand that the residents of TSC expect more. According to one, "It is a new project; it is very unique; and it needs more of the costumer care role."

In contrast, other residents see the limits of a client-centered approach. One of these residents said: "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."

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 still others believed that total client satisfaction would never be possible. Disagreement regarding governance impacts the community's overall performance post-occupancy, for example, how willing residents are to abide by community norms. Hence, governance structure demands to be more intentionally addressed in future post-occupancy evaluations.

#### 5.4. The **Behavior** Controversy: Awareness, Enforcement, and Norms

Occupant behavior is always a challenge within communities and buildings with environmental goals. In the case of TSC, for example, an increased use of chemical-based detergents impacted the internal water recycling process of the community. The interviewees expressed varying opinions about how the project is impacting occupant behavior and the role of management in altering and enforcing behavior.

Many residents believed that living in TSC supported them in adopting more pro-environment 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. According to one resident, "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." Another resident stated that his kids' behavior had 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." One resident also believed that TSC could help local businesses develop a sustainability agenda: "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. Many criticized the behavior of other residents; according to one, *“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.”* Some residents put the blame entirely on other residents: *“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 believed that it is the job of management to encourage behavior change. According to one resident, *“It is still the responsibility of the management to handle that.”*

Other actors called for greater 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 depends 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 stated that the team is 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 and 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.”*

Many actors demanded more regulations, laws, and enforcement. *“They need to make things compulsory,”* said one resident. Some demanded fines: *“There are no fines that people get for not doing things.”* However, others doubted the ability of the management to force change, *“You can’t force people to do it...you can’t control people.”* One resident, who was also a business owner in TSC, described the conflict inherent in wanting strongly environmental behavior in a private, free-market development: *“I told the management you need to put it in the contract [to] mandate people. In the beginning they just wanted to sell, it is economics that rules...I hope that they put more requirements. 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.

##### 5.5. 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. Renters, owners, developers, and designers all seemed to have different interests to justify.

One of the original goals of developing TSC was to prove that sustainability is not expensive and 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 explained, *“It’s a pioneer in that it is doable, it is feasible, you can have a happy, profitable business but still subscribe to sustainability.”*

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. Due to the high demand for units and ongoing operational costs, the developers of TSC decided not to lower their rent prices. The high demand for units was

ascribed both to a better quality of living and the inherent market value of sustainability. This increased market value caused a divide between residents. For owners, this meant a great return on investments, but 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 the forefront of our agendas, for others it is rent.”* A member of the operations team stated the challenge as, *“how to make it more affordable, how to bring down the cost even more, so that sustainability becomes mainstream...Sustainability must not be subsidized.”*

For owners, the price of units in TSC can be justified. Owning a unit in TSC is perceived as a good return on investment with lower operating costs. 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 a good return back on investment.”* Another owner confirmed, *“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 bills.”*

Many actors in TSC seemed ready to justify profits and price increases compared to surrounding properties. A local business owner commented, *“This is a commercial venture; the value is to make money and there is no harm to make money in a sustainable way. It is not a charity. It has to make business sense for the owner.”* A resident commented that, *“[Developers] need to stay afloat as well as generate revenue and pay salaries.”*

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. 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 the pillars of social sustainability related to access and affordability, unless there are market strategies in place to control such profit.

## 6. Conclusions and Recommendations

Establishing the understanding of a sustainable neighborhood from the perspective of different actors and their values can be challenging. Branding, behavior, governance, innovation, and market dynamics are all topics that are rarely highlighted in traditional post-occupancy evaluations. Nevertheless, it was apparent that they can have a long-term impact on the performance of the community. Using controversy-mapping, based on actor–network theory, to evaluate TSC post-occupancy revealed how lingering disagreements impact all actors involved. This method is not a replacement for more technical evaluations yet does contribute to creating a more holistic and realistic image of the performance of such communities.

The branding controversy showed that a focus on the environmental brand of the community can succeed in attracting a small pool of residents with strong pro-environmental commitment, which helps the performance of the community in the short term. However, a continuous high occupancy rate is needed to preserve the community’s economic success, and this economic agenda tends to dilute the community’s environmental brand to attract a broader range of residents with various interests. This more diverse resident base may negatively impact the environmental and social performance of the community in the short term; however, intensive educational efforts may allow for a

transformation of values. Success in transforming the community's norms might then produce 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.

*Recommendations to tackle the **branding** controversy:*

- Developers should collaborate with real-estate marketing agencies and the sales team to ensure that a constant but broad sustainable identity is communicated to potential buyers and tenants.
- The operation team should plan long-term awareness and educational programs to improve sustainability behavior among new residents and those not drawn there for sustainability reasons.
- Local business owners should collaborate with the neighborhood developers to develop a shared sustainability identity that reflects the goals of both businesses and the community.

The innovation controversy showed a conflict between new designs and technologies that appeal to early adopters and innovations that may put off residents who want reliable services and do not like feeling that they are guinea pigs. Although most residents appreciated and took pride in the continued progress and innovation within the community, they also demanded convenience, technologies that function well, and involvement in decision-making.

*Recommendations to tackle the **innovation** controversy:*

- The design team should refrain from deploying untested technologies in vital infrastructure within market-oriented sustainable communities to avoid operational failures.
- Operations teams should be trained in advance on operating and maintaining sophisticated green technologies.
- Developers should plan a budget for testing and incorporating new technologies throughout the project's lifespan to maintain the innovative identity of the project.
- Community managers should train residents on new technologies and provide information and assistance to limit frustrations.

The governance controversy showed the tension between a corporate-like structure, that treats residents as customers with a focus on client satisfaction, and a participatory approach aimed at building community, stewardship, and self-agency within the community. A participatory approach can increase the sense of ownership among residents, which can positively influence their consumption patterns. A participatory approach will encourage and also assist in communicating community goals and action plans transparently, increasing the social acceptance of community rules and regulations, and decreasing the operational expenses of the community by transitioning some responsibilities to residents.

*Recommendations to tackle the **governance** controversy:*

- Community managers should focus, from the start, on building civic agency, for example, by initiating resident representative committees.
- Marketing staff should communicate the community's governance structure to potential buyers and renters. Early communication will limit long-term conflicts of expectations regarding management, responsibilities, and regulations.

The behavior controversy showed that rules and regulations can be used to enforce behavior and social norms that can impact the sustainability performance of the community. On the other hand, developers and managers may fear that too many rules can repel potential residents, impacting finances. Regulations such as chemical-free detergents or limited car use can be well received if residents are informed and educated from the start about community goals and performance data targets. However, this demands

continuous effort to combat resident turnover, and can be perceived as interference in personal freedom.

*Recommendations to tackle the **behavior** controversy:*

- Community managers and the operations team should collaborate early on to develop a code of conduct related to consumption and behavior that residents will abide by. This should be communicated early to potential residents and enforced fairly.
- Developers should allocate resources for awareness sessions throughout the project's lifespan, as part of operational expenses.
- Community managers should regularly provide sessions and information related to community goals and the impact of individual behavior.

The market controversy might be the biggest challenge facing developer driven sustainable communities. The TSC example shows that developing a sustainable neighborhood as a commercial venture can be a success. This is partly due to the multiple quality-of-life amenities the project offered. Child safety, a healthy environment, and fresh food are all attractive to a broad segment of the resident market. However, features aimed at high quality-of-life and sustainability tend to position a development at the upper end of the market, diminishing affordability and social equity. This situation at TSC counteracts the initial vision of an accessible average-price sustainable community.

*Recommendations to tackle the **market** controversy:*

- Developers and funders should consider different market scenarios including capping rents or prices for some residents with below-average incomes.
- Local officials and regulators should consider supporting the developers with partial subsidies or density bonuses above local codes in exchange for affordable housing commitments.
- Local officials and regulators should consider implementing rent control schemes to protect residents from large changes in rent prices.
- Local governments should consider tax deductions for limited-income residents who choose to live in a sustainable neighborhood.

These controversies related to sustainable neighborhood development may vary in different contexts. However, analyzing and learning from them can allow future similar communities to plan in advance for strategies to maximize success. Rather than being based on wrong design decisions or outside market forces, these controversies result from a mix of operational considerations, actor values, technology, and market dynamics. These factors cannot be understood by a post-occupancy evaluation that simply looks at resource consumption, demographics, and resident satisfaction. They require the in-depth interviewing of multiple actors, and an analysis and juxtaposition of interactions between actors, perceptions, and values. By analyzing these controversies, communities can proactively plan strategies to navigate challenges and increase the likelihood of success.

Conventional post-occupancy evaluations, that focus solely on resource consumption, demographics, thermal comfort, and resident satisfaction, are insufficient for understanding the underlying dynamics of sustainable neighborhood development. To gain a comprehensive understanding, it is necessary to conduct in-depth interviews with multiple actors and analyze the interactions, perceptions, and values that shape the development process. By taking a holistic approach, a more nuanced understanding of the complexities and challenges can be achieved, leading to informed decision-making, enhanced operations, and improved outcomes.

Projects such as The Sustainable City (TSC) are pioneers in defining a new vision of sustainability as a mainstream commodity in the housing market. This concept, often referred to as "the mainstream green" (Fosket and Mamo 2009), represents an important step towards the widespread adoption of sustainable practices.

However, it is crucial to consider how sustainability concepts can be diffused to the mainstream without diluting their essence due to market demands and pressures. TSC and similar privately owned sustainable communities bring together a diverse array of actors

with different values, attitudes, and behaviors. Understanding the role of these actors and their contributions can help address inherent controversies within these communities and foster collaboration towards sustainable solutions.

The global shift towards sustainable urbanization has far-reaching implications for social and sustainable development. With the projected increase in urban population, urban sustainability transitions become essential for creating livable, resilient, and environmentally conscious cities. These transitions involve reconfiguring urban systems, including infrastructures, culture, lifestyles, governance, and institutional frameworks, by understanding the perceptions, attitudes, and values of various actors. It is crucial to acknowledge that these transitions are complex and multifaceted processes that require careful planning, stakeholder engagement, and the consideration of an array of factors, including technological advancements, cultural norms, market dynamics, and societal expectations. The case of TSC demonstrates that developing and operating a mainstream sustainable neighborhood is not without challenges. Evaluating such projects through post-occupancy evaluations that solely focus on resource consumption fails to capture the larger dynamics at play. Instead, alternative methods are needed in order to provide a more comprehensive understanding of the complexities involved. Documenting controversies, obstacles, and lessons learned from these projects and the way in which they operate can stimulate important conversations about how to successfully transition urban sustainability concepts into the mainstream. These insights can inform best practice and recommendations for future sustainable neighborhood development while fostering equitable and environmentally responsible urban growth.

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