The Adoption of Building Environmental Performance Assessment Methods in the UAE Built Environment

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Abstract Current research in sustainable development of the built environment acknowledge the role of building environmental sustainability assessment methods as market changers for sustainable buildings' design and construction. While most of the existing studies are focused either on developing and comparing assessment methods, or on assessment methods' performance outcomes, this research addresses how assessment methods are adopted in practice. To address this, a pilot study was designed with desktop study of literature and regulation documents, as well as 7 guided in-depth interviews with 8 professionals engaged with assessment methods in the UAE. While, the spread of sustainable design and construction practices is motivated by mandating the assessment methods for all projects, but, with various rating requirements for government and private development projects, the analysis has revealed the continuous development of communication channels for the spread of sustainable design and construction practices between the regulative bodies with: (a) clients through raising awareness activities, (b) projects professionals through training and technical support, and (c) suppliers of sustainable systems and products through quality assurance and certification procedures. Finally, the paper discusses these findings and outlines possible impact on theory, policy and practice.

Keywords Adoption · Building assessment · Innovation · Sustainability · UAE

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1 Introduction

Sustainability is one of the major challenges around the world nowadays. Globally, UAE has one of the highest energy consumptions per capita where buildings are considered the primary consumer of energy, water and materials, this could be attributed to the exponential growth for the UAE's built environment during the last three decades, furthermore, this profile is in line with previous research which found that high-income countries with high Human Development Index (HDI) *has disproportionally larger increase in Ecological Footprint* (Moran et al. 2008). However, since the late 1990s the UAE has started to adopt a pro-active approach for addressing environmental issues by establishing administrative capacities such as the Environment Agency to address climate change and launching pilot projects such as "Masdar City" to raise awareness, which has placed the country at the forefront of environmental sustainability policy and development for the Gulf Cooperation Council (GCC) region (Reiche 2009). Moreover, current UAE sustainability policy and regulations reflects its own social, economic, environmental and governance needs and dynamics, and addresses the nature of the country as high-income emerging economy which doesn't rely on taxation or financial donor packages by international agencies to meet sustainable development goals (O'Brien et al. 2007).

While sustainability is defined to address three main pillars: environment, economy and society, this definition is often extended to include governance. Sustainability assessment is commonly associated with the derivation of indicators to simplify and break down those pillars into smaller units for ease of analysis to better inform evaluation and decision-making (Bond and Morrison-Saunders 2011). Currently, there is a plethora of assessment methods across the world and a wide array of rating schemes which has been developed with different purposes and features to enhance buildings' sustainability, however, it is unlikely to prepare environmental criteria that is pre-designed and sufficient for global use without further adjustments. Examples of such adjustments include using geographically adapted database (Ding 2008), as such, sustainability assessment methods could be considered as an innovation that is context specific, which calls for research to consider the dynamics of adopting this innovation in development projects from a transformational perspective rather than only their performance assessment and measurement outcome (Cole 2005).

In order to understand the role of assessment methods as innovation and market changer, it is paramount to understand the processes and dynamics of sustainable development projects. Previous research has found that project managers and directors' leadership helped drive targets down the supply chain leading to improved understanding and better realisation for the concept of sustainability, furthermore, engaging with suppliers in early stages of design was found to add real value, however, it is often difficult because strict procurement processes need to be adhered to (Epstein et al. 2011). Moreover, challenges facing sustainability adoption where related to the temporary nature of construction projects, and the fact that engineers sometimes join the project at later stages after sustainability conceptualisation and targets have already taken place (Abraham and Gundimeda 2018). Additionally,

clients' lack of understanding for the benefits of Whole Life Costing (WLC) continuously influence their decisions when adopting sustainability (Opoku and Ahmed 2014). These are some of the important issues which need to be investigated in order to understand the adoption of assessment methods in the built environment development projects.

The aim of this research is to investigate how assessment methods are adopted in practice; this aim is achieved through a pilot study of the adoption of assessment methods by the UAE built environment. The paper is organized as follows: The following section outlines the approach and tools for the pilot study. That is then followed by the presentation of the analysis and discussion of the findings in relation to communication channels for the adoption of assessment methods as well as some of the captured projects' dynamics and the assessment process. Finally, the paper concludes with outlining the possible impact of this pilot study on theory, policy and practice.

2 Research Method

The research reported here is part of an ongoing research project which addresses innovation and sustainability discourse and practices which are rapidly emerging in the UAE. The research adopts interpretivist and contextualist approach (Pettigrew 1990) to investigate the adoption and diffusion of assessment methods in the UAE built environment. While most of the existing studies are focused either on comparison studies for various assessment methods, or on the outcomes in performance as the result of the assessment process, this research primarily focuses on the assessment process itself and its intersection with project development, while attending to the idea that assessment methods provide objective evaluation and assessment of the performance of the developed facility in relation to its environmental impact is an innovation that has the potential to play a transformational role and act as market changer (Cole 2005).

A pilot study was conducted between June and December 2018, involving two main data collection methods: First, a desktop study of relevant academic literature in assessment methods as well as regulation documents concerned with the two domestic assessment methods in the UAE namely Estidama and Alsa'fat. Second, 7 guided in-depth interviews (Spradley 1979) were conducted with 8 professionals working with both Estidama and Alsa'fat systems. Interviews considered as guided conversations (Yin 2018) to provide "*depth, subtlety, and personal feeling*" (Pettigrew 1990). The interviewees were 3 engineers from Abu Dhabi and Dubai municipalities, and 5 sustainability consultants who work for global construction companies based in the UAE; 3 of them were architects and 2 were mechanical engineers who are all certified by Estidama and Al Sa'fat. While this is a small sample which may lack comprehensive representation of the UAE's construction industry, the pilot study provides a starting point for further data collection and analysis to investigate the adoption of assessment methods in the UAE built environment.

Classic diffusion of innovations model, which defines diffusion as *the spread of new ideas through communication channels in a social system over time* (Rogers 2003), and concepts from the growing research in assessment methods (Schweber 2013; Schweber and Haroglu 2014; Thomson and El-Haram 2018) were used to inform the development of the interviews' questions, and they guided the thematic analysis of the qualitative data (Miles and Huberman 2018) which was gathered using the two data collection methods above. The following section introduces background information about assessment methods in the UAE, before delving into the analysis and discussion of the pilot study findings.

3 Assessment Methods in the UAE

Sustainability regulations has started to emerge in the UAE construction sector from the late 2000s, with the launch of Estidama framework in Abu Dhabi in 2009, which was then shortly followed by Dubai Green Building Code (DGBC) in 2010. Each regulation now has its own associated assessment method. The Pearl Building Rating (PBR) system, which is Estidama's assessment method has been mandated since 2010, and it is part of Abu Dhabi building code. Currently covering approximately over 10 million m^2 and more than 2000 villas. The basic requirement for PBR is achieving 1 pearl for privately owned villas and 2 pearls for governmentally owned projects which could be achieved by the mandated sections and 60 additional points to be selected. Higher pearl ratings are optional and could be gained for implementing other requirements.

Al Sa'fat, the most recent assessment method was also launched by Dubai municipality in 2018. While around 70% of Dubai buildings have already reached Al Sa'fat basic requirements by applying DGBC regulations, Dubai Municipality visualized the need to address the level/ category of sustainability that each building accomplishes. Therefore, Dubai Emirate, having its individual goal and vision towards reducing resources consumption and improving the indoor environment quality has launched Al Sa'fat rating system that was tailored for Dubai's construction field. Al Sa'fat is mandatory on all buildings that built after 2014, with private residential villas and industrial buildings being required to acquire Bronze certification and investment villas, public buildings and multi-story buildings required to meet the Silver certification.

The economic, cultural, social, and environmental pillars of sustainability were addressed in both Pearl and Al Sa'fat rating systems in a way that is suitable to the UAE, its climatic condition, culture, market, and vision. Furthermore, both Estidama and DGBC frameworks adopt performance-based rather than prescriptive approaches, as they specify minimum requirements rather than prescribing specific systems or components. Mandating PBR and Al Sa'fat assessment systems may encourage innovation and diffusion, however, as argued by Gann et al. (1998), this can happen only if these mandated regulations "*be able to translate into a system of incentives and certification which encourage a successful flow of ideas between*

designers and builders responsible for final product development, integration and assembly, and upstream component innovation by materials producers and suppliers" (Gann et al. 1998), hence, this research focuses on the adoption processes for PBR and Al Sa'fat as transformational innovation in the form of mandated regulations in development projects in the UAE built environment.

4 Analysis and Discussion

4.1 Communication Channels for the Adoption of Assessment Methods

The analysis of the pilot study has revealed that the spread of sustainable design and construction practices in the UAE development projects was driven by sustainability regulations and mandating UAE context specific assessment methods such as PBR and Al Sa'fat. In order to support and enforce this mandate, regulative bodies for both systems were found to be engaged in a continues buy-in process with clients, projects' professionals and suppliers for sustainable products and systems—using various communication channels as discussed in the following sections and summarized in Table 1. Furthermore, these communication channels are necessary to address the needs of different members of the sustainable built environment's eco system, ensuring that they are cautiously maintained, and that they complement one another.

4.1.1 Communication Channels to Clients

The acquired qualitative data recognizes that the two most evident motives for clients and owners to meet the assessment requirements are: financial savings and gaining reputation. To address these two points, motivational strategies for companies to adopt the system are frequently considered by both PBR and Al Sa'fat teams, which are evident in activities such as: a-close monitoring the cost of sustainable construction materials to avoid any unjustified price increases by suppliers, b-issuing various marketing materials, and holding and attending events involving clients and owners to raise the public's awareness of the economic impact of certified sustainable buildings, c-conducting and publishing results for comparative case studies of certified and non-certified buildings to demonstrate savings on energy and water, and d-displaying plaques showing the building rating on a highly visible place in the building in a similar fashion to hotel rating, so the users can stay informed of the building's certification.

Table 1 The adoption of assessment methods communication channels

Communication channel with	Challenges	Mechanism to address the challenges
Clients	Get the buy-in for financial savings and gaining reputation	– Close monitoring for the cost of sustainable construction materials – Marketing materials, and events to raise the public's awareness for Estidama – Comparative case studies to demonstrate savings on energy and water consumption – Display plaques showing the building rating on a highly visible place in the building
Projects' professionals	Spread knowledge and enable easy certification processes	– PQP and Al Sa'fat Certified Engineer training and certification. – Individual support for projects
Sustainable products and systems suppliers	Get the buy-in from suppliers	– Product certification processes – Online library of approved products and systems

4.1.2 Communication Channels to Projects' Professionals

One of the main characteristics of both PBR and Al Sa'fat rating systems is that they have training and certification schemes for development projects professionals. For example, for PBR there is the Pearl Qualified Professional (PQP) training course and certification. Each project requires a PQP to be assigned to the project as the single line of communication linking the Estidama team with project professionals. Which enables the Estidama team to easily monitor and supervise the certification progress. The data shows that sufficient communication and proper handover between the project consultants, contractors, PQP, and Estidama personnel is the key for successful adoption of the rating system, hence, Estidama team offer continuous individual support to projects.

4.1.3 Communication Channels to Suppliers of Sustainable Products and Systems

The data shows that the diffusion of sustainability methods and practices in the built environment through the adoption of assessment methods since 2010 has resulted in the emergence of companies specializing in sustainability services and products,

creating new jobs and employment opportunities in the industry. The responsibility of monitoring the market for sustainable products and systems falls on PBR and Al Sa'fat teams along with other government organizations, with quality assurance as a high priority. Therefore, both systems adopt strict product certification processes conducted by third parties in realistic lab conditions. They also publish an extensive online library of approved products and systems hosted on their websites, making it available to projects, which has encouraged suppliers and manufacturers to certify and include their products on these valuable libraries.

5 Projects' Dynamics and the Assessment Process

While Al Sa'fat system has only been launched in 2018, and projects are yet to start seeking certification, the interviews with projects' professionals who have engaged in Sa'fat certified development projects, has revealed that the assessment process actually promotes collective project work, or as one architect puts it: "*it forces people to get out of their silo*". Moreover, working together is challenging because design and construction teams are not static, with professionals often moving from project to project, and while previous experience with the assessment method is important, but this also poses more challenges as the following quote suggests:

> it depends on that project team, how many members are experienced in the past that they can really look in the score card like, "Yeah, got it. I know what you're talking about." Like you know because again we are in a geography that has people coming and going. So I might have, I mean landscape architect who came only last week from Melbourne Australia, what's Estidama? Architect

This not only captures the temporary nature of the involvement of construction project professionals and the importance of their prior experience, but also highlights the construction sector in the UAE as being international with global workforce who might not be completely familiar with local practices and regulations such as Estidama framework.

With Estidama and PBR system having more exposure after nearly 10 years of implementation, projects professionals believe that design and construction practices have in fact improved, however, the awareness and level of knowledge and involvement of clients is considered to be still lagging, this is demonstrated in the following two quotes by one of the participants;

> So yeah we've gotten a better hold of the design side and the definitely construction side. I think we need to improve on clients' involvement to be honest because they tend to think like, "Oh it's you guys." Yes, it does but it's also you;

> Client buy-in can be challenging. convincing the client that maybe this credit is better than that credit. Or illustrating to a client why a particular credit might not be viable or the best solution that we're looking for. Each project is different. Each client is different. Even repeat clients because a repeat client may be asking you to do something else. Or a repeat client might be asking you to build something that you have done before but because of the site location the previous credits are not available. Architect

This shows the need for more sustainability literacy to be communicated to clients by Estidama team for example, in order for them to become more involved and to positively engage in the assessment process.

6 Conclusions

The aim was to investigate the adoption of assessment methods for sustainable built environment in the UAE. This aim was founded on the need to address the emerging discourse for sustainable development of the built environment through policy, regulation and the mandate of assessment methods in the UAE. Guided by diffusion of innovations theory and emergent assessment methods literature, a pilot study was designed and implemented, revealing dynamic communication channels between regulative bodies and clients, projects' professionals, and sustainable products and systems suppliers, which increases awareness and achieves the buy-in from the various members of the sustainable built environment eco system. Furthermore, the pilot study has captured projects' dynamics and the assessment process which is characterized by challenges posed by the temporary and global nature of development projects teams, and the lack of client awareness, involvement, and levels of knowledge.

Despite the limitations of generalizability of the pilot study, the findings presented here can provide guidance to regulative bodies to improve their communication channels in order to address the captured challenges at project levels. Moreover, this paper contributes to the growing literature concerned with the effect of assessment methods in the development process by providing focus for environmental sustainability of the built environment in an emerging economy such as the UAE which is unique due to its climatic, social, cultural, and economic conditions.

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