University of Reading

An Ethnographic Investigation into How Social Practices Inform Sustainable Building Design in Oman

A thesis submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy at the School of Built Environment

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Declaration

I confirm that this is a product of my efforts and that I have given proper and complete recognition to all material taken from outside sources.

Majid Al Jahdhami

Acknowledgments

Lastly, I am deeply grateful for the love, encouragement, and unwavering support from my mother **(Nasra)**, who has always supported me with her motivational words, and my wife **(Khalsa),** who provided unwavering support and sacrifices that have been crucial. Her love, patience, and companionship enabled me to balance family needs and my Ph.D. study. Finally, I express my heartfelt gratitude to my daughters **(Mazoun, Qamar, Raghad, Ebaa, and Hakeema)** for their patience when I couldn't give them the attention they deserved while focusing on this project. Their affection, happiness, radiant smiles, boundless enthusiasm, and delightful mischief served as an inexhaustible source of inspiration, fueling my determination to overcome the challenges presented by my Ph.D. They have been my constant source of strength and inspiration throughout this journey, and their support has been invaluable in helping me to achieve my goals.

List of publications

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POE	Post-Occupancy Evaluation
PDO	Petroleum Development Oman
BMF	Bait Mina Al Fahal
BREEAM	Building Research Establishment Environmental Assessment Method
LEED	Leadership in Energy and Environmental Design
MODES	Ministry of Defense Engineering Services
DfSB	Design for Sustainable Behaviour
DfS	Design for Sustainability

Glossary

Designers	Are professionals who are trained and skilled in creating architectural designs for structures of the case study, the BMF
Case study	Bait Mina Al Fahal (BMF)
Facilities management	Individuals or teams that offer various facilities to the building users, including catering, furniture, network, and cleaning
Organization	Petroleum Development Oman (PDO)
Post-occupation	The stage that ensues after a building's construction is completed involves persistent inspection and assessment to ensure that it adheres to its initial specifications. This stage frequently entails administering surveys and other evaluative instruments to its inhabitants to gauge its performance vis-à-vis the intended standards.
Practice as entity	The focus of attention is the components of a particular activity taking place within a specified temporal and spatial context.
Practice as performance	A distinct instance of a practice carried out by a practitioner at a specific point in time is involved.
Practice	Identifying routine actions carried out in daily life becomes possible by utilizing specific distinguishing characteristics, such as skills, images, and artifacts.
Service providers	Are individuals or teams that offer various services to customers or clients that are interacted daily with users of the building, including the security team, facilities management team, and operation and maintenance
Sustainability team	A group of professionals responsible for promoting and implementing sustainable practices and initiatives in building
Users	Individuals or groups occupy or utilize the BMF building for various purposes. These users include employees, cleaners, operation and maintenance, security, and visitors. The needs and requirements of users of buildings can vary widely depending on the type of building and its intended use.

Abstract

This study addressed a recognized problem whereby design intention is often wrongly assumed to be an accurate prediction of a future user action, resulting in lower-than-expected building performance when measured quantitatively through Post Occupancy Evaluation surveys. The issue with the current approaches for promoting sustainability in building design is that they have paid more attention to the environment and less to the social dimension of sustainability, despite the widely accepted definition of sustainability having an explicit anthropocentric focus emphasizing human needs. Hence, this research illustrates the constitution of users' daily life, revealing that the influences of cultural and contextual factors extend beyond the intentions of design for sustainability.

Contemporary discussions surrounding the evaluation of building performance frequently underscore the existence of a 'performance gap' between the operational reality of buildings and the envisioned performance delineated during the design phase. Although these discussions predominantly revolve around energy-related considerations, there is a growing emphasis on attending to the subjective experiences of building occupants, particularly with regard to thermal comfort and overall well-being. While the heightened focus on these aspects is undoubtedly commendable, it is notable that prevailing conceptualizations of buildings persist in treating them as static physical constructs rather than dynamic entities that manifest in practical utilization. Seeking to challenge prevalent assumptions, the concept of building appraisal diverges from established paradigms of building performance evaluation by departing from the notion of the building as an ostensibly immutable entity. Instead, it centers on the inherent fluidity of the occupying organization and its spatial aspirations as the foundational framework for assessment.

Empirical data was obtained from an ethnographic case study of an office building in Oman, involving observations, shadowing, interviews, and documentary analysis. Notably, this method included users often excluded from knowledge generation processes, such as cleaners, and those typically considered authoritative, such as architects, operation and maintenance, and facilities managers. As a result,

numerous unexpected instances of individual actions were observed, contradicting prevailing design approaches for social sustainability. Collecting and collating seemingly mundane information has uncovered a wealth of knowledge that can be translated into valuable insights for individuals who can influence future designs and sustainability approaches. Hence, the primary novelty of this thesis lies in the mapping of theories concerning sustainable building design and theories concerning social practices. This study breaks away from traditional post-occupancy evaluations and offers new insights into sustainable design and building use in the context of the Middle East.

Chapter 1 : Introduction

1.1 Background

According to Pollard *et al*. (2010), the World Wildlife Fund Living Planet Report indicates that the environment has experienced a twofold increase in human demand from 1961 to 2007. Consequently, the planet's ecological footprint has surpassed the biosphere's carrying capacity. To meet their resource requirements and manage waste, humans now require the equivalent of 1.5 Earths (Global Footprint Network, 2010). Over the past 50 years, global demand has tripled, exceeding nature's restorative capacity by 30% (Staniškis, 2012). If a swift change of direction is not undertaken, humanity is approaching multiple existential crises (Taylor *et al*., 2016). Considering the crisis above, the literature suggests a significant correlation between design practice and social reform. As a result, design endeavors are already committed to tackling unsustainable practices (Kimbell, 2015), leading to establishing a research field within the design, referred to as "sustainable design," which has emerged within the context of this thesis.

Design research is the field in which this thesis is situated. According to Nigel Cross, one of its innovators, design research "includes the study of how designers work and think, the establishment of appropriate structures for the design process, the development and application of new design methods, techniques and procedures, and reflection on the nature and extent of design knowledge and its application to design problems" (Cross, 1984). Increased awareness of sustainability and its impact on society has led to greater recognition of the necessity to modify our lifestyles to mitigate the negative consequences of human activities on the environment (Nash *et al.*, 2017). The study conducted in this thesis is based on the underlying assumption that design theory has been developed and applied to tackle unsustainable activity levels. So, however, these endeavors have thus far proven insufficient. Despite an extended period of focus on "sustainable design" spanning over a decade, the creation of novel products persistently yields augmented levels of unsustainable utilization rather than achieving the intended objective of reducing such levels (Kuijer and Bakker, 2015).

In light of this, the literature highlights specific design challenges and reveals that user actions often deviate from designers' intentions, posing difficulties in meeting human requirements. The critical issue identified is that while sustainability has been widely accepted as a concept that prioritizes human needs and has an anthropocentric focus (Brundtland, 1987, p. 43), current approaches to promoting sustainability in building design have placed a stronger emphasis on environmental aspects while neglecting the social dimension of sustainability. The neglection has emerged from the assumption that users are passive actors rather than active participants, hindering achieving the desired performance has emerged due to design thinking (Sanne, 2002; Cole and Brown, 2009). Design thinking involves problem-solving activities focused on "devising courses of action aimed at altering existing situations to preferred ones" (Simon, 1969, p.130). These concerns highlight the need to move beyond traditional design thinking to envision progress through actual actions as an alternative approach for designers to promote building sustainability (Warde, 2005; Shove, 2010). Hence, in this study, the vital significance of users in buildings plays a fundamental role in comprehending sustainable design.

1.2 Research Problem

This research at a School of the Built Environment concentrates on the relationship between building design and user practices. The literature indicates that buildings are among the leading causes of climate change (Dixon *et al*., 2018). This situation has prompted the construction industry to adopt sustainable design, construction, operation, and use. As a result, the industry has endorsed Design for Sustainable Behavior (DfSB) as a solution to this issue, focusing mainly on individuals as an extension of the theory of planned behavior (Bhamra *et al*., 2011). Therefore, building design must implicitly and explicitly encourage and influence sustainable behavior (Wever *et al*., 2008). However, sustainable buildings continue to exhibit discrepancies between anticipated and actual performance (Bordass *et al*., 2004). Consequently, various research has been conducted to assess the performance of sustainable buildings in terms of technical, physical, and economic factors, but performance gaps remain unresolved (Watson, 2015).

Therefore, this study must focus on the building design theories developed to promote sustainable behavior through sustainability discourse. These theories have received widespread criticism in the literature for relying heavily on technology and neglecting the broader context of user practices, resulting in ineffective outcomes (Brynjarsdóttir *et al.*, 2012). Moreover, they tend to be rational and viewed as causal models of behavior that disregard habitual behavior (Scott *et al.*, 2012). As a result, the literature has demonstrated that such theories have not accomplished their sustainability objectives. The potential drawback of contemporary design theories is that they prioritize individual behavior, which relies on individualistic approaches and technical solutions to promote targeted, sustainable behavior. Consequently, sociologists have advocated social practice theory as a promising method for better-comprehending user interaction and design artifacts in a specific context. The users' practices, which consider contextual and individual factors that shape and influence practices, are the primary unit of analysis (Shove and Pantzar, 2005).

The existence of performance gaps in sustainable office buildings has been demonstrated in the literature, which serves as the basis for the current investigation. According to the literature review, the performance gap comprises operational energy and occupant satisfaction discrepancies between anticipated and actual outcomes (Bordass *et al*., 2004). Moreover, this gap may be due to the requirement that building users modify their practices in response to an unsatisfactory built environment, despite meeting industry standards (Leaman and Bordass, 1999). In other words, current sustainable policies have primarily disregarded social practices, making it difficult to envision how users' everyday activities are constructed (Sahakian and Wilhite, 2014). Therefore, this study argues that reducing the performance gap should not only focus on technical, physical, or economic considerations but should also consider social practices.

Consequently, it is argued in this study that the concern arises from inadequate integration between the supply side (design) and the demand side (operation and use). The evaluation focuses on two aspects: the design process and occupancy. In the design process, even sustainable buildings that meet regulatory requirements like BREEAM or LEED can exhibit performance discrepancies (Robinson *et al*., 2016). Critiques of environmental management systems (EMS) have highlighted

the limitations of relying on predictive or modeling tools prone to subjective measurement issues (Haapio and Viitaniemi, 2008; Ding, 2008). These systems also rely on inferential statistics based on specific criteria, which can vary depending on the reviewer and introduce reliability concerns (Drayson *et al*., 2017). Furthermore, EMS considerations may conflict with other factors, such as social aspects, necessitating a comprehensive assessment of user practices (Røpke, 2009). Therefore, it has been proposed that a qualitative approach would provide more informative insights.

The second aspect of this investigation delves into the occupancy phase, a critical stage in the life cycle of buildings. During this phase, the tools used for the Post-Occupancy Review of Building Engineering (PROBE) are scrutinized. These tools have been extensively criticized in the literature, serving as the foundation for the exploration in this study. One notable criticism, highlighted by Patel and Green (2020), is the linear nature of the current POE system. This system often adopts individualistic approaches, perceiving buildings as static and fixed physical objects. However, this perspective fails to acknowledge buildings' dynamic and evolving nature as they are enacted in practice. They have emphasized that buildings are more than mere structures, as they are living entities shaped by the activities and behaviors of their occupants. Furthermore, there is a growing concern about how users are portrayed in evaluating building performance. Cole and Brown (2009) argue that users are often considered passive consumers rather than active participants. This perspective overlooks users' significant role in shaping the performance and sustainability of buildings through their daily practices and interactions with the built environment.

Therefore, the contemporary issues arising from the interplay between the supply and demand sides can be attributed to the differentiation between two perspectives: practices-as-entities and practices-as-performance (Schatzki, 2010). Understanding the intricacies of daily activities hinges upon this distinction. Regrettably, prevailing design regulations and policies have predominantly embraced the practices-as-entities perspective to encourage sustainable behavior. However, the practices-as-performance perspective is crucial for comprehensively considering practices in their entirety, leading to the insufficient promotion of sustainability

(Hargreaves, 2011). Furthermore, this has led to the persistent gap between intended design performance and actual user satisfaction with the built environment that can be attributed to subjective measurements employed during the pre-and post-design processes and the insufficient integration of social sustainability considerations in design thinking (Watson, 2015). Therefore, it becomes apparent that there is a clear requirement for a more comprehensive and resilient approach. In this context, the emergence of social practice theory as a promising framework has the potential to enable designers to promote building sustainability effectively. Moreover, it serves as the necessary theoretical foundation for this research, providing a solid basis for investigating and addressing the challenges associated with sustainable practices in building design.

1.3 Theoretical Foundations

This research explores the actions carried out by designers and the occupants of buildings, recognizing the importance of understanding their behaviors concerning the broader social context. By adopting a socially-informed approach grounded in social theory, the study has shed light on how the surrounding circumstances influence users' daily activities within buildings. Central to this research is the notion that individuals' daily practices are not isolated occurrences but are deeply intertwined with the social context in which they are situated. Furthermore, the interactions between individuals and their environment play a critical role in shaping and influencing these practices. Drawing support from the work of Berger and Luckmann (1967), who argue that the social world intricately influences individuals in their daily activities, this research recognizes the significance of the social context in shaping the behaviors and practices of building occupants. Furthermore, the research findings highlight the potential misalignment between building practices and design principles. Latour (2005) asserted that by delving into these contextual factors, such as cultural, social, and political factors, the research seeks to uncover why building practices may deviate from the intended design principles.

The literature has observed that the sustainability challenges faced by the construction industry primarily stem from social factors rather than economic or

technical ones (Hoffman and Henn, 2008). Therefore, improving sustainability depends mainly on transforming human lifestyles and aligning them with sustainable aspirations (Jenks and Dempsey, 2005). However, traditional design strategies, which have been goal-oriented, have primarily centered around analyzing and modifying individual behavior, assuming predictable user consumption patterns (Kuijer and Bakker, 2015). As a result, this narrow focus on individual behaviors has hindered the effectiveness of sustainable design, as it relies on the willingness and ability of individuals to change their behaviors (Khashe *et al*., 2019). Moreover, this approach has overlooked the critical aspect of considering "what use and user should be like" during the design process (Redström, 2006, p. 136). Additionally, contemporary design approaches have overlooked the significance of contextual factors that shape the daily practices of users (Hargreaves, 2011). By neglecting these contextual influences, the design strategies have failed to fully comprehend and address the complexities of user behaviors within specific social and environmental contexts.

In light of these considerations, Shove (2010) observes that the previous failure to capture significant social change processes stemmed from perceiving individuals as fixed entities. In contrast, practice-oriented design views individuals as active agents within practices, where their repeated actions manifest in performance, as Spurling *et al*. (2012) articulated. Hence, this research emphasizes social practices and departs from the traditional focus on the individual, exploring this alternative approach to design. According to Reckwitz (2002), practices are understood as dynamic relationships between users and materials. This approach has gained recognition in the field of sustainable design and presents itself as a viable alternative to conventional design strategies. Practice-oriented design expands the examination of users' behavior in the built environment to encompass complex practices and dynamics that extend beyond individual actions, as emphasized by Kuijer and Bakker (2015).

Given the significance of social practice theory in comprehending users' everyday activities, it is imperative to utilize the most suitable approach to examine these practices effectively. In previous studies, Van Veggel (2005) discussed how designers used psychological methods to examine user behaviors within buildings.

They conducted tests in controlled settings, such as prototypes, and relied on post-occupancy evaluation surveys to gather information about user perceptions. However, these approaches were criticized by sociologists for their quantitative nature and their limited ability to provide in-depth insights into building usage. Consequently, sociologists recognized the importance of exploring activities that are not directly observable and advocated for designers' adoption of ethnographic research. As a research approach, ethnography allows designers to observe users' daily activities and comprehensively understand their practices. This understanding is a valuable resource for designers in developing new product designs that effectively meet users' needs. Therefore, the research employs ethnography as the primary research approach to enhance our understanding of the relationship between building designers' intentions and users' practices, aiming to promote sustainability in future designs.

1.4 Ethnography to Investigate the Practices

Understanding the different perspectives of design as engineering science and social science is crucial (Dourish, 2006). In engineering science, Kimbell (2012) highlights that design is often approached as a problem-solving activity where designers tackle ill-defined problems. They bring their unique problem-solving approach to finding solutions, sometimes oversimplifying design thinking as a mere information processing task that overlooks the role of context. Consequently, designers are perceived as the primary agents in the design process. In contrast, social scientists such as Suchman (2011) and Shove *et al.* (2007) have reconceptualized design as a socially distributed accomplishment in which artifacts and other individuals play significant roles in shaping the meaning and outcomes of a design. By adopting an ethnographic approach, designers can better understand how designs are shaped and the diverse actors involved in the process. This perspective shifts the focus away from the designer as the central agent in the design process.

Recently, design research has recognized the importance of ethnographic data and methodology. The design has been regarded as a resource for developing general ethnographic methods to investigate contemporary social settings (Rabinow *et al.*,

2008). Anthropologists have started exploring design's socio-cultural and political relevance within the framework of classic ethnographic research, recognizing design as a vital human capacity and a primary source of social order (Murphy, 2015; Schüll, 2012). From this perspective, this research can be classified as an anthropology of design, which considers design as a subject of anthropological study (Gunn *et al*., 2013). This perspective rectifies a common tendency to excessively embrace the potential of design in diverse social, economic, and political contexts with an overly optimistic outlook (Suchman, 2011). Accordingly, this research aims to reveal the relationship between design and users' daily activities using ethnography as an anthropological approach to understanding design's impact on users.

The anthropology of design is concerned with bridging the gap between design intentions and user practices. Anthropologists argue that design emphasizes static aesthetic qualities, such as shapes, geometries, patterns, and their relationships while downplaying the importance of human actors in shaping and being shaped by design (Anusas and Ingold, 2013). Consequently, design has been characterized as a "gaze-narrowing device" that limits the entire understanding of its referent (Agha, 2011, p. 22). In contrast, anthropology focuses on the interrelationships between entities that shape users' daily activities (Murphy, 2016). Anthropology can contribute to a design by providing theoretical and cultural interpretations (Gunn *et al*., 2013). Therefore, this research aims to use ethnography to investigate both the design intentions and approaches used to promote sustainability in buildings and the actual use of the building. This approach will explore the factors influencing users' behavior and their impact on sustainable practices.

1.4.1 Research Context, Questions, and Objectives

The design community has recognized the role of social practice in design, and "practice-oriented design" has been identified as a research area by scholars in sustainable design. Table 1.1 indicates that most previous practice-oriented studies were conducted in developed countries. However, within the given context, there is a scarcity of research conducted in Eastern countries that explores the interactions between users and buildings. Hence, this research aims to address this gap by

investigating user practices in the Sultanate of Oman, one of the Middle Eastern countries where different cultural meanings of user practices can be uncovered. Furthermore, culture potentially impacts the constitution of daily activities explored through the ethnographic approach used in this study, which may offer new insights into design.

Table 1.1 A Summary of Empirical Studies Applied the Social Practice

No	Title	Field	State	Author
1	Consumers, Producers, and Practices Understanding the invention and reinvention of Nordic walking	Walking	Norway	(Shove and Pantzar, 2005)
2	Converging Conventions of Comfort, Cleanliness, and Convenience	Comfort, Cleanliness, and Convenience	UK	(Shove, 2003b)
3	Sustainable Consumption: A Theoretical and Environmental Policy Perspective	Domestic consumption	The Netherlands	(Spaargaren, 2003)
4	Ecological citizenship and sustainable consumption: Examining local organic food networks	Food consumption	UK	(Seyfang, 2006)
5	Understanding change and continuity in residential energy consumption	Household energy consumption	Denmark	(Gram-Hanssen, 2011)
6	New thinking on the agentive relationship between end-use technologies and energy-using practices	Air conditioning and food refrigeration	Norway	(Wilhite, 2008)
7	Theories of practice — New inspiration for ecological and economic studies on consumption	Domestic practices and consumption	Denmark	(Røpke, 2009)

8	Practicing behavior change: Applying social practice theory to pro-environmental behavior change	Workplace	UK	(Hargreaves, 2011)
9	Towards sustainable household consumption: exploring a practice oriented, participatory backcasting approach for sustainable home heating practices in Ireland	Household consumption	Ireland	(Doyle and Davies, 2013)
10	Making practice theory practicable: Towards more sustainable forms of consumption	Food consumption	UK, USA, and Switzerland	(Sahakian and Wilhite, 2014)
11	Analysing cycling as a social practice: An empirical grounding for behaviour change	Cycling	UK	(Spotswood et al., 2015)
12	Implications of Social Practice Theory for Sustainable Design	Bathing and staying warm	Netherlands	(Kuijer, 2014)
13	Standby Consumption in Households Analysed With a Practice Theory Approach	Household consumption	Denmark	(Gram-Hanssen, 2010)
14	Applying Social Practice Theory to Contemporary Working Practices in Sustainable Office Buildings: Implications for the Performance Gap	Workplace	UK	(King, 2019)
15	Up, down, round, and round: connecting regimes and practices in innovation for sustainability	Food consumption	UK	(Hargreaves et al., 2013)
16	How theories of practice can inform the transition to a decarbonized transport system	Transportation	UK	(Watson, 2012)

In the context of sustainable building considerations, this study holds particular relevance in Oman, where the country has experienced a significant increase in electricity and water consumption due to rapid urban development and infrastructure expansion (Powmya and Abidin, 2014; Saleh and Alalouch, 2015). Additionally, Oman's economy faces resource scarcity, relying heavily on a single primary source of national income (Al-Badi *et al*., 2011). Therefore, this research can contribute to redirecting the country's focus toward a practical understanding of sustainable building practices. By developing a localized understanding of sustainable building practices, Oman can effectively address its challenges related to resource scarcity, rising energy demands, and economic sustainability.

Furthermore, despite the current reliance of Oman on internationally recognized assessment tools such as LEED and BREEAM, this research endeavors to overcome this constraint by examining contextual factors that impact user practices within buildings. This investigation enables the development of accurate sustainability rating systems that align with local weather conditions and cultural needs. This study's outcomes can guide the development of a customized assessment tool tailored explicitly for sustainable building design in Oman. The absence of rating tools adapted to the unique context of Oman's buildings underscores the necessity for such a tool. The research findings, particularly the actionable insights derived from cultural interpretations, would be invaluable in creating this tool.

Therefore, this study seeks to address two research questions:

- To investigate how organizations implement sustainability initiatives related to their office buildings.
- To understand the cultural context of Oman impacts the sustainability practices of office buildings.

Given these questions, the study focuses on three primary themes: sustainability, design for sustainability, and user practices. Social practice theory serves as the underlying theoretical framework employed. By conducting ethnographic investigations into users' daily routines, the study examines the interplay among these topics from an anthropological standpoint. It is essential to note the

complexity of this research, as it involves scrutinizing the organization's sustainability approach, evaluating its impact on building design, assessing the extent to which design objectives for sustainability were achieved, and identifying potential factors contributing to any shortcomings. Consequently, the research encompasses multiple objectives to address the three questions above. These objectives include:

- To perform an extensive literature review into the disciplines of sustainability, design, and practices of users and to understand the significance of their relationship for promoting design for sustainability.

- To identify limitations of current approaches for understanding sustainability and its implications to the design of buildings from the current best practice.

- To examine the organisational approaches for promoting social sustainability in buildings.

- To use ethnographic investigations to explore the social practice theory's role in understanding the building's actual use.

- To map the theory of practice with the design theory to promote social sustainability in future designs.

1.4.2 Research Design

This research focuses on understanding human actions, knowledge, and the utilization of objects, guided by the social practice approach. To achieve this objective, the research adopts an appropriate ethnographic strategy to explore the dynamic interactions and derive meaningful conclusions that align with the social practice epistemology underpinning this research (Bryman, 2016). Although this approach differs from conventional methods like interviews or questionnaire surveys, it may not facilitate universal generalization. However, it can provide richer, more valuable, and more nuanced accounts of action within specific contexts (Atkinson and Hammersley, 2007). Therefore, this section provides an overview of the ethnographic approaches, data analysis techniques, and challenges that impacted the research, highlighting the fundamental elements of the research design employed in this study.

a. Undertaking the Ethnography

Drawing on Social Practice Theory (SPT) principles, this study's primary objective is to investigate users' practices and their intricate relationship with the built environment within specific empirical contexts in Oman. Following Warde (2005), this examination involves observing users and considering their embodied knowledge, the influence of materials and technology on their actions, and the social structure of the context. Thus, the observation has focused on these aspects to unravel the underlying meanings behind these actions (Bourdieu, 2003). However, a challenge lies in going beyond examining these individual elements and comprehending the broader social structure of practices to gain a deeper understanding of their societal significance (Røpke, 2009). This research explores various building elements impacting users daily, including open spaces, lighting, heating, ventilation, and noise.

For several reasons, the workplace has been chosen as the specific social context for this research. Firstly, it has been argued by various authors that an individual's behaviour within a particular environment is influenced by the broader discourse surrounding that location or situation, such as their home, neighbourhood, or workplace (Proshansky *et al.*, 1983; Vorkinn and Riese, 2001). Furthermore, previous studies have indicated that individuals exhibit different behaviours in different conditions, and people from diverse cultures may engage in distinct cognitive processes, particularly within the workplace setting (Kaplan, 1966). Additionally, considering that many individuals spend a significant amount of time interacting with colleagues in the workplace, this specific context and the associated social interactions warrant close attention in research focusing on the design of sustainable workplaces (Tudor *et al.*, 2007). Given these considerations, this thesis specifically focuses on examining the workplace environment.

Therefore, this study focused on conducting a case study in a specific workplace building in Oman. The chosen building served as a representative example for the research, considering its significance concerning sustainability. The building in question is owned by Petroleum Development Oman (PDO), the leading organization in the country engaged in oil and gas exploration and production,

known for its strong commitment to promoting sustainability. To investigate the impact of social context, PDO's headquarters building, known as Bait Mina Al Fahal (BMF), was specifically selected as the subject of examination. In addition, ethnographic investigations were carried out within this sustainable building to gain valuable insights. BMF serves as the workplace for employees from diverse nationalities and backgrounds, with their cultural influences significantly shaping their daily activities within the building. To explore the interaction between the building and its users, the users were observed as they went about their day-to-day activities within the building. By observing their daily activities, the study aimed to assess the extent to which the design team's intentions aligned with the users' actual practices. The collected data provided valuable insights into the degree to which the users' daily practices matched the expectations of the designers.

Between February and August 2022, a series of ethnographic investigations were conducted, employing various methods such as observation, shadowing, informal interviews, and document analysis. The fieldwork commenced with an initial discussion involving service providers who catered to the needs of the building users, including members of the design team responsible for the BMF's design. The purpose was to gain a comprehensive understanding and explore the intentions of these stakeholders. Subsequently, the organization's sustainability initiatives in buildings and the strategies employed to achieve the targets set by these initiatives were examined. The facilities management team, responsible for cleaning, catering, and furniture provision to the building users, was also included in the investigation. These three service providers collaborated to shape the daily activities of the building users, as their materials and resources interacted with the users regularly.

Users' daily activities in the built environment were observed as an additional component of the fieldwork, with their interactions with the materials designed by service providers serving as a facilitator. A diverse range of users, including staff, cleaners, security personnel, operation and maintenance personnel, and visitors, were included in the observations. The firsthand experience of witnessing users' reality played a crucial role in understanding their everyday practices and how they engaged with the various elements of their environment. As a result, several significant instances of individual behaviors were identified and synthesized into

key themes. This process involved collecting and compiling seemingly mundane information, which has the potential to yield valuable insights. Moreover, the organized and transformed information can be valuable to an audience that has the power to influence future designs and approaches to sustainability.

During the fieldwork, two significant opportunities arose that contributed to the data collection for this research. Firstly, the selected case study building, BMF, was undergoing an evaluation of its sustainability in operation and maintenance in collaboration with LEED (Leadership in Energy and Environmental Design). This assessment process coincided with the fieldwork period, providing the opportunity to gather relevant data in partnership with LEED. Secondly, PDO engaged a specialized institution to develop a new "Future of Work Strategy" strategy for their buildings. This initiative aimed to understand employees' perspectives on the work environment, particularly in light of the challenges posed by the pandemic. As a participant and observer, it provided a rare opportunity to be a part of the sustainability assessment and formulating the "Future of Work Strategy", and consequently provided valuable data that directly contributed to achieving the study objectives.

b. Data Analysis

In this research, the social practice lens developed by Shove *et al*. (2012) has been employed to analyse practices as the focal point of investigation. According to this perspective, practices encompass a combination of related materials, meanings, and competencies that collectively shape human behavior. Moreover, these practices are influenced by social norms, cultural values, and power dynamics and are embedded within wider social and institutional frameworks. By centering on practices, this research seeks to comprehend the interactions between users and the built environment, particularly concerning the materials designed by service providers and users' engagement with sustainable practices. The social practice lens proves valuable in exploring the intricate, multi-dimensional, and dynamic nature of human behavior and its connection to the built environment. Moreover, it enables a comprehensive analysis of practices that surpasses individual attitudes and behaviors, recognizing the impact of social and institutional contexts. Furthermore,

the social practice approach offers insights into integrating sustainable practices into everyday routines and the facilitators or obstacles presented by institutional structures and policies. Overall, adopting the social practice lens as a theoretical framework has contributed significantly to this research, providing a comprehensive understanding of practices related to sustainability in the built environment.

The ethnographic investigations employed in this research generated significant data, consisting of observation notes, semi-structured interviews, and document analysis. A comprehensive analysis was carried out across all data sources to reveal recurring patterns of meaning that transcend the literal content of the data. This qualitative data was thematically analysed using a six-step approach recommended by Braun and Clarke (2006). The process involved multiple readings of the data to gain a comprehensive understanding, identifying initial patterns and codes through a reflexive approach, searching for codes that could be grouped into overarching themes, reviewing the data to explore different themes, categorizing the themes, and initiating the writing process to construct a coherent narrative. Additionally, specific data in this research required specific procedures. For example, verbal data from interviews needed to be transcribed, and all data originally in Arabic had to be translated into English.

c.   Challenges to Research Design

The challenges associated with using ethnographic research have been encountered in this study, as discussed in the existing literature. Firstly, these challenges relate to the methods employed for data collection and analysis, necessitating the active involvement of the researcher in the data collection process and close collaboration with the components of the case under investigation. Compared to conventional methods such as interviews or surveys, which can be conducted remotely, this approach demands more time and effort. Secondly, ethnographic research often generates detailed data from multiple sources, requiring additional research effort and an extended timeframe for analysis. Thirdly, this study has confronted these challenges, mainly because the case study is situated in the researcher's home country, and the complications posed by the COVID-19 pandemic have further

hindered data collection and analysis. Lastly, the challenges of ethnographic research encompass the management of a substantial volume of data resulting from the observation process, necessitating thorough analysis within a specific timeframe.

1.5 Summary and Thesis Outline

The general idea of the research and its grounding outlines have been demonstrated in this chapter. The research idea has emerged to discuss the theories designers utilize in promoting sustainability and designing buildings. It also explores the organisational understanding of sustainability and its linkage to the designer's approach to promoting sustainability in building design. The literature has highlighted criticisms of these intentions as they do not correspond realistically to daily activities in the built environment. These criticisms indicate a deficiency in understanding how daily activities in buildings arise and the influences that contribute to their formation. Finally, the potential of social practice theory in bridging the gap between design intentions and actual daily activities has been addressed in this chapter.

To establish a cohesive and interconnected structure, this thesis has been divided into two main parts. Between the introduction and conclusion, these parts consist of theoretical foundations and an empirical case study. The objective of the theoretical foundations, which are explored in chapters 2, 3, and 4, is to investigate the research area. In Chapter Two, an examination is conducted on the theoretical foundations relevant to understanding human activities. In contrast, Chapter Three focuses on deliberating the concept of sustainability, encompassing its fundamental principles and the challenges associated with the current understanding of social sustainability. Finally, in Chapter Four, the sustainability literature is linked to explore the strategies employed by designers in promoting building sustainability.

The second part of the thesis comprises chapters 5, 6, and 7, which present the empirical case that has been examined and discusses the data and their presentation. Chapter Five provides an overview of the research methodology and the case study. The analysis and presentation of the empirical data are discussed in Chapters Six and Seven. Chapter Six investigates the organisational comprehension of

sustainability, the approaches used for encouraging users toward sustainable actions, and highlighting their limitations through the investigations of the users' daily activities. Chapter Seven explores the design's intention of promoting sustainability in building at the BMF and presents the users' practices in their daily activities. This chapter has the most extended length as it encompasses the interactions between various categories of users, such as employees, operation and maintenance staff, facilities management personnel, and the entities introduced by the designers.

Finally, Chapter Eight concludes the thesis by presenting the practices investigated in this research to promote sustainability in future designs. The conclusion highlights the results of the empirical chapters, namely Six and Seven, demonstrating the research implications for design practices. Additionally, this final chapter illustrates the significant contributions of this research in three key areas: method, theory, and practice. It has emphasized that incorporating design into practice is a fitting conclusion to a thesis that asserts ethnography as a distinct method of knowledge with implications to promote sustainability in building design. Finally, it describes the limitations of the research and suggests potential directions for future studies.

Chapter 2 : Theoretical Foundation

2.1 Introduction and Background

This chapter is about exploring how cultural factors are taken into account when organizations plan and design their office spaces with sustainability in mind. Sustainable design in this context likely refers to creating work environments that minimize negative impacts on the environment and promote the well-being of the people using the space. Now, when considering cultural aspects, it means taking into account the values, beliefs, and practices of the people associated with the organization. This could involve understanding how different cultural preferences and work styles influence the design of office spaces. For example, certain cultures may prioritize collaborative workspaces, while others may value more private and individual work areas. In essence, it is encouraging an examination of how organizations integrate both environmental sustainability and cultural considerations when shaping the physical and functional aspects of their office spaces.

For quite some time, environmental social scientists have been intrigued by the question of how we perceive and act on environmental issues in our daily lives. This inquiry delves into the ways people engage with climate change, water scarcity, biodiversity, waste, and renewable energies. Scientifically, it explores how individuals navigate and respond to the connections between their personal lifestyles, routine consumption practices, and global environmental changes. Scholars such as Southerton *et al*. (2004), emphasized that there is a recognized necessity to comprehend the intricacies of everyday consumption practices. This is crucial because the choices we make in our homes, transportation, and office activities play a significant role in achieving substantial reductions in resources consumption.

The discourse on sustainable consumption and behavioral change in policy remains primarily under the influence of social psychologists and economists who predominantly adopt an individualist perspective on behavioral shifts, discussed in Section 2.2. Next, Section 2.3 examines alternative sociological perspectives that

critique psychological techniques for their insufficient knowledge of the fundamental role of context in organizing daily activities. This body of work emphasizes the significant influence of discourses, technology, and lifestyles on users' unremarkable and routine daily practices, highlighting the need to pay close attention to the surrounding social circumstances of activity. Accordingly, theories of practice offer an alternative, non-individualist comprehension of environmental behaviors, presenting avenues for novel approaches to global climate governance. When (re)conceptualized through the lens of practice theories, various theoretical issues emerge, yielding innovative questions and strategies for environmental research and global governance. First, the role of culture in shaping the practices of people which is discussed in Section 2.4.1. Second, understanding the concept of practices through the differentiation between practice as entities and practice as performance is highlighted in Section 2.4.2. Third, the re-conceptualization of the agency-structure dualism reveals that everyday routine practices can serve as the new foundational elements for constructing environmental governance arrangements (Section 2.4.3). Fourth, creating conceptual space for the co-structuring role of objects, technologies, and infrastructures in the reproduction of social practices allows the analysis of technology's crucial role in environmental change without succumbing to technological determinism (Section 2.4.4). Fifth, learning is significantly facilitated by the interactions that take place at the interfaces between diverse communities of practice (Section 2.4.5). All these thematic sections furnish theoretical discussions coupled with debates on their applicability to environmental governance, with a primary focus on sustainable consumption policies. Finally, Section 2.5 has shown the implications of the social practice theory for understanding the issue addressed by this research.

2.2 Existing Approaches for Understanding Individual' Action

This study's central research inquiry is why users' practices in buildings certified to be sustainability compliant conflict with sustainable behaviours. Answering this concern is crucial regardless of the discipline's objectives, which may aim to assist, reduce, or understand the nature of activities. This topic is complicated by the socially and historically constructed meaning of things in a specific social context. The literature on this subject addresses various perspectives on understanding

individuals' actions, namely psychological and sociological (Shwom and Lorenzen, 2012). Thus, the initial step of this study is to review the primary sociological, psychological, and ontological techniques used to comprehend the sustainable-relevant activities of individuals. Typically, social psychology has been dominated by ontological approaches that focus on the individual and tend to view individuals as consistently irrational, rational decision-makers, or both (Kurz *et al.*, 2015).

Existing literature has seriously questioned the fundamental presuppositions of models that conceptualize individuals as rational decision-makers responding to external environmental factors. For instance, Howarth (2006) highlights that these models tend to isolate individuals from their environment, assuming that the environment is a given and that individuals simply respond to it. However, this ignores the reality that individuals and their environments are interconnected and that individuals may also influence their environment. Furthermore, the passage notes that these models are primarily based on a realist and cognitive understanding of the relationship between individuals and their social environment. This approach treats the context as an external factor unrelated to the individual, ignoring the facts that people's behavior is also shaped by history, ideology, and communication. Therefore, Hinchliffe (2007) critiques these models for failing to consider the individual's agency in shaping the context and the mutual shaping of the individual and the environment.

As a consequence of the challenge of comprehending individuals' actions, sociological scholars have developed various perspectives. For example, Shove and colleagues addressed this issue in their book by introducing social practice theory to understand how societies change and why they stay the same (Shove *et al.*, 2012, p. 1). As a sociological approach, social practice theory often conceptualizes individual activities as socially structured (Shove and Walker, 2007) or locked into socio-technical systems (Verbong and Geels, 2007). Instead of considering the participant's personal attributes, the individual is viewed as a carrier for activities, where comprehending, knowing how to, and wanting to are necessary components and elements of the action.

Due to the limitations inherent in both individualist and systemic or structuralist

approaches, which hinder the attainment of a profound understanding essential for advancements towards more sustainable consumption, there arises a necessity to identify a more balanced approach. Such an approach should take into account both agency and structure, integrate bottom-up and top-down dynamics of change, and acknowledge the reciprocal influence and co-shaping between human actors on one hand and objects and technological infrastructures on the other. In this context, it is contended that practice-based approaches, developed within sociology since the 1970s and 1980s, are well-suited to offer this new, balanced perspective (Spaargaren, 2003). In the subsequent sections, the methods for encouraging pro-environmental behavior, drawing from cognitive, social, and environmental psychology, as well as quantitative sociology will be examined. Then, will explore the practice paradigm both theoretically and from a governance standpoint, illustrating how conceptual innovations related to agency, technology, and culture can be leveraged to rejuvenate the policy agenda for governing sustainable consumption.

2.2.1 Resource-Efficient Products

The use of technology has become an essential component of redesigning products with minimal resource usage, as Elias *et al*. (2007) noted. Furthermore, the strategic incorporation of technology in designing products has successfully modified user behavior and has been implemented in various appliances. Consequently, this resource-efficient approach has paved the way for the development of a design for a sustainable behavior approach, which places greater emphasis on understanding and influencing user behavior (Wood and Newborough, 2003). However, while resource-efficient products have shown positive results in some fields, their limitations have been exposed in other areas, as Rüdenauer *et al*. (2005) pointed out.

One of the limitations of resource efficiency techniques is the rebound effect. This phenomenon occurs when appliances designed to conserve resources lead to increases in resource usage due to changes in user behavior. For example, Herring and Roy (2007) found that individuals tend to use more resources when they perceive that they are saving them through the use of energy-efficient appliances.

Similarly, Verbeek and Slob (2006) found that people use appliances more frequently when they perceive that they use less energy per use. These findings suggest that relying on technology alone is insufficient in promoting sustainable behavior and needs to be expanded to consider additional contextual elements.

2.2.2 Resource-Efficient Interactions

The integration of technology and design can help promote sustainable behavior among users. This can be achieved through interaction-oriented approaches that make sustainable behavior simple and automatic while discouraging unsustainable behavior by making it challenging or impossible (Wever *et al*., 2008). In this approach, design is seen as a tool to address sustainability challenges associated with human behavior, and various theoretical models have been proposed to achieve this goal (Bhamra *et al*., 2011; Lilley, 2009). These models focus on understanding behavior by considering different elements, such as attitudes and norms. However, some of these approaches have been criticized for heavily relying on technology and ignoring users' preferences, resulting in inefficient outcomes.

This approach categorizes potential users into three groups (Bhamra *et al*., 2011). The first group comprises individuals who are already motivated to adopt sustainable behavior, and technology is developed to assist them in achieving their objectives. The second group consists of users who lack such intentions, and the design aims to influence and persuade them to contemplate their behavior and take responsibility for their actions. Finally, the third group comprises users who cannot independently modify their behavior, and technical solutions can eliminate "inefficient" operational procedures without the user's cooperation or awareness.

Thus, both the resource-efficient product approach and the resource-efficient interaction approach have certain limitations. Designers rely on theories from psychology and social psychology to identify behavioral variables that influence sustainable actions, taking into account personal factors such as the complete action determination model (Klöckner and Blöbaum, 2010), the theory of planned behavior (Ajzen, 1991), the Theory of Interpersonal Behavior (Triandis, 1989), and attitude-behavior-context theory (Stern, 2000). Design is seen as a means to address

environmental challenges associated with user behavior. However, sustainable behaviors are often assumed to be obvious, resulting in less effort being dedicated to identifying positive behaviors (Lockton *et al*., 2008). Behavior models have been developed to encourage sustainable user behavior, but they typically focus on rational decision-making and do not account for habitual behaviors (Verplanken and Wood, 2006). Considering these limitations, the preceding discussion underscores the necessity for a more comprehensive approach that considers rational and habitual behavior and user preferences.

2.2.3 Cognitive Approach

The significance of comprehending human behavior, attitudes towards the environment, and environmental commitments for promoting sustainability is highlighted by the argument put forth by Maloney and Ward (1973). Human decision-making profoundly affects the environment and natural resources, rendering a serious investigation into the factors that contribute to unsustainable behaviors crucial (Bamberg, 2003). According to specific theoretical perspectives, behavior is believed to follow a linear and rational process. In this process, policymakers and media outlets are responsible for effectively delivering environmental knowledge to individuals. Subsequently, individuals are expected to internalize this knowledge, gain awareness of the environmental consequences of their actions, and develop cognitive schemas such as beliefs, values, or attitudes. These cognitive processes are then assumed to motivate individuals to engage in sustainable behavior (Burgess, 1990). Finger (1994) summarising this linear developmental paradigm in Figure 2.1.
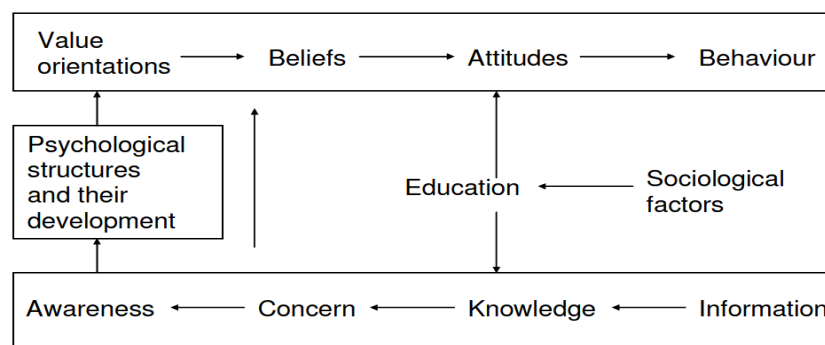
Figure 2.1 The Linear Model of Pro-Environmental Behaviour Change (Finger, 1994)

Based on this fundamental concept, two strategies for promoting sustainable behavior have emerged among American social scientists. The first strategy focuses on attitudes as cognitive constructions that can be modified to promote sustainable behavior. The second strategy examines societal patterns and how the spread of sustainable values can influence sustainable behavior. The first strategy emphasizes modifying attitudes to promote sustainable behavior. This approach assumes that attitudes are instrumental in predicting behavior and that changing attitudes toward the environment makes individuals more likely to engage in sustainable behavior. However, this strategy has received criticism for being simplistic and ignoring other factors that may contribute to behavior. The second strategy focuses on societal patterns and how sustainable values can influence behavior. This approach assumes that cultural norms and values influence behavior and that promoting sustainable values can lead to sustainable behavior. However, this strategy also has limitations, such as overlooking individual factors that may contribute to behavior. Each of these two strategies is therefore discussed individually in the following sections.

a. Attitude

Numerous cognitive, social, and environmental psychology studies have attempted to link pre-defined environmental attitudes with sustainable behavior. This has resulted in the attitude concept attracting much interest in psychology, particularly in the 1980s. According to Bamberg (2003), attitudes were considered a "situation invariant orientation pattern," and if the right attitudes towards sustainability were transmitted among people, sustainable behaviors would adapt to the changes that occur in daily life activities. However, he argues that linking specific behaviors with generalized environmental attitudes is incorrect. He contends that generalized environmental attitudes can account for only ten percent of the diversity in specific environmental behaviors. Instead, he suggests that generic attitudes act as a cognitive tool, providing the person with a description of the context in which specific environmental attitudes are critical for predicting specific environmental behaviors.

Furthermore, with the increasing localization, diffusion, and ambiguity of efforts to tackle global environmental issues, the effectiveness of models diminishes. As the

quest to identify attitudinal drivers of behavior advances and more substantial variables are recognized, the value of these models diminishes (Hargreaves *et al*., 2008). They emphasised that the complex and multifaceted nature of contemporary environmental challenges necessitates a nuanced understanding of the interplay between individual attitudes, societal norms, contextual factors, and structural constraints. The simplistic reliance on models that oversimplify this intricate interplay is no longer sufficient to comprehensively address the intricate dynamics of sustainable behavior.

The Theory of Planned Behavior (TPB) is one of the most well-known and frequently employed models in this area shown in Figure 2.2. It suggests that people's behavior has a rational basis because they weigh the consequences of their choices. According to the TPB, a person's intention to engage in a particular behavior determines that behavior immediately. However, Bamberg (2003) argues that this approach is too simplistic and linking attitudes to specific behaviors is more complex. Overall, the studies linking environmental attitudes to sustainable behavior have faced many challenges, including the difficulty of linking specific behaviors with generalized environmental attitudes and the increasing complexity of understanding and addressing environmental problems. Therefore, there is a need to adopt a more comprehensive approach that considers various factors, including contextual, social, and individual factors, in understanding and promoting sustainable behavior.
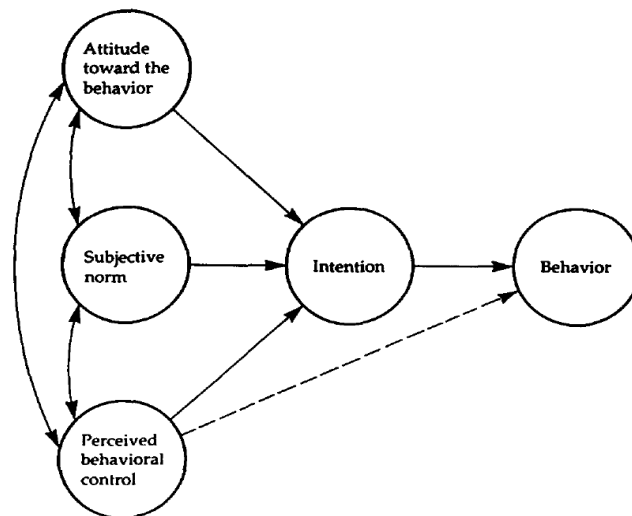
Figure 2.2 Theory of Planned Behaviour (Ajzen, 1991)

b. Values

Maslow's (1954) hierarchy of needs forms the foundation of the cognitive method's second branch, as developed by sociologists to replace the psychological approach to attitude measurement (Maslow, 1954). The New Ecological Paradigm (NEP) scale, developed by Dunlap and Van Liere (1978), suggests that personal values progress causally to specific environmental beliefs, with environmental information influencing actions and promoting values. An individual's values toward the environment may encourage sustainable behavior, strengthening beliefs through a sense of duty to the environment. This perspective contends that activity occurs in pursuing needs to improve human well-being.

However, this perception has been challenged as it relies on individual beliefs and values. Sustainable policies that depend on information sharing can lead to environmental damage despite increasing environmental awareness and subscribers. Sustainable behavior levels remain relatively low, with persistent materialist principles of Western culture over the past 50 years adversely affecting the environment (Jackson and Marks, 1999). While the cognitive approach has been effective in promoting sustainable attitudes, values, and beliefs compared to other approaches, there is a lack of a corresponding shift in sustainable behavior, which is theoretically problematic (Blake, 1999). Moreover, some studies have shown limitations of the cognitive approach when adopted in practice, with concerns that individuals are viewed as passive consumers rather than active participants (Hobson, 2002).

To address these limitations, scholars have identified contextual and situational variables that present obstacles to the presumed linear passage from attitudes or values to behavior (Derksen and Gartrell, 1993). In addition, situational factors may be closely associated with sustainable behaviors, sometimes superseding attitude/value behavior relationships (Olli *et al*., 2001). The DEFRA framework in the UK is an example of a pro-environmental behavior that has adopted cognitive strands of attitude and values. In summary, the cognitive approach to promoting sustainable behavior has limitations related to the value-action gap and the need to consider contextual and situational variables that may impede behavior change.

Therefore, sociology has promoted an alternative approach to promoting sustainability, as demonstrated in the following section.

2.3 The Contextual Approach for Understanding Individual' Action

The focus on enacting diverse social practices is a distinctive feature of sociological perspectives, shifting attention away from individual decision-making moments (Hargreaves, 2011). According to theories of practice, social practices are shaped by social, institutional, and infrastructural factors, including the state and other institutions that configure the fabric and texture of daily life (Shove, 2010). Theories of practice are distinct in their approach to social practices, as they focus on the execution of what people consider normal ways of life and are considered better suited to routine reproduction than innovation (Shove *et al*., 2012).

In contrast to the psychological approach, a different sociological approach to behavior emerged in British and European research in the 1990s across cultural geography, sociology, anthropology, and science and technology studies, which seriously criticized the cognitive perspective (Berkhout *et al*., 2003). The sociological approach challenges the methodological foundation of psychological models, which rely mainly on self-report surveys that are highly socially desirable and rarely examine actual behavior. Such all-inclusive macro categories can be seen more as political tools than scientific concepts (Ungar, 1994). Psychological theories have also been criticized for not recognizing how various settings influence the constitution of social activities (Southerton *et al*., 2004).

Furthermore, the sociological perspective challenges the cognitive approach's implicit notion of information deficiency and its emphasis on information in promoting sustainable behavior (Owens, 2000). This paradigm views information as neutral and constructs people as passive agents waiting to receive unambiguous instructions from distant and dispersed experts (Hobson, 2002). The sociological approach has focused on how various agents socially construct environmental problems and how environmental knowledge and values interact. This has led to adopting alternative methodological approaches to examine how environmental

knowledge and values are applied in context. Finally, the sociological perspective criticizes the psychological perspective for portraying social existence as inherently asocial, contextual, and political (Burgess *et al*., 1998). The sociological approach from prior research encompasses various distinct strands, which will be elaborated on in the subsequent sections.

2.3.1 The Discursive View of Human Behavior

The sociological perspective aims to understand how different social agents contribute to environmental problems and how this affects the promotion of sustainable behavior (Phillips, 2000). Sociological studies focus on how attitudes, values, and beliefs are constructed as statements within particular social discourses rather than representations of personal mental processes, as in the psychological perspective (Billig, 1996). The discursive approach argues that sustainable behavior is socially constituted at a specific moment and place (Burningham and O'brien, 1994). Its goal is to challenge the top-down, linear approach of the psychological perspective and shift the focus to social agents who construct and interpret human behavior (Hobson, 2002).

Thus, this critical approach requires qualitative information obtained through in-depth interviews or participant observations to study contextual influences instead of relying on quantitative data. Research has indicated that the rhetorical context of a situation exerts a substantial influence on shaping human behavior. Contrary to the psychological perspective's direct impact on behavior, the sociological perspective becomes intertwined with other social discourses, which can be manifested and comprehended as actions (Macnaghten and Jacobs, 1997). The suggestion is that individuals should not be regarded as passive receivers of institutional interpretations regarding the impacts of sustainability. They do not merely absorb information and make required adjustments accordingly. Instead, they are considered proactive agents who actively seek to explore the interconnectedness of environmental issues with other moral quandaries and engage in discussions on these matters (Hobson, 2002). In summary, the sociological perspective emphasizes the importance of social context and discourse in shaping human behavior and promoting sustainable practices.

2.3.2 Non-Human Objects

The second facet of the sociological approach revolves around the influence of non-human infrastructures, technologies, and objects on everyday practices. Empirical studies indicate that human behavior and technological systems co-evolve within socio-technical networks, presenting a contrasting viewpoint to the psychological approaches that perceive the technical domain as an external constraint on human behavior (Verbong and Geels, 2007). Consequently, human behavior is understood as an outcome of the socio-technical process. This perspective is informed by the actor-network theory, which asserts that interactions involving both human and non-human actors and objects contribute to the observed behavior in everyday life (Murdoch, 2001). Nevertheless, individuals encounter constraints in their ability to influence specific behaviors directly, as these behaviors are shaped by a multitude of agents and networks (Woolgar, 1991).

Furthermore, significant attention has been devoted to investigating the influence of non-human entities, particularly technology, on human behavior, emphasizing the need to design these objects carefully and consider human morality to foster sustainable behavior (Jelsma, 2003; Huijts *et al.*, 2012). Objects are recognized as active agents capable of shaping social behavior, seamlessly intertwined within the socio-technical infrastructure of society (Hargreaves, 2011). Hence, non-human factors, including technology and infrastructure, assume a critical role in shaping human behavior and should not be disregarded in studies about sustainable behavior. The sociological approach underlines that sustainable behavior is not solely determined by individual attitudes, values, and beliefs, but rather, it is molded through intricate interactions between social agents, discourses, and non-human factors. Therefore, a comprehensive comprehension of sustainable behavior necessitates integrating multiple perspectives and considering broader socio-technical networks.

2.3.3 Habits and Routine of Everyday Lifestyle

The first two strands of the sociological approach have explored the discursive and

socio-technical contexts of behavior, while the third strand places behavior within a social and temporal context. This approach considers how different behaviors interact and coordinate throughout a person's lifestyle, a complex process that requires individuals to coordinate all actors in a way that suits their requirements. Therefore, promoting sustainable behavior is challenging because all lifestyle contexts must be structured to meet human needs. According to Bedford (1999) and Giddens (1984), lifestyle is employed to establish connections between behaviors and practices across time and geographical locations.

Numerous routine actions that impact sustainability repeatedly occur in the same contexts, and breaking such habits is challenging. Behaviors often have distinct characteristics that call for interpretations distinct from those for rare activities. For instance, individuals routinely make fewer decisions about frequent activities and pay less attention to their options, sticking with what they are used to. There is a growing emphasis on depicting repeated activities as more established and unconscious routines and habits than as the consequence of deliberate, logical thought processes. Within various disciplines, there are two distinct theoretical explanations for the occurrence of repeated, ecologically relevant behavior patterns (Kurz *et al.*, 2015).

Firstly, the concept of habit, as explored in the field of psychology, delves into the individual psychological construct that exists independently of action. Habit refers to the internalized dispositions and automatic tendencies that drive individuals to repeat routine activities in specific contexts or situations. Psychological research on habits emphasizes the role of cognitive and behavioral processes in forming and maintaining habitual behavior patterns. It suggests that behaviors become automated and ingrained within an individual's cognitive and behavioral repertoire through repetition and reinforcement.

On the other hand, sociologists take a broader societal perspective in examining routinized ways of doing things. They explore how practices become established and endure within social contexts. Sociological analyses focus on the social structures, norms, and institutions that shape and sustain routines and practices. These practices are seen as social phenomena that are not solely dependent on

individual choices but are deeply embedded in social systems. The sociological approach highlights the ways in which practices secure carriers or hosts within society, enabling their persistence and replication over time. It emphasizes the collective nature of habits and their embeddedness within social relations and cultural systems (Bourdieu, 1984).

Taking a sociological approach provides practical insights into how individuals experience their lives in specific circumstances. According to Hargreaves (2011), individuals face the challenge of managing various demands on their time and ethical standards while navigating their everyday lives and interacting with others who also lead complex lives. It is unrealistic to expect individuals to committedly adopt sustainable behaviors unless they are socially and structurally normalized across all environments. Therefore, leading a sustainable lifestyle is more challenging than cognitive approaches suggest. It involves not just a change in attitudes or values, but also broader social and structural transformations. In light of this perspective, achieving a sustainable lifestyle remains difficult, even when individuals possess the right attitudes or ideals.

2.3.4 The Integration of the Three Strands

The three sociological approaches discussed widen the complexity of understanding and promoting sustainable behavior. These approaches demonstrate that context is more than just a collection of physical or situational factors that need to be rationally addressed to overcome obstacles to behavior. However, the previous investigations in these three strands only partially achieve their objectives because they only focus on one area of context at a time, such as discourses, technology, or lifestyles. Additionally, they highlight that context shapes what constitutes sustainable or unsustainable behavior and that certain behaviors are more or less likely sustainable depending on the discourses, technologies, and lifestyles that shape them.

Addressing this issue, Shove Shove (2003) delves into the intricate interplay between various contextual systems, including discourses, technologies, and lifestyles, and elucidates how they co-evolve to establish collective conventions that uphold and perpetuate daily practices. Shove posits that individual actions in

everyday life are not isolated events but rather the outcomes of a complex and dynamic "system of systems." This perspective recognizes that people's behaviors are shaped not only by their personal choices and motivations but also by the broader socio-cultural, technological, and discursive frameworks within which they are embedded. Shove's framework emphasizes the interconnectedness and mutual influence of these contextual systems, highlighting the need to examine the interdependencies and feedback loops that contribute to the persistence and reproduction of established practices. By recognizing the multifaceted nature of everyday actions and their embeddedness within larger systems, Shove's approach offers a more comprehensive understanding of the complexities in shaping and sustaining collective conventions that govern daily practices. To this end, social practice theory is the promising lens that sociology relies on to understand and promote sustainable action.

This research aims to understand the impact of context on behavior and explore the role of social practice theory in accomplishing this aim. Therefore, it is of utmost importance to employ a middle-level approach utilizing social practice theory to effectively address the concerns raised by previous studies and acquire a fundamental understanding of how individuals shape their behavior. For example, Shove (2003) expresses concern regarding the global convergence of social systems, which has resulted in significant increases in the consumption of environmental resources and the widespread prevalence of unsustainable behavior. In addition, recognizing the potential marginalization of individuals' real-life experiences has emerged from the need to comprehend better how context influences behavior.

2.4 Practice Theories

Practice theorists focus on understanding the intricate interactions between individuals, their skills, attitudes, and the broader social structures surrounding them. They recognize that practices are not isolated phenomena but are embedded within a complex socio-cultural context. This context includes elements such as technology, infrastructure, and institutions that shape and are shaped by practices. While there is no singular, unified approach to practice theory, scholars within the field agree on the importance of examining socially recognizable normative

behaviors that arise from these interactions. These behaviors collectively shared and socially understood, play a significant role in shaping individuals' identities, social relationships, and the reproduction of broader social structures. Thus, investigating the dynamics of practices and their normative dimensions is considered crucial for a comprehensive understanding of human behavior and social life.

Social Practice Theory (SPT) has evolved through two distinct stages of development, each contributing to a deeper understanding of the concept. The initial stage of SPT was marked by the influential writings of sociologists Giddens (1984) and Bourdieu (1984). Giddens explored the notion of structuration, emphasizing the mutual influence between individuals and social structures, while Bourdieu introduced the concept of habitus, highlighting the role of individual dispositions shaped by social contexts. While these earlier researchers were able to explain the visible truths of how society can influence individuals' behaviour through societal norms and rules, they failed to account for the role that technologies and infrastructure also play in this context. Many sustainability initiatives cannot be achieved without the presence of certain technologies and infrastructures, yet the focus is usually on the human behavioral aspects of sustainability. It is in a bid to account for and take into cognisance the latent role of technologies and infrastructure in shaping human behaviours that the second stage of SPT evolved (Spaargaren, 2003). In the second stage of SPT's development, scholars such as Reckwitz (2002), Schatzki (2002), Shove *et al*. (2012), and Warde (2005). Reckwitz examined the social construction of practices and their role in shaping individual and collective identities. Schatzki focused on the interconnectedness of practices, emphasizing how they form more enormous webs of social life. Shove *et al*. emphasized the materiality and entanglements within practices, emphasizing the significance of technologies and infrastructures. Finally, Warde explored the role of consumption practices and their connection to social structures. The subsequent sections will delve into discussions on various paradigms of social practices, demonstrating ways in which conceptual innovations regarding agency, technology, and culture contribute to the agenda for governing sustainable consumption.

2.4.1 Practice -as – Culture

Organisations were initially perceived in early sociological studies as cohesive entities operating in a straightforward manner guided by a nearly Weberian instrumental rationality (Reed, 1992). The primary focus of this early work was on enhancing workplace processes' efficiency and maximizing worker productivity through the application of 'scientific management' principles (Taylor, 1997). Subsequently, the earliest investigations into organisational environmental sustainability also adopted a rational approach to organisational change. It was assumed that integrating relevant environmental information into existing organisational rationalities was sufficient for greening organisations. Various techniques were developed to achieve this, including environmental management systems, environmental auditing (Welford, 1995), Triple Bottom Line accounting (Elkington, 1997), and resource productivity (Weizsacker *et al*., 1998). The process of greening organisations was initially perceived as a straightforward and linear developmental process. Multiple taxonomies and scales of green development were devised, expecting organisations to progressively ascend these as they capitalized on increasingly advantageous situations (Welford, 1995).

The Inability of organisations to progress through these scales and emerge as environmentally friendly workplaces has prompted a recent focus on cultivating green organisational cultures (Shrivastava, 1995). Similar to individual values addressed in cognitive approaches to pro-environmental behavior change, organisational cultures are perceived as deeply ingrained value systems crucial to organisational functioning, offering significance and identity to employees (Peters and Waterman, 1982). The proposition is that by influencing cultures to integrate pro-environmental values, it might be feasible to instigate swift and profound transformations in workplace practices. Consequently, scholars have directed their efforts toward formulating culture change programs, encompassing initiatives such as rebranding, revising organisational mission and value statements, and implementing company programs like Total Quality Environmental Management to engage all employees in the process of adopting environmentally friendly practices (Harris and Crane, 2002).

However, achieving greener cultures and environmentally conscious organisations remained challenging (Fineman, 1996). Subsequent critiques of this work have pointed out its flaw in treating organisations and their cultures as singular and undifferentiated entities. This approach neglected the social dynamics, power relations within these entities, and overlooked individuals' lives beyond the organisational context (Knights and McCabe, 2000). In particular, criticisms were directed at the 'culturalist theorizing' for implying that managers could dictate the meaning of work to their employees (Willmott, 1993). Instead, scholars argued for an exploration of how individuals personally interpret their work and the workplace.

These studies have identified various interpretations of greening within organisations, the power dynamics involved in advocating or resisting a green agenda, and the emotional efforts often required in these processes. However, despite making significant strides in this field, these studies have heavily relied on interviews with managers. Consequently, not only have they largely overlooked the experiences of some workers in greening processes, but, akin to the contextual approaches to pro-environmental behavior mentioned earlier, they have also failed to comprehend or observe actual behavior within workplaces. Thus, how individuals engage with, interpret, and either adopt or reject pro-environmental behavior while actively performing work practices remains to be explored.

All previous approaches have failed to sway organisations towards environmentally friendly practices while the negative effects of unsustainable practices continue to appear in the form of rising sea water levels, ozone layer depletion, increasing emissions, and increasing global temperatures. Recognizing these threats has led governments to develop the 'carrot and the stick approaches' where organisations are incentivized for environmentally friendly behaviours through tax credits and punished through carbon taxes. This current approach has led to an explosion of agencies with expertise for monitoring, measuring, and certifying environmentally friendly behaviours in organisations. Institutions such as BREEAM, LEED, Estidama etc are such organisations that now carry out such assessments and certification of sustainability compliant practices (Robinson *et al.,*2016). At a governmental level, countries have come together under the aegis of the United Nations Climate Change Conference (UNFCCC) commonly referred to as COP

currently in its 28 meeting (COP28) at the United Arab Emirates. Previous climate conference includes COP25-Spain, COP26-Glasgow, COP27-Egypt with Azerbaijan now selected to host COP29 in 2024.

2.4.2 Practice as Agency-Structure

The relationships between individuals and society, along with the explanation of social order and conceptualization of the social, constitute a fundamental subject in social theories. Traditionally, social theories offer responses categorized by a fundamental opposition between two extremes. On one end are theories grounded in a structuralist perspective, where the social system and structures are seen as pre-existing realities that significantly shape individuals' actions. On the other end are theories that begin with self-contained individuals, reducing society to the sum of these individuals and their actions. Since the formulation of this opposition, various attempts have been made to bridge or dissolve it. One such effort involves conceiving a dialectical interplay between structures and actors, emphasizing that structures emerge through the actions of individuals, while these actions, in turn, are shaped by existing structures. Giddens' theory of structuration (Giddens, 1984) advances these efforts by providing a nuanced and intricate formulation of the interaction, wherein social practices serve as the mediating concept between action and structure.

According to Giddens, individuals possess knowledge about their day-to-day activities, and many routine activities operate on a practical consciousness that doesn't necessitate conscious reflection. Instead of viewing actions as isolated occurrences, agency is perceived as a continuous stream of activities within an ongoing process. Consequently, intentionality is also understood from a processual standpoint rather than linking specific motivations to particular actions. Although reasons for actions can be articulated through discourse, particularly when agents are queried and, upon reflection, become receptive to change, this suggests that agents are not merely passive recipients of structural pressures. Through the reproduction of social practices across time and space, agents create patterns of social relations, characterized as social systems.

2.4.3 Practice as Agency-technology

The initial generation of practice theories, as developed by Giddens and Bourdieu, had limited applicability in analyzing the roles of objects, technological systems, and hybrids. Formulated during the same period, the 'long 1980s,' structuration theory and actor-network theory exhibited minimal awareness of each other's existence. In the 1990s, several authors undertook the challenge of reformulating practice theory. The goal was to incorporate the roles of objects and technologies without compromising some of its fundamental premises concerning the relationship between agency and technological structures.

Schatzki (1996) and Reckwitz (2002), have undertaken a more comprehensive exploration of the issues surrounding agency, structure, and technology. Their investigations are situated within the frameworks of both structure and actor-network theories. Notably, Reckwitz has played a significant role in integrating technology into theories of practices. When evaluating Schatzki's work, he advocates for reconciling a robust emphasis on the autonomous impact of technology with the fundamental structuration's premise that human agency is the ultimate determinant of making a difference in the world. It is essential to fully acknowledge and conceptualize the impacts of things in the social order, not merely in terms of representations or as entities that acquire meaning through human attribution. The effects of objects themselves, the role of inter-objectivity alongside inter-subjectivity, and the notion of objects being 'constitutive' for social practices all require detailed consideration and conceptualization.

The evolution of practices over time often hinges on technical changes. Shove *et al*. (2007) examine digital photography and do-it-yourself activities as instances where technological innovations play a significant role. In the case of do-it-yourself, competence is distributed between the practitioner's skills and the tools, materials, and instruction manuals employed for task execution. Recent advancements in materials and equipment have diminished the reliance on traditional skills, enabling new practitioner groups to undertake tasks that were previously too demanding. This underscores the fluid and changeable nature of the boundary between material elements and competence.

2.4.4 Practice – as – Dynamics of Interactions in Communities

The concept of communities of practice (Wenger, 1998) originated primarily in professional settings, such as educational institutions and corporations (Handley *et al.*, 2006). It acknowledges the inherently social nature of practice and is concerned with how individuals coordinate themselves to collaboratively negotiate and perform specific practices. This concept emphasizes that the successful execution of tasks does not rely on individuals learning and executing them in isolation. Instead, the performance of practice is based on informal connections and unspoken understandings among groups of colleagues, friends, family members, and so on. These communities of practice thus represent networks of situated and distributed cognition essential for the collective achievement of practices.

As individuals navigate their diverse paths within communities of practice, the communities themselves undergo learning and evolution, resulting in changes to their practices. Wenger (2000) characterizes this collective learning process as a dynamic tension between perceptions of competence and levels of experience. According to him, every community of practice shares a common understanding of what constitutes competence in the practice, and this forms a crucial aspect of membership. Being a competent member of a community of practice involves engaging in a specific practice and gaining experience within it. In this context, competence attracts experience. As experience is gradually accumulated, and as individuals undertake new experiences (such as interacting with a different community), perceptions of competence are progressively redefined. In such instances, experience attracts competence.

The interactions at the boundaries between different communities of practice serve as a vital mechanism for learning. When communities of practice engage in conflicts or cooperation with each other, they acquire new experiences that can lead to changes in their perceptions of competence. Similarly, individuals, as carriers of their experiences from other communities, contribute to the renegotiation of what constitutes competent performance in a practice. By highlighting these interaction processes, the concept of communities of practice offers a mechanism through which individuals can alter practices. It acknowledges that such changes

fundamentally involve collective renegotiation. In the context of pro-environmental behavior, communities of practice thus indicate the social processes that may be implicated in the acceptance or rejection of pro-environmental ideas within existing practices.

Until now, the majority of research on pro-environmental behavior has concentrated on private and domestic practices. In these contexts, social control mechanisms, although undoubtedly present, may be highly ingrained and challenging to pinpoint, partly due to the inherent difficulty of accessing such settings. To delve into these social dynamics, drawing inspiration from Wenger, it would be reasonable to shift the focus toward more structured social and institutional settings, such as workplaces, where mechanisms of interaction and social control may be more overt. This shift could also unveil strategies for leveraging these social dynamics to encourage pro-environmental behavior.

2.5 Implication of Social Practice Theory for this Research

The primary contention of this chapter is that theoretical explanations of pro-environmental behavior, spanning various perspectives, lack sufficient contextualization. Consequently, they fall short of presenting an accurate depiction of how everyday practices unfold and evolve in social situations. Consequently, these theories are unable to provide much-needed guidance on how to effectively encourage more pro-environmental behavior. Within the cognitive tradition, which emphasizes information provision, beliefs, values, and attitudes, there exists a relatively narrow and asocial perspective on how individuals make decisions. In adopting this viewpoint, it overlooks the impact of the surrounding context in shaping behavior.

The contextual approach has sought to address this Issue by focusing on various factors such as discourses, technologies, and lifestyles, which establish a normative foundation for everyday behavior. This approach suggests that behavior adheres to distinct social logics in various contexts. However, by not integrating the different emphasized forms of context (e.g., discourses, technologies, lifestyles), it achieves only a partial re-contextualization. Recent efforts from a second generation of social

practice theorists aim to offer a more comprehensive view of practice, illustrating how everyday behavior results from the interplay between structure and agency. This perspective directs attention to the social organization and performance of specific practices. Despite this, due to the selection of empirical case studies and a tendency to overlook social interaction processes, research in this area has maintained a somewhat abstract stance and has remained somewhat detached from the actual enactment of practice.

The examination of existing theories highlights a pressing need to comprehend the actual occurrences in real-world situations that either hinder or encourage pro-environmental behavior. Until now, studies in this field have overlooked the micro-level processes of interaction, which, it can be argued, play a decisive role in determining the occurrence of pro-environmental behavior in specific contexts. Therefore, it is imperative that new research endeavors to delve into the local social dynamics of pro-environmental behavior and aims to identify the social mechanisms that either support or oppose it. Ethnography emerges as potentially the only methodological approach capable of exploring these dynamics, a discussion that will be further developed in Chapter Five.

The current body of literature indicates that social practices and behaviors are established and negotiated within, and thus profoundly influenced by, a range of context-specific dynamics. Up until now, studies have primarily focused on domestic settings. Therefore, new research should embark on investigating behavior in alternative settings, such as workplaces (Tudor *et al*., 2008). This exploration would also enable the comparison of dynamics across various contexts, providing insights into how pro-environmental behavior could potentially be encouraged to transition between different settings. Hence, given the focus on user practices within an office setting, a comprehensive grasp of sustainable office buildings and post-occupancy evaluation is deemed essential in consideration of the discussed theoretical framework. This critical area is addressed in Chapter Three.

2.5.1 Defining Practices

The definition of practice in Social Practice Theory (SPT) remains a subject of

significant debate (Schatzki, 2005), resulting in various definitions in the literature. For example, According to Schatzki (1996), practices comprise a sequence of actions and verbal expressions that evolve and spread across different places. These practices take three primary forms: shared understandings of how to behave, explicit norms that set boundaries on behavior, and tele affective structures that define appropriate goals and levels of emotional involvement. In essence, practices encompass a range of behaviors and associated meanings collectively understood, regulated by norms, and guided by purpose and emotional experiences. Alternatively, Reckwitz (2002) provides a widely cited definition that describes the practice as "a routinized type of behavior which consists of several elements, interconnected to one another: forms of bodily activities, forms of mental activities, things and their use, a background knowledge in the form of understanding, know-how, states of emotion and motivational knowledge" (p. 249).

Although these criteria may possess some vagueness and present challenges in practical application, they highlight several widely accepted elements of practice that researchers have considered (Hargreaves, 2011). First, practice theorists view attitudes, values, and beliefs as components of practices situated within individuals instead of psychological entities that people possess (Schatzki, 2002). Second, Reckwitz (2002) argues that practices always involve specific arrangements of non-human objects and things but do not grant them the same agent status as humans, despite acknowledging their agency. Third, individuals are competent and active actors performing procedures and can debate, resist, and occasionally change practices (De Certeau, 1984). These definitions provide a framework for understanding the role of practices in sustainable design, as Shove *et al.* (2007) suggested. Furthermore, they argued that understanding and influencing the evolution of practices over time and space is essential for promoting sustainability, as most consumers, including environmentally significant consumption, occur as part of social practices. Therefore, correctly defining the practices investigated in sustainable design is crucial for research success in this field.

2.5.2 Applying Practices

Identifying the fundamental characteristics of practices has been accomplished

through philosophical definitions; however, the practical application of these definitions presents challenges in empirical research (Spaargaren, 2006). Researchers have sought more basic, empirically applicable understandings of practice to address this challenge to apply a practice approach to sustainable behavior (Hargreaves, 2011). For instance, Schatzki (1996) provides scientific detail by classifying activities in various ways and distinguishing between practices as performances and entities. Although these entities exist as separate and organized units, the continuation of practice relies significantly on performances (Warde, 2005). Therefore, two forms of practice must be distinguished: practices-as-entities and practices-as-performance, which coexist beside one another and frequently conflict with one another. In addition, empirical research must consider the extent to which practices as entities influence practices as performances simultaneously. Schatzki (1996) also distinguishes two forms of practice: dispersed and integrative. The dispersed form comprises activities such as describing, ordering, following rules, explaining, questioning, reporting, examining, and imagining, while the integrative form involves complex entities joining multiple actions, projects, ends, and emotions (Schatzki, 2002, p. 88).

Warde (2005) suggests that integrative practices should form the foundation for sociological research, as they offer organizing frameworks for action in particular areas of daily life. However, while these broad contrasts illustrate how practices can vary from one another, they do not explain how practices function within specific social settings or how they are organized internally (Hargreaves, 2011). Consequently, valuable works have been offered to address this gap in applying practices empirically. For example, Spaargaren and Van Vliet (2000) have developed a helpful schematic shown in Figure 2.3, which asserts that practices are always conducted in particular settings by individuals who may also have conflicting demands on their time and other practices. By understanding the complexities of how practices function and are organized in different social settings, researchers can develop effective strategies for promoting sustainable behavior.

ANALYSIS OF
STRATEGIC CONDUCT

INSTITUTIONAL
ANALYSIS

Heating

Washing

Cooking

Etc.

Discursive &
Practical
Consciousness

Lifestyles

Collective Socio-material/
Systems of Provision

Rules and
Resources

MODES OF USE	MODES OF ACCESS	MODES OF PROVISION	MODES OF PRODUCTION

S_1 S_2 S_3 S_4

ENVIRONMENTAL INNOVATIONS IN PRODUCTION-CONSUMPTION CYCLES
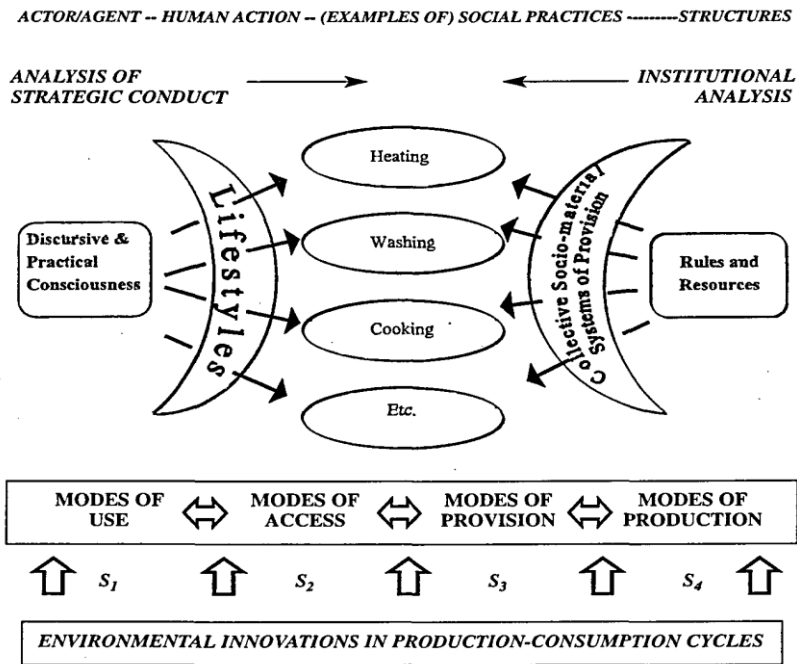
Figure 2.3 Schematic of Social Practices (Spaargaren and Van Vliet, 2000, p. 71)

Second, Shove and Pantzar's (2005) analysis provides a more comprehensive explanation of practices, as presented in Figure 2.4. They argue that the interactions between images/meanings, objects/stuff, and competence/skill create the essential functioning of practices. The symbolic elements of practices are described through images and meanings. Practices with different meanings may exist, and individuals must demonstrate their understanding and behavior when participating. The stuff category comprises technology, artifacts, locations, bodies, structures, formats, compositions, and components. Skill, which is socially acquired and developed through performance, includes understanding, taste, competence, know-how, or procedures for accomplishing an activity. The skills element in this model shows that individuals actively participate in executing practices. Practices can only be identified through repeated performances over time, so the connections between the components in this model signify the dynamic impact and connectivity continuously upheld or contested through performance (Warde, 2005).

Shove and Pantzar's model of practices reveals the complex and dynamic nature of practices, where various elements interact to form a practice. Individuals must have the skills, knowledge, and understanding required to engage in practices that have symbolic meanings. The model also recognizes that practices exist in particular

social settings and are performed through time. The dynamic impact and connectivity of the components suggest that practices are not static but change over time. This view is consistent with the notion that practices are not fixed but are subject to modification as individuals engage with them (Scott *et al*., 2012). This model has been utilized as the basis for comprehending the practices of a workplace building in Oman investigated in this study which is discussed in Section 4.6.
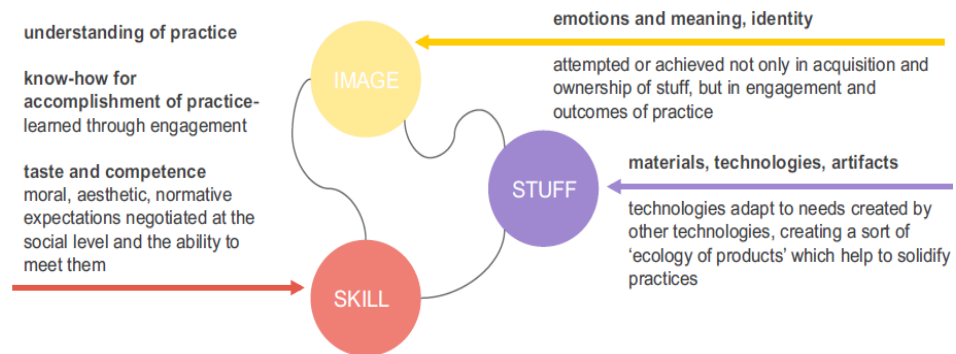
Figure 2.4 Stuff-Image-Skills Model (Scott *et al*., 2012, p. 283)

This thesis relies on social practice theory in its research questions and methods to examine the practices of users in an office building. Nevertheless, the literature highlights several concerns regarding the practical application of social practice theory, which are discussed in the following section.

2.5.3 Limitations of Employing Social Practices Theory

According to Feldman and Orlikowski (2011), applying practice theory to understand organisational phenomena is challenging. This difficulty arises from the practice theory's emphasis on routine activities' consequences and the interconnectedness of things. For instance, one of the challenges in using practice theory is the difficulty in theorizing the constitutive processes of enactment instead of assuming the presence of distinct entities. Additionally, there is no consensus on a single comprehensive paradigm of practice theory, making it challenging to employ a common language and reasoning that explain daily behaviors' relational nature. Moreover, practice theory necessitates dealing with the complex and ambiguous realities of organisational life that are fraught with emergence, diversity,

and contingency. The ideas generated through practice theory are generally closely aligned with current practices since they are constituted in the participants' existing context.

Another challenge of applying practice theory to research is the need for ethnography to understand the case. Applying social practice theories to empirical occurrences is challenging, and having a practiced sensitivity does not necessarily make it any easier (Michal, 2017). He argued that sensibility for practice consists of four primary principles that allow for holding ideas loosely: attention to what people do, concentration on everydayness, the activity of assembling, structuring, and order, and focus on reflexivity (Michal, 2017). Furthermore, these principles necessitate interpretations rooted in social ontological and interpretive epistemological perspectives, with the researcher being responsible for capturing and conveying the actual user involved in any given practice (Nicolini, 2013). Therefore, these limitations must be considered when developing the research design for any study, including this research.

Furthermore, it has been asserted by Seyfang *et al*. (2010) that one of the criticisms directed at SPT is that the complexity of the social and cultural context within which practices take place may not be fully addressed. Specifically, SPT may not sufficiently acknowledge how broader social, economic, and political factors could impact practices. Another critique of SPT is its potential failure to offer clear guidance for designing interventions aimed at altering practices. SPT underscores the significance of social norms and cultural expectations in shaping practices, presenting challenges in effecting change. Additionally, some critics argue that SPT may not adequately consider the intricacies of individual agency and decision-making processes.

As a result, several steps were taken throughout this research to address these potential difficulties. First, acknowledging the inherent complexity and contextuality of practices in the built environment, a multifaceted method has been adopted to acquire complete and diverse data. This strategy involved using various research techniques to capture various practice dimensions. Second, great attention has been paid to the specific organisational and cultural contexts in which design

practices occur, and the significance of these contextual factors in shaping and influencing design practices. Finally, a careful and diligent approach was adopted throughout the data interpretation phase to ensure accuracy and reliability in the findings.

2.6 Summary

The main focus of this chapter was to address the inadequacy of contextualization in current theoretical explanations of sustainable behavior. It was argued that conventional behavior modification tactics assume individuals possess the necessary tools to effect change. That change is a deliberate process, which does not accurately reflect how everyday practice evolves and develops in social circumstances. Sociological approaches were then presented as an alternative solution to this issue, with a focus on various discourses, technologies, and lifestyles that serve as a normative foundation for understanding everyday behavior. These approaches attempt to present a more comprehensive understanding of practice by demonstrating how structure and agency interact to produce everyday behavior. Finally, the social practice theory was introduced as a valuable tool for understanding sustainability, offering insights into practices that may not be possible with other methods. This theory highlights the significance of practice trajectories, practices as entities, performance, and relevant empirical work. In summary, this chapter highlights the importance of contextualization in understanding sustainable behavior and provides alternative approaches to conventional behavior modification tactics. The social practice theory, in particular, is presented as a valuable tool for understanding sustainability.

The subsequent two chapters in this research endeavor aim to delve into the existing literature surrounding the social aspect of sustainability and its implications for sustainable building designs. In Chapter Three, a comprehensive exploration will be undertaken to shed light on the concept of sustainability. This chapter will delve into the fundamental principles underpinning sustainability and critically examine the challenges arising from the current understanding of social sustainability. By scrutinizing these challenges, the chapter seeks to deepen our understanding of the complexities and nuances of integrating social considerations into sustainable

practices, including offices.

Chapter 3 : Understanding the Social Dimension of Sustainability

3.1 Introduction and Background

The sustainability framework, introduced over 30 years ago, has generated a significant body of literature in the field of sustainable building. Since the inception of the sustainability concept, with a heightened awareness of environmental damage, numerous buildings have been categorized as "sustainable" (Carley, 1998). The environmental pillar has been the most extensively addressed aspect, as the ecological concerns gave rise to sustainability (Boström, 2012). Nevertheless, despite the anthropocentric focus of "sustainability," social sustainability in built environment disciplines has received surprisingly little attention (Hopwood *et al*., 2005). This discrepancy arises from the inherent tension among the interconnected aspects of sustainability: environmental, social, and economic (Jenks and Dempsey, 2005). Thus, this chapter explores this critical issue, examines the fundamental ideas of sustainability pillars, and elucidates the role of understanding the social dimension in promoting sustainability. The relationship and overlap among the three sustainability pillars are also investigated. Finally, this chapter advocates the significance of comprehending sustainability-related issues through the lens of social practice, the theoretical foundation of this research.

The central argument of this chapter is that the social dimension plays a crucial role in comprehending and advancing sustainability (Vallance *et al*., 2011). This argument aligns with the widely accepted definition of sustainability, which emphasizes meeting the needs of present and future generations. The three pillars of sustainability are analysed from various theoretical perspectives to demonstrate this argument. To this end, the chapter commences with a brief history of sustainability in section 3.2, examining the current perception that sustainability has shifted toward the environmental and economic dimensions while neglecting the social aspect. Section 3.3 discusses the concept of the three pillars, outlining the significance of social pillar and showcasing how society's appropriate involvement can enhance them, explores the literature supporting the social dimension's

importance in promoting sustainability and its various interpretations. Finally, Section 3.4 summarises the chapter while providing guidance on what follows in the succeeding chapter.

3.2 The History of Sustainability

The historical context of sustainability plays a crucial role in comprehending the challenges and constraints encountered by the current approaches and strategies employed to advance sustainable objectives. The origins of sustainability can be traced back to a significant milestone in 1948, namely the establishment of the International Union for Conservation of Nature and Natural Resources (IUCN). This event serves as a pivotal starting point in the history of sustainability. The IUCN was founded with three primary objectives: to promote cooperation between concerned individuals and organisations to safeguard natural resources, to establish a legislative framework for monitoring natural resource conservation, and to develop a database for information on natural resources, analyzing and distributing relevant studies. Subsequently, the IUCN launched an initiative to establish an organization called the "World Wildlife Fund (WWF)" through an international declaration known as the "Morges Manifesto." This initiative was introduced in 1961 in the United States to encourage existing international bodies to enhance their natural conservation efforts (Berwick, 1969).

Approximately a decade after the initiation of the WWF, the United States designated a day to celebrate Earth in April 1970 (Hill and Bowen, 1997). This action was followed by the United Nations Conference on the Human Environment, a global environmental conference held in Stockholm in June 1972. The Stockholm Declaration aimed to assess and mitigate human environmental impacts by espousing several regulations to conserve and enhance the human environment (Korman, 1976). Then, in 1980, the IUCN issued an international conservation strategy called "Genetic Management Iceberg" (Hill and Bowen, 1997).

After that, the World Commission on Environment and Development issued an official report titled "Our common future" on 20 March 1987. This report introduced the concept of sustainable development and established the three bottom

lines of sustainability. It defines sustainability as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Brundtland, 1987, p.43). Moreover, the report proposes recommendations and actions for nations to preserve natural resources. In June 1992, the second global environmental conference, "The United Nations Conference on Environment and Development" (UNCED), was held in Rio. This conference launched Agenda 21 for sustainable development, which includes several actions that all nations must undertake to enhance sustainable development in terms of social, economic, and ecological aspects (Handl et al., 2012).

In 2002, the IUCN organized a conference called the "UN World Summit on Sustainable Development," which produced several actions that were outlined in the "Johannesburg Plan of Implementation" (Plessis, 2007). A decade later, the concept of sustainability was further developed into the "Green economy" trend in 2012. This idea emerged from the Rio + 20 declaration, which emphasized the importance of economic growth in line with the minimization of resource consumption. The declaration also stressed that adequate policies and management, rather than political measures, should be employed to achieve this goal (Gómez-Baggethun and Naredo, 2015). In conclusion, several initiatives have been undertaken to promote the efficient utilization of resources in pursuit of sustainability objectives. These initiatives have been put in place to address environmental challenges, reduce waste, and promote responsible practices.

Despite the social mandate included in the original definition of sustainability, recent approaches have prioritized economic and environmental concerns at the expense of the human aspect (Vallance et al., 2011). The evolution of UN sustainability history has progressed from "Limit to growth" to "Our common future" and eventually to the promotion of a "Green economy." The Stockholm Declaration of 1972 aimed to improve the human environment, while the United Nations report "Our common future" in the 1980s emphasized the need to improve environmental sustainability. The current focus is on the "Green economy," which the United Nations endorsed in 2012. However, despite these efforts, global warming, resource depletion, biodiversity loss, and ecological life support system collapses have persisted, indicating the failure of sustainable international policies

(Gómez-Baggethun and Naredo, 2015). Therefore, further research in sustainability is crucial to advance understanding in this critical field.

Accordingly, the concept of "social sustainability" has gained attention due to the widespread failure of current strategies to achieve significant change in sustainability. For instance, Robinson (2004) criticized the UN Commission on Environment and Development, claiming it had taken a different ineffective approach to sustainability. According to Robinson, the UN was more concerned with sociopolitical and distributive issues and less likely to advocate radical changes in practices and priorities. Robinson argued that sustainability needed to be understood differently, going beyond technical solutions and recognizing the importance of social practices and community involvement. To address these concerns, Brown (1981) developed a more comprehensive and socially conscious definition of sustainability, emphasizing the need to look beyond immediate environmental impacts and focus on institutional changes necessary to build a society capable of managing the environment sustainably over the long term. To move beyond technical fixes, sustainability must be understood as an integrative process that recognizes the role of social practices and community involvement.

Therefore, the primary objective of this research is to explore the integration of sustainability initiatives in office buildings and the methods employed in the process. Hence, a comprehensive understanding of sustainability is crucial since it forms one of the core themes of this study. In addition, sustainability has diverse aspects that require comprehension and approaches to enhance it, with a particular focus on social sustainability. This chapter provides a detailed discussion of sustainability, including its three pillars and the current system used to promote each. The arguments presented in this chapter will address the general challenges faced in promoting sustainability and will be followed in the subsequent chapter by a discussion of how social concerns were overlooked on the current approached for sustainability in building design.

3.3 Sustainability and its Pillars

According to Stubbs and Cocklin (2008), sustainability is a multifaceted and

controversial concept that has evolved over time. The United Nations and professional industries have continuously debated its definition. The lack of consensus on its meaning has resulted in challenges in operationalizing sustainability, as noted by Green (2017). The United Nations World Commission on Environment and Development (WCED) introduced the concept of sustainability in 1987 by publishing "Our Common Future." This report defined sustainability as the Triple Bottom Line, encompassing environmental, economic, and social considerations. Subsequently, in 1991, a partnership between the World Conservation Union (IUCN), United Nations Environment Programme (UNEP), and Worldwide Fund for Nature (WWF) released a report titled "Caring for the Earth," which introduced another sustainability concept. These various sustainability concepts and terms underscore the complexities of understanding sustainability.

The literature notes numerous and ambiguous definitions for sustainability, leading to difficulties in promoting it. Sustainability generally requires meeting and achieving three environmental, social, and economic pillars (Brundtland, 1987). Despite increasing publications on Sustainability over the past 30 years, it remains a fluid concept with multiple possible meanings and context-specific understandings (Kajikawa *et al*., 2014). One popular way of describing sustainability is through three interconnected "pillars" (Boyer *et al*., 2016), which are society, environment, and economy, represented by three crossing circles, as shown in Figure 3.1. These three pillars can take various forms, such as physically represented as nested concentric rings, literal "pillars," or independent visual aids as discrete categories for sustainability goals or metrics.
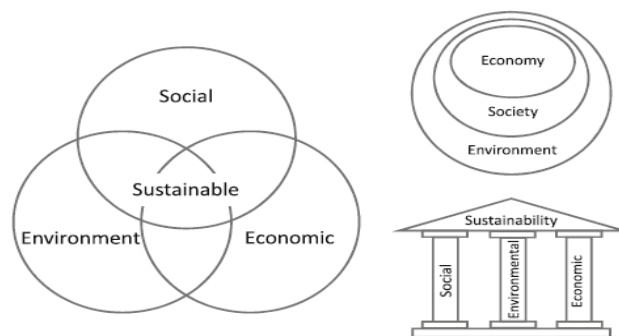
Figure 3.1 Visual Representations of Sustainable Development (Purvis *et al*., 2019)

The classic formulation of sustainability as three pillars has encountered opposition and critique. While some scholars acknowledge the triad structure, they emphasize the need to integrate and balance the three elements to achieve sustainability (Peterson, 2016; Dale and Newman, 2010). Others with a revisionist perspective propose alternative approaches and question the sufficiency and validity of the suggested triad structure (Leal Filho *et al*., 2016; Soini and Birkeland, 2014). In addition, it is commonly suggested that culture should be included as the fourth pillar. Hawkes (2001), for instance, suggests cultural vitality as the fourth pillar of sustainable development, defining culture as the fundamental need and foundation of a society that encompasses values and aspirations. Although these structures offer clarity, their content and the more significant "pillars," conception often remain ambiguous, hindering their proper operationalization (Purvis *et al*., 2019). Presently, the discourse on sustainability is predominantly centered on the three-circle rubric, with little emphasis on its effectiveness in achieving a more thorough understanding of sustainability (Thompson, 2017).

In addition to these challenges in understanding the relationship between the pillars of sustainability, there are still other ambiguities and challenges around the social aspect. This aspect, as discussed in the global trends (section 3.2), appears to have not received the same attention as the other two aspects: the environment and the economy. Since this research focuses on the importance of the social aspect in promoting sustainability, it requires a deeper understanding of this pillar, which will be covered in the next section.

3.3.1 Social Sustainability

Promoting social sustainability aims to meet the basic needs of human life and ensure its flourishing for the present and future generations. Dempsey *et al*. (2011) suggest that how individuals interact with their environment can be used to assess the social component of sustainability, as external factors like economic and environmental elements can affect its development positively or negatively. However, despite the compatibility and support of social sustainability with other pillars, such as environmental and economic sustainability, it has received less attention and is often overlooked (Littig and Grießler, 2005). This issue is due to

the challenge of operationalizing and assessing the broad indicators associated with social sustainability (Boström, 2012). The social aspects of sustainability are challenging to measure and quantify compared to environmental and economic sustainability due to their dynamic and variable nature across contexts and fields. The challenge of social sustainability is vast and includes several concepts, such as social justice, social cohesion, social rights, social capital, participation, and gender issues (Murphy, 2012). The complexity and vagueness of these concepts have resulted in high expectations and enormous tasks (Davidson, 2009).

The lack of well-defined and quantifiable concepts in social sustainability, similar to those in environmental sustainability, poses a significant challenge (Vifell and Soneryd, 2012; Marcuse, 1988). Thus, understanding the role of humans in promoting social sustainability is a crucial area of focus in this research. The building industry faces difficulties in addressing social aspects of sustainability, as metrics to assess social sustainability are currently inadequate compared to environmental sustainability, such as with BREEAM. Nonetheless, the current generation of developers, architects, engineers, and builders have a greater responsibility to act than any previous generation, as failing to do so could have severe consequences for the global environment, economy, and society. The success of the building and development sectors is significantly influenced by the economic and political environmental matrices in which they operate. Building a genuinely sustainable structure is challenging if it primarily depends on the traditional model of individual behaviour.

Therefore, Suchman (2011) argues that buildings, in particular, plays a critical role in cultural production and transformation, much like science, technology, and art. It is through design that new ideas and innovations are developed and implemented. The design of sustainable buildings is not just about reducing environmental impacts but also about creating spaces that support social interaction and promote community engagement. This requires a shift in the traditional design approach, which often prioritizes aesthetics over functionality and sustainability. To create genuinely sustainable buildings, designers need to adopt a more holistic approach that considers not only the environmental impact of the building but also its social and economic impact. This requires collaboration with other stakeholders in the

building industry, such as architects, engineers, builders, and policymakers. It also requires a willingness to experiment with new materials and technologies and to challenge the status quo.

However, according to Littledyke and Manolas (2010), modern science's attitudes, including design, conflict with nature and hinder the promotion of sustainability. As a result, humans have become alienated from the environment, leading to the use of human power against the environment and the continuous destruction of the environment, as Eagan and Orr (1992) argue. Building designs are shaped by three philosophical assumptions: dualism, reductionism, and positivism. Dualism posits that mechanical and technological principles can explain all occurrences, distinguishing between the physical body and the mind, matter, and spirit, and reason and emotion. While it helps distinguish between predictable, irregular phenomena and uncertain ones, such as the effects of anthropogenic climate change, it effectively separates people from the natural world, except for external forces (Cross, 2001). Therefore, dualism relies heavily on codes, morals, and ethics in understanding and shaping human behaviour, as Dripps (1999) argues. Due to this separation between humans and the environment, design has evolved into a science-based discipline that mainly relies on technical solutions, detached from other disciplines' world descriptions.

The second philosophical assumption shaping building design is reductionism, which considers all entities to be composed of more specific or fundamental components. This approach breaks down complex problems into smaller, more manageable pieces and attempts to understand these specific elements by logically reassembling them to comprehend the entire issue. The third assumption, positivism, is characterized by the belief in the limitless power of human reason to control, master, and utilize the forces of nature, which relies on this system (Bennetts *et al*., 2003). According to Perez-Gomez (1983), it is commonly believed that human reason possesses the boundless potential to exert influence, dominate, and harness nature's forces. Science has emerged as a highly effective means of understanding the world, as acknowledged by Bennetts *et al*. (2003). In response to industrialization, society has embraced scientific methods, and new technologies have undeniably brought material improvements to some areas of the world.

However, the notion of the world as a system that humans can use and manipulate has resulted in the devastation of the natural environment. It could be posited that the increasing dominance of science and technology has caused the design of buildings to overlook humanistic values.

Applying the three philosophical assumptions within the building industry has given rise to a growing recognition of the importance of incorporating humanity into design practices. Orr (2008) argues that designers should prioritize place-making over form-making, focusing mainly on creativity and style at the expense of environmental and human considerations. On the other hand, place-making recognizes and preserves a place's cultural and spatial aspects. According to Hajer (1995), environmental challenges are fundamentally social and cannot be fully understood by quasi-technical decision-making on physical issues. He advocates that sustainable building should be viewed as a social phenomenon, and the social structure must be considered in identifying environmental concerns and embodying them in constructed forms. However, recognizing sustainable building as a social matter does not diminish the importance of addressing pressing environmental issues or the range of legitimate building solutions from ethical, social, commercial, or technical perspectives. Instead, sustainable buildings can be regarded as a social representation of various ecological and ethical ideals, covering a wide range of topics with varying degrees of emphasis on technique, aesthetics, and social obligations.

3.3.2 Why is Social Sustainability Important?

While environmental and economic sustainability have garnered considerable attention, social sustainability has often been overshadowed in research and practice (Dempsey *et al*., 2011). The relative neglect of social sustainability can be attributed to challenges associated with its theoretical and operational frameworks and the difficulties in measuring its impact in real-world contexts (Vallance *et al*., 2011; Boström, 2012). This lack of clarity has confused how to effectively address and assess social sustainability. However, social sustainability's multifaceted and intricate nature presents an opportunity for a deeper understanding of its objectives (Littig and Grießler, 2005). Recognizing the significance of social sustainability,

practitioners and policymakers have increasingly focused on exploring strategies to enhance it, mainly through lifestyle changes (Hampton and Adams, 2018). By directing efforts toward improving social sustainability, practitioners and policymakers can create more equitable and harmonious societies, ensuring that individuals' and communities' well-being and quality of life are at the forefront of sustainable development endeavors.

While changing individual behavior has been a widely utilized strategy in sustainability for promoting social aspect, it has also received criticism due to its limited impact (Kuijer and Bakker, 2015). Instead, a more comprehensive approach that considers factors influencing lifestyle and society's organization is needed to promote sustainability (Hoolohan and Browne, 2020). It has been emphasized that understanding social practices and the cultural factors that shape them is crucial in promoting sustainability, as social and cultural consequences may hinder the adoption of more sustainable technologies (Jacobsson and Johnson, 2000; Geels, 2005; Nash *et al.*, 2017).

Therefore, it is important to recognize the significance of social sustainability by delving into the influence of culture. By doing so, a more comprehensive understanding of sustainability beyond individual actions and technological solutions can be gained, as emphasized by (Loorbach, 2010). It is crucial to establish a robust theoretical framework that captures the complex relationship between society and its environment, thereby guiding the pursuit of social sustainability goals (Littig and Grießler, 2005). Furthermore, specialists, researchers, and policymakers are suggested to actively investigate the role of cultural factors that may impede the promotion of sustainable behaviors. By examining the cultural aspects that shape people's attitudes and actions, the barriers to sustainability and develop strategies to overcome them may be identified. This requires a concerted effort to understand the values, beliefs, norms, and practices that influence individuals and communities in their pursuit of sustainability. Therefore, since culture is crucial in promoting social sustainability, it is essential to understand the relationship between social sustainability and human culture. To this end, the following section addresses the various interpretations of social sustainability that show the role of culture.

3.3.3 Interpretation of Social Sustainability

In the broader discourse on sustainable development, the social 'pillar' has been acknowledged as crucial for achieving outcomes, albeit not gaining the same momentum in paradigm development as the first two pillars. Regarding social sustainability, three key interpretations have been identified by Chiu (2003) in the literature. One perspective emphasizes the constraints on development by linking ecological sustainability with social sustainability (Munro, 1995). This approach contends that social norms define the limits of environmental change, and breaching these limits would encounter resistance, leading to the failure of activities. According to this view, the maintenance and desirable support of social customs, structures, and values are essential for the success and social sustainability of activities in environments (Chiu, 2003). The second interpretation focuses on the social factors supporting ecological sustainability (Borrini-Feyerabend and Buchan, 1997). According to this perspective, the allocation of resources and assets among present and future generations is dictated by rules and values embedded in a social context. If the current distribution is not sustainable, modifications in social customs, structures, and values might be necessary to attain environmental sustainability (Chiu, 2003).

The third interpretation pertains to the social well-being of current and future generations (Townroe, 1996). Adopting a more people-oriented perspective, this approach highlights aspects of social cohesion, stability, and quality of life. The reduction in social inequality, exclusion, and conflict plays a role in achieving social sustainability (Chiu, 2003). The term 'well-being' carries various meanings without a specific or universally precise definition, generally suggesting a positive state. Defined as 'the state of being healthy, happy, or prosperous' (The Oxford Dictionary), well-being finds application in diverse disciplines such as medicine, economics, psychology, and philosophy in research and policy contexts. Social policy strongly links well-being with 'wellness' and 'health' in line with initiatives by the World Health Organization to conceptualize health holistically. However, approaches to well-being and health that prioritize Western constructs, neglecting local or indigenous beliefs and behaviors, can pose challenges when used to justify

cross-cultural interventions (Boddington and Raisanen, 2009).

According to Chiu (2004), the linkages between cultural and social sustainability become more intertwined when social sustainability is understood as the maintenance or enhancement of the well-being of people in both present and future generations. Yet, considering the most encompassing notion of culture, cultural sustainability must encompass environmental, economic, and social sustainability entirely. Human interactions with their environment, economy, and society all encompass culturally specific values, beliefs, attitudes, knowledge, and behaviors. To underscore this assertion, it is necessary to introduce a definition of culture for the purpose of this argument. According to Mammot and Keys (2015), cultural products or components may encompass concepts and beliefs, speech, behavior, and objects. These components are assembled by groups and societies to create distinct compound patterns and styles, like behavioral settings, languages, technologies, and rituals. Subsequently, these elements can be incorporated into even more abstract, intricate, and advanced cultural systems (or institutions) such as government, education, religion, social organization, and the economy.

Numerous human experiences, beliefs, and concepts exhibit cultural expressions and varied structures globally. As culture becomes increasingly significant as both a conceptual and practical lens in the realm of sustainable development, it becomes crucial to be aware of these diversities. Identifying cultural concepts that are applicable and relevant to both non-Western and Western societies is especially important when working cross-culturally in the design of environments for people (Ratna *et al*., 2007). This situation has led to calls for the consideration of culture as the fourth pillar of sustainability (Burford *et al*., 2013).

3.3.4 Culture as a subset of Social Sustainability

In its interpretation of social sustainability, the UN included the concepts of diversity, inclusion, preservation of a peoples' way of life, their history and social norms. From this explanation, it is clear that culture has already been embedded under the social sustainability pillar. Culture is defined by the Webster online dictionary as -the customary beliefs, social forms, and material traits of a racial,

religious, or social group (Webster Online Dictionary). Culture is a peoples' identity which they pass on from one generation to another. Culture guides decision-making in many instances (Vitell *et al.,*1993). However, it is important to highlight the fact that culture cannot be separated from all human endeavours or social activities and interactions because culture influences peoples' decisions. For instance, despite the global relevance of ethics, the drafting processes, and the contents of ethical codes differ considerably between countries due to the influence of each country's national culture (Vitolla *et al.,* 2021). Clements *et al.,* (2009) further demonstrates significant influence of culture on human activities through an assessment of the degree of adoption of international Accounting Code of ethics; and their results indicates that organizations in high individualism and uncertainty avoidance societies are less likely to surrender the setting of ethical standards to an outside international organization. Although there are arguments for culture as a fourth pillar of sustainability (Burford *et al.,* 2013; Soini & Birkeland, 2014); it is clear from the foregoing that culture is a subset of social sustainability because the summation of cultural norms defines individual societies. However, what has often taken place is that the social perspectives of the dominant or most powerful member is often enforced as the consensus policy in international affairs (Jackson, 2021; Mayer, 2009). This seem to be the case with the sustainable development goals (SDGs) where countries with less carbon footprints are required to take the same actions with developed countries with much higher carbon footprints, ignoring the capacity issues in the different countries. Hence, despite the strong attempts by globalization to force a consensus through the United Nations across numerous areas of international interactions, very distinct differences continue to exist whether on the economic, political, governance, environmental, and social fronts. This can be gleaned from the variety of capitalism literature by Hall & Soskice (2001;2009) who argued for two varieties of capitalism and Amable, (2003) who identified five varieties of capitalism. Several Hofstede-influenced studies have also reinforced the need to take cultural factors into cognisance. For example, many studies have reinforced the influence of culture across a diverse set of human activities (Stek *et al*., 2022; Roth *et al.,* 2004; Ogden *et al*., 2007; Obeidat *et al*., 2012; Al Sharji *et al*., 2023).

Mayer (2009) argues that there is a clear need for states to determine their national policy domains, in contrast with international policies that are often pushed onto national domains. Even the United Nations, in its 2023 report on SDGs progress has highlighted several priority areas that countries should put their efforts in the coming years before 2030. A major recommendation includes the need to give due consideration to the contribution of culture to the achievement of SDGs in the formulation of national, regional, and international development policies and international cooperation instruments (United Nations, 2023). This recognition is testament to the increasing realisation that there is no one-size-fits-all within the international policy space and the need for dialogue and consultation in reaching internationally binding policy objectives. Culture and respect for cultural diversity, however, remain undervalued and underutilized in the push for Goals-related progress (United Nations, 2023). Arguments are already being made for the inclusion of Social and Cultural values in planning if sustainability is to be achieved (Axelsson *et al.,* 2013). Ignoring social and cultural factors can result in failure to recognize potential barriers and opportunities for sustainable energy and resource development in culturally diverse communities (Necefer *et al.,* 2015). Culture serves as a source of knowledge, values, and respect for cultural diversity, religious diversity as well as intercultural dialogue are crucial for strengthening social cohesion and sustaining peace (United Nations, 2023).

3.4 Summary

The challenges involved in achieving sustainability have been explored in this chapter, revealing the difficulties in translating the concept into practice. The three-pillar model was subjected to critical analysis from both theoretical and practical perspectives. The significance of considering social perspectives when conceptualizing sustainability-related issues was also discussed. The chapter also investigated the concept of social sustainability, including its definition and assessment challenges. The extant literature has been found to hint at the inclusion of cultural sustainability given its evidential influences in sustainability studies. Researchers have called for establishing culture as a fourth pillar arguing that most decisions are often influenced by the cultural perspectives of the decision makers. However, it has been shown that culture is simply a subset of the social

sustainability pillar since social sustainability caters to how individuals lived within their societies. Interactions within societies are shaped by the culture of the constituent individuals. Considering the arguments presented in this chapter regarding the importance of understanding the social aspect of sustainability along with culture as its sub-component, the following chapter will address the significance of understanding the social and cultural aspects of users when conducting post-occupancy evaluations of sustainable office buildings.

Chapter 4 : Understanding Sustainable Office Building and Post Occupancy Evaluation

4.1 Introduction and Background

The previous chapter demonstrated the challenges associated with sustainability and its pillars, along with the significance of the social aspect in promoting sustainability, which has been extensively marginalized in current sustainability approaches. Consequently, the present chapter aims to comprehend how the approaches being used in sustainable buildings have addressed the social aspect of sustainability. This chapter argues that the current approaches to sustainability have overlooked the understanding and conceptualization of users' daily activities, negatively impacting the promotion of sustainability in buildings. This issue is consistent with the argument presented in the previous chapter, which highlighted the inadequate attention paid to the socio-cultural aspect of sustainability, specifically the daily activities of users as dictated by their culture.

Therefore, this chapter is organized to address the issue around the approaches in use for assessing the performance of sustainable buildings. Section 4.2 indicates the circumstances that lead to the performance gap within the existing approaches of sustainability in buildings. Section 4.3 goes beyond to show the implications of the ignorance of social and cultural dimension in the evaluation of sustainable buildings, the offices in particular. Then, as the primary focus of this research centres on sustainability in Oman, Section 4.4 serves as an introduction to Oman's initiatives promoting sustainability. This section presents an overview of the various initiatives, policies, and actions undertaken by the Omani government and relevant stakeholders to advance sustainable practices within the country. Section 4.5 delves into the critical examination of the cultural influence in the context of sustainability in buildings, shedding light on how cultural factors shape sustainable practices within the Omani context. Finally, Section 4.6 shows a framework which may help close the gap in performance of sustainable buildings, focusing on the social needs and drawing from the lens of social practice theory.

4.2 Contemporary Approaches to Sustainability

Unsustainable patterns of resource consumption have resulted from the construction and occupation of buildings. The construction industry plays a crucial role in achieving national and international targets for reducing consumption and incorporating sustainability across all phases of building, from design to deconstruction. Globally, buildings account for 40% of annual energy consumption and contribute to up to 30% of all energy-related greenhouse gas emissions. Non-domestic buildings in the UK exhibit high levels of water and energy consumption, waste production, and greenhouse gas emissions, with non-domestic buildings contributing approximately 18% of CO_2 emissions (Stevenson and Rijal, 2010). In response to the urgent need to decrease the environmental impact of buildings, a variety of adaptive and mitigative measures have been developed, ranging from technical solutions to regulatory and legislative requirements.

Attention from policymakers and industry is directed towards the design and construction of buildings with minimal environmental impact, as exemplified by standards like BREEAM and LEED. The construction sector presents an opportunity for cost-effective reductions in emissions and resource consumption, achievable through both technical and non-technical measures. Nevertheless, a growing body of research has surfaced, highlighting the disparity between the predicted and actual performance of non-domestic buildings, commonly referred to as the "performance gap". Post Occupancy Evaluations (POE) play a crucial role in assessing various building performance indicators, encompassing monitoring energy and water consumption, building simulation modelling, and gauging occupant satisfaction. POE serves as a valuable tool for providing systematic feedback, feed-forward, and benchmarking information (Deuble and de Dear, 2012).

In this field, research has aimed to identify and modify individual behaviours to enhance occupant engagement with sustainable buildings (Menezes *et al*., 2011). Typically rooted in economic and psychological theories, this approach emphasizes the individualistic economic perspective of the rational actor. Within the context of Post Occupancy Evaluation (POE), this perspective has been widely applied through the Building Use Studies (BUS) methodology. This method involves

surveying occupants of buildings in use or undergoing refurbishment to assess satisfaction levels. While this approach has effectively provided the industry with a tool for the "rapid and comprehensive study of user needs in a range of building types" (Bordass, 2001), it may not fully consider the complexity of daily life and social dynamics within buildings, including the impact of human culture. This contemporary issue has led to the emergence of "performance gap" in sustainable buildings.

As a result, the evolution of sociological, practice-based theories offers an alternative perspective, yielding insights into societal-level change that centers on practices rather than individuals as the primary unit of analysis. Social practice theory (SPT) presents a potential alternative for comprehending the practices within sustainable office buildings in everyday life. These practices emerge as a result of the convergence of elements such as meanings, materials, and skills (Shove *et al*., 2012). Therefore, it is crucial to understand the contemporary evaluation systems for buildings and the impact of the social practice insights in understanding unsustainable behaviour of users.

4.3 Beyond the Building Performance Evaluation (BPE)

The recent resurgence of interest in building performance evaluation (BPE) has primarily been motivated by concerns about energy efficiency. However, the imperative for energy efficiency is now being balanced by a growing interest in the subjective experiences of building users, particularly in terms of thermal comfort and well-being. It is crucial to acknowledge that BPE has a lengthy and checkered tradition, marked by several false starts (Bordass & Leaman, 2015). Persistent questions revolve around who should lead BPE and, more importantly, who should bear responsibility for the associated learning. The prevalent discourse often perceives buildings as 'composed formal objects' that offer a fixed environment for passive consumption by a specified group of users (Preiser *et al*., 2015). This perspective largely shapes the ongoing debate on BPE, especially in its emphasis on the 'technical' aspects of building performance. Nevertheless, buildings as entities enacted in practice as discussed in the previous chapter, it becomes necessary to adopt an alternative interpretation of 'performance' as something that

unfolds over time. It is argued that the time dimension is centrally important for a more nuanced understanding of building performance, one that extends beyond the narrow confines of environmental determinism.

To tackle this concern, contemporary concepts of building performance are examined and evaluated concerning the recurring inclination toward environmental determinism. Patel and Green (2020) has put forth an alternative perspective, grounded in the idea of enacted performance. This perspective forms the foundation for critiquing approaches to post-occupancy evaluation (POE) that prioritize ideas of stability and permanence. There's also a note of caution about the extent to which POE can serve as a means to sustain the knowledge base of the architectural profession. In fact, the argument will be made that the very concept of a 'knowledge base' is misguided in implying that knowledge can be perceived as a static and singular commodity.

4.3.1 Performance Gap and Beyond

Present discussions on building performance are largely centered on the so-called performance gap, particularly in terms of energy usage (Wilde, 2014; Menezes *et al*., 2012). The primary contention is that occupied buildings often deviate from the anticipated performance outlined during the design phase. Various explanations have been proposed for this perceived 'gap,' encompassing issues such as inadequate modelling and faulty on-site installation of energy technologies. Unfortunately, these discussions often exhibit a simplistic form of 'environmental determinism' (Vischer, 2008), assuming a strong recurring belief that design choices will determine the behaviour of building occupants. Even researchers who highlight the 'unintended consequences' of energy interventions appear to do so with a mild sense of surprise (e.g., Shrubsole *et al*., 2014).

The current emphasis on energy performance runs the risk of being regressive as it reduces space to its energy cost. Even the concept of energy efficiency has critics. Shove (2018), for instance, contends that current notions of energy efficiency may undermine their intended goal of reducing carbon emissions. According to Shove, the increasing focus on energy efficiency diverts attention from the socio-material

practices influencing energy demand. This argument is partly related to the rebound effect, where energy savings lead to a demand for higher-level services, such as increased thermal comfort. The issue is that building energy usage is not solely determined by design or advanced technologies. Building performance, even when considering energy alone, is a more intricate phenomenon than commonly portrayed and cannot be meaningfully assessed against any idea of a 'gap.'

Cole *et al*. (2008) have played a significant role in arguing that to enhance environmental performance, one must comprehend the dynamic interaction between a building and its occupants. Notably, they advocate for the concept of 'interactive adaptivity,' which considers both context and human agency. Their focus is on understanding how interactions unfold over time, from design to construction, and particularly during occupancy. However, similar to others influenced by building physics, Cole *et al*. are mainly concerned with environmental performance within the context of green buildings. While their interests extend to thermal comfort and well-being, they seem less inclined to delve into the broader perspective of building performance—specifically, how buildings contribute to the operational performance of the organization occupying them.

In their comprehensive examination of current approaches to Building Performance Evaluation (BPE), Tweed and Zapata-Lancaster (2017) scrutinize BREEAM In-Use, LEED Operations and Management, and 'Soft Landings'. They argue that these approaches are predominantly conceived as technical methods for assessing buildings as physical assets against predetermined technical performance criteria. The authors observe that 'failure' is often associated with unsatisfactory environmental conditions, as noted by Bluyssen (2009) and Vischer (2008). As an alternative, Tweed and Zapata-Lancaster (2017) propose a humanities-based approach centred on phenomenology to comprehend 'thermal experience.' This shift directs the focus away from evaluating the energy cost of space to understanding the experiences of individual building inhabitants. However, there remains a limited interest in organisational-level performance, specifically, how the space might be perceived as 'adding value' to the occupying organization. The interest in building appraisal in this broader sense appears to have waned, inversely correlating with the increasing attention to energy performance (Patel & Green, 2019). Having said

that, it is crucial to understand how contemporary rating systems for sustainable office buildings have treated the POE in terms of social and cultural factors, including BREEAM, LEED, ESTIDAMA, and GSAS.

4.3.2 Cultural Factors in Sustainable Rating Systems

In general, as Gifford (2014) succinctly states, buildings have a reciprocal relationship with individuals: we shape them, and they, in turn, shape us. Throughout history, people have tailored their architecture to embody specific, culturally constructed lifestyles. Once constructed, this architecture influences and transforms how people live, shaping their future "ways of living" and cultural practices, as observed by Dessein *et al*. (2015). In the operational phase of a building, the role of social sustainability is pivotal and closely tied to cultural backgrounds. Despite the global surge in green buildings, the focus has shifted from the mere adoption of green building technologies to the incorporation of 'sustainable behaviours' that ensure the effective functioning of these structures. Achieving changes in sustainable behaviours requires substantial cultural and psychological shifts, as emphasized by Williams and Dair (2007).

Considerable attention has been given to the cultural obstacles hindering the adoption of green buildings. The discourse often centers around concerns related to higher-density housing, a topic that has been extensively addressed in studies by Dave (2011) and Martin *et al*. (2014). For instance, the historical inclination towards low-density housing in suburban areas, as outlined by Winston (2010), is viewed as a culturally embedded preference in many Western societies. Conversely, in developing nations, there is a tradition of embracing and culturally accepting high-density compact living, as observed by Dave (2011).

A Green Building Rating System (GBRS), as defined by Nguyen and Altan (2011), is a tool utilized by the building industry to assess, improve, and/or advocate for the sustainability of developments. These systems offer a means of analysing, valuating, and comparing information to provide guidance and better insights into sustainability. The primary objectives include enhancing operational performance, minimizing environmental impact, gauging the effect of buildings on the

environment, and objectively evaluating and assessing building development. In the context of the Middle Eastern region where this research is conducted, it is crucial to examine sustainability practices in alignment with green building codes. The green building codes of Abu Dhabi and Qatar have been evaluated and compared to two widely implemented systems globally, namely BREEAM and LEED.

Awadh (2017) conducts an objective comparison of two globally employed Green Building Rating Systems (GBRSs), namely LEED and BREEAM, alongside two systems specifically developed for the Gulf region. The Energy category receives the highest weighting in the BREEAM, GSAS, and Estidama systems, while LEED prioritizes the Indoor Environmental Quality category. Due to the paramount importance of energy considerations, the four systems assign the highest weighting to enhanced energy performance credits. Attaining enhanced energy performance and points related to renewable energy under BREEAM is the most demanding. LEED is relatively more lenient in granting energy performance credits, while Estidama is accommodating in terms of renewable energy generation. On a different note, Estidama offers the easiest means of earning a high number of points for water reduction, followed by LEED and BREEAM. The requirements for interior water reduction in Estidama and LEED are more stringent compared to BREEAM. This insightful comparison underscores the importance of prioritizing the journey towards sustainable design rather than solely focusing on certification or achieving higher ratings, as the latter is subjective.

As noted by Awadh (2017), Green Building Rating Systems are tools oriented towards environmental considerations and should be differentiated from Sustainability Assessment Systems. Simply obtaining a green building certification does not guarantee the accomplishment of sustainability objectives, as per Elkington's definition (Brundtland, 1987), which encompasses three pillars: environmental, social, and economic targets, along with requisite minimum standards. It is worth emphasizing that certain rating systems may lack incorporation of one or two of these pillars. In the context of sustainability pillars, Ascione *et al.* (2021) has underscored that existing rating systems often neglect factors such as compatibility with local culture and history, and they undervalue the adaptability and flexibility of liveable environments.

4.3.3 Alternative Insights for the POE: Enactment

The enduring belief that building performance can be predetermined through design persists despite repeated challenges. Van Marrewijk and Yanow (2010) strongly argue for the need for alternative theoretical foundations advocated for practice theory. While practice theory is diverse, its core focus is on understanding social phenomena as dynamic entities constantly shaped by various socio-material practices (Nicolini, 2012). Applying this logic to buildings leads to a fundamentally different understanding of building performance. There is a well-established line of practice-based research, particularly in the context of energy use (Chiu *et al*., 2014; Shove, 2018; Shove & Walker, 2014). Practice theory is also briefly addressed by Lowe *et al*. (2018) in their recommended socio-technical systems approach to Building Performance Evaluation (BPE). Even with the considerations mentioned earlier, there is a prevailing tendency among those focused on the technical aspects of building performance to see buildings as unchanging entities. An alternative perspective suggests treating a building as in constant flux over time, emphasizing the numerous adjustments that take place throughout its lifespan. However, there remains little interest in understanding buildings in terms of the ongoing enactment of socio-material practices (Patel & Tutt, 2018).

Although the precise definitions of Post-Occupancy Evaluation (POE) are subject to debate, Preiser and Vischer (2005) maintain their influence by emphasizing the assessment of how well a building caters to the needs of its 'users.' Common concerns include occupant performance, worker satisfaction, and productivity. These concerns trace back to organisational performance models from the 1960s. Indeed, all three mentioned issues are challenging to measure independently, regardless of any assumed causal link with the physical environment in which they occur. The concept of 'diagnostic tools' for evaluating occupied buildings also carries the risk of creating expectations that may not be fulfilled, leading to the 'diminishing returns' of POE.

In the prevailing understanding of Post-Occupancy Evaluation (POE), 'users' are often assigned a completely passive role, and the assumed technocratic process is geared towards meeting their perceived needs. Riley *et al*. (2010) highlight that the

term POE itself can be misleading, suggesting it used to be conducted as a one-time activity after the building is occupied. However, there has been a longstanding argument that POE should be considered as part of a broader commitment to 'BPE,' extending throughout the building's life cycle (Preiser & Vischer, 2005). This brings attention to another argument that is consistently raised but tends to be repeatedly disregarded. To address this issue in Post-Occupancy Evaluation (POE), Patel and Green (2019) emphasized the vital initial step towards adopting an alternative theoretical framework. This involves going beyond the fixed perception of 'building users.' Progress in comprehension relies on built environment professionals recognizing that the choices made in the early design stages do not rigidly dictate how buildings are used, nor do they exclusively determine the energy costs over the building's lifespan.

4.3.4 Empirical Gap with the Practice Approach

The application of the empirical model developed by Shove and her colleagues has been observed in various contexts, although these studies have often been constrained to specific fields, overlooking others, as evidenced in Table 1.1 from the Chapter One. Previous empirical investigations, for instance, have predominantly centered on select household practices, isolating identifiable routines such as sports or hobbies that can be readily distinguished from daily life. Furthermore, the focus has primarily been on personal and domestic settings, disregarding the multifaceted interactions and conflicts that arise within the broader context of daily life and the intricate processes involved in acquiring, developing, modifying, and challenging practices.

Additionally, applying the Social Practice Theory (SPT) in domestic areas has overlooked the power dynamics present in practices and the influence of different groups of practitioners, such as workplaces, on practice control and negotiation. Although some studies have used the practice approach in the workplace to explore users' practices, such as by Hargreaves (2011) and King (2019), no empirical studies have examined users' practices in Eastern nations, which have unique cultural and contextual requirements. Therefore, social practice research that seeks to apply practices in real-world contexts, particularly the Middle East, should consider

sustainable behaviour's social and contextual dynamics. Furthermore, the study of practice theory in building design, the focus of this study, requires integrating social practice theory with design theory. This integration is critical in understanding the complex social dynamics underlying sustainable behaviour and developing effective interventions that address the built environment's social and environmental challenges where this research is positioned.

Given that Oman serves as the research context, it is imperative to comprehend how sustainability is addressed in office buildings within the Omani context. In examining Oman's approach to sustainability in office buildings, we gain insights into how the nation intertwines economic development with environmental responsibility. The focus on sustainable workplaces in Oman provides a microcosm of its broader environmental initiatives. This research delves into specific strategies, such as energy-efficient technologies and waste reduction, highlighting Oman's commitment to reducing its ecological footprint. Moreover, the study explores how the country addresses unique challenges, like water conservation in its arid climate. Ultimately, understanding Oman's practices in creating sustainable workplaces contributes not only to local improvements but also to the global discourse on harmonizing economic growth with environmental consciousness.

4.4 Sustainability Initiatives in Oman

Reserving natural resources has become a top priority globally, owing to the commitment to sustainability. This priority has been in focus for several decades, and actions have been taken in various sectors. The built environment and construction sectors are prioritized in many countries' efforts towards sustainable development as they consume over 40% of all produced energy and other human activities like manufacturing, agriculture, and transportation (Saleh and Alalouch, 2015). Therefore, sustainability has gained attention from developed and developing nations as it plays a crucial role in protecting the environment and natural resources, which are fundamental rights for all generations.

For example, among the developed countries, the United Kingdom established an environmental assessment method called Building Research Establishment

Environmental Assessment Method (BREEAM) in 1990, while the United States developed Leadership in Energy and Environmental Design (LEED) in 1998 (Lee and Burnett, 2008). In addition, additional assessment methods, such as Japan's Comprehensive Assessment System for Building Environmental Efficiency (CASBEE) and Hong Kong's Comprehensive Environmental Performance Assessment Scheme (CEPAS), were introduced (Cole, 2005).

Similarly, developing nations have adopted sustainability assessment methods similar to the developed nations. For instance, the Arab Gulf Countries GCC are among the most significant contributors to carbon dioxide emissions. In addition, Middle Eastern countries have the highest level of per capita ecological footprint. In response, most of these countries have established sustainability assessment methods, such as the UAE and Qatar, which have established rating systems like "Estidama" for construction projects in Abu Dhabi and "Green Building Decree" for Dubai's projects (Al-Jebouri *et al*., 2017). Qatar has also developed a unique rating system called the Qatar Sustainability Assessment System (QSAS) (Saleh and Alalouch, 2015).

The research context, Sultanate of Oman as one of the GCC country has paid several actions to promote sustainability. The country has implemented various measures and initiatives in compliance with local, national, and international requirements while also considering its culture and environment. The first regional action in Oman took place in 1974, establishing the Environmental and Renewables regime (MECA, 2020). This organization became a standalone ministry dedicated to the environment since 1984. In 2007, the Ministry of Environment and Climate Affairs was established to address additional duties related to climate affairs (Powmya and Abidin, 2014). These actions demonstrate the Sultanate's commitment to sustainability, including protecting the environment.

Furthermore, in line with its commitment to promoting sustainability, the Oman Ministry of Finance (MoF) (The Oman Ministry of Finance, 2019) has formulated a vision for the future that is oriented towards sustainability and achieving its goals. This vision, called Oman Vision 2040, aims to achieve several national priorities. It outlines high-level, long-term targets that reflect the planned progress towards

strategic goals and directs Omani firms to create innovative plans and effective tactics to diversify the country's economy and reduce its dependence on the oil industry (Al Lawati, 2022). In addition, the vision includes the development of governorates and sustainable cities, economic diversification and fiscal sustainability, environment and natural resources, and well-being and social protections (The Oman Ministry of Finance, 2019). Therefore, it is evident that Oman's future plans align with the sustainable development goals. However, to accomplish these objectives, it is crucial to recognize any potential impediments and obstacles that may hinder their attainment.

4.4.1 Oman's Sustainable Initiatives in Buildings

Oman is experiencing significant growth in the construction sector, attributed to the country's booming economy and rapid population expansion. Furthermore, the demand for housing is anticipated to rise in the next decade as a significant portion of the population is young. As such, the Sultanate has shown remarkable efforts to promote sustainable building practices in line with its commitment to achieving sustainable development. Sustainable building techniques are currently being utilized in several construction projects across Oman (Saleh and Alalouch, 2015). In addition, a scientific research centre was established in 2005 to foster innovation, green building, and sustainable development. Furthermore, the Green Construction Council was created in 2012 to collaborate with the scientific research center and promote the development of a sustainable building system. The council's responsibilities include organising international conferences and delivering introductory lectures on sustainability in buildings (The Oman Green Building Council, 2012).

The Sultanate of Oman, with its unique regional settings, physical features, cultural practices, and traditions, required an assessment tool to promote sustainability in the country, as has been developed in other countries. Al-Jebouri, *et al*. (2017) have shown that culture is one of the critical elements that must be considered to promote sustainability in Oman buildings. In the context of sustainability in Omani buildings, the cultural theme refers to recognizing and incorporating Omani cultural values and practices in building design, construction, and use. This involves considering

the cultural significance of certain building materials, traditional architectural styles, and spatial arrangements that reflect the country's heritage and traditions (Hegazy, 2015).

By incorporating these cultural elements, buildings in Oman can serve as a means of preserving and promoting Omani culture while also contributing to sustainable development by enhancing the well-being and satisfaction of the building occupants. Cultural sustainability in Oman's buildings involves designing structures that respect the traditional building and design and integrating contemporary innovations that are appropriate and responsive to present and future needs. Preserving the cultural heritage and traditional knowledge is crucial while incorporating modern materials, technologies, and environmentally sustainable construction techniques. To promote the cultural sustainability in building practices, designers must understand the cultural context and the social dynamics of the communities in which they work. They must also consider the local communities' traditional construction techniques and building materials. This approach fosters a sense of ownership and connection to the built environment, encouraging community members to maintain and care for the buildings over time.

4.4.2 Challenges of Sustainability in Oman's Construction Industry

The adoption of sustainable practices in the construction industry of Oman is currently encountering challenges. A market study conducted by Powmya and Abidin (2014) reveals that the process of transitioning from traditional strategies to sustainable ones within the construction industry is time-consuming and impacts the perspectives of all stakeholders involved. The study underscores the substantial effort and time required to reshape established practices and mindsets within the construction industry to embrace sustainability. This transition necessitates a revaluation of existing processes, the incorporation of new technologies and materials, and the integration of sustainable principles throughout the entire construction lifecycle. As a result, these changes influence the perspectives and attitudes of diverse stakeholders, including contractors, architects, engineers,

policymakers, and clients.

Powmya and Abidin (2014) categorized the main obstacles to environmentally friendly building in Oman into four groups: economic, professional, societal, and technological. Firstly, the study found that construction professionals in Oman believe sustainable building methods would raise project costs without measurable benefits, posing a significant challenge. Secondly, Oman's construction professionals' lack of familiarity with green technologies and materials was recognized as a significant barrier to adopting green strategies and requirements. Thirdly, although most stakeholders in Oman are aware of contamination problems, they frequently believe that environmental protection is solely the responsibility of local governments. Finally, the restricted supply of environmentally friendly products and technology in the local market poses a significant challenge to the Omani construction sector.

This study focuses on the use of workplace buildings in Oman. It is crucial to emphasize this aspect and explore the understanding of sustainability in this context. Therefore, the upcoming section will delve into this particular area.

4.5 The Use of Oman Workplace Buildings

The forces of the natural environment influencing lifestyle, mood, faith, and identity of the traditional architecture of Oman, as highlighted by Hegazy (2015). He claimed that Oman's traditional design progress has incorporated the climate, local materials, and socio-cultural values. In terms of climate, although the objective of this study does not involve creating an exhaustive climate classification for Oman, a preliminary and approximate understanding of the country's primary climates was deemed necessary. Situated in the southeastern region of the Arabian Peninsula, Oman is found between latitudes 16° 40′ and 26° 20′ North and longitudes 51° 50′ and 59° 40′ East (National Centre for Statistics & Information, 2023). Encompassing an area of 309,500 km2, Oman displays diverse topography, including plains, mountains, desert, valleys, and an extensive coastal strip of approximately 3000 km (Gastli & Charabi, 2010).

The capital of the country is Muscat, and its primary economic driver is derived

from oil and gas revenues. The climate prevailing in Oman is generally characterized by high temperatures, aridity, and humidity. While no specific climate classification has been officially developed in Oman, the updated map assigns Oman a BWh classification—a hot, dry desert climate, with an annual average temperature exceeding 18 °C (Kottek *et al*., 2006). It's important to note that this global classification does not account for the variations in Oman's climate conditions or its microclimates.

With the exception of the warm tropical climate, primarily two seasons are observed in Oman. The summer season, extending from May to September, witnesses temperatures soaring to as high as 49 °C in July, accompanied by a humidity level of 96%. On the other hand, the cool season experiences temperatures ranging from 14 to 32 °C in December, with humidity varying between 20 and 92% (National Centre for Statistics & Information, 2023). The prolonged high temperatures during the summer season often led to a peak in energy demand, reaching its highest in July due to the continuous requirement for air-conditioning, as highlighted by previous studies (Al-Badi *et al*., 2009). The climate as emphasized by Hegazy (2015) influences designing of buildings which has implications on the culture of people. Hence, it is imperative to scrutinize both factors in the formation of buildings within the Omani context, the climate and culture.

4.5.1 The Impact of Oman's Climate on Buildings

A considerable amount of electrical energy is used by the building sector to ensure a satisfactory indoor environment for occupants. In Oman, for instance, residential, commercial, and governmental buildings were responsible for consuming between 73% to 85% of the generated electricity in 2014, as reported by the Authority for Electricity Regulation of Oman (AER) (Al-Saadi and Al-Jabri, 2017). In hot climates, it is widely recognized that the major portion of the electrical demand in buildings is primarily due to air conditioning systems. The annual report from AER has also highlighted a significant increase of 34%, 58%, and 26% in energy intensity for the residential, commercial, and governmental sectors, respectively, between 2005 and 2014. The rise in energy intensity is noteworthy.

Apart from energy consumption, the issue of peak electrical load poses another challenge in Oman. This predicament has become increasingly evident in recent years, attributable to the construction boom witnessed in the country. An average annual growth of peak electrical load, approximately 9%, has been observed in the past 5 years, translating to a 46% increase over this timeframe. The seasonal fluctuation of the peak electrical load is also proving to be a financial burden. In 2014, the peak electrical demand during the summer was 2.3 times higher than that in the winter (Al-Saadi and Al-Jabri, 2017). This situation results in excess electrical capacity during the winter season, rendering it redundant. To address the escalating electrical demand in Oman, ongoing efforts are consistently exerted to secure additional electrical capacity. While this costly approach has demonstrated temporary relief, it proves insufficient to meet the annual escalation in peak electrical demand, as continually noted in reports.

The primary source of electrical power generation in Oman is natural gas, constituting more than 97% of the production, as demonstrated by Al-Badi and Al-Saadi (2020). In terms of consumption, they have shown that the residential sector utilizes nearly half (47%) of the supplied electricity, followed by the commercial sector at 22%, as indicated in the 2016 Annual Report for the Authority of Electricity Regulations. Notably, the building sector, encompassing residential, commercial, and governmental structures, contributes to 80% of the total electrical energy consumption in Oman. The annual increase in energy consumption for both residential and commercial sectors, constituting approximately 70%, is close to 10%. This substantial growth rate underscores the necessity to construct new power stations to meet the escalating demand for energy. Despite the existence of committees dedicated to developing building codes and appliance standards, no implementation has taken place thus far. They emphasized that it is imperative to enforce mandatory building codes that comprehensively address all building energy systems, encompassing the building envelope, electrical systems, lighting systems, mechanical systems, and domestic water heating systems.

4.5.2 The Impact of Culture in Oman Workplace Buildings

Culture plays an important role in Arab Middle East society. Its unique historical,

social, and religious traditions require special attention to cultural traits in the exercise of authority, control, and interaction (Naoum *et al*., 2015). However, the open plan office design is not much welcomed within the cultural realm of the Arab Muslim world where gender separation for religious reasons is highly recommended (Salem & Yount, 2019). But it has become common place within many organisations in the Arab world due to the use of international design consultants and management consultants' advice for enhancing profitability and asset cost control. Employees are unable to voice their objections to such open plan office for two important reasons; they need the jobs, and their culture is a high-power distance culture. Arab countries have a high score on Hofstede's Power Distance dimension (Khashman & Large, 2012). Despite this high-power distance environment, it has been found that productivity in open plan offices can be enhanced with adjustments made to improve the ambience of the spaces (Mulville, *et al*., 2016).

A Gallup global survey found that only 23% of global workforce are actively engaged in their workplace and this low engagement is costing the global economy an estimated $8.8 trillion while accounting for about 9% of global GDP (Gallup, 2023). The Gallup survey further found that in the Middle East, only 15% of the workforce indicated being actively engaged while another 45% indicated being stressed at work and 32% felt angry. There is a mounting amount of evidence to suggest that open plan office design negatively impacts the productivity of employees (Kim and de Dear, 2013; Haapakangas *et al*., 2018). However, organisations still choose to pursue the use of open plan office designs for economic and efficiency reasons to increase space utilization and promote collaboration (Backhouse, *et al*., 2019). In fact, a survey of over 11,000 European office workers revealed that an average of 51% of European organisations, 73% of UK organisations and 37% German organisations operate open plan offices (Savills, 2019). In the same Savills survey, 52% of workers reportedly preferred to have their own personalized space. It was also found that 81% of surveyed workers wanted '*a quiet space for focused work*'.

Accordingly, understanding the cultural sustainability in the Oman workplace context is crucial. The positive response to the call of Islam in the seventh century

by the Omani people is noted (Hegazy, 2014). Islam, as a comprehensive regulatory framework, governs all aspects of Muslim life. Derived from divine legislation, the Sharia establishes guidelines and limits that shape the daily life of Muslims. Consequently, Islamic teachings influence all attitudes, values, and ideas forming the Muslim culture. The civilization of Islam holds a distinctive position in art and architecture. The signature Islamic art known as "arabesque" encompasses a diverse array of crafts such as ceramic tiles, gypsum work, stained glass, metal and wooden work, carpentry, and masonry. This arabesque art incorporates biomorphic shapes that mirror the features of the surrounding environment, created by God—the primary source of beauty in the universe. Muslim artists abstract the pristine forms, rhythms, and patterns of nature to their original essence.

From an architectural standpoint, the belief held by the Muslim architect is that God serves as the Superior Architect. Consequently, the relationship between the Muslim architect and the surrounding environment is founded on respect rather than arrogance (Hegazy, 2015). As a result, Omani vernacular architecture reflects a humane scale. In the construction process, builders and key craftsmen utilized segments of their bodies as units of measurement (Murray, 2013). The development of vernacular architecture in Oman is a culmination of various factors harmoniously merging over time to create a cohesive built fabric. Notably, the careful selection of colours and materials from the physical environment distinguishes it. Furthermore, it adheres to a height restriction of three floors, consistent with Arabian Islamic countries, and employs local materials such as lime mud plasters, wood, and stone (Hegazy, 2015). The traditional architecture of Oman is characterized by simplicity and purity. It is marked by the juxtaposition of arabesque decoration and details against substantial solid walls. These arabesque details manifest in a diverse array of carved wooden doors and wooden window screens.

Concerns about cultural sustainability, indicative of a profound respect for people and history, have surfaced in contemporary architecture. The adoption of ultramodern architectural styles was initiated globally in the 20th century by a majority of states. However, only a select few, including Oman, recognized that trendy architectural designs often neglect cultural values, identity, environmental context, economic considerations, and social performance. The transformation of

the Sultanate of Oman from a stagnant and insular community to a modern nation began in 1970. Despite unprecedented development across various facets of Omani life, Hegazy (2023) asserted that the leadership and the public demonstrated the capacity to adapt to evolving global challenges without compromising social values and identity. Recent instances of contemporary vernacular architecture in the Sultanate of Oman include the Oman International Airport. This airport gained international acclaim for its Omani-themed architecture, exceptional traveller experience, and cutting-edge technology. Consequently, it was recognized by the World Travel Awards as the Best Tourism Development Project in the Middle East just four weeks after commencing its operations.

4.5.3 Previous Studies in Oman Buildings

Although this research is concerned with workplace buildings, most of previous studies were focused on the Oman residential buildings. However, they have shown the vital impact of the climate and culture on designing buildings. For instance, Majid *et al*. (2013) examined architectural elements in Omani houses to elucidate responses to both culture and climate. This involved the analysis of house samples and survey responses. The survey collected data on inhabitants' attitudes and behaviours, along with evidence related to set point temperature, operating hours, and thermal sensation. The findings from the analysis, which encompassed design parameters of both vernacular and contemporary houses, as well as the present behaviour and attitude of occupants, provided insights into establishing harmonious living environments in Oman.

Furthermore, existing literature indicates that prior studies on residential buildings in Oman primarily focused on domestic energy efficiency using quantitative tools. For example, current research on sustainability in Oman predominantly concentrates on renewable energy resources and their potential in the energy production sector, as well as the smart grid strategy (Al-Badi *et al*. 2009; Malik *et al*. 2018; Al-Saadi *et al*, 2017; Al-Badi and Al-Saadi, 2020). Limited attention is given to proactive measures, such as the potential for energy consumption and carbon emissions reduction through the incorporation of passive and active green strategies during the design, construction, and operation phases. However, a

significant study conducted by Alalouch *et al*. (2019) addressed energy consumption in the residential sector in Oman. It was critically analysed and forecasted based on its growth rate and historical consumption. The study emphasized that fostering an energy-efficient culture necessitates a long-term plan, with effective collaboration among all stakeholders guiding the cultural shift toward a more energy-efficient built environment in Oman. The conclusion reached by the study is that the promotion of efficient energy may take into account the inter-relationship between people's lives and health with their environment.

These studies discussed above have shown that the sustainability in Oman buildings were primarily focused on the residential buildings and not the commercial buildings. They have also relied on quantitative approaches for assessing the sustainability of those buildings. In consideration of the impact of social and culture on sustainability in which this research is positioned, there is a lack of studies that have considered such a vital area in either residential, or commercial buildings in Oman. Therefore, this research has emerged to explore the critical area in Oman within a workplace building: to examine the impact of users' culture on the promotion of sustainability.

4.6 A Conceptual Framework to Post Occupancy Evaluation

Having explained the importance of social practice theory and its alignment with the current study, it is important to reiterate that many of the sustainability certifications for buildings such as LEED and BREEAM focus on reduction of emissions and resource consumption costs, increase productivity, health, comfort, well-being and provide a future strategic asset (Heerwagen, 2000). They do not take into cognizance the important role of culture as it impacts the behaviour of building users. It could also be argued that these building certifications take culture into cognisance but focus on the dominant Western-style culture as the benchmark for every good behaviour. However, it is important to note that available evidence from the seminal work of Geert Hofstede has shown that a people's culture has a very strong impact on their work-related values after studying people's behaviours across 70 countries for the same roles (Hofstede, 1980). He further showed that even within the same country, attitudes differ after comparing experimental results

across all the regions in Brazil (Hofstede *et al*., 2010). Hofstede's culture consequences has now been tested across many sectors by researchers across the world to explain different skills requirements for the same procurement system in different regions (Umar *et al*., 2023), purchasing and supply skills requirements (Stek *et al*., 2021), differences in managerial approach between western and Arab managers in organisations operating in Arab countries (Obeidat *et al*., 2012), buyer & supplier relationship (Cannon *et al*., 2010), strategic sourcing (Ogden *et al*., 2007) and characteristics of industrial buyers in Japan and the U.S (Roth *et al*., 2004).

Across all the cited studies above without exception, they all found that culture had a huge impact in creating differences in perception. This latent cultural influence was not taken into consideration during the design process for all the various sustainability/green certifications. This explains the reason why users of PDO's Mina Al Fahal building have been experiencing declining comfort and productivity even though their LEED-certified office building was supposed to help staff achieve the opposite-better comfort and increased productivity. This view has previously been argued by King *et al*., (2013) who posited that the failure to understand the totality of practices individuals are engaged in will limit the success of any initiative to encourage sustainable practices. This was what was left out of the LEED evaluation of Mina Al Fahal resulting in a certified building not aiding the corporate vision of a company. Adapting King *et al*., (2013)'s framework shown below in Figure 4.1 and re-arranging the framework within the context of the findings from this study, we now have Figure 4.2-the modified framework.
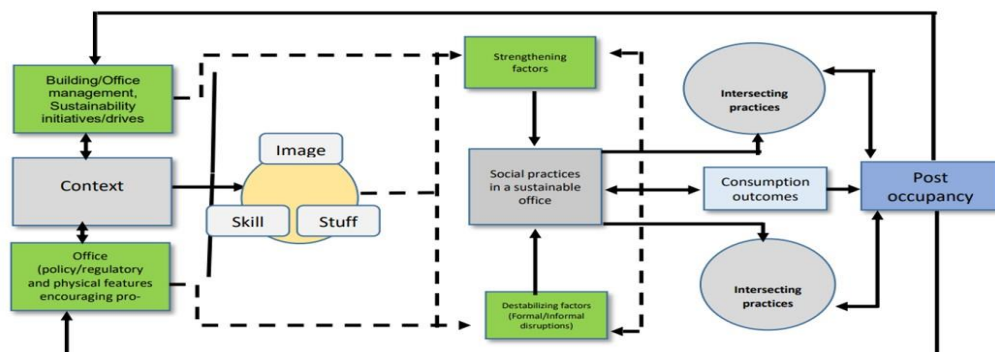
Figure 4.1 Conceptual Framework of Social Practice Theory and POE (King, *et al*., 2013)
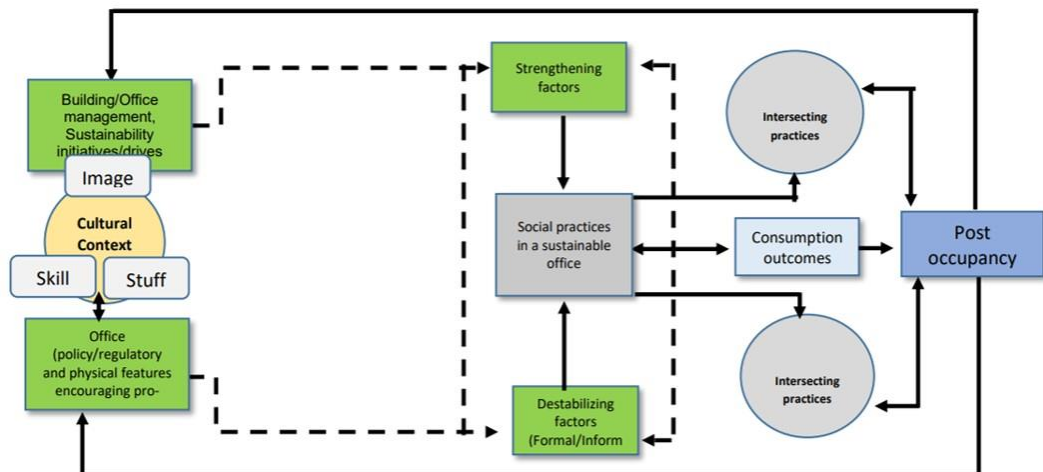
Figure 4.2 Modified Conceptual Framework of Social Practice Theory and POE

In the modified framework, the three-element model is moved into the context field to provide a foundation for any other process to build upon. Therefore, in the modified framework, an understanding of the Islamic and Arab culture becomes the foundational element upon which designers will then provide their services. After ensuring that the cultural aspects of intended users are taken into cognizance, all other sustainability processes of certification institutions are then considered. A major implication of this work is that all current certification organisations may need to tweak their evaluation criteria to incorporate cultural aspects or create entire standalone certifications for the Arab world.

This adjusted framework adapted from King *et al*, 2013 is better suited to the Middle East and Oman in particular as it allows the consideration of the cultural landscape of the potential employees/users as the first point of attention. This will reduce the areas of evaluation for those conducting POEs as they will be focused on other technical aspects of the buildings' operations. With the cultural aspects of users already covered, designers can then attempt to implement all other sustainability interventions using their technical knowledge. Another implication of this framework is that international design consultants need to meet and discuss cultural issues with potential facility users; doing this infers giving the users a say in the design which is considered a very important aspect of stakeholder engagement.

4.7 Summary

This chapter has shown how current building sustainability approaches have addressed the interaction between users and their built environment. It has shown that they have failed to understand such a relationship as they still consider users as passive rather than active participants. This situation has led to a critical issue in buildings called the "performance gap". Therefore, this chapter proposes an alternative approach to design for sustainability that considers the social side and the complexity of daily human activities. The social practice theory provides a promising approach in understanding how the human activities are developed and explore the factors that lead to such practices, emphasizing the role of users' culture in shaping their actions. This theory requires an ethnographic approach to investigate the daily activities of building users and the influences that shape the activities. The following chapter describes the methodology used-ethnography-which is structured to align with the theoretical foundation of this research. It seeks to understand how the daily practices of building users may deviate from the sustainability initiatives.

Chapter 5 : Research Methodology

5.1 Introduction and Background

This chapter comprehensively explains the research methods employed and the reasoning behind their selection. The utilization of each study method and its specific focus on particular data are demonstrated, highlighting the preference for these approaches over alternative options. Additionally, the rationale behind choosing the case study institution over other institutions in the Sultanate is clarified. The effectiveness of these techniques in collecting data from the designated case study is showcased, thereby enhancing the reliability and rigor of the findings. This study aims to portray individuals as active participants who actively interact with their surroundings when engaging in practices within specific contexts grounded in social practice theory. It diverges from research that relies on surveys to gather data and portrays individuals as passive and unsociable, necessitating external guidance to prompt action (Heiskanen, 2005).

Therefore, the chapter is structured to provide a comprehensive and detailed account of the research methodology utilized in this study. Each section is dedicated to a particular aspect of the methodology, starting with Section 5.2, which outlines the reasons for relying on ethnography as a research design. Ethnography is a qualitative research method well-suited for exploring social phenomena in their natural settings, making it a valuable tool for studying complex social practices and interactions. Section 5.3 presents the criteria employed to select the specific case under investigation. The case selection process involved careful consideration of various factors, including the relevance of the case to the research questions, the accessibility of the case, and the potential for rich and detailed data.

Section 5.4 describes the methods utilized in ethnography, including participant observation, shadowing, interviews, and document analysis. Participant observation involves observing and recording the behaviour of individuals and groups in their natural settings, while interviews allow for in-depth exploration of the meanings and motivations behind such behaviour. Document analysis, on the other hand, involves examining written or recorded materials related to the case

under investigation. Section 5.5 details the data analysis process, highlighting the techniques used to analyse the data collected through participant observation, interviews, and document analysis, which were employed to identify and interpret patterns and themes in the data. Finally, the ethical process followed to gather data from the targeted respondents involved in this study is presented in Section 5.6. This includes obtaining informed consent, protecting the anonymity and confidentiality of participants, and ensuring that the research was conducted ethically and respectfully. Finally, Section 5.7 describes how the thesis was written and the process followed to achieve it. This section discusses the thesis's structure, the chapters' organization, and the writing process.

5.2 Rationale for Ethnographic Approach

The selection of ethnography as the research methodology for this study is justified based on several considerations aligned with the research questions and theoretical framework. First, the primary objective of this study is to obtain a profound comprehension of the interaction between the entities of building design and users, with a specific emphasis on sustainability. To this end, an extensive literature review was conducted to examine theories and concepts about building designers, users, and sustainability. This comprehensive exploration revealed the significance of expanding the conceptual framework to incorporate sustainability and its interplay with the other two components, ultimately leading to the development of sustainable buildings. The literature review also sheds light on the challenges associated with comprehending sustainability and implementing practical approaches to promote it within the built environment. It emphasized the necessity of gaining a nuanced understanding of users' daily activities. Consequently, adopting an ethnographic approach allows researchers to delve into this context's intricate dynamics and practices. By immersing in the research setting and engaging directly with the participants, rich and detailed insights into the complexities of the interaction between building design and users can be approached, particularly concerning sustainable practices.

The preceding discussion outlines the need for a thorough examination of methods that enable a researcher to comprehend broader contextual issues. According to

Hammersley and Atkinson (1983), qualitative and interpretivist techniques provide a means for the researcher to gain insight into the culture or subculture of the studied population and to interpret the world from their perspective. This is particularly relevant to the research questions addressed by this study, which focus on the conceptualization of contemporary working practices, necessitating an understanding of the surrounding context and culture. Martens and Spaargaren (2005) point out that quantitative methods may not fully account for cultural and contextual meanings associated with practices. Additionally, Smith (1998) suggests that "…*we know relatively little about how people construct and live their routines, let alone how they use them to challenge, sustain or mediate the structures of society in which they are embedded…subjective understanding will not conform to a priori categories, much less settle comfortably into coding boxes of a questionnaire.*" (p.20).

Beyond culture and context lie the paths that practices follow, as mentioned earlier, emphasizing the importance of comprehending these trajectories to analyse practices effectively. The research questions aim to explore the trajectories of practice, seeking to conceptualize current practices, understand their relationship with sustainably designed office buildings, and uncover implications for both practice and future design. According to De Certeau (1984), quantitative methods like statistical analysis fall short in fully grasping the trajectories of practice, leading to fragmentation and oversimplification. On the contrary, qualitative approaches provide a more in-depth understanding of practices over time and highlight the interconnected and interlinked elements of practice. Therefore, this research has chosen ethnographic investigations as a tool to understand in-depth daily activities of building users, considering its limitation which is discussed in the following section.

5.2.1 Critique of Ethnography

As with all research and enquiry methodologies, there exist some weaknesses that researchers have to be aware of in their chosen methodology; ethnographic research is no exception. Some methodological challenges that are encountered in ethnographic research may include:

- Researcher bias, which postulates that the researcher will note observed events and actions that they find most compelling (Porter, 1993). To overcome this bias, constant notetaking was used to ensure every noticed action and process the participants were engaged in was recorded without attributing any meaning to the actions or making any attempt to provide immediate interpretations. This was, the impact of researcher bias was reduced since the notes later formed the bases for writing the final report, hence all significant actions in the notes found their way into the final report.

- Another criticism of ethnography was that theoretical underpinnings may be lost in rich descriptions generated by ethnography (Hammersley, 1990). The dual role of researcher–participant necessitates very extensive recording of events and activities from as many perspectives as possible (Fellows & Liu, 2015). While taking notes, an elaborate annotation method was used by simplifying narratives and writing only major points without the need to provide extensive descriptions of the actions being observed. However, during the writing of the final report, it was also important to describe concepts that, though easy for the researcher to understand as a member of the Arab culture will require some degree of description for a non-Arab to understand. Therefore, where it was felt that a better understanding was required, extensive descriptions had to be used.

- Another argument against ethnography is the inability to generalize findings. Ethnographic studies are usually specific to communities, tribes, and cultures; however, the overarching aim of this study was not to generalise. And studies have also shown the futility of generalisations even within studies of the same culture (Hofstede *et al.,* 2010). From the outset, it was established that the study would take place in a carefully selected case location that fits the requirements for the proposed study-an institution that purports to engage in sustainable behaviour or practice.

- Impact of Researcher beliefs/culture: it has been argued that 'Any interpretive act is influenced, consciously or not, by the tradition to which the researcher belongs' (Baszanger and Dodier 1997, p. 12). While this may be true, this study differs in that the researcher belongs to the same culture as the participants

under study. This has provided the advantage of limited interaction and interruptions in the daily actions of participants within their natural environment. The researcher, being from the same culture readily understands most actions and the reasons behind them. This has served to reduce the need to ask too many questions thereby limiting interruptions to participants' routines.

- Another challenge often cited against ethnographic studies is researcher commitment. It has been argued that the researcher must be vigilant 24hrs a day (Dawson, 2019). However, the focus of this study was the daily practices in an office environment where participants were only available from the hours of 7.00 am-4.00 pm, which is approximately 9 hours daily except for the days when the cleaners were the subject of observation. For these, an additional hour was necessary because they resumed an hour earlier than everyone else in order to complete cleaning before the regular office users arrived.

- The difficulty of admission into the study community is another criticism that has been argued against ethnography. The success or failure of the research will hinge on such factors as the ability to fit-in with the people being studied and the ability to communicate with groups members on their level and terms (MacDonald & Headlam, 2008). To overcome this difficulty, it has been suggested that researchers seek and make use of a gatekeeper (Dawson, 2019). The gatekeeper helps the researcher manoeuvre around the community, and this helps keep community member's minds at rest with regard to the intentions of the researcher. In this study, a gatekeeper was assigned by the senior management of the organisation under study, and it truly made navigating around the organisation a lot easier.

- The issue of ethics is also a major concern for ethnographic studies (Lester, 2020; Russell & Barley, 2020; Krause, 2021). As a result of the nature of participant observation, there tend to be more issues involving ethics and morals to consider (Dawson, 2019). This is especially true for very conservative societies like the Arab cultures. The researcher being of Arab origins reduced the challenges of this access. However, it was challenging to access and observe female employees within the organisation because the Arab culture does not permit non-related men to speak or be in close proximity to non-related females. Hence, observing the female employees in the focus organisation was done from

a distance.   One way to overcome this challenge would have been to recruit a female assistant to conduct the observation of the female members of the group under study. This was impossible due to resource constraints. However, it is hoped that future researchers will be armed with this knowledge to include a female assistant when intending ethnographic studies in conservative cultures such as those of Oman.

Despite all the care taken to limit the impacts of the weaknesses often associated with ethnographic studies, it is impossible to argue that no bias was allowed to influence the opinions expressed in the study particularly coming from the same cultures as the study participants. However, there was no deliberate recording of unobserved phenomena throughout the period of observations. It is a weakness in ethnographic studies that the presence of an observer can alter the behaviours of participants and there is no way the observer can control the actions or predict how the participant will behave or their responses to questions. Finally, participant observation does not prejudge issues and events, and for these reasons, it is possible to argue that such a method provides data that has a high level of validity (MacDonald & Headlam, 2008).

5.3 Finding and Conducting a Case Study

The initial challenge for this project, which employed a case study approach, was to identify a suitable organization. Given the research's focus on the relationship between sustainability, designers, and users, finding an organization that would satisfy this condition was crucial. Additionally, accessibility and convenience in obtaining institutional approval were also considered essential factors in the selection, as Spradley (1980) stated. Considering these criteria, two organisations that met these criteria came to mind, one from the public sector and the other from the private sector. The first organization was Oman's Ministry of Defense Engineering Services (MODES), which provides engineering services to the armed forces camps throughout the Sultanate, including building and infrastructure design, operation, and maintenance. The second organization was Petroleum Development Oman (PDO), Oman's leading oil and gas exploration and production company, which is also committed to sustainability.

When selecting an organization for the case study, two large organisations were assessed - MODES and PDO based on multiple criteria. These criteria included the availability of the design team who participated in the building's design process and the emphasis placed on sustainability as the primary design criterion aimed to be achieved by the designers. Both organisations were carefully evaluated based on these factors to determine the most suitable institution for the case study. Additionally, ease of accessibility and convenience in obtaining institutional approval for the study were also considered. In addition, the potential significance and benefits of the research for organisations were considered, as the study aims to improve organisations' comprehension of sustainability.

Although both organisations had dedicated departments for building design, users and decision-makers acknowledged the significance of the research and its potential benefits to their institutions. The decision to use PDO's office building was influenced by the organization's commitment to sustainability, which aligned with the study's objective of examining sustainable building design. In addition, conducting the study in PDO's office building would provide valuable insights into the organization's sustainability efforts, which could be helpful for other organisations seeking to adopt sustainable practices. Furthermore, MODES, also considered a potential case study location, has not been particularly active in its pursuit of sustainability, a central theme in this research. Thus, the MODES was deemed less suitable for the study's objectives, and the decision was made to concentrate on PDO's office buildings instead.

The selection of a suitable building for the case study was a crucial step in the research process following the selection of PDO as the chosen institution. To this end, consultation with colleagues at the institution was undertaken to guide this decision. As a result of the consultation, two buildings were initially identified as potential candidates for the study: the PDO school building, which was built according to global sustainability standards, and the headquarters building, Bait Mina Al Fahal (BMF), which was designed and operated as a sustainable building by LEED (Leadership in Energy and Environmental Design). However, after seeking guidance from supervisors, it was suggested that buildings where children under the age of 18 were present, such as the PDO school, should be avoided due

to ethical considerations and potential complications that could arise during the study.

Hence, the case study selected the BMF building as the most suitable option for achieving the research objectives. The BMF building stood out as an excellent choice due to its capacity to accommodate numerous employees, including senior managers, and its critical role as a facility for PDO. Additionally, it is important to emphasize that the design and maintenance of the building were highly relevant to the research focus on sustainability in the context of office building design. This relevance stemmed from the utilization of sustainable materials and energy-efficient systems, such as solar panels, in building construction. Furthermore, the building's design aimed to facilitate natural ventilation and daylighting, enhancing indoor air quality and energy conservation. Finally, the building's maintenance was also noteworthy, as a team of professionals trained in sustainable practices regularly monitored and serviced the building. Therefore, following consultations with colleagues at PDO and supervisors, it was concluded that the BMF building was the optimal choice for the case study.

The building under study, the BMF, is a significant structure located by the seaside. The building comprises a ground floor and three upper floors, providing ample space to accommodate the PDO's managing director and all senior managers. With a capacity of 2300 people, the BMF is a spacious structure designed to meet the organization's growing needs. The building's interior has been thoughtfully designed to provide a modern, open-plan office environment, promoting employee collaboration and communication. The building's design is characterized by the use of high-quality materials and advanced technology, creating a contemporary built environment that is both functional and aesthetically pleasing.

After selecting the BMF building as the location for the case study, a formal request was made to obtain consent from Petroleum Development Oman (PDO) to conduct the fieldwork. Detailed information on the activities, framework, and data required for the study were provided to the organization, along with a statement confirming that the information would solely be used for research purposes. However, obtaining consent from various parties expected to participate in the study proved

to be a complex and time-consuming process that required careful coordination. Eventually, after nearly two months, the request was granted by the end of 2021, marking a significant milestone in the project's progression. The organization sent an email confirming and approving the request to carry out the fieldwork at the BMF building.

Following the approval, the PDO appointed an internal supervisor that would assist in liaising with relevant departments and individuals during the fieldwork. This decision streamlined the process, provided the necessary support to navigate the complex environment, and ensured the study proceeded smoothly. After much effort and coordination, the procedures required to access the case under study were completed, marking a crucial milestone in the study's progression.

5.4 Undertaking the Ethnography

The commencement of fieldwork was scheduled for January 30 following the framework agreed upon with PDO. The proposed duration of the fieldwork was initially eight weeks, but it could be extended if necessary. The proposed research strategy included multiple data collection techniques, such as interviews, observations, document analysis, and shadowing. The study was supposed to concentrate on individuals who were closely connected to the research goals, including designers and users. However, as discussed during the last meeting with supervisors before the trip, the targeted participants and research plan underwent expected changes. The supervisors emphasized the need for flexibility in the fieldwork plan to accommodate potential unforeseen factors that could impact the initial plan. During the fieldwork, unforeseen tasks arose as new participants related to the research issues necessitated communication. This caused the extension of the fieldwork period by several additional weeks.

This study's adoption of flexible data collection approaches was driven by the research objective of investigating the relationship between designers and users. In order to gain a comprehensive understanding of this relationship, a multi-faceted approach to data collection was employed. Firstly, discussions took place with the design team to gather information on their intentions and expectations concerning

the design process. This involved conducting interviews with designers, reviewing design documentation, and observing the assessment process for sustainability. Then, having understood the designer's intentions, focus shifted to the users. Through observations of users' daily activities, the researcher sought to investigate whether these intentions were met and to what extent. Finally, by gathering user feedback on their experiences with the design, insights into the actual use of the building and how it may differ from the initial design intentions were revealed.

In cases where discrepancies between the design intentions and the actual implementation were observed, the designers were approached for further insights. This approach helped to understand better the design process and how it evolved over time based on user feedback and other factors. Adopting a flexible data collection approach created an opportunity to gather rich and comprehensive data on the relationship between designers and users, providing valuable insights for future design processes. The following sections demonstrate each method used to collect this research's required data.

5.4.1 Semi-structured Interviews

The study aims to investigate the design team's intentions, and to achieve this; interviews were employed as the primary data collection technique. Initially, the ethnographic research aimed to establish contact with the group involved in the BMF building design. However, since the building was constructed in 2012, and more than ten years have passed, some design and construction team members have moved on to other occupations. Therefore, an internal supervisor used her networks and contacts with previous employees to locate the design team. Through this process, four individuals were identified, all involved in designing and managing construction processes for the BMF. Three are still actively designing building projects, while the fourth has retired. A formal request to the designers to take part in the study was accepted by all design team members, including the retired designer, who demonstrated a strong interest in the study.

The purpose of interviews with the design team was to gain insight into their intentions for the BMF building and the process followed to promote those

intentions. Due to the timing of the fieldwork coinciding with the pandemic, all interviews were conducted remotely using Microsoft Teams. These informal conversations aimed to better understand the designers' plans and how they were executed. However, a significant challenge during the interviews was the inability to record the conversations, resulting in having to record the data manually. Nevertheless, the social connections with the design team through these interviews created an environment that permitted further subsequent office visits. These interactions provided an opportunity to explore further the design objectives and the methods used to achieve them.

The snowball method was employed to collect relevant data from various actors, including designers, users, and others. These discussions with the design team revealed other team members who contributed to promoting the design intentions. For example, during the transition period, the building designers employed a dedicated team to communicate directly with users. The responsibility of this team was to familiarize people with the building's elements and the best ways to communicate with them. They also played a role in convincing people to adopt the new way of working that replaces the traditional closed workplaces with an open office setting. Therefore, the team's role is crucial as it investigates users' opinions after engaging with the new design elements. Consequently, interviewing a participant in such a position has become feasible and contributes to the study's objectives. According to the designers, three individuals were involved in this work, but only two were interviewed since one had retired. The interviews with these team members revealed that their roles were explicitly focused on change management and direct user interaction due to the changes brought about by the open-model design of the workplace building.

Following the snowball strategy, during the conversations with the BMF designers, it was mentioned that the building is currently evaluating its sustainability in operation and maintenance. Multiple members, including designers and building operation and maintenance experts, have been assigned this responsibility. Even though it was not part of the original plan, this vital activity was crucial for comprehending the team involved and joining the activity as an observer. Therefore, a meeting was requested through the internal supervisor to contact the committee's

head. By joining the committee responsible for evaluating the sustainability of the building, I gained an understanding of the procedures used for this purpose was acquired. Furthermore, this involvement as a participant observer has also identified any gaps in the process recommended by the literature. Therefore, this activity has been thoroughly discussed in section 5.4.2, about the domain of observations.

Moreover, two actors influencing users' actions within the BMF building beyond the influence of the designers were revealed in the process. These actors were identified through interaction with staff and conversations with the internal supervisor. The presence of these factors necessitated additional actions that were not initially contemplated in the research framework, hence the need to identify and investigate these components. The first factor identified was the presence of office services within the building, such as furniture, meals, and cleaning services. These services were not part of the building's original design but were added through a different strategy since it is beyond the design role. A committed team was responsible for incorporating these elements into the building, and they interacted with users regularly, impacting their daily routines. The facilities management team was the significant component responsible for these services. To better understand the impact of these elements on users' actions, three participants were interviewed to assess the goals of these materials and the standards used to develop them. The goal was to understand better the factors that shape users' actions within the building beyond the building's original design. This detection demonstrates the importance of looking beyond the original research framework and considering other factors that may influence the study's results. By investigating these additional components, a better understanding of the building's operations and how they impact users was revealed.

The sustainability team has been identified as the second crucial variable in investigating coexistence with people and participation in their everyday lives. This team has been found to be critical in promoting sustainable practices among users. With this objective in mind, the sustainability team has sought to introduce several innovative elements to the workplace to support sustainability. These elements include measures such as reducing the use of plastic and paper, implementing new waste management practices, and rationalizing water consumption. Given that the

new processes and technologies introduced to the built environment need to interact with users regularly, seeking input from the sustainability team to investigate the motivations behind their actions has become necessary. To this end, an interview was conducted with one of the key players responsible for managing these sustainability projects. This interview aimed to gain insights into the team's goals and strategies to achieve them and explore any challenges they faced while implementing these innovative sustainability practices.

Furthermore, during the fieldwork, it was observed that there is a significant effort being made to build a sustainable city for PDO. Given this, it was deemed essential to visit the Ras Al Hamra project and interact with one of the team members, given the importance of this research to sustainability. An encounter with a former colleague who happens to be the project manager during the visit provided a rare opportunity to delve deeply into the goals and strategies employed to enhance sustainability in the project. As a result, valuable insights into the project's sustainability objectives through a conversation with the project manager was achieved. The objectives of integrating sustainability into the project was probed, which provided valuable insights into understanding the meaning of sustainability in PDO's new construction projects. In addition, discussions with a group participant responsible for implementing sustainability requirements in building designs and construction took place. The visit and subsequent interactions provided valuable information and a better understanding of the sustainability efforts being made in PDO's construction projects.

Therefore, the snowballing approach is an effective research method in this study, as Flowerdew and Martin (2013) suggested. Furthermore, this approach has been instrumental in enabling the identification of additional actors who play a role in shaping the daily practices of users, in addition to the designers of the built environment. Specifically, the researcher has explored the roles of two key groups, namely the sustainability team and facilities management, in contributing to the daily practices of users in the built environment. Furthermore, by leveraging the snowballing approach, additional perspectives and insights that have enriched the overall understanding of the factors that shape users' practices in the built environment were uncovered. As a result, a series of participants were interviewed

as shown in Table 5.1.

Table 5.1 Summary of Interviews

Team	Name	Date
Designers of BMF	Participant 1	13/02/22, 23/02/22, 16/08/22
	Participant 2	09/02/22, 10/02/22, 16/08/22
	Participant 3	13/02/2022, 03/03/2022
	Participant 4	15/02/22
Sustainability team	Participant 5	24/02/22, 15/08/22
Facilities management team	Participant 6	08/02/22, 23/02/22, 02/03/22
	Participant 7	17/03/22, 16/08/22
	Participant 8	21/02/22, 22/04/22
Sustainability certification team	Participant 9	17/04/22
	Participant 10	08/02/22
Sustainable city team	Participant 11	16/02/22, 29/03/2022
	Participant 12	24/02/22
Communication and change management	Participant 13	10/02/22
	Participant 14	24/04/22
Operation and maintenance team	Participant 16	03/03/2022
	Participant 17	14/02/22, 15/08/22
	Participant 18	02/03/2022

	Participant 19	10/03/22
	Participant 20	14/02/22
	Participant 21	16/04/22

5.4.2 Observations

Observation is one of the strategies for gathering information in an ethnographic study. In this study, Observation was employed as a means to track participants' everyday routines and activities. As this study is based on the social practice theory, observing these practices was the most effective approach for achieving the research goals. Crucial information for this study was collected by actively observing the practices that took place within the building. Regular user interactions provided the ability to assess the extent to which the design aims aligned with the reality of the situation. If any deviations from the original design aims were observed, the motivating factors that led to the change in practice were investigated. Therefore, observation played a crucial role in this study, and the ethnographic technique was the most suitable approach for exploring the meanings that encouraged users to engage in those practices, which alternative methods might have hindered. This study has used observation to observe the daily practices of the BMF buildings as the primary target, as well as observation of the work of external specialists, the sustainability evaluation team for the BMF, and the focus group assigned to assess the work environment of PDO buildings. Each of these two activities is discussed in the following sections.

a. Observation of Users' Practices

The primary emphasis of this study centered on three major factors that influence users' everyday practices within the building: the designers, facilities managers, and the sustainability team. Regarding building design, the various elements were intentionally designed with specific purposes and objectives. As a result, the designers anticipated specific outcomes when users interacted with these elements.

The design of the workspace and its layout had specific goals, raising curiosity about whether these goals and the designers' concepts aligned with the methods implemented. For instance, the open workplace was intended to serve several purposes, including improving employee communication, promoting worker equality, and adhering to international building standards. Also, the design aimed to consider the importance of operation and maintenance by using sustainable materials, one of which is the reliance on technical building operations solutions such as BMS (Building Management System) to minimize user intervention. Moreover, part of the design concept was to initiate a prayer hall close to the building to enable male employees to pray there. On the other hand, the building designated prayer rooms specifically for women, prioritizing their privacy.

Secondly, the study observed that the facilities management team's provision of services significantly impacted the building's maintenance, upkeep, user satisfaction, and productivity. Initially, it was not anticipated that the team would play such a crucial role in ensuring the building's smooth operation. The various services offered by the facilities management team, such as office furnishings, catering, internet access, and cleaning services, were deemed essential for establishing a sustainable work environment. These services were made accessible to address user needs and ensure their contentment. Hence, users' interactions with these service components were critical in determining the extent to which they could effectively accomplish their objectives within the building. Consequently, investigating users' interactions with the services was important to attain their goals. This inquiry could yield valuable insights into users' perceptions and utilization of the services, facilitating improvements in the services provided. Thus, it was important and critical to document users' interactions with the services offered by the facilities management team and evaluate their utilization in achieving users' objectives.

Finally, the institution's commitment to promoting sustainability in its facilities has led to the establishment of a sustainability team. The PDO has tasked this team with implementing specific initiatives to steer the building's efforts toward sustainability. The initiatives launched by the team aimed to encourage building occupants to adopt more sustainable practices in various areas, including water, waste, paper, and

plastic use. The team has implemented new procedures to optimize waste management and organize the use of water, paper, and plastic, among other measures. The team hopes these endeavours will prompt users to become involved and promote adopting more sustainable practices. Consequently, this study aimed to observe these encounters and understand the factors that led users to support these activities while investigating any contextual factors that might have hindered the team's aspirations.

During the investigation, it was observed that particular users' actions within the building were influenced differently by each of the three service providers, depending on their roles in the building's context. For instance, the impact of the building design was observed to extend to all users, encompassing even the facilities management team, which includes cleaners. This impact was because the building's materials and layout can determine how easily and effectively the cleaners can perform their jobs. For example, if the materials are difficult to clean or the building's layout is complex, it can be challenging for the cleaners to maintain a high level of cleanliness. Additionally, the procedures of the sustainability team often overlapped and complicated the tasks given to the facilities management team. For example, the materials used to reduce water use might impact how well the cleaners can perform their duties. The overlap between the sustainability team's initiatives and the facilities management team's responsibilities highlights the complexity of understanding building activities and interactions between building components, including materials and people.

Two types of practices have been observed, what people do and say. A participant observation method in which a researcher is immersed in the daily practices and routines of the study's participants to gain an in-depth understanding of how they interact with the built environment was employed. Through this approach, the participants' doings and sayings, which is critical for understanding how they engage with the built environment were uncovered. For the sayings, to ensure a comprehensive analysis of the participants' experiences, discussions took place with several users, as shown in Table 5.2, to examine their perceptions of the built environment, including its design and other facilities offered by the facilities management and sustainability initiatives employed. This approach provided the

opportunity to capture diverse perspectives and experiences, essential for understanding the complexity of the participants' practices.

Table 5.2 List of Participants Involved in the Informal Interaction

Department	Participants	Categories
Ground floor, gas directorate	Participant 1	Male
	Participant 2 (manager)	Male
	Participant 3	Male
	Participant 4	Female
Ground floor, Finance Directorate	Participant 5	Male
	Participant 6	Female
	Participant 7	Male
First floor, Oil South Directorate	Participant 8	Male
	Participant 9	Female
	Participant 10 (Non-Omani)	Male
	Participant 11	Female
	Participant 12	Male
Second floor, Oil North Directorate	Participant 13	Male
	Participant 14	Male
	Participant 15	Female
	Participant 16	Male
	Participant 17	Male
Second floor, External Affairs, and Added Value	Participant 17 (Head of local community contractors)	Male
	Participant 18 (Cooperative communication)	Female
	Participant 19 (Head of event management)	Male

Second floor, Human Resources	Participant 20	Male
	Participant 21	Female
Facilities management	Catering and servicing team	Male and Female
	Facilities management	Male
	Security	Male and Female

Second, as part of doing which is the other category of practices, the daily activities of users was observed to gain deeper insights into individuals' interactions with their surroundings. This approach facilitated a more comprehensive understanding of the participants' experiences, perspectives, and behaviours within their environment. By observing people's actions, valuable insights into their navigation of the physical space and their interactions with various objects and materials in their surroundings was acquired. The observation of daily activities as a research method is widely recognized as a valuable tool for comprehending the complexities of human behaviour within specific environments. It has yielded important information about how individuals utilize, adapt to, and experience their surroundings. This method involves observing individuals' everyday activities and collecting data on the environment, activities, social interactions, and other factors influencing their behaviour.

To comprehensively understand the interaction between users and building entities, users' practices during winter and summer were observed and documented. Certain activities emerged more prominently in each of these seasons, which prompted the need to conduct observations at different times of the year. For example, some observations were conducted in February and March, characterized by colder temperatures and shorter daylight hours. These weather conditions often prompt changes in user behaviour, such as increased use of indoor spaces and different clothing choices. On the other hand, observations were also carried out in July and August, which typically have warmer temperatures and longer daylight hours, resulting in different user behaviours. By observing different seasons, a more nuanced understanding of how the building's design and facilities interact with

users' needs and behaviours in various weather conditions was observed. Furthermore, this approach allowed for identifying seasonal patterns and trends in building use, which may help inform future design and management decisions.

b. Observation of the External Teams

Additional activities not initially planned in the fieldwork plan have been included in the study. One of these activities is the certification process for BMF sustainability. Observing the committee's activities was valuable and attended several meetings from February to April 2022 to gain insight into how the certification process was conducted. Specifically, focus was placed on understanding how the process considered the social aspect of sustainability and its implications for building users. Through this involvement, a deeper understanding of the environmental management systems (EMS) used to assess buildings and the criteria used in these processes was gained.

This involvement was crucial in understanding how environmental management systems treat buildings and the criteria used in such processes. Attendance at these meetings provided an opportunity to understand better the certification process and the criteria used to assess a building's sustainability. By observing the committee's work, it was possible to see how social factors were considered in the evaluation process and how the building's users were taken into account. This information was essential in gaining a holistic understanding of the building's sustainability efforts, and these insights were incorporated into the overall analysis of the BMF.

Also, the opportunity to attend focus groups organized by a specialized consulting firm contracted by PDO to assess the perceptions of building users, including the BMF was very beneficial. The focus group approach was utilized to gather insights from users in each department of the BMF. Having informed the internal supervisor that understanding user perspectives was a major objective, the internal supervisor provided access to attend two focus groups in August 2022. During the sessions, the users expressed concerns about the built environment and its impact on their daily work experiences. Interestingly, most of their concerns had already been investigated and observed during the initial fieldwork, which lends credibility to

the research findings. By attending the focus groups, additional insights into the users' perceptions and experiences were uncovered, which helped to further contextualize and support the findings from the fieldwork. The focus group approach helped provide a deeper understanding of user perspectives and concerns, which will be beneficial in developing future strategies to enhance the built environment of the BMF.

c.   Encountered Challenges for Observation of Users

Considering the possible obstacles associated with ethnographic research discussed in Section 2.8, several challenges were encountered during the observation phase that impeded the successful implementation of the research plan. Ethnography, known for generating high-quality data, necessitates the researcher's immersion in the study participants' daily routines and activities. However, achieving this immersion in practice proved challenging. One of the difficulties encountered during the fieldwork at the BMF building was the participants' reluctance to be observed while engaging in their daily activities. This reluctance is understandable, as people generally prefer privacy during routine activities. Sensitivity to this concern was crucial, and strategies had to be devised to observe the participants discreetly without causing discomfort. To address this challenge, various techniques were employed to blend in with the surroundings and minimize visibility. These techniques involved wearing attire that matched the building's uniform and engaging in activities similar to the participants, such as praying and eating. Additionally, practical communication skills were vital in fostering smooth interactions with the participants, bridging the gap between the researcher and the study subjects. This approach facilitated the acquisition of valuable insights into the participants' daily lives and enabled the observation of their behaviours in a natural and non-threatening environment.

Another difficulty encountered was deciding which activities to observe, as many different types of activities take place in the BMF. To effectively capture the data needed for the study, focus had to be narrowed to the most relevant activities that could provide insight into users' practices in the built environment. Much focus and diligent observation were required, leading to potential mental strain. Furthermore,

gathering field notes also proved to be challenging. Some observed activities required photo documentation, while others necessitated conversation with consumers. However, taking photos without obtaining users' consent and ensuring their right to privacy would violate research ethics and the institution's policies. As a result, the researcher had to find a balance between documenting the observed activities and respecting users' privacy rights. This activity required high ethical awareness and adherence to the institution's guidelines for protecting human subjects in research as dictated by research ethics.

This study also faced cultural barriers that impacted the ability to observe female users. These cultural barriers stem from religious or societal norms restricting the presence of unrelated men in the same space as women, particularly during private activities. As a result, it was more challenging to observe female users' daily routines and activities than male users. These challenges may have arisen in various ways, such as limited access to spaces where female users were present or needing special permission from those in authority to observe female users. Furthermore, even when access was granted, it was important to be extra cautious and respectful of cultural norms and sensitivities to ensure that female users did not feel uncomfortable or violated. Despite these challenges, efforts were made efforts to overcome them and gather valuable data about the daily routines and activities of female users.

In addition to the challenges posed by cultural barriers, the research was also indirectly impacted by the COVID-19 pandemic and the resulting modifications to office work schedules. The pandemic reduced the building's occupancy rate by around fifty percent, which affected the expected number of daily activities to be observed. The shift from in-person to virtual meetings also had significant consequences, as most users spent most of their time participating in video conferences. This organisational decision reduced the opportunity to observe and interact with users. Moreover, users often spent most of their time sitting at their desks, making it difficult to communicate with them directly. Despite these challenges, alternative ways to gather data the relevant data were sought. For instance, staff breaks were used to take field notes and interact with users. The staff breaks, morning and afternoon, provided a suitable opportunity to approach users

and ask them about their experiences, concerns, and opinions about the building's environment. These informal conversations provided insight into the users' perspectives and experiences, complementing the data gathered through observation. Overall, flexibility and adaptability were critical in addressing the challenges posed by the COVID-19 pandemic and ensuring the validity and reliability of the study's findings.

Despite encountering several challenges during the ethnographic study, a significant amount of valuable data was collected through observation to meet the study's objectives. Social skills also proved instrumental in successfully living with the users and obtaining accurate information about their daily routines. Requesting and getting a desk provided through the director of facilities management made the process more efficient. This desk allowed for the fast transfer of handwritten field notes to computers for safekeeping. Moreover, participating in various activities with the participants, including driving to the building early, using breakout rooms for restrooms, dining indoors, and praying also aided data collection. Through this approach, critical issues and challenges that users face while using the building's facilities and services, such as access, comfort, and functionality limitations were identified. Additionally, by engaging in these social activities, a rapport and trust was built with the users, which was crucial for collecting accurate and reliable data. Consequently, a comprehensive understanding of the users' experiences and perspectives, which informed the analysis and interpretation of the study's findings was obtained.

Furthermore, the data collection approach was driven by the understanding that the practices within the building were not rigidly structured and did not follow specific schedules. Thus, it would be more advantageous to document the practices in their natural setting without any preconceived notions or artificial structures. This approach allowed for a more authentic and accurate representation of the practices and ensured that critical details that might have been overlooked with a more structured approach were captured. By employing this approach, several advantages were derived, with the primary advantage lying in the ability to acquire a more precise representation of users' experiences in their everyday activities. In addition, the lack of structure permitted the documentation of a wide range of practices,

including those that were unexpected or unusual. This approach also helped to identify any overlaps or interconnections between different practices, highlighting the complex nature of the users' experiences in the building. While this approach required flexibility and adaptability, it ultimately proved to be an effective way of achieving the study's aims.

5.4.3 Shadowing

The unique aspect of this study compared to other ethnography investigations lies in its adoption of shadowing as a research method. Shadowing is a technique that involves closely following a subject for some time to observe their daily activities rather than simply investigating their prescribed roles (Pickering, 1992). This approach is particularly effective in exploring how institutional order and complex relationships and hierarchies among various roles affect people's work coordination (Smith, 2005). Data collection through shadowing was a vital aspect of this research. It allowed for the collection of data on the social relations between participants rather than just individual perspectives, which is crucial for a comprehensive understanding of the interaction between users and building entities. In this method, the actions and perspectives of participants in their natural environment were recorded rather than reconstructing past experiences in focus groups or interviews (Quinlan, 2008).

Furthermore, shadowing allows the exploration of positions within a complex of related activities, providing a more nuanced understanding of the context in which participants operate. As such, data obtained through shadowing is based on actual events and behaviours, making it more reliable than other data collection methods. Additionally, shadowing allows for in-depth exploration of the "why" questions, as shadowed users typically have deep knowledge and competence of the studied function (Quinlan, 2008). Finally, shadowing is valuable for conducting ethnography research, particularly when investigating social relations and work coordination in complex institutional settings. By utilizing shadowing as a research method, this study gathered rich and detailed data on the interaction between users and building entities, providing insights into how institutional order affects daily practices in the built environment.

In this study, shadowing was used to examine two different activities. First, to observe cleaning methods and gain insight into the reasons, processes, and techniques involved. The focus on cleaners was deemed crucial, as they possess a wealth of practical knowledge that is often overlooked and underutilized. Thus, the study aimed to shed light on the interactions between cleaning staff and various building design components through shadowing. The shadowing method effectively captured cleaners' actual practices and experiences, which could inform future building design decisions. Furthermore, by closely observing their actions and perspectives, a better understanding of how building design impacts cleaning tasks and sustainability efforts was uncovered.

This study highlights the potential benefits of involving those who are often marginalized or overlooked in the design and management of buildings. By recognizing the expertise and insights of cleaners, for example, building designers and managers can better understand how their decisions and actions affect different stakeholders. Moreover, by engaging with sustainability initiatives, cleaners can play a critical role in reducing the environmental impact of buildings and promoting sustainable practices. This study shows that shadowing can effectively uncover hidden knowledge and experiences and inform more inclusive and sustainable building design and management practices.

Several measures were devised to carry out the shadowing procedure for the cleaning team. Firstly, permission was sought from the building manager to establish contact and engage with the cleaning staff in the field. Next, discussions with the cleaners took place to explain the purpose of the shadowing procedure and to reassure them that there would be no negative impacts. Additionally, the cleaning staff were encouraged to participate and collaborate in the study, highlighting the value of their knowledge and experiences. This approach has effectively increased the cleaners' willingness to collaborate and contribute to the study. To ensure the shadowing activity proceeded smoothly, experience from a pilot study conducted at the University of Reading came in handy. The concern was to avoid repeating the previous mistakes encountered with the cleaning team at the Chancellor building, in which the cleaning team was unsure of the purpose of the observation. By taking proactive measures to establish a clear understanding of the objectives and reassure

the participants, trust was built which enabled and encourage collaboration, resulting in a more successful study.

Accordingly, the cleaners were observed on various occasions and schedules to account for the different cleaning requirements of the building. Since it is necessary to maintain the building's cleanliness and appearance for the employees, the cleaning process should be conducted before their arrival in the morning and after leaving for the day. In addition, some cleaning tasks need to be done during employee break times which meant being present at observation points at those times. The cleaning activities covered a range of facilities, including restrooms, pantries, corridors, carpets, windows, doors, and other building components. The cleaners were shadowed during these activities to understand each task's processes, techniques, and challenges. This activity provided a comprehensive view of the cleaners' daily work routines and contributed to a more in-depth analysis of the interactions between the cleaning staff and building design components. The results of this study can be used to improve building design in the future and ensure that the cleaning staff's needs are taken into account.

Shadowing was also used in the study to understand the complex practices of prayer hall users. One design intention was to construct a prayer hall adjacent to the office building so that male employees could perform their prayers during their break, typically between 12 pm to 1 pm. The prayer hall is located approximately five minutes away from the office building and is connected by an air-conditioned pathway, which takes into account the hot weather prevalent in the area. However, it was observed that most employees chose to perform their prayers in some rooms within the office building, and only a few employees used the prayer hall. Both groups were observed separately to comprehend the underlying factors influencing their actions. By shadowing the employees in this manner, the study could effectively comprehend the contextual influences that motivated them to act in that manner.

Therefore, this study has demonstrated that shadowing can be an effective method for gaining insight into the practical knowledge of workplace users, including their routines, preferences, and decision-making processes. Furthermore, researchers can

better understand the contextual factors that shape their behaviours and practices by observing workplace users in their natural settings. This information is precious for designers who aim to create more effective and user-centered spaces. By understanding the practical knowledge of workplace users, designers can develop designs that better meet their needs and expectations. For example, designers can identify common pain points or areas where users may need additional support or resources and develop solutions to these issues.

5.4.4 Documents Analysis

Document analysis is a powerful method in social science research that allows researchers to study various forms of texts, including official records, transcripts, reports, and other written materials. Documents are social products created in social contexts; therefore, they offer valuable insights into individuals' and groups' social practices, beliefs, and values (Prior, 2003). Consequently, researchers must consider the dynamic connections between practitioners and the material when investigating documents as a research topic. This activity means that they should not just focus on the document itself but also on the social practices, discourses, and ideologies that shape its creation and use. In addition, scholars need to understand the context in which the document was produced, its intended audience, and its purposes.

One of the significant advantages of document analysis is its ability to provide retrospective information about a case (Caulley, 1983). In some cases, documents may be the only source of information available. For instance, historical documents, court records, and public reports can provide valuable information about past events or circumstances that cannot be observed or measured directly. Therefore, document analysis is an essential tool for researchers who want to study events that occurred in the past. Moreover, document analysis can be a cost-effective and time-saving method for researchers. It saves time and resources because it avoids the need for additional data collection. Instead, researchers can gather the needed data by analysing existing documents, which are often readily available and accessible. This can be particularly useful for researchers working with limited resources or when collecting new data is not feasible or ethical.

Despite its many advantages, document analysis has some disadvantages, which must be considered when selecting the research method, as Bowen (2009) reported. One of the primary drawbacks of document analysis is that obtaining specific documents for analysis can be challenging, especially when dealing with sensitive or confidential materials. Another disadvantage is that documents can be ambiguous or unclear, making it difficult to interpret their meanings accurately. Furthermore, documents may be incomplete, and researchers may not have access to all the relevant documents, which can limit the accuracy of their findings. Additionally, documents can be biased or intentionally misleading, making it challenging to draw accurate conclusions. In some cases, documents may also be lost or destroyed, making it impossible to analyse them retrospectively.

Considering those arguments, this study has found that document analysis is an effective method for investigating social practices related to building sustainability. The study has better understood how sustainability is conceptualized and practiced in the PDO building by analysing various documents, such as design documents, post-occupancy evaluations, and sustainability policies. One of the study's key findings is that design documents are crucial in promoting building sustainability. These documents not only outline the technical specifications for building materials and systems, but they also reflect the design team's values and priorities, including their consideration for the users of the building. By examining these documents, the study identified how designers approach the challenge of integrating sustainability into building design while also addressing the needs and preferences of users.

Another important finding of the study is that post-occupancy evaluations provide valuable feedback on the success of sustainability initiatives in buildings. These evaluations can reveal areas where sustainability goals have been met and areas where improvements are needed. In addition, by analysing these evaluations, the study identified best practices for achieving sustainability goals in building design, operation, and maintenance. Finally, the study found that organisational understanding of sustainability is critical in shaping building sustainability practices. The study identified how PDO prioritizes sustainability and balances social and environmental goals by examining sustainability policies and other organisational reports. Overall, the study has demonstrated the value of document

analysis in understanding complex social practices related to sustainability in buildings and has provided insights that can inform future building design and policy.

As in this study, it is crucial to utilize multiple approaches to access the relevant documentation when conducting research that involves analysing documents. Several methods were employed to obtain the necessary documents for this study. Firstly, the design team were interviewed about policies for building construction projects, which effectively identified critical documents related to the design process for promoting building sustainability. Furthermore, relevant documents were accessed by engaging with the sustainability and facilities management team. This facilitated a thorough comprehension of the organization's approach to sustainability in its buildings, with a particular emphasis on the social aspect of sustainability. Additionally, the official website of the organization served as another valuable source of information to gather relevant documents. However, some participants hesitated to provide specific documentation due to sensitivity or confidentiality concerns. Assurances were provided to these participants that the sole purpose was purely academic and eventually they willingly released the necessary documents. Table 5.3 provides a summary of the documents accessed in this study.

Table 5.3 A Summary of the Documents

Document	Category	Description	Reference
1	Project management	Project Engineering Code of practice	CP-117
2		Real estate technical guidelines for buildings and infrastructure	GU-841
3		Specification and criteria for the	SP-1275

		design of civil and building works	
4		Project planning and initiation (Concept design)	UIB2 Process maps
5		Project planning and initiation (Detailed design, tendering and contracting, execution, close-out, and handover)	UIB3 Process maps
6		SOP (Standard Operating Procedures)	UIB4 process maps
7		Design concept	BMF, C4 project overview
8		Floor plans	BMF
9	Facilities management	Integrated facilities management control framework	UIB5 process maps
10		IFM handover process	Operation & maintenance contractor
11	Sustainability	Sustainability report	Sustainability
12		PDO pathways to sustainability	Sustainability
13		LEED certification process	BMF

5.4.5 Leaving the Field

The final stage of the ethnographic study involved the researcher's departure from the field. Throughout the research period, a vast network of acquaintances has been built and a profound connection to the BMF building established. This connection may have been more robust than some employees who viewed the building only as a place of employment. Despite this, study participants were cooperative and expressed a keen interest in the study topic as it related to a practical component of their daily lives. Additionally, building sustainability was of significant importance to the institution and the Sultanate, making senior management at PDO interested in the research and eagerly awaiting the resultant findings. This motivated the need to conduct the study with the utmost respect and integrity.

One other key challenge faced was creating the necessary intellectual distance from the ethnographic observations to identify underlying structures and develop theoretical insights. Even though the study was conducted in a workplace setting, which typically allows for a faster exit from the field than a community-based study, the intellectual distance was still challenging. As Davies (1999) notes, leaving the field requires a physical departure and a mental separation from the specific observations made during the study. This allows the researcher to see the larger patterns and structures underlying those observations and formulate broader theoretical insights. In addition, the classification of data based on the three elements of social practice theory added complexity to the process. There was a requirement to balance the need for detailed observation and data collection with the requirement for a broader theoretical perspective. This proved challenging, as focused sometimes shifted specific details of the observations and lost sight of the larger theoretical picture.

However, with persistence and a commitment to intellectual rigor, the ability to achieve the necessary distance and identify the underlying structures and patterns that informed their theoretical insights was developed. To overcome the difficulties of creating intellectual distance and developing a broader theoretical perspective, discussions with supervisors and a deeper dive into the literature on social practice theory came in handy. These activities helped create the required critical distance,

allowing for the identification of structures and patterns in the data and formulating theoretical insights. As a result, valuable insights into the social practices related to sustainability in buildings at the BMF were understood and this has contributed to the broader field of sustainability research.

5.4.6 Methodological Limitations and Considerations

This research relied on the ethnographic case study approach to investigate users' practices in a sustainable office building. This method was selected because it is often used to study systems or activities that are not well understood. It allows for a thorough exploration of a specific situation and provides detailed insights into everyday life. Despite criticisms of the case study method, it was deemed suitable for this research on sustainability in workplace building design. Critics have pointed out limitations, though. Firstly, findings from a single case may not easily apply to broader situations, making it difficult to make universal conclusions. Additionally, the method is seen as lacking objectivity because it does not include statistical representation in data analysis.

In response to the criticisms, Flyvbjerg (2006) defended the case study approach. He argued that this method often gives detailed and interconnected insights into daily life that cannot be captured solely through statistical representations. He stressed that qualitative case studies provide a more genuine portrayal of reality and challenge theories supported by quantitative research. Additionally, in the social sciences, research is guided by the research problem rather than the methodology itself, and the case study method is seen as both necessary and sufficient for certain research tasks. Lastly, considering the intricate interaction between design entities and users, the case study method was deemed appropriate for this research.

5.5 Data Analysis

In ethnographic research, data analysis is an informal and ongoing process that must be integrated into the ethnographer's conception of research and interpretations, according to Atkinson and Hammersley (2007). Because of this informal nature, researchers have adopted a flexible data analysis tool that uses thematic analysis techniques. Thematic analysis is a popular qualitative method for data analysis used

to identify patterns and themes of meaning across a dataset concerning research questions. The simplicity and flexibility of this approach have contributed to its widespread use (Braun and Clarke, 2013). However, it is essential to emphasize that the emergent themes generated from the data should be linked to the theory utilized to understand a social situation. According to Corbin and Strauss (2008), the research questions need to be informed by theory, and the emergent themes should be linked to that theory. Additionally, the interpretations of specific observations of participants' activities within a particular setting must provide an articulate narrative. Guest *et al*. (2012) pointed out that researchers must strive for clarity and precision in their interpretations to ensure that the resulting insights are grounded in the data and theory.

Thematic analysis is a qualitative research method that involves reading and comprehending the material to identify emerging themes (Fereday and Muir-Cochrane, 2006). Although there is no standardized procedure for conducting thematic analysis (Braun and Clarke, 2006), this study has adopted the general methods described in Table 5.4. These procedures included coding, which involved assigning labels to the data based on the emerging themes. The data was reviewed to ensure the accuracy of the codes and themes. Finally, the themes were further refined and organized into a narrative that provided insight into the research question.

Table 5.4 Phases of Thematic Analysis (Braun and Clarke, 2006)

Phase	Description of the process
1. Familiarizing yourself with your data:	Transcribing data (if necessary), reading and re-reading the data, noting down initial ideas.
2. Generating initial codes:	Coding interesting features of the data in a systematic fashion across the entire data set, collating data relevant to each code.
3. Searching for themes:	Collating codes into potential themes, gathering all data relevant to each potential theme.
4. Reviewing themes:	Checking if the themes work in relation to the coded extracts (Level 1) and the entire data set (Level 2), generating a thematic 'map' of the analysis.
5. Defining and naming themes:	Ongoing analysis to refine the specifics of each theme, and the overall story the analysis tells, generating clear definitions and names for each theme.
6. Producing the report:	The final opportunity for analysis. Selection of vivid, compelling extract examples, final analysis of selected extracts, relating back of the analysis to the research question and literature, producing a scholarly report of the analysis.

The analysis process can be complex and subjective, requiring a blend of imagination, diligence, and a deep immersion in the subject matter. From experience, it has been found that analysing data is an enigmatic process that demands a great deal of effort and a meticulous approach. It involves scrutinizing the information, critically evaluating it, and drawing meaningful insights. Additionally, it requires a high level of subjectivity, meaning that researchers need to bring their unique perspectives and interpretations to the table. Finally, to succeed in this process, researchers must be diligent, working tirelessly to uncover the underlying meanings and patterns within the data. Ultimately, it is through this rigorous approach that researchers are able to make meaningful contributions to their field of study.

Therefore, from the outset of the fieldwork, efforts were made to record data logically and systematically, following Clive's (2004) suggestion to document any changes in memos or field notes. Clive emphasizes that building a foundation of memos and tentative analysis pieces will make the analytic process much less complicated. In addition, this process analyse aided data analysis and ability to connect it to existing literature. Furthermore, exploring ideas concerning the data, codes, categories, or themes, and identifying essential concerns that arise and how they connect, have aided a better understanding of the research area. In addition, there were also consultations with colleagues to confirm the integrity of any inconsistent data across sources. Finally, direct oversight from supervisors during the data analysis process has ensured that the results are linked in a way that aligns with the adopted theoretical framework. These procedures have contributed to logically presenting facts that readers can easily comprehend.

Given the reliance of this research on social practice theory as its theoretical foundation discussed in Chapter two, it is imperative to elucidate the impact of this theory on data analysis. Social practice theory, fundamentally, examines how social phenomena extend beyond abstract concepts, becoming deeply embedded in the everyday actions and behaviours of individuals within a specific social context. To this end, this research has employed a framework to analyse and interpret the data which is discussed in the following section.

5.5.1 The Framework of Analysis

Social practice theory is a framework for understanding how social practices shape everyday life and the world around us (Shove *et al.*, 2012). It emphasizes the importance of analysing practices in their social, cultural, and historical contexts and the material and technological infrastructures that enable and constrain them. This theoretical lens is used for analysing the data to address the two research questions discussed in the following two chapters, Six and Seven. Therefore, the following considerations are undertaken in the analysis of ethnographic data using social practice theory in this study:

- The conceptual framework outlined in Section 4.6 has been formulated based on established social practice theory, integrating the Three Elements Model detailed in Section 2.5.2. This framework takes into account various contextual factors to establish a structure for examining the elements of practice within sustainable office buildings. It encompasses the potential to either destabilize or reinforce these practices. Furthermore, it establishes a continuous loop for feedback and systematic Post Occupancy Evaluation (POE).

- A comprehensive approach to context is taken by this framework, incorporating the Three Elements Model. This inclusion serves as a tool for analysing contextual factors and illustrating the interconnectedness of meanings, materials, and competencies. These elements are subsequently examined and categorized thematically as factors that either strengthen or destabilize practices. Such factors encompass cultural aspects (Section 2.4.1), structural components (2.4.2), and technological elements (2.4.3). This approach allows for the consideration of a diverse range of elements applicable in various contexts. The significance of this is particularly noteworthy due to the depth of contextual analysis required.

- In order to enhance the adoption of 'desired' sustainable practices within sustainably designed office buildings, the framework must take into account intersecting "communities" of practices (Section 2.4.4). The success of any

initiative aimed at promoting sustainable practices may be hindered if there is a failure to comprehend the entirety of practices individuals are involved in.

5.6 Ethical Considerations

Since this study relied on the ethnographic investigation, which included participant observations and semi-structured interviews, ethical considerations are paramount when conducting research involving human participants (Clive, 2004). Furthermore, given the potential impact of research on participants, it is essential to ensure that ethical standards are upheld throughout the research process (Flowerdew and Martin, 2013). As such, measures were taken to identify and tackle significant ethical issues and implement various steps to guarantee that the research meets ethical standards. The first step to ensure ethical standards in the study involved submitting an ethics form for approval from the University of Reading. This form required providing detailed information about the study's objectives, procedures, and potential risks to participants. Next, the university's ethics committee reviewed the form and assessed whether the proposed study met the required ethical standards. This step helped ensure that the study was conducted in a manner that respected the rights and dignity of the participants while addressing the research questions comprehensively.

Further measures were taken once the ethnographic study of the particular case had commenced. To begin with, transparency about the purpose of the research from the outset was important along with making clear the real intentions of studying them rather than seeking employment. Then, to ensure that the participants in the observations and semi-structured interviews were fully informed about the nature and purpose of the study and provided informed consent, the potential risks and benefits of participation and the right to withdraw from the study at any point without prejudice were explained to participants. Additionally, the local supervisor emailed all building users, informing them of the study's objectives and the procedures that the study would employ.

Although armed with initial consent from the participants, it was necessary to

consider ethnographic research's dynamic and flexible nature. Ethnographic research can last for a prolonged duration and is known to have a level of adaptability to its methodology. Consequently, the participant's consent details may become ambiguous or altered as time passes. Therefore, to address this potential issue, the researcher implemented a process of regular engagement with the participants. These periodic discussions provided the opportunity to give updates on the study's progress and seek continued verbal consent for the participants' continued participation. By obtaining ongoing verbal consent, participants became more comfortable with continuing to participate in the study knowing that their interests and rights were protected.

Furthermore, the study has taken steps to protect the identities of individual building users and the organization itself. For example, pseudonyms were used when referring to individuals in the building in an attempt to avoid using their real names to describe their activities. Similarly, when discussing the various departments within the organization, general terms such as "design team," "facilities management," and "sustainability team" rather than identifying any specific individuals who work in those areas was the manner of reporting their activities in the study. Furthermore, it was particularly important protecting the organization's anonymity under investigation. Therefore, to prevent any potential harm from the unauthorized use of organisational data, steps were taken to ensure that the data collected from the organization was only used for research purposes and not for any other purpose. In essence, concerted efforts were made to prevent any misuse of the data collected and to ensure that the data was only used for its intended purpose, thereby upholding the ethical standards of the research. In this regard, meticulous handling of the data with the utmost care, keeping it confidential and secure at all times was a paramount goal throughout the study. By doing so, it is hoped that the analysis produced in this study will not negatively affect the institution or any of its members.

5.7 Writing Up

It was important to ensure that the thesis followed two significant influences: the School of the Built Environment (SBE) guidelines and a structure that would make

it easy for readers to comprehend. First, the SBE guideline is essential to any thesis written within the School of the Built Environment. It provides the framework within which all research is conducted and must be followed to ensure that the research produced meets the necessary standards. This included information on the required word count, font size, and other elements that must be included in the thesis. By adhering to these guidelines, it ensured that the thesis is consistent with the expectations of the SBE and meets the necessary academic standards.

In the second step, the thesis was organised in a way that would facilitate readers' comprehension of its argument. Therefore, careful consideration was given to how the chapters were presented to ensure the thesis was well-organized and followed a logical sequence of ideas. Consequently, the chapters were organized around the research questions the thesis sought to address. Starting from the empirical chapters, Six, Seven, and Eight, for instance, were structured to answer one of these questions. An overall summary of the thesis findings, along with the study's contributions and suggestions for future research, was presented in Chapter Nine. The literature review Chapters Three and Four were structured similarly, based on the main themes of the research. Chapter Three, for example, explored the concept of sustainability and its social dimension, while Chapter Four discussed how this understanding had impacted the design of sustainable buildings. Finally, the first and second chapters of the thesis, which introduced the rationale for the study and provided the theoretical foundation for understanding the social issue being explored, were positioned at the beginning of the thesis to provide context for the reader.

5.8 Summary

In this chapter, the various approaches that were used to conduct ethnographic investigations and gather data for the research are presented. The chapter explains each method in detail, highlighting its objectives and the participants it was designed to target. The chapter serves as a comprehensive guide to the research methodology used in the study, providing a clear and concise overview of each method used to collect and analyse data. By outlining the objectives and participants of each method, it ensures that readers clearly understand how the data was gathered

and how it relates to the research questions.   In addition, the chapter emphasizes the importance of data analysis and how it was used to inform the structure of the thesis. By clearly describing the data analysis process, it ensures that readers thoroughly understand how the findings were derived and how they relate to the overall research objectives. The following two chapters of this thesis will delve into the empirical findings from those previously discussed methods.

Chapter 6 : Organisational Path to Sustainability

6.1 Introduction and Background

The literature review discussed in Chapters Three and Four has critiqued the current systems in understanding the concept of sustainability. Specifically, Chapter Three demonstrates the role of the social dimension in promoting sustainability, and Chapter Four links the arguments presented in Chapter Three to understanding and exploring the approaches used in designing buildings for sustainability. On this basis, the approached data was concentrated on examining the two domains of the case study, which included an organisational understanding of sustainability and the mechanisms utilized for designing sustainable buildings. In light of this, the structure of data presentation and discussion has been devised to encompass the organisational path toward sustainability (Chapter Six) and the users response to sustainability initiatives (Chapter Seven). Additionally, since this research is critiquing the understanding of current systems to sustainability, this chapter also covered some observations of the interaction between sustainable initiatives with the building users to demonstrate the conflict between the approaches used for the PDO path to sustainability.

The literature review has shown that sustainability is a contested concept with several definitions (Dixon, 2019). However, this research draws upon the basic description: "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Brundtland, 1987, p.43). This definition includes three main aspects, environmental sustainability, economic sustainability, and social sustainability. Although the basic definition of sustainability has implicitly indicated that achieving sustainability can only be achieved by meeting the needs of human beings (Shirazi and Keivani, 2017). Nevertheless, the existing literature has indicated that previous studies have focused more on the environmental and economic aspects than social Sustainability (Zuo and Zhao, 2014). The reason for this is that, in contrast to the social pillar, which is more complex, the other two pillars can be measured quantitatively. Therefore, this study focuses on social sustainability and

how it is handled at the organisational level and building design in the Petroleum Development Oman (PDO).

Therefore, exploring the organisational understanding of sustainability is vital in this chapter. This chapter addresses the data concerning research question one, "organisational To investigate how organisations implement sustainability initiatives related to their office buildings". Using this lens in the analysis to address the research question, the organisational meaning of such a concept has been explored generally in section 6.2. This chapter also highlights the organisational commitments to promote the sustainability pillars, including environmental and economical in section 6.3, and social in section 6.4. In light of those commitments and initiatives the sustainability team has promoted, some observations that emerged through user interaction with those initiatives were discussed. Then, section 6.5 has demonstrated the organisational approaches for promoting sustainability in buildings. Finally, the chapter has concluded by the main findings in Section 6.6 and provided some insights from social practices on those findings in Section 6.7 to promote sustainability in future buildings.

This study has relied on different ethnographical approaches to investigate these areas. The investigation of PDO's understanding of sustainability involved the application of multiple research methods. Firstly, interviews were conducted with key personnel, including the climate change and sustainability manager, the energy manager, and individuals actively involved in the LEED certification process for buildings within PDO. These interviews provided valuable insights into PDO's practices and perspectives regarding sustainability. Additionally, the investigation encompassed the analysis of documents, including PDO's Sustainability Report[1] and PDO Pathways to Sustainability[2]. These documents provided detailed information on PDO's sustainability initiatives, achievements, and performance indicators. By examining these documents, it was possible to assess the extent to which PDO had successfully implemented sustainable practices across its operations. Moreover, the Real Estate Technical Guidelines for Buildings and

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[1] This report is part of the documents that this research has relied on (Table 5.3, Document No 11)

[2] This report is part of the documents that this research has relied on (Table 5.3, Document No 12)

Infrastructure played a significant role in the investigation. These guidelines served as a valuable resource in understanding the specific criteria and standards that PDO adhered to in its pursuit of sustainable building practices. In addition, analysing these guidelines it became possible to evaluate the alignment between PDO's practices and the established sustainability benchmarks. Finally, participant observations were used to examine users' daily activities constituted by their interaction with the entities of sustainable initiatives.

The major findings reflected in this chapter include the following:

- The case study organisation places less emphasis on the social pillar of sustainability in its operations.

- The case study organisation is relying heavily on technologies to reduce its environmental impact rather than attitudinal changes.

- New practices have emerged in response to sustainability initiatives introduced at the case study organisation.

By employing the procedures illustrated in Section 5.5.1, the following sections aim to provide an overview of the data describing Petroleum Development Oman (PDO) practices for promoting sustainability. PDO is an oil and gas exploration and production company operating in Oman, and it has implemented several initiatives to ensure sustainable operations in the industry.

6.2 The Organisational Understanding of Sustainability

The concept of sustainability is a topic of debate with various definitions and interpretations, as discussed in the literature. Chapter Three highlights different perspectives and criticisms surrounding sustainability. Therefore, this section aims to investigate further these issues indicated in the literature by examining Petroleum Development Oman's (PDO) perspective on sustainability. This section will analyse whether PDO's understanding of sustainability aligns with or diverges from the criticisms discussed in the literature. In addition, it examines the meaning of sustainability in PDO, and the approaches used for sustainability.

6.2.1 The Meaning of Sustainability in PDO

PDO's policies and official reports have shown that the organization is committed to sustainability. According to the Pathways to Sustainability[3], PDO (Petroleum Development Oman) oversees the exploration and production of over 70% of Oman's oil and gas. As a result, it consumes Oman's valuable natural and daily use of physical resources that, impacts the efficiency of current people but also the capacity of future generations. In response to that, the strategy shows that the organization is committed to ensuring its operations and activities are carried out in a way that doesn't harm people or the environment. Accordingly, the company has undertaken a theme in achieving sustainability: "*no harm to humans, the environment, and assets."* (p. 3: Pathways to Sustainability). Furthermore, the sustainability report of PDO has demonstrated its mission: "*to find, develop and produce oil and gas safely, responsibly and profitably, in order to contribute to the sustainable development of Oman, to the benefit of all our stakeholders.*" (p. 9). By adhering to best practices in the oilfield, the PDO approach seeks to increase production while reducing financial costs, environmental damage, and social effect.

Based on the data, the PDO is committed to sustainability, as shown in its policies and official reports. This commitment aligns with the broader societal and cultural norm of environmental and corporate social responsibility. PDO recognizes the impact of its operations on people and the environment and aims to carry out its activities in a way that does not harm them. This practice aligns with the broader societal and cultural norm of sustainable development. The organization's mission also reflects its commitment to sustainable development and the benefit of all its stakeholders. Focusing on reducing financial costs, environmental damage, and social effects shows that the organization recognizes sustainability's economic and social dimensions. However, there is a need to improve organisational competencies in sustainability policy development, implementation, and monitoring, integrate sustainability into the organization's culture and values, and engage stakeholders in sustainability efforts. Investing in research and development to enable sustainable innovation and transformation in the oil and gas sector is also

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[3] This report is part of the documents that this research has relied on (Table 5.3, Document No 12)

essential.

6.2.2 What is the Primary Concern of PDO Sustainability?

Excerpt from an interview with the climate change and sustainability manager, conducted while visiting him at his office on 24th February 2022:

Me: "what is the aim of sustainability in PDO?"

The climate change and sustainability manager: *"It mainly focuses on environmental aspects of sustainability as the core business of PDO is mainly on operational activities related to environmental issues such as air pollution, water management, and waste management. Sustainability in PDO aims to do your business with minimum cost".*

This excerpt highlights the focus on environmental aspects of sustainability as the core business of PDO, with a particular emphasis on operational activities related to environmental issues such as air pollution, water management, and waste management. The climate change and sustainability manager is a crucial practitioner involved in this social practice, and their role involves managing the environmental impact of PDO's operations. The material arrangements involved in this practice include the resources and infrastructure needed for environmental management, such as equipment and personnel. In addition, the meaning attached to sustainability in PDO is focused on doing business with minimum cost, suggesting that the organization sees sustainability as a means to optimize operational efficiency rather than a goal.

Overall, this interview excerpt suggests that the organisational understanding of sustainability in PDO is focused on managing the environmental impact of its operations in a way that minimizes costs. While this approach aligns with the principles of social practice theory, which emphasizes sustainability's material and social dimensions, it also highlights the potential tension between environmental goals and economic imperatives in organisational decision-making. As a result, the organization's strategies and reports indicate that it values the three pillars of sustainability, including environmental, social, and economic aspects. However, the

effectiveness of sustainability policies and reforms largely relies on integrating environmental and economic concerns, as observed in PDO. The documents, Pathways to Sustainability and Sustainability Reports illustrate that the organization prioritizes environmental and economic aspects to achieve its sustainability goals, which has been criticized in the literature (Littig and Grießler, 2005). Furthermore, the organization's practices primarily focus on the environment and economy since its core oil and gas business heavily impact the environment. This critique supports the argument in the literature that the current organisational understanding of sustainability has disregarded the social dimension (Shirazi and Keivani, 2017).

6.2.3 The Approaches Used for Sustainability in PDO

The approaches used for sustainability refer to the various methods, strategies, and techniques that organisations employ to achieve their sustainability goals. Sustainability approaches aim to promote sustainable practices by ensuring that the needs of the present generation are met without compromising the ability of future generations to meet their own needs. Such approaches often consider sustainability's economic, social, and environmental aspects. Organisations that adopt sustainable approaches often have a clear sustainability strategy that outlines their sustainability goals and the actions they will take to achieve them. They also regularly measure and report on their sustainability performance using a range of metrics, such as energy consumption, waste generation, and greenhouse gas emissions. By adopting sustainable approaches, organisations can reduce their environmental impact, improve their brand reputation, attract and retain customers, and enhance their long-term financial performance. Therefore, exploring the PDO approaches for enhancing sustainability in its practices is critical, discussed in the following sections.

a.   Relying on Technology

According to the Pathways to Sustainability, PDO has adopted several globally regarded environmental best practices to realize this goal. Additionally, it is always looking for new and creative green technology and solutions to lessen its environmental impact further. In Ras Al Hamra, where the organization is building

a new residential community, and throughout Bait Mina Al Fahal BMF, the case study, "Think Green" principles have been embedded (p. 3). The organization's top priorities include energy efficiency, water conservation, and renewable energy sources. According to the sustainability report, over the course of the last five years, around 32 different technologies aimed at addressing sustainability challenges relating to energy efficiency, water management, and facilities management have been put into place (p. 79).

This data suggests that sustainability in PDO is understood as a set of practices focused on minimizing the environmental impact of the organization's operations. This practice involves adopting environmentally friendly best practices and using innovative green technology and solutions to reduce their impact further. PDO as an organization, including its management and employees, are the key practitioners involved in this social practice. The material arrangements include the technology and infrastructure needed to implement sustainable practices, such as energy-efficient equipment and renewable energy sources. The meaning attached to sustainability in PDO is focused on prioritizing energy efficiency, water conservation, and renewable energy sources. This orientation suggests that the organization knows the importance of reducing its environmental impact regarding resource consumption and carbon emissions. Furthermore, PDO is actively working towards achieving its sustainability goals by embedding "Think Green" principles in its building practices and adopting effective energy efficiency, water management, and facilities management technologies.

Overall, this data suggests that the organisational understanding of sustainability in PDO is centered around implementing sustainable practices and using innovative technology to minimize their environmental impact. This approach aligns with the principles of social practice theory, emphasizing sustainability's material and social dimensions and highlighting the organization's commitment to achieving its sustainability goals. Also, the data presented that PDO has implemented approximately 32 efficient technologies in the past five years to address sustainability challenges related to energy efficiency, water management, and facilities management. This action suggests that PDO heavily relies on technology to achieve its sustainability goals. However, this approach raises concerns about the

role of people in promoting sustainability. The literature argues that current sustainability approaches tend to assume a passive role for people, leading to a heavy reliance on technological solutions (Gaziulusoy, 2015). This approach can create a disconnection between the users and the sustainability initiatives. When people are not actively engaged, they may not fully understand the sustainability initiatives, which could result in the initiatives not being used effectively. In turn, this could reduce the effectiveness of the sustainability initiatives and limit the organization's overall sustainability progress.

An example of the importance of engaging users in sustainability initiatives, in August 2022, as part of their ongoing commitment to enhancing services, including those provided in the BMF building, PDO enlisted the assistance of a consultant to develop a new workplace layout, considering the lessons learned from the pandemic. The consultant's primary responsibility was collaborating with the design team and engaging with users to evaluate their perceptions of the existing work environment. Based on the feedback received, the consultant proposed improvements. A focus group approach was employed to facilitate this process, comprising six meetings involving participants from various departments. Recognizing the relevance of the focus group sessions to BMF users, the design team provided opportunities to attend as an observer in two meetings held in different BMF departments on August 10th, 2022.

The primary goal of the consultant was to gain insights from users' experiences, which is why the discussions centered on various aspects that directly impact their daily lives, including sustainability within the built environment. During the discussions, users shared their feedback on the current state of the built environment and services. After the activity, a summary of each group's conversation was provided by the design team. By actively participating in the activity, valuable data that revealed a notable deficiency in users' comprehension of the sustainability initiative's objectives within the buildings was discovered. Consequently, the users have displayed a lack of confidence in the efficacy of these initiatives. The following excerpt exemplifies a summary of the participant observation.

Field notes, excerpt from the observations for the discussion held in both groups, August 10th, 2022:

I participated in a focus group on August 10th, 2022, which was conducted for two departments, finance, and human resources, at the BMF building. The discussion focused on various areas that impact the users' daily life, including sustainability, which is the main area of our research. Based on the discussion in this area, it appeared that the sustainability initiatives implemented in the building were not meeting the users' needs. During the discussion, it was observed that most participants were not aware of the ongoing sustainability work and did not trust the effectiveness of these initiatives. The users' feedback on the sustainability of the building in both groups is summarized in Figures 6.1 and 6.2.
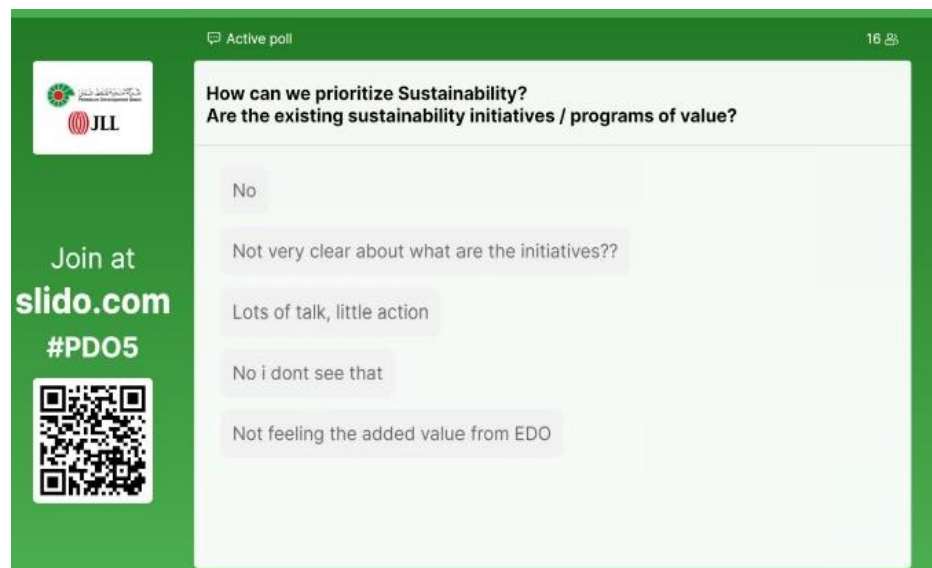
Figure 6.1 Users' Perception of Sustainability (Source: Summary of Focus Group 5)[④]

[④] Focus groups organized by a specialized consulting firm contracted by PDO to assess the perceptions of building users discussed in section 5.4.2 (b)
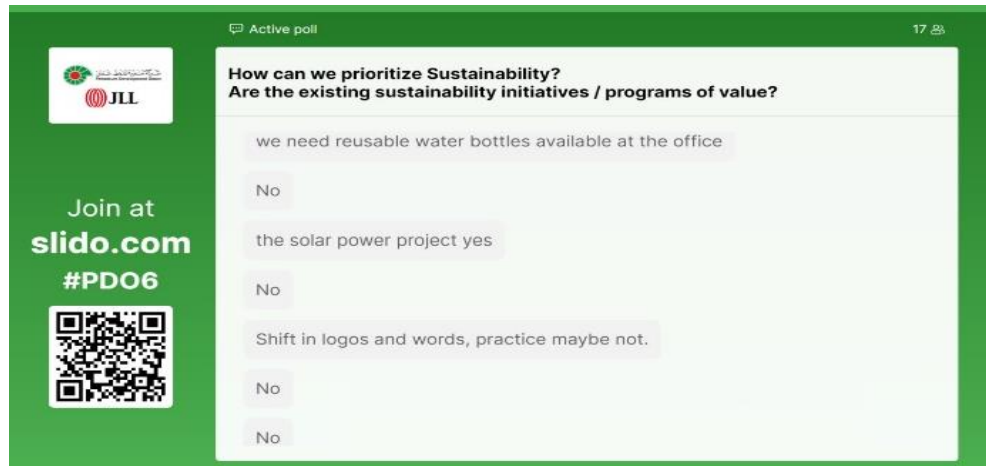
Figure 6.2 Users' Perception of Sustainability (Source: Summary of Focus Group 6)[⑤]

This lack of awareness and trust could be attributed to the limited integration of sustainability practices into the users' daily routines and practices, which are crucial components of social practices. Therefore, while technology is a crucial component of sustainability, it should not be the only focus. Instead, sustainability approaches should also consider the role of people in achieving sustainability goals. By actively involving people in sustainability initiatives, organisations can enhance their understanding of sustainability, promote sustainable behaviours, and ensure that sustainability initiatives are used effectively.

b. Used International Standards

The sustainability report revealed that PDO's technical operations mostly adhere to relevant national, regional, or international organisations. As such, the State Audit Institution of Oman, which is financially and administratively independent, conducts a yearly audit of the organization. In 1999, PDO obtained its environmental management system accreditation according to ISO 14001, making it the first oil company in the Middle East to achieve such recognition. In 2019, the organization received re-certification for the same standard. Furthermore, PDO successfully conducted the initial independent audit of its greenhouse gas (GHG)

[⑤] Focus groups organized by a specialized consulting firm contracted by PDO to assess the perceptions of building users discussed in section 5.4.2 (b)

data for 2017 and 2018 using ISO 14064 methodology. The report also mentioned that the GRI Standards were utilized to evaluate the organization's sustainability performance. Thus, the data suggest that PDO heavily relies on international standards to measure and improve its sustainability practices.

According to social practice theory, sustainability is not just a set of individual actions, but a complex web of social practices shaped by cultural and institutional factors. From this perspective, the data suggests that the organization's understanding of sustainability is closely tied to institutional frameworks and technical standards. Specifically, the organization appears to emphasize aligning its operations with national, regional, and international standards and regulations, as evidenced by its ISO 14001 accreditation and its use of ISO 14064 methodology to audit its GHG emissions. Additionally, the report indicates that the organization uses the GRI Standards to evaluate its sustainability performance. These technical standards and frameworks are likely to shape organisational actors' social practices and behaviours, as they provide a shared language and set of expectations for sustainability-related activities.

Therefore, the data presented that the PDO relied heavily on technical frameworks and global standards to evaluate its sustainability practices. While these frameworks have helped the organization achieve essential sustainability goals, it remains unclear how they intersect with the everyday practices of the organization and whether they fully capture the social and cultural dimensions of sustainability. As such, further research may be necessary to explore these questions to deepen the understanding of the organization's sustainability practices. Moreover, the reliance on global and statistical tools to address sustainability-related areas has been criticized in the literature. One of the critiques is that sustainability approaches often rely on subjective measurements and marginalize objective data, leading to incomplete or inaccurate evaluations of sustainability practices (Dempsey *et al*., 2011). Additionally, because these strategies are often used globally, societies' cultural aspects and practices have been ignored (Geels, 2005). Thus, while technical frameworks and global standards have helped PDOs progress in sustainability, a more nuanced and culturally sensitive approach may be necessary to fully understand and address sustainability issues. This concern is addressed by

the following example, which highlights culture's influence on users' practices.

The importance of providing adequate food in the workplace cannot be overstated, as it plays a critical role in promoting sustainability and motivating employees. Recognizing this, the management of the BMF building has prioritized this aspect and provided various catering services for employees. These services aim to enhance sustainability within the work environment and contribute to employee satisfaction, fostering a positive and productive work culture. Additionally, considering the diverse range of employees at BMF, the facilities management team has partnered with a specialized firm to install complimentary tea and coffee machines throughout the building, focusing on breakout areas. Furthermore, in collaboration with expert vendors, modern and high-quality cafes and restaurants have been established within the building. These establishments serve breakfast and lunch, considering the employees' limited one-hour break time.

However, interactions with employees and observations of their daily routines revealed that the premium catering services offered by the facilities management were being overlooked. First, the research findings identified several instances that highlighted the underutilization of complimentary modern tea and coffee machines. For instance, Figure 6.3 showcases a modern machine provided by the catering team on the right, while employees have brought their own Omani coffee pot on the left, indicating a marginalization of the high-end catering services. Similarly, Figure 6.4 presents another example in a different department where employees preferred Omani dates and coffee instead of the existing coffee services provided by the facilities management. The following excerpt demonstrates an employee's concern regarding catering.

Field notes, excerpt from the interaction with a member of the cleaning team stated at the BMF, 18th August 2022:

Me: "It is good that PDO is offering Omani coffee and dates."

The employee: *"No, this has been brought from our home as we are Omani, and the coffee machine does not offer such Omani coffee."*

Figure 6.3 Modern Coffee Machine and Omani Pot Coffee (Source: Author)

Figure 6.4 Omani Coffee and Dates (Source: Author)

Additionally, during the focus group discussed in Section 5.4.4.2, it was observed that food is among the significant concerns to the building users, as illustrated in Figures 6.5 and 6.6.

Figure 6.5 Users' Perception of Food (Source: Summary of Focus Group 5)[⑥]
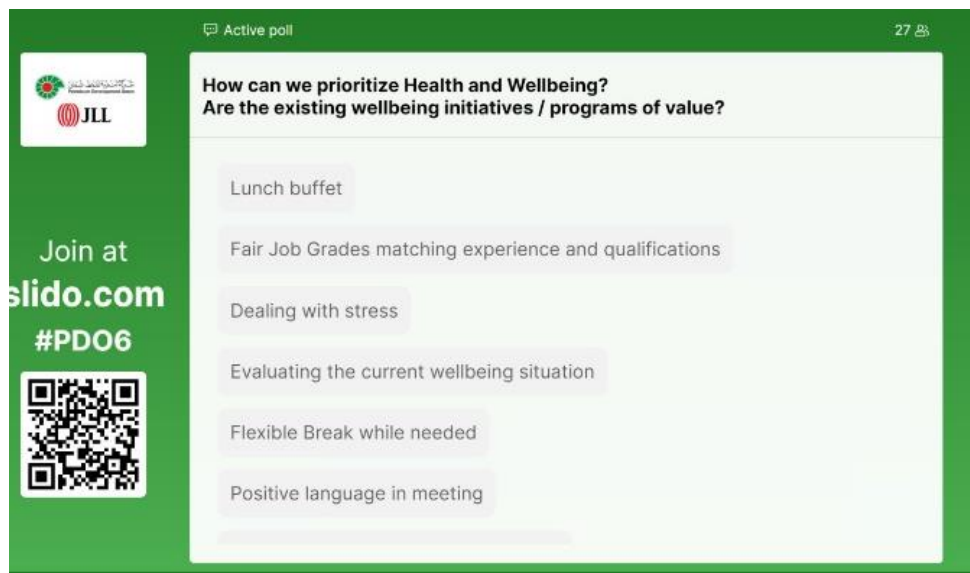
Figure 6.6 Users' Perception of Health (Source: Summary of Focus Group 6)[⑦]

[⑥] Focus groups organized by a specialized consulting firm contracted by PDO to assess the perceptions of building users discussed in section 5.4.2 (b)

[⑦] Focus groups organized by a specialized consulting firm contracted by PDO to assess the perceptions of building users discussed in section 5.4.2 (b)

Modern and high-quality coffee services represent the tangible "stuff" available to employees in this particular scenario. However, there may be a lack of corresponding "skills" among employees to fully utilize these services. Additionally, cultural factors, such as the significance of traditional Omani coffee and dates, may influence employees' preferences and contribute to their perception of the overall "image" associated with catering. Therefore, the facilities management team must engage in dialogue with employees to better understand their needs and preferences to bridge the gap between the intentions of the catering team and actual employee practices. Furthermore, promoting the advantages of high-end catering services and providing training to enhance the necessary skills can encourage employees to use these services effectively. Recognizing the cultural context and social norms related to food and beverage practices in the workplace is essential, as they significantly impact employee well-being and sustainability. By obtaining a more comprehensive understanding of employees' practices and the underlying factors that motivate their choices, the facilities team can design workplace environments that are more efficient, sustainable, and tailored to employee needs.

According to Bourdieu (1984), comprehending users' social and cultural context is crucial for attaining sustainable building performance. Kimbell (2012) further emphasizes the importance of designers and facilities managers recognizing the influence of culture on user practices and striving to align design intentions with cultural norms. Failing to acknowledge cultural practices can result in a misalignment between design intentions and user behaviours, ultimately impeding building performance. In this particular situation, facilities management could have actively engaged with employees to gain insight into their cultural preferences and requirements and integrate them into the design and management of the facilities.

Based on the impact of culture on the behaviours of BMF employees, two distinct daily routines that reflected their interaction with the available restaurants were observed. Firstly, the investigation findings indicated that some employees choose to bring their own lunch from home, indicating a discrepancy between the food provided in the building and their personal preferences or dietary needs. This

behaviour goes against the organisational rules enforced by the building manager. Secondly, it was observed that a majority of male employees opt to leave the premises during lunch breaks instead of utilizing the restaurants provided by the catering team. The investigations uncovered several factors contributing to this trend, as reported by some employees. Firstly, they expressed that the food offered in the internal restaurants did not align with Omani culture, as it primarily caters to international tastes. Secondly, the cost of meals in the internal restaurants was comparatively high compared to external restaurants offering Omani cuisine. Furthermore, the neglect of the restaurants provided by the facilities management team has inadvertently impacted the utilization of the main prayer hall, as discussed in section7.4.1. This highlights the unintended consequences faced by building designers.

c.   Stakeholders Engagement

A wide range of stakeholders is directly impacted by PDO's activities and performance as the primary driver of Oman's economy. First, the sustainability report stated that PDO considers it crucial to interact with principal stakeholders, including local communities, the government, shareholders, customers, suppliers, regulatory bodies, municipal authorities, academia, non-governmental organisations, the media, and employees and contractors. As a result, the PDO has relied on stakeholder engagement, which believes that plays a vital part in building and promoting PDO's sustainability goals. Consequently, various tools were used to gather feedback and information, including formal and informal face-to-face meetings, telephone calls, visits, workshops, questionnaires, and Internet communication. This data highlights the importance of understanding stakeholder engagement practices for promoting sustainability goals within PDO.

The engagement of stakeholders is seen as a practical approach to promoting sustainability within PDO. However, some critics argue that stakeholder engagement approaches tend to focus on individual perspectives, leading to user-centered systems (Vallance *et al*., 2011). These critics contend that sustainability needs to be understood and augmented within the everyday practices of individuals. In other words, sustainability practices must be integrated into people's routines and

ways of life to be truly effective. This action suggests that while stakeholder engagement can be valuable, it may not be sufficient to promote sustainable practices within an organization. There may need to be a deeper understanding and integration of sustainability into people's everyday practices and routines to realize sustainable goals fully.

Second, reliance on users is an approach used to promote sustainable actions by empowering employees to take ownership of sustainable practices in their work environment. As the excerpt below demonstrates, the climate change and sustainability manager recognise the significance of engaging employees in the sustainability program.

Excerpt from an interview with the climate change and sustainability manager, conducted while visiting him at his office on 16th August 2022:

Me: "What were your approaches to meeting those initiatives?"

The climate change and sustainability manager: "*Multiple approaches have been used, starting with an awareness campaign using several tools like slide packs, corporate communication notes, face-to-face engagement with staff, town hall discussions, videos, and regular email reminders. Other approaches involved putting restrictions on use like restricted printing, stopping plastic bottle supply, online monitoring, and tracking.*"

Therefore, the organization encourages its employees to be environmentally conscious and take actions that contribute to a more sustainable work environment. This approach involves creating a culture of sustainability that permeates all aspects of the organization. The organization provides resources, training, and incentives to encourage employees to adopt sustainable practices. These practices have included reducing energy consumption, recycling waste, using eco-friendly products, and reducing water consumption. The organization believes it can create an efficient and effective sustainable system by relying on users. As such, the users become agents of change, and their actions contribute to a more sustainable work environment. This approach also helps to create a sense of ownership and responsibility among employees, which can lead to a more significant commitment

to sustainable practices in the long term. This information indicates that PDO's perception of sustainability centers on motivating and incentivizing individual users to behave more sustainably, utilizing methods such as raising awareness and implementing usage limitations. This approach assumes that users' behaviour can be changed through cognitive processes, such as increased awareness and knowledge.

In practical application, the fieldwork has demonstrated how effectively utilizing the cognitive approach promotes users' engagement in sustainable behaviour. For instance, the facilities management team is responsible for guiding users to navigate and utilize the BMF building. According to the team lead of facilities management, the users have been equipped with a guide containing essential information for utilizing the facilities. The open work environment is new to the employees, so the guide offers advice on working in such a setting. It also outlines rules and regulations about the operation of various facilities, including air conditioning, lighting, windows, and doors. Furthermore, the guide has recently been updated to include instructions for working during the pandemic. Additionally, the users have been directed to report any operational or maintenance issues and communicate with the facilities management team. The information described above is presented in the excerpt below, and a copy of the guide was obtained.

Field notes, excerpt from the interaction with the facilities management team lead, 08th February 2022:

Me: "Has any building users' guidance or training been provided for the sustainability and efficient operation of the building?"

The facilities management team lead: "*A guide has been issued to all staff to show how to behave in the open space plan.*"

During the fieldwork, various building management activities were observed to promote the users' sustainable use of facilities. Figures 6.7 and 6.8 depict examples of these activities, wherein instructions were provided to guide users, especially regarding air conditioning and lighting. These instructions were considered crucial considering the open work environment within the building.

Figure 6.7 Lighting Instruction (Source: Author)

Figure 6.8 Air Conditioning Instruction (Source: Author)

However, the facilities team overlooked other essential services within the building, which were investigated in two cases. First, during a conversation with a non-Omani employee, he expressed that the building lacked shower facilities. The

employee, who commuted to the building by bicycle daily, had stopped using the bicycle, especially during the summer, due to the absence of shower services, as he mentioned. Surprisingly, he was taken aback when I informed him that such facilities were available in the building based on my investigation. He had no knowledge of this service despite spending nearly three years in the building. To address this, I accompanied the employee on tour to physically demonstrate the existence of the shower facilities. The investigation revealed that the problem originated from the absence of proper signage on the door intended to guide users toward essential services. This issue is evident in Figure 6.9, where the lack of signage is depicted.

Figure 6.9 No Door Sign (Source: Author)

The second example involves an Omani employee who raised a significant concern regarding the building's lack of ablution services. He expressed his frustration with this issue, explaining that he had been facing difficulties for approximately five years without realizing that a service for ablution was available. This situation highlights a clear gap in communication and signage within the building, as the employee was unaware of the presence of such a facility. The absence of proper signage prevented him from accessing this essential service and resulted in

unnecessary inconvenience and discomfort. These two cases vividly illustrate the crucial role that facilities management plays in shaping the daily practices and experiences of building users. It underscores the importance of effective communication, guidance, and signage to ensure that users know the available facilities and services within the building. In both instances, the lack of clear and visible signs led to misunderstandings and prevented users from fully utilizing the resources provided.

These cases provide further support for the existing literature on the subject. Scholars such as Reckwitz (2002) have emphasized the significance of signage and its impact on user behaviour and practices within various contexts. The findings from these cases align with the literature, reinforcing the argument that signage plays a crucial role in guiding user activities and enhancing their overall experience within a built environment. These activities and experiences also highlight the importance of recognizing the competencies and skills of users. In these cases, the lack of clear signage acted as a barrier that hindered users from effectively engaging with the available facilities. This aligns with the insights offered by researchers such as Shove and Pantzar (2005), who argue that user competencies and skills are fundamental elements that shape practices, including the ability to interpret and navigate signage.

Although the cognitive has shown some advantages in promoting sustainable action, The literature has critiqued this approach for ignoring the social and material circumstances in which practices are carried out and for understating the significance of other aspects that influence users' behaviours (Stern, 2000). The data provides nothing about how the organization's social practices, such as how trash is produced and managed or social norms and values that shape user behaviour, are integrated with sustainability programs. According to the social practice theory, practices are constituted by the interplay between material and social elements. Material elements, such as technologies and infrastructure, interact with social elements, such as norms, values, and meanings, to shape practices. Therefore, to achieve sustainability goals, PDO must consider users' behaviour and the broader social and material contexts that shape practices. The organization can develop more effective and sustainable solutions considering the various factors influencing

users' practices.

6.2.4 The Approaches Used for Sustainability Evaluation in PDO

The previous discussion highlighted that the main focus of sustainable initiatives is to promote sustainability through the preservation of the environment and cost reduction. The sustainability team responsible for implementing such initiatives has primarily relied on a user-centered approach, which assumes that promoting sustainable behaviour among users will help achieve these targets. This approach has shown that the team has encouraged people to act sustainably through various initiatives. In addition, these initiatives have been evaluated through surveys and statistical representations to understand the impressions of the targeted users and their level of satisfaction with the initiatives. Both tools are discussed in the following sections.

a. Survey

Conducting such a survey is a standard method used by the PDO to gather data on user perceptions, which is crucial for evaluating the effectiveness of any sustainable initiative. The sustainability team is expected to identify gaps or areas requiring improvement in their initiatives and subsequently make adjustments to accomplish their sustainability targets by comprehending the users' perspectives. The excerpts below are to demonstrate this fact.

Excerpt from an interview with the climate change and sustainability manager, conducted while meeting him at BMF on 15th August 2022:

Me: "Is there a system in use for evaluating such initiatives to examine the gap between the predicted and the actual engagement of users?"

The climate change and sustainability manager: "*User surveys are used to assess success and satisfaction of staff, and improvements are implemented based on received feedback.*"

Based on the provided data, it is evident that the sustainability team at BMF primarily concentrates on promoting sustainable practices through a user-centered

approach. This approach assumes that the users of BMF play a pivotal role in determining and embodying sustainable practices in their everyday activities. However, the interview excerpt indicates that the sustainability team also acknowledges the significance of comprehending the users' viewpoints and experiences when implementing sustainable initiatives. A notable example of this recognition is the utilization of user surveys to evaluate the success and satisfaction of the staff. By conducting these surveys, the sustainability team aims to gain insight into the users' perspectives and experiences, enabling them to identify any gaps or areas that require improvement in their initiatives. Subsequently, the team can adjust to attain its sustainability objectives.

While surveys can be a valuable tool to gather information on user perceptions and level of satisfaction with sustainable initiatives, they may not provide a comprehensive understanding of the actual practices and influences that shape user behaviour. Social practice theory emphasizes that behaviour is not simply an individual choice but is shaped by social norms, material contexts, and cultural meanings. Therefore, it is necessary to examine user perceptions and broader social, cultural, and material contexts that shape user practices to gain a more nuanced understanding of the organisational understanding of sustainability. For example, in the excerpt from the interview with the climate change and sustainability manager, it is evident that the sustainability team relies on user surveys to assess the success of their initiatives and make improvements based on feedback. In this sense, users may report that they recycle regularly, but in practice, they may only recycle when it is convenient or when they feel social pressure.

Thus, a more thorough examination of the larger social, cultural, and material contexts is necessary to investigate the actual practices and influences that motivate users to behave in a certain way. This action might involve observing user practices in situ or analysing the cultural meanings attached to sustainability practices in the organization. By adopting a social practice perspective, the sustainability team can gain a more comprehensive understanding of the organisational understanding of sustainability and identify the factors that shape user practices. This method, in turn, can help them design more effective sustainable initiatives that address the underlying social, cultural, and material influences that shape user behaviour.

b. Statistical Representation

The sustainable initiatives implemented by PDO have been focused on addressing the environmental and economic priorities of the organization. As existing literature suggests, these two areas can be measured using quantitative methods. To this end, the annual sustainability report[®] released by PDO in 2020 has presented some statistical data suggesting that the organization is progressing toward achieving its sustainability goals. The following excerpts serve as evidence of this claim.

Excerpt from an interview with the climate change and sustainability manager, conducted while meeting him at BMF on 15th August 2022:

Me: "Is there a system in use for evaluating such initiatives to examine the gap between the predicted and the actual engagement of users?"

The climate change and sustainability manager: *"Systems tend to be developed in line with the initiative nature. For example, the impact of changing LED lights was monitored through electricity bills and power consumption. Also, paper printing and consumption were monitored and tracked electronically, and a monthly report is shared with each department."*

From a social practice theory perspective, the focus on environmental and economic aspects of sustainability indicates a limited understanding of sustainability within the PDO organization. The organization seems to view sustainability as a set of technical problems that can be solved through quantitative measures rather than as a complex and multifaceted social practice involving various actors, influences, and interactions. The interview excerpt with the climate change and sustainability manager highlights this limited understanding of sustainability. The manager's response indicates a focus on measuring the impacts of sustainable initiatives in terms of quantitative indicators, such as electricity bills and paper consumption. This approach assumes that changes in these indicators will result in changes in

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[®] This report is part of the documents that this research has relied on (Table 5.3, Document No 11)

user behaviour rather than recognizing that a range of social, cultural, and material factors shape user behaviour.

The PDO organization could benefit from adopting a social practice perspective to develop a more nuanced understanding of sustainability. This action would involve recognizing that sustainability is not just about technical solutions but also the social practices and cultural norms shaping how people consume resources and interact with their environment. By taking a more holistic and integrated approach to sustainability, the PDO could develop initiatives that address environmental and economic concerns and consider social and cultural factors, such as user habits and values. This, in turn, could help to foster more sustainable practices and behaviours across the organization.

In summary, section 6.3 has discussed the PDO understanding of sustainability by examining the meaning and approaches in use. It has demonstrated the initial indication of how the organization has understood the concept of sustainability in its business. However, it is crucial to explore the PDO approaches and programs employed to support them to enhance its sustainable goals across the three pillars of sustainability. Figure 6.10 summarize all PDO sustainability initiatives that are discussed in the following sections, 6.3, 6.4, and 6.5.
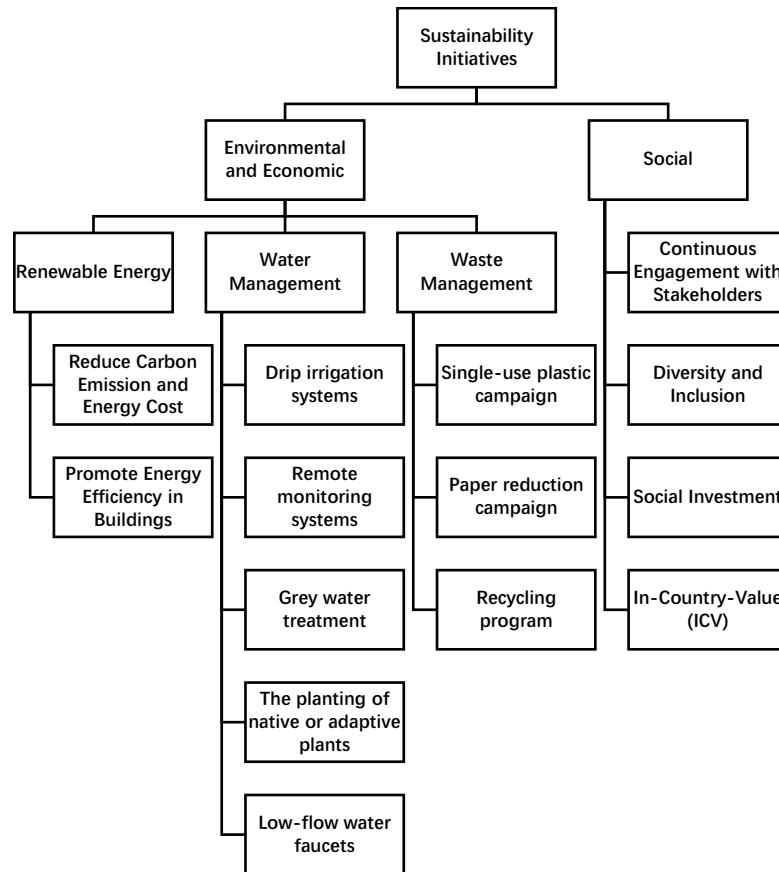
Figure 6.10 PDO Sustainability Initiatives

6.3 Economic and Environmental Sustainability

Economics has been identified as a critical sustainability objective by PDO. In addition, the organization considers attaining business efficiency as a strategic aim to ensure long-term sustainability. Consequently, reducing financial costs is integral to PDO's operational strategy. This approach is clearly stated and reflected in both PDO's pathways to sustainability and sustainability report. Moreover, the following excerpt further illustrates the organization's commitment to minimizing financial costs.

Excerpt from an interview with the climate change and sustainability manager, conducted while visiting him at his office on 24th February 2022:

"*The aim of sustainability in PDO is to do your business which minimum cost.*"

According to the data, PDO's understanding of sustainability primarily focuses on achieving business efficiency and minimizing financial costs. This approach is prioritized as one of the leading sustainability objectives and is seen as a strategic goal for the organization's long-term sustainability. This emphasis on economic considerations is reflected in the interview with the climate change and sustainability manager, who stated that the aim of sustainability in PDO is to conduct business with minimum cost. However, this sustainability approach has its limitations, as it emphasizes the significance of the interaction between material aspects, such as technologies, and social aspects, including norms, values, and meanings, in shaping practices. Therefore, while prioritizing economic considerations is important, it is essential for PDO to also consider the broader social and material contexts that shape practices, such as waste generation and management practices, as well as the social norms and values that influence user behaviour. By taking a more comprehensive approach, PDO can better achieve its sustainability goals and ensure long-term viability.

The Pathways to Sustainability document highlighted the managing director of PDO's commitment to achieving exemplary environmental performance. In order to fulfil this objective, the organization is devoted to adhering to prioritized requirements, company policies and procedures, legal and regulatory obligations, best practices, and international standards. PDO's efforts towards environmental sustainability have focused on managing energy, water, and waste. To promote sustainable practices, PDO has implemented several initiatives. For example, the installation of numerous solar panels on car parking lots at the Bait Mina Al Fahal BMF and the introduction of a new waste management strategy and water management initiatives are among these initiatives. The subsequent sections will delve into the specifics of the organisational initiatives aimed at promoting energy, water, and waste management.

6.3.1 Renewable Energy

This section discusses PDO's initiatives to promote energy efficiency and reduce energy consumption. Energy efficiency is critical to sustainability and is essential in reducing carbon emissions and addressing climate change. PDO has recognized

the importance of energy efficiency and has implemented several initiatives to reduce energy consumption and promote sustainable energy practices. These initiatives range from adopting new technologies to implementing energy management systems and employee engagement programs. Through these initiatives, PDO aims to reduce its carbon footprint, promote sustainable energy practices, and contribute to the global effort to address climate change.

a. Reduce Carbon Emission and Energy Cost

The biggest problem for PDO in the twenty-first century, as stated in its sustainability report, is to power the earth while attempting to reduce carbon emissions and the cost of supplying the necessary energy. Therefore, PDO is committed to achieving the goals of the Oman Energy Master Plan 2040 as it endeavours to satisfy rising energy demands while also attempting to transform the realities of climate change into opportunities. One of its main goals is to have thirty percent of its power needs produced from renewable sources by 2025. The strategy to approach the target of renewable energy has included different activities. These actions have included promoting the swift expansion of Omani low-carbon supply chains and assisting with efforts to decarbonize the power industry. Furthermore, it investigates and advances the development of solar, hydrogen, and wind energy as low-carbon alternatives. Additionally, it encourages investor confidence in big low-carbon projects and notably increases energy efficiency.

According to social practice theory, sustainability is not just a technical or environmental issue; it is deeply intertwined with individuals' and organisations' social practices and routines. Therefore, it is essential to understand how PDO's sustainability initiatives are shaping and being shaped by the organization's and its stakeholders' social practices. For instance, PDO's efforts to generate thirty percent of its energy needs from renewable sources by 2025 can be seen as a significant step towards sustainability. However, it is essential to examine how these initiatives intersect with the organization's and its stakeholders' day-to-day practices and routines. For example, how are employees and stakeholders involved in developing and implementing these initiatives? Are these initiatives integrated into the daily practices and routines of the organization, or are they seen as separate and distinct

from the organization's core activities?

Second, PDO's engagement with the Oman Energy Master Plan 2040 and its focus on promoting low-carbon supply chains and supporting the power industry's decarbonization can also be analysed using social practice theory. How do stakeholders' social practices and routines, such as investors, regulators, and customers, shape these initiatives? How are they impacting the broader social and cultural context in which PDO operates? Furthermore, social practice theory can help to examine the extent to which PDO's initiatives are genuinely transformative and able to reshape the energy-related practices of the organization. Are these initiatives merely incremental changes to existing practices or fundamentally changing how PDO operates? Are they addressing the root causes of sustainability challenges, or are they merely addressing symptoms?

Overall, social practice theory can provide a valuable framework for analysing PDO's organisational initiatives for promoting energy efficiency and understanding the social dimensions of sustainability. It can help to examine the extent to which these initiatives are transformative and how they are shaping and being shaped by the social practices and routines of the organization and its stakeholders.

b. Promote Energy Efficiency in Buildings

PDO has different actions to promote energy efficiency in the building industry. For the new projects, the sustainability report[9] has shown that around twenty-five percent of project construction expenditures, including site setup, local production, and supply, were accounted for by Omani goods and services. Following the completion of a pilot project to install 10-kilowatt solar PV technology at ten villas in the Ras Al Hamra development project, work is now underway on constructing an additional 580 low-rise residential buildings, infrastructure, and landscaping. Furthermore, in collaboration with an Omani SME, the organization has completed the solar car park project of the BMF, which involved installing PV panels over parking lots at the buildings, including the BMF, which is the case study of this research. The project will lower annual carbon dioxide emissions by 2,621 tonnes

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[9] This report is part of the documents that this research has relied on (Table 5.3, Document No 11)

and reduce electricity costs by roughly OMR 200,000.

Additionally, PDO decreases power usage for the existing buildings by keeping track of and managing the energy used at the company's real estate facilities. An energy audit has been conducted to manage and regulate buildings' electricity usage effectively. Accordingly, several actions have been adopted, including replacing incandescent lights with LEDs and optimizing HVAC, lighting, and power usage per office occupancy and working hours. These initiatives have led to some improvements in energy consumption in buildings, including the BMF buildings. As a result, such initiatives have shown that the organization relies on technology to enhance environmental sustainability in energy. The excerpt below is also demonstrating this fact.

Excerpt from an interview with the energy manager, conducted while visiting him at his office on 13th February 2022:

"*To solve the energy consumption issues, the energy management team is trying to install smart devices as a technology-based system to reduce energy consumption.*"

PDO's sustainability efforts are not just focused on energy efficiency but also on promoting renewable energy sources. The organization has set a target of producing thirty percent of its power needs from renewable sources by 2025 and has implemented strategies to achieve this goal. These strategies include promoting the expansion of low-carbon supply chains and investing in low-carbon projects to encourage investor confidence. PDO's approach to sustainability is multifaceted, incorporating various practices and technologies to promote environmental sustainability in the energy and building industries. The organization's focus on promoting local production and supply of materials, conducting energy audits, and implementing intelligent devices and LED lighting are all examples of social practices that contribute to PDO's organisational understanding of sustainability.

When examining PDO's energy efficiency initiatives using social practice theory, it becomes evident that the organization's sustainability approach is primarily centered around reducing carbon emissions and energy costs through technology-based systems. This perspective is reflected in the energy manager's statement

regarding installing intelligent devices to lower energy consumption. As a result, there is a strong emphasis on the material arrangements component of energy efficiency practices, which focuses on employing technological solutions to tackle sustainability challenges. Nevertheless, there are indications that PDO also takes into account the social arrangements component of energy efficiency practices. For instance, the organization actively promotes the development of low-carbon supply chains within Oman and collaborates with Omani small and medium enterprises (SMEs) to implement renewable energy projects. Furthermore, PDO includes expenditures on Omani goods and services in project construction, which suggests a desire to support local communities and economies. These actions demonstrate consideration for social factors within the framework of energy efficiency practices and technological aspects.

The findings from the data indicate that PDO has heavily relied on technological solutions to enhance energy efficiency, as evidenced by the organization's initiatives to install smart devices as a technology-based system for reducing energy consumption. While these technological solutions have shown some progress in achieving energy efficiency, as reported in the sustainability report (p. 76), existing literature suggests that a strategy that goes beyond sole reliance on technology is necessary to foster sustainability (Loorbach, 2010). Specifically, it is crucial to understand social behaviours and the factors contributing to their formation to promote sustainability (Nash *et al*., 2017). However, attempts to persuade or convince individuals to adopt sustainable behaviours have not yet resulted in widespread action. This highlights the importance of exploring the human aspect of technological solutions for sustainability (Lee *et al*., 2015).

6.3.2 Water Management

PDO has paid more attention to managing water as part of environmental sustainability. The PDO pathways to sustainability have shown that the organization has relied on technology to promote water use across its sector, including buildings. For example, it has leveraged new technology to optimize water use in its buildings and infrastructure, one of which is the BMF. In addition, to reduce water waste, technical approaches have been utilized in buildings, as mentioned in the pathways

to sustainability (p. 25), including:

- The installation of drip irrigation systems is carried out, incorporating automatic timer control settings and rain sensors.
- Utilization of remote monitoring systems and software is employed to control water use for an advanced golf course, integrating automatic irrigation control.
- Grey water treatment is employed for non-potable purposes, such as toilet flushing and irrigation.
- The planting of native or adaptive plants is carried out for landscaping.
- The utilization of low-flow water faucets is implemented to regulate the water flow.

PDO's approach to water management indicates that the organization recognizes the importance of integrating social practices into its sustainability initiatives. They include installing drip irrigation systems with automatic timer control settings, employing greywater treatment, and planting native/adaptive landscaping plants. For example, planting native plants can have multiple social benefits, such as preserving local biodiversity and connecting people with their natural environment. However, examining how these technical solutions are integrated into social practices to achieve sustainable outcomes is essential. For instance, low-flow water faucets can be an effective technical solution for reducing water usage. Still, it is necessary to understand how individuals and organisations use these faucets in their daily routines to reduce water usage significantly. Understanding social practices and norms around water usage can help PDOs develop more effective sustainability initiatives that address both technical and social dimensions of sustainability.

The initiative encompasses all water taps within the organization's facilities, including kitchens, toilets, and breakout areas. The primary goal is to diminish water consumption by adjusting the nozzles and enhancing water pressure. Figure 6.10 depicts the execution of this initiative. Technical measures, such as specialized nozzles, are employed to offer users the precise amount of water required. As

indicated by the organisational sustainability report[10], preliminary findings have demonstrated favourable outcomes, illustrating a substantial reduction in water usage.

Figure 6.11 Tape with Nozzle (Source: Author)

Investigations into the daily activities of some users have uncovered resistance to implementing this strategy. First, the design of the system results in reduced water consumption but increased flow pressure, leading to water splashing on users' clothes. The inconvenience caused by such a system was also experienced by the researcher involved in the fieldwork. This issue of user inconvenience highlights the importance of considering the user's needs and preferences when designing sustainability initiatives. While the goal of reducing water consumption is crucial to achieving economic sustainability, the user's experience and convenience should not be overlooked. An inconvenient or challenging design can lead to user resistance and potentially undermine the initiative's effectiveness.

Therefore, it is necessary to consider the trade-off between sustainability goals and user convenience when designing sustainability initiatives. For example, in this case, it may be necessary to explore alternative nozzle designs that balance reduced water consumption and user convenience, such as nozzles that control flow pressure to minimize water splashing. Incorporating user feedback and involving users in

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[10] This report is part of the documents that this research has relied on (Table 5.3, Document No 11)

the design process can also help to ensure that the resulting sustainability initiatives meet their needs and preferences. This can increase user acceptance and support for the initiatives, leading to more effective and sustainable outcomes.

Second, building cleaners have stated that while this technique may effectively reduce water consumption in toilets, it is impractical in kitchens where more water is needed for cleaning. Consequently, the cleaners have had to remove the nozzles from some kitchens, resulting in increased water usage compared to the pre-rationalization technology period, as depicted in Figure 6.11. The following excerpt serves to demonstrate the concern raised regarding the new nozzle.

Field notes, excerpt from informal interaction at the BMF with a cleaner, 15th August 2022:

Me: "Removing certain tap nozzles from some kitchens has been observed. By whom and for what reason were they removed?"

The cleaner*: "Yes, we have removed the nozzle as such a system is not practical for the kitchen since we need more water for cleaning. But this system could be effective for other areas, not the kitchens."*

Figure 6.12 Removed Nozzle (Source: Author)

In this scenario, the removal of nozzles by the cleaners in certain kitchens indicates their awareness of the necessary skills for effective cleaning and the essential

resources, namely water, required to complete the task. They have also considered the image of the social practice, i.e., the cleanliness of the workplace, which requires sufficient water usage. This case highlights the importance of considering the needs and requirements of different building areas while designing and implementing sustainability initiatives. While reducing water usage is essential for achieving economic sustainability, ensuring that the measures implemented do not compromise the quality of services provided in different areas is equally important. Moreover, the removal of nozzles from some kitchens and the resulting increase in water usage indicates that the success of sustainability initiatives depends on the willingness and cooperation of the cleaners. Therefore, it is crucial to involve employees and seek their feedback on the measures' effectiveness to ensure the success of sustainability initiatives. This suggested action can help identify any areas of improvement and ensure that the measures implemented align with the needs and expectations of the employees.

This case highlights the limitations of relying solely on technological solutions, such as nozzle water, to encourage sustainable behaviour among users. As Spaargaren (2011) argues, technological solutions alone may not result in significant changes in behaviour. Furthermore, the example of the cleaners removing the nozzles from some kitchens illustrates the potential rebound effect, where unintended consequences of sustainability initiatives may counteract their intended outcomes (Hertwich, 2005). Therefore, to develop sustainable systems, it is essential to understand the practices, insights, and influences that shape those practices. This approach involves relying on technology and recognizing that users are not passive but actively participate in shaping the systems they use. The sustainable team can develop more effective and sustainable solutions by considering the various factors influencing user behaviour, including norms, beliefs, and values. Thus, future sustainability initiatives should incorporate insights from social practice theory to achieve long-lasting and effective change.

6.3.3 Waste Management

As part of its ongoing sustainability efforts, PDO has developed a waste management plan (WMP) that encompasses all stages of waste management, from

creation to disposal. Furthermore, PDO has recently introduced a five-year environmental strategy and action plan to further its overall business objectives and uphold its sustainability commitments. In line with the environmental policy's objectives, several significant waste management projects have been successfully implemented in recent years as part of this environmental strategy. These initiatives, which have been detailed in the Sustainability Report [11] and Pathways to Sustainability[12], include the following actions:

- Single-use plastic campaign: Following the campaign's commencement in 2018, PDO continued to reduce the use of single-use plastic in its operations. Together with the Environment Authority and the Environment Society of Oman, a focused PDO workgroup is identifying applicable best practices, recycling opportunities, and other options. As part of this campaign, thousands of eco-friendly bags were distributed to staff. As a result, most of the PDO buildings are currently free from single-use plastic.
- Paper reduction campaign: It started in 2019, and by October 2020, it had cut its paper usage in half. The initiative has included some actions that have been deployed, which include using digital signatures internally for employees and contractors and distributing tablets to students so that all course materials are digital rather than printed. The campaign has also focused on convincing employees to drink from mugs rather than paper cups. Additionally, it promotes a decrease in paper usage by preventing staff from printing reports and presentations. Finally, it only offers black-and-white printing because it is five times less expensive than color.
- Recycling program: An effective recycling program has been implemented in workplaces as part of a company initiative to operate more sustainably. The PDO has installed metallic waste segregation containers to collect papers, plastics, cans, and general garbage in every office space.

The organisational understanding of sustainability in the context of the waste management plan (WMP) and PDO's environmental strategy and action plan can

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[11] This report is part of the documents that this research has relied on (Table 5.3, Document No 11)

[12] This report is part of the documents that this research has relied on (Table 5.3, Document No 12)

be analysed using social practice theory. In the case of PDO, the WMP is an example of a social practice that has been created to address waste management issues more sustainably. Furthermore, the WMP covers all waste streams from "cradle to grave," indicating that it aims to manage waste throughout its lifecycle, from production to disposal. This action suggests that PDO recognizes waste management as a long-term, ongoing practice requiring a comprehensive and integrated approach.

Additionally, the five-year environmental strategy and action plan show that PDO is committed to sustainability and has set specific goals and objectives to achieve it. This action suggests that sustainability is viewed as a core value and strategic priority within the organization. Several large projects have been implemented to manage waste and reduce environmental impacts, indicating that PDO recognizes sustainability as an ongoing process that requires continuous effort and investment. The single-use plastic campaign, paper reduction campaign, and recycling program are examples of social practices that have been developed to promote sustainability within the organization. These practices are aimed at changing the behaviour of employees and contractors to reduce waste and promote recycling. The use of eco-friendly bags, digital signatures, tablets, and the promotion of mug usage over paper cups and black-and-white printing suggests that PDO recognizes the importance of social norms and cultural factors in shaping sustainable practices.

From a social practice theory perspective, how different organisational groups receive and adopt these initiatives has to be examined. For example, the single-use plastic campaign may require changes in employee behaviour and habits around the use of plastic in the workplace. Similarly, the paper reduction campaign may require employees to adopt new practices around document management and printing. The success of these initiatives will depend on how well they are integrated into existing social practices and how the organization as a whole supports them. For example, the effectiveness of the recycling program may be influenced by the availability of recycling bins and the ease of use for employees. Overall, analysing PDO's waste management initiatives from a social practice theory perspective can help understand how these approaches are implemented and how they impact social practices within the organization. By examining these initiatives' material, social,

and cultural context, an insight may be obtained into the organisational understanding of the social dimension of environmental sustainability and identify areas for improvement.

Positive results have been documented in the organisational sustainability report[13], showcasing advancements in attaining the objectives of sustainability initiatives. These achievements encompass decreased paper usage and enhanced user adherence to waste management protocols. Nonetheless, users' everyday actions have unveiled diverse perspectives, highlighting the intricacy of transitioning from established practices to a novel model influenced by various contextual factors. First, the waste separation process is the initial stage of waste recycling. However, achieving the anticipated outcomes may not be possible due to the absence of an integrated waste recycling system in the Sultanate. As a result, the focus of this initiative has been to change the behaviour of individuals in the workplace. Nonetheless, it seems that this approach has overlooked the underlying processes that are beyond the scope of the PDO sustainability team, as indicated in the following excerpt.

Excerpt from an interview with the climate change and sustainability manager, conducted while meeting him at BMF on 15th August 2022:

Me: "How are you treating the waste after being separated into three pins? Is there any waste management system for recycling in Oman?"

The climate change and sustainability manager: *"There is no recycling plant for paper in Oman, but we are dealing with SMEs to transport it to one of the Gulf countries for recycling."*

In this case, the "stuff" refers to the modern and central waste bins, the "skills" refer to the knowledge and abilities of employees and cleaners to use them, and the "image" refers to the perception of waste management practices. The data shows that installing the new waste bins has influenced users' behaviour to some extent, leading to positive outcomes such as reduced paper consumption and increased

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[13] This report is part of the documents that this research has relied on (Table 5.3, Document No 11)

compliance with waste management practices. However, the absence of an integrated waste recycling system in the Sultanate may limit the effectiveness of waste separation in achieving the intended outcomes. Additionally, the focus on changing individuals' behaviour in the workplace may overlook the underlying processes beyond the scope of the sustainability team.

The climate change and sustainability manager acknowledged that there is no recycling plant for paper in Oman and that the PDO is collaborating with SMEs to transport the waste to another Gulf country for recycling. This suggests that the PDO's initiative to promote waste recycling relies heavily on external entities. The sustainability team's role may be limited to waste separation and behaviour change within the workplace. Thus, the initiative's success may depend on a range of factors, including the willingness and ability of external entities to recycle waste and the broader waste management system in the Sultanate.

The initiatives have primarily focused on the users themselves, disregarding the contextual factors highlighted in the literature by Kuijer and Bakker (2015) and Shove *et al*., (2007) that may contribute to shaping user practices. The sustainability team operates under the assumption that users are the sole decision-makers who determine and shape their daily activities towards more sustainable actions. However, the formation of users' activities is not a straightforward or causal process, as it involves multiple influencers working in conjunction to shape specific activities. Hence, it is crucial to understand how people's daily practices are structured and examine the influences that might promote unsustainable behaviour. Additionally, it is necessary to expand the scope beyond the organisational boundaries at a micro-level to comprehend the larger-scale picture of the process and grasp its complete cycle.

Thus, to promote sustainability effectively, a thorough understanding of the interconnectedness of different practices within a specific area of daily life is necessary, rather than focusing solely on individual practices. Warde (2005) argued that individual practices are influenced by cultural norms, social structures, and their interactions with other practices. Therefore, it is insufficient to examine individual practices in isolation. Instead, sustainable practices emerge when

changes occur in the broader network of interconnected practices within a specific domain. This sustainability approach highlights the importance of adopting a holistic and systemic perspective that recognizes the intricate interdependencies among various system elements and seeks to address them in a coordinated manner.

Second, the sustainability program has implemented a recycling and waste management strategy in all workplace buildings, including BMF. A new bin design, illustrated in Figure 6.12, has been distributed to each department, with bins placed in central locations to promote easy access. According to observations, most users have complied with these initiatives, remarkably since the "No Paper campaign" initiative has reduced paper in the work environment. However, during fieldwork, one of the cleaners responsible for collecting waste materials after work hours mixed all three bags due to unfamiliarity with the new work. This occurrence highlights the marginalization of the sustainability team, which primarily focuses on employees, leaving some users, such as cleaners, out of the initiative. Therefore, to address this issue, the climate change and sustainability manager suggested using a different color for each type of waste to facilitate easy sorting for cleaners.

Figure 6.13 New Bins of Waste (Source: Author)

The sustainability team's objective of altering workplace behaviour and promoting compliance with initiatives is demonstrated by the actions of the cleaners. These initiatives include the use of newly designed bins strategically placed in central areas for easy access. These actions exemplify the "stuff" component of the social practice theory, where the material objects and infrastructure (bins) are designed to

encourage sustainable behaviour. However, the behaviours of certain users, such as the cleaners, have not aligned with the intentions of the sustainability team. For instance, the cleaners mixed all three bags of waste, reflecting the "skills" component of the social practice theory. It appears that they were unfamiliar with the new procedures, suggesting a potential lack of training or communication from the sustainability team. Additionally, the marginalization of specific users, such as the cleaners, within the initiative can be attributed to the sustainability team's primary focus on employees, neglecting their inclusion. This highlights the "image" component of the social practice theory, wherein the cultural norms and social structures surrounding waste management may not align with the objectives of the sustainability initiative.

Future designs must consider the interrelationships between practices, cultural norms, and social structures to advance sustainable waste management practices. This includes addressing the issue of marginalization of some users, such as cleaners, and ensuring that they are included in the initiative. Additionally, training and communication with all users, including cleaners, are crucial to ensure they have the necessary skills and knowledge to comply with the sustainability initiative. This approach aligns with the social practice theory, which emphasizes the importance of considering the interconnection between practices and the broader social context to promote sustainable behaviour (Shove and Pantzar, 2005).

Thirdly, during the fieldwork, it was observed that certain employees used personal bins instead of the designated waste bins located in central areas, as shown in Figure 6.13. This behaviour underscores the importance of understanding the factors that have influenced these users to depart from the recommended waste disposal practices in central bins and the difficulties associated with altering established waste management practices. The following excerpt illustrates this issue concerning the utilization of central bins.

Field notes, excerpt from the interaction with a member of staff, 29th March 2022:

Me: "I have noticed that you have a personal bin while others are using the central bin."

The employee: *"Yes, the central bin is too far from my workstation, and I like to have my private bin."*

Figure 6.14 Personal Bin (Source: Author)

This case shows that users' actions are shaped by the "stuff, skills, and image" associated with a particular practice. In this case, the "stuff" refers to the physical objects associated with waste, such as bins and bags, while the "skills" refer to the knowledge and habits needed to dispose of waste correctly. The "image" refers to the social norms and expectations associated with waste management practices. The use of personal bins by some employees reveals that their practices are influenced by privacy concerns and convenience, which are beyond the scope of the sustainability team's intentions. The presence of personal bins some employees use due to privacy concerns illustrates the complexity of implementing sustainable waste management practices. In addition, the interactions with a staff member revealed that some users may prioritize their convenience and comfort over the designated waste management practices. This finding suggests that merely providing central waste bins may not be enough to encourage all users to participate in the sustainability initiative. Therefore, future designs should consider users' values, beliefs, and practices to facilitate sustainable waste management practices.

Hargreaves (2011) investigated a workplace building in the UK that implemented a pro-environmental behaviour change initiative called "NO Bin Day." The initiative involved removing all bins from the building to assess user response to the program. This scenario is similar to the one previously discussed. However, Hargreaves'

research uncovered unanticipated challenges that the team responsible for the program encountered. Users resisted the initiative because the meaning of bins was context-specific and linked to other practices. For instance, some users felt that removing bins invaded their privacy. Thus, the study underscores the importance of considering contextual factors that influence users' reactions to sustainability initiatives in the workplace.

Finally, another example of how privacy and confidentiality are disregarded in the workplace is evident in the effort to minimize paper usage. This initiative sought to encourage the use of electronic platforms and centralized printing as a means to reduce expenses. However, this practice has presented challenges for users who handle confidential or private transactions that require paper use. For example, fieldwork interactions with some users revealed concerns about the potential for leaked printed documents. Therefore, a more nuanced approach to sustainability initiatives in the workplace is crucial, as policies that do not consider users' practices and concerns can have unintended consequences. For example, the policy of centralized printing reduced paper usage and costs, but it also exposed sensitive information to potential leaks. This could result in adverse outcomes such as losing sensitive information, reduced organisational trust, and reputational damage. Likewise, the effort to decrease the use of paper cups for drinking water has resulted in certain users bringing their own plastic water bottles from home, as noted during the fieldwork.

Therefore, the sustainability team may consider the broader implications of their sustainability initiatives and engage with users to comprehend their practices and concerns. This necessitates a deeper understanding of social practices and the interactions between various elements, such as technology, infrastructure, and individual behaviours. The importance of a nuanced approach to sustainability initiatives in the workplace is highlighted by the potential unintended consequences of policies centered on centralizing services. To address this, organisations must engage with users to understand their practices and concerns and develop more effective and sustainable policies that consider both environmental impact and user needs and practices.

6.4 Social Sustainability

PDO's commitment to social responsibility is manifested through its consideration of economic, social, and environmental factors in all decision-making processes, aiming to earn public recognition. The sustainability report emphasizes PDO's objective of garnering appreciation for the excellence of its workforce and the value it contributes to Oman and all stakeholders. As articulated by the PDO managing director, the vision is "to be renowned and respected for the excellence of our people and the value we create for Oman and all our stakeholders." (p. 10). In line with this vision, PDO joined the United Nations Global Compact in 2015, becoming the first national oil company in the Gulf region to do so. Since then, PDO has remained committed to upholding the labour, environmental, and anti-corruption principles of the UN Global Compact. These principles have been integrated into PDO's strategy, culture, and day-to-day operations, forming the foundation for the organization's core values and ethical business practices. In addition, employees and communities are encouraged to adhere to these principles. The subsequent sections will shed light on PDO's understanding of social sustainability and its initiatives to promote social sustainability for its staff and the community.

6.4.1 Understanding of Social Sustainability

The organization, PDO, has experienced difficulty in understanding and integrating such concepts in the workplace. The excerpt below is also demonstrating this fact.

Excerpt from an interview with the climate change and sustainability manager, conducted while visiting him at his office on 16th August 2022:

Me: "What is your understanding of social sustainability in buildings?"

The climate change and sustainability manager: "*Limited understanding. I believe this relates to embedding social and people needs, expectations, and interests in buildings design and management, such as having green spaces, walkways, clean water, and adequate services.etc.*"

The excerpt suggests that PDO has a limited understanding of social sustainability, particularly in the context of buildings. The climate change and sustainability manager's response imply that they view social sustainability as involving the incorporation of people's needs, expectations, and interests into the design and management of buildings. However, the response does not discuss the social practices involved in achieving social sustainability or the broader social and material contexts that shape practices. From a social practice theory perspective, this limited understanding may be due to a focus on individual elements, such as specific features or amenities, rather than the broader practices and contexts that shape social sustainability in buildings. To effectively promote social sustainability, PDO needs to consider how buildings are embedded in social practices and how broader social and material contexts shape these practices.

The quote highlights the challenges of applying the concept of social sustainability in real-life contexts, particularly in the design and management of buildings. The literature, as referenced by Boström (2012), has highlighted the difficulties in operationalizing social sustainability, as it often involves addressing complex and dynamic social and cultural factors that are not easily measurable. The interview excerpt with the PDO climate change and sustainability manager further emphasizes the difficulties in understanding and integrating social sustainability in the workplace. The manager acknowledges having a limited understanding of social sustainability in buildings and highlights the need to embed social and people's needs, expectations, and interests in buildings design and management. The quote suggests that relying solely on statistical data to assess human needs may not be sufficient, as it may not capture social sustainability's qualitative and subjective aspects. Instead, a more nuanced and holistic approach to understanding and assessing human needs may be necessary, considering a particular community or organization's unique social and cultural context.

While PDO's understanding of social sustainability may be limited, the organization has implemented various strategies to improve and promote this essential aspect of sustainability. The subsequent sections will detail these approaches, including communication and feedback, diversity and inclusion, and social investment.

6.4.2 Communication and Feedback

The stakeholders of PDO, including its staff, are directly affected by the organization's activities and performance. Recognizing this, PDO places significant importance on engaging with its major stakeholders, fostering openness and transparency regarding its achievements and operations, and actively seeking input to address any issues and continuously enhance its performance. Improving stakeholder relations has been a significant priority for PDO, as the involvement of stakeholders plays a crucial role in shaping and maintaining the organization's reputation. Therefore, PDO employs various channels to gather stakeholder feedback and information, such as formal and informal face-to-face and telephone meetings, visits, workshops, surveys, and online communication. Recently, the organization has introduced an additional tool, the annual survey, as part of its stakeholder engagement efforts aimed explicitly at gauging employee perceptions. This reliable tool has become instrumental in assessing employee satisfaction, reflecting PDO's commitment to valuing and carefully considering the input it receives. In addition, by relying on the annual survey, PDO emphasizes the significance it places on its employees, who are recognized as its most valuable resource.

However, using statistical data to assess human needs has limitations in providing a comprehensive understanding of social practices and their impact on sustainability. While such data provides subjective measurements, it fails to capture the nuance and complexity of social practices, which often require a qualitative approach. Furthermore, relying solely on survey measurements, PDO may miss essential insights into its stakeholders' needs, experiences, and expectations, including employees and the wider community. Therefore, the organization may need to explore additional methods to assess human needs, such as in-depth interviews, focus groups, and ethnographic research, which allow for a more nuanced understanding of social practices and their impact on sustainability. By taking a holistic approach that includes both quantitative and qualitative data, PDO can gain a more comprehensive understanding of sustainability issues and make more informed decisions about addressing them.

Despite these limitations, PDO's efforts to engage with stakeholders and assess their feedback demonstrate its commitment to integrating sustainability practices into its operations. By actively seeking input from employees, customers, and the wider community, the organization can identify areas where it needs to improve its sustainability practices and make the necessary changes to address them. This approach is critical in building trust with stakeholders and ensuring that PDO's operations align with the values and expectations of its communities. Ultimately, PDO can create a more sustainable future for itself and its stakeholders by continuing to engage with stakeholders and taking a proactive approach to sustainability.

6.4.3 Diversity and Inclusion

According to the sustainability report[14], the PDO intends to enhance the culture of participation and inclusion in every aspect of the business by implementing an improved diversity and inclusion strategy and governance approach. PDO recognizes diversity and inclusion (D&I) as a business requirement since it involves staff from various demographic areas; fourteen percent of its employees are non-Omani, drawn from 63 nationalities. PDO acknowledged the importance of cultivating an inclusive culture for the success of its business, given the diverse nature of its workforce. According to PDO, a fair workplace is characterized by the fair and equitable treatment of employees, devoid of favouritism or discrimination. The organization prioritizes merit-based hiring decisions and emphasizes opportunities for growth and advancement based on individuals' abilities and competence. The four focus areas of D&I in PDO are communication, fairness, gender balance, and anti-harassment and anti-bullying. The organization is committed to these four areas and continuously raises awareness among employees about the importance of such areas. According to the most recent People survey, the overall D&I scores have remained at 83%.

Following social practice theory, PDO's focus on diversity and inclusion can be seen as a way to address social practices within the organization. By recognizing

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[14] This report is part of the documents that this research has relied on (Table 5.3, Document No 11)

diversity as a business requirement and striving to create an inclusive culture, PDO attempts to change social norms and practices within the workplace. In addition, the organization's emphasis on fair treatment, gender balance, and anti-harassment and anti-bullying practices shows an awareness of the social practices that affect the workplace and the need to create a supportive environment for employees. PDO's approach to diversity and inclusion can also be seen as an attempt to change the social practices of communication and collaboration within the workplace. By creating an open work environment where managers and staff work in the same area, PDO promotes communication and collaboration, leading to increased productivity and better outcomes. Finally, the organization's commitment to raising employee awareness about the importance of diversity and inclusion shows that they understand the importance of changing social practices and norms.

However, the fact that PDO's D&I scores have remained at 83% suggests there may still be areas for improvement. While PDO's commitment to diversity and inclusion is laudable, it is essential to remember that changing social practices is a continual process that requires ongoing effort and attention. PDO may need to continue exploring ways to improve its diversity and inclusion strategy and governance approach to ensure that it effectively promotes social sustainability within the workplace. As such, actual activities in the BMF have demonstrated some concerns about such a strategy. The employees, including managers, have shown reluctance to engage in such an environment emerging from cultural barriers or business-related difficulties. The following excerpts highlight the concerns expressed by users regarding this matter.

Field notes, excerpt from an interview with a member of the change management team concerned with convincing the users on the open plan environment, which was the first case in PDO, 10th February 2022:

"*One of the main challenges in the open work environment was to convince the female about this new layout. It was so difficult for women to accept such a layout. I remember that one of the women was carrying*!"

Field notes, excerpt from the interaction with a man at the BMF, 17th April 2022:

"This diversity and inclusion are restricting us as males from joking or having fun with each other since some words could be understood differently by the females."

In the first case, introducing an open-plan environment met resistance from female employees who required privacy and comfort. The second case focused on PDO's diversity and inclusion strategy, which some male employees perceived as restricting their ability to interact freely with colleagues. These cases illustrate the importance of considering the perspectives and needs of all users when implementing sustainability initiatives. The investigations indicate that not all users may readily embrace well-intentioned sustainability initiatives. Hence, designers and sustainability teams should consider the stuff, skills, and image of the social practice when developing and implementing sustainability initiatives. By understanding users' daily practices and perspectives, sustainable solutions can be created to meet the needs and preferences of all stakeholders.

The objective of PDO's initiative to promote employee equality is to adopt an open working model inspired by practices originating in the United States and further refined in Western countries (Roberson, 2006). In order to cultivate a sense of equality among employees, PDO has implemented a new work environment featuring an open layout. The decision to adopt diversity and inclusion as a means to enhance social sustainability seems to have been influenced by the success of this work paradigm in Western contexts. However, despite the anticipated benefits, implementing diversity and inclusion has inadvertently led to the marginalization of the local culture. The resistance observed among certain users suggests that their cultural background influences their actions. The literature emphasizes that when designing and implementing sustainability initiatives, it is crucial to consider the broader image and meaning associated with specific activities, which the sustainability team may have overlooked. These findings align with previous research that underscores the significance of social practice theory in the design and implementation of sustainability initiatives (Shove and Pantzar, 2005).

6.4.4 Social Investment in the Community

PDO aspires to be a responsible corporate citizen and good neighbour by generating

sustained advantages for small-town communities and the larger Omani society. Following the United Nations Sustainable Development Goals (SDGs), PDO is committed to implementing effective social investment (SI) programs that benefit Omani society in the long term. Accordingly, it has initiated several projects supporting communities across societies in Oman on four social investment themes: community infrastructure development, learning and research, health and safety, and youth and female empowerment. In addition, it is regularly revising its social investment strategy to maintain its standing as a respectable business neighbour and member of the neighbourhoods where it operates. The revised plan considered feedback from numerous local and international sources to ensure it accurately reflects the needs of those communities in line with the Oman Vision 2040 while also being in line with current trends and aims worldwide.

Therefore, such practical efforts in promoting social sustainability have been recognized and valued by communities in Oman and international authorities. The organisational reputation in terms of social investment is well-known among the local communities throughout the Sultanate. The communities' gifts to the PDO while conducting fieldwork were observed as they expressed their gratitude for its services. The organization also follows the guidance of the United Nations' Sustainable Development Goals (SDGs) as a member of such international regulatory institutions. As a result, the initiatives that PDO delivers to communities support global efforts toward promoting sustainability.

According to the social practice theory, PDO's endeavours to enhance social sustainability are intended to change the social practices of its communities. By committing to the Sustainable Development Goals, PDO recognizes that sustainability is a collective responsibility and that its actions can significantly impact social practices in Oman. The organization's approach to social investment is aligned with the four focus areas of social practice theory: materials, competencies, meanings, and rules. PDO invests in community infrastructure, learning and research, health and safety, youth and female empowerment, and critical material resources for promoting sustainable social practices. By supporting education and research, PDO is also helping to develop competencies that can facilitate social change. Moreover, PDO's emphasis on community participation in

its social investment strategy aligns with the meanings and rules of social practices. PDO is creating a sense of ownership and participation in sustainability efforts by engaging with local communities and incorporating their feedback into its social investment plan. This practice can lead to a sense of shared responsibility for sustainability and promote social practices that support sustainability in the long term.

The recognition and gratitude expressed by local communities toward PDO indicate that the organization's efforts to promote sustainability are contributing to positive social practices. The fact that the communities are contributing gifts to PDO suggests that the organization's actions have created a sense of reciprocity and mutual benefit, which can further promote sustainable social practices. PDO's commitment to promoting social sustainability through effective social investment programs and its alignment with global sustainability goals demonstrate its understanding of sustainability as a collective responsibility that requires organisational, community, and international action. Through its actions, PDO is transforming social practices and contributing to a more sustainable future for Oman and beyond.

Since this research concerns sustainability in buildings, it is critical to discuss the organisational approaches to address the organisational understanding of sustainability in buildings in more detail, demonstrated in the following section. Therefore, this examination provides an overview of the PDO approaches for promoting sustainability in existing and new buildings. It also highlights the evaluation approaches used for sustainability in buildings.

6.4.5 In-Country Value

To ensure meeting the target of economic sustainability, which is cost reduction, the company has established a rigorous cost management regime resilient to oil prices since it is the primary source of Oman's economy. As a result, according to the sustainability report, PDO has adopted the theme "In-Country Value" (ICV) as the vital assessment indicator for its economic sustainability. Economic sustainability is promoted according to the ICV through different ways that the PDO has engaged

in, which include the following aspects:

- Jobs and training: it provides more than 2,500 job vacancies across a variety of sectors, including training for employment, redeployment, transferability, and scholarship opportunities through its contracting community and internal recruitment.

- Small and medium enterprises (SMEs): it registers more than 200 SMEs as approved vendors as the focus on growing and training these enterprises in diverse areas increased. Such an initiative supports Oman Vision 2040 of sustainability and strongly emphasizes empowering Omani SMEs.

- Community development: 520 local community contractors (LCCs) have signed up for the online Joint Supplier Registration System, which PDO continues to promote. Furthermore, with a focused jobs drive in all contracts, a new LCC Omanisation strategy is being launched in PDO as part of community development.

This data highlights PDO's understanding of sustainability as primarily focused on achieving economic sustainability through cost reduction. The organization sees cost minimization as essential to ensure its long-term sustainability and has established a rigorous cost management regime to achieve this goal. In-country value (ICV) is crucial for assessing the company's economic sustainability. However, while the ICV approach highlights job creation, SME growth, and community development, the data does not discuss the broader social and material contexts that shape these practices. The social practice theory argues that the interplay between material elements, such as technologies, and social elements, such as norms, values, and meanings, constitutes practices. Therefore, to achieve economic sustainability goals, PDO needs to consider cost reduction and the broader social and material contexts that shape the practices of job creation, SME growth, and community development. Additionally, PDOs need to consider the potential unintended consequences of these practices, such as their impact on the environment, the well-being of employees and communities, and social inequalities.

6.5 Sustainability in PDO Buildings

Given the nature of PDO's operations, which primarily involve the exploration and production of oil and gas, the organization has implemented numerous measures and initiatives to promote sustainability in this sector, recognizing its significance as a core aspect of its business. However, it is important to note that the scope of this research revolves explicitly around the office building Bait Mina Al Fahal (BMF). In this context, it has been observed that construction projects do not hold the same level of importance as other industries within PDO. As a result, there is currently no specific policy in place concerning the sustainability of buildings. The following excerpt serves to illustrate this fact:

Excerpt from an interview with the climate change and sustainability manager, conducted while visiting him at his office on 24th February 2022:

"There is no dedicated policy for sustainability in building in terms of design, construction, operation, and maintenance. This is because the building and infrastructure do not belong to the operational activities of the PDO's core business."

The data suggests that PDO's understanding of sustainability is fragmented and limited to certain areas of its operations. As a core business of PDO, the exploration and production of oil and gas have received significant attention regarding sustainability measures and initiatives. However, the construction of buildings, including office buildings such as Bait Mina Al Fahal BMF, is not considered a critical industry, and there is no dedicated policy for sustainability in building design, construction, operation, and maintenance. This fragmented understanding of sustainability can be attributed to the social practices within PDO, where certain areas of the organization are prioritized over others. Additionally, the lack of policy and attention to sustainable building practices indicates a lack of consideration for the long-term implications of building operations on the environment and society. Consequently, a reassessment of PDO's organisational practices and priorities is necessary to foster a comprehensive comprehension of sustainability and integrate sustainable practices across all its operations, encompassing building design,

construction, operation, and maintenance.

However, to promote sustainability in its buildings, PDO has recently begun implementing new construction projects that adhere to international sustainability standards, specifically the Leadership in Energy and Environmental Design (LEED) certification process, which covers both the design and construction phases. In addition, PDO has established a committee concerning existing buildings dedicated to certifying buildings for LEED in operation and maintenance, led by the building design team and consisting of representatives from operations and maintenance, facilities management, and an external consultant with expertise in LEED evaluation. As a result, the BMF building was selected as a pilot project for this purpose. The main aim of the PDO through the application of sustainability standards is to enhance buildings' environment and economic aspects. The excerpts below are to demonstrate this fact.

Excerpt from an interview with the sustainable city manager, conducted while visiting him at his office on 16th February 2022:

Me: "Why are you relying on LEED?"

The sustainable city manager: *"It is a more globally recognized system."*

Me: "What is the aim of sustainability in buildings?"

The sustainable city manager: "*The concept of sustainability in the PDO project is focusing on resources efficiency and environment."*

Me: "Which building phases have been certified by LEED?"

The sustainable city manager: *"The certification process starts from the design phase, which includes concept design, detail design, and construction."*

PDO predominantly views sustainability through an ecological and economic lens, with minimal attention given to the social dimension. This perspective can be attributed to the organization's emphasis on oil and gas projects, considering construction endeavours, non-core activities, and lower cost priority. Adopting the LEED system for sustainable design and construction showcases PDO's aspiration

to enhance its buildings' environmental and economic aspects. The reliance on the LEED system primarily stems from its global recognition, indicating that the organization places excellent value on external validation and acknowledgment rather than developing a more nuanced and holistic understanding of sustainability.

According to the informal interaction with the team concerned with the LEED certification process for the PDO school and Ras Al Hamra sustainable city, both projects have been certified for the design and construction phases. However, the two projects have not yet been evaluated in the operational and maintenance phases to assess the actual performance and compare it with the predictive data that relied on it in their design development. According to the social practice theory, the data suggests that PDO has a limited understanding of sustainability as a social practice that involves the design and construction of buildings and marginalizes their use and maintenance. The certification process for the PDO school and Ras Al Hamra sustainable city shows that the organization is focused on the technical aspects of sustainability, such as resource efficiency and environmental impact, while neglecting the social aspects of sustainability, such as the user experience and the building's impact on the community.

This narrow understanding of sustainability is evident because the two projects have only been certified for the design and construction phases and have not been evaluated in the operational and maintenance phases. This action neglects the importance of sustainability as an ongoing process that requires continuous evaluation and improvement. Consequently, there is a potential risk that the long-term performance of the buildings may not align with expectations, potentially compromising their sustainability (Watson, 2015). To address this gap, PDO needs to broaden its understanding of sustainability beyond the technical aspects and consider the social and cultural dimensions of sustainability. This would involve engaging with the users and communities affected by the buildings and incorporating their perspectives and needs into the sustainability assessment process. PDO also need to adopt a more holistic approach to sustainability that considers the complete life cycle of the building, from design to demolition, to ensure that sustainability is maintained over the building's entire lifespan.

Furthermore, the excerpt below demonstrates that the PDO relies on LEED, considering its worldwide recognition.

Excerpt from an interview with the person in charge of LEED certification for the Ras Al Hamra project, conducted while visiting him at his office on 24th February 2022:

Me: "Why are you relying on LEED?"

In charge of LEED certification for the Ras Al Hamra project: *"More popular and reputation. In addition to that, the availability of green ratter and consultants in LEED in the market".*

The person in charge of LEED certification for the Ras Al Hamra project indicates that they rely on LEED certification because it is a more popular and reputable system, and many green raters and consultants are available in the market. This action suggests that seeking LEED certification is embedded in a social network of actors, including green raters and consultants who provide services related to LEED certification. These actors have created a norm around LEED certification, making it the default choice for sustainable building certification. The reliance on this norm is not necessarily based on a deep understanding of sustainability but on the perceived benefits of using a recognized system with available expertise. This may indicate a lack of critical reflection on the suitability of LEED certification for the specific context of the Ras Al Hamra project and the organization's overall sustainability goals.

Using the LEED system for assessing construction projects in Oman comes with some limitations. Firstly, the system tends to overlook the implementation of local regulations and project management practices, as well as the cultural and climatic characteristics of the region, as highlighted by Roaf *et al*. (2011). This action raises concerns about the accuracy and suitability of a system that does not fully consider crucial elements of the Omani context. Secondly, the management policies of construction projects in Oman are likely to differ from those in the US, where the LEED system originates from, thus requiring careful consideration when applying international standards. Lastly, as Soini and Birkeland (2014) argue, the climatic

and cultural conditions of Oman and the US vary significantly, further emphasizing the need for localized approaches to sustainability assessment.

Moreover, it has been observed that there is a discrepancy between the reliance on LEED certification for new construction projects and the policy outlined in PDO's "Real Estate Technical Guidelines for Buildings & Infrastructure." According to the policy, buildings should be designed and constructed in accordance with a rating system such as "Estidama" or "BREEAM Gulf" (p. 15). This indicates that the policy acknowledges the importance of considering Oman's climatic conditions, with Estidama being a suitable rating system. Estidama is specifically developed to meet the unique needs of Abu Dhabi, encompassing factors such as climate and culture. Given the similarities between Oman and Abu Dhabi, relying on Estidama can be deemed as the most effective approach compared to other rating systems.

6.6 The Main Findings

This chapter examined the organisational understanding and treatment of sustainability within PDO. It addressed research question one, which explores the organisational understanding of sustainability. The findings from organisational policies, reports, and participant interviews revealed that PDO recognizes and prioritizes the three pillars of sustainability: environment, social, and economic. However, the organization has emphasized the environment and economy more, considering them crucial for sustainability. This focus on the environment and economy is evident in PDO's documents, such as Pathways to Sustainability and Sustainability Reports, which have predominantly highlighted environmental and economic factors in promoting sustainability goals. This emphasis on the environment and economy aligns with the organization's primary business in the oil and gas sector, which is known to have a significant negative impact on the environment. This observation supports the criticism found in the literature that the social aspect of sustainability has been marginalized in PDO's recent organisational perspective (Shirazi and Keivani, 2017; Littig and Grießler, 2005).

Furthermore, the chapter has revealed that PDO's practices substantiate the literature's criticism of organisational sustainability approaches. For instance, PDO

has implemented widely recognized environmental best practices and actively seeks innovative green technologies to reduce its environmental impact, aligning with the literature's observation that contemporary sustainability approaches often assume passive human behaviour and rely heavily on technological solutions (Gaziulusoy, 2015). In addition, the organization's sustainability report indicates that most of its technical activities comply with international standards, endorsing the literature's criticism of using global and statistical techniques to address sustainability issues. Moreover, PDO's sustainability approaches highlight the problems associated with subjective measurements and the marginalization of objective data in sustainability practices (Dempsey *et al*., 2011). These findings support the literature's contention and reveal the neglect of the cultural component of local society in Oman, as the widespread adoption of these strategies leads users to deviate from sustainability initiatives' intended goals (Geels, 2005).

This chapter also delves into examining new practices as entities that emerged due to sustainability initiatives introduced at the BMF building (Schatzki, 2002). The sustainability team significantly constructed these practices, shaping new meanings, skills, and objects assemblages. They introduced sustainable concepts that required acquiring new abilities, installing new infrastructures and objects, and disseminating justifications for action. Chapter Six examined how Social Practice Theory (SPT) can contribute to understanding activities that arise from these practices. The aim was to explore SPT's potential benefits and insights in studying these activities. As a result, SPT provides an alternative perspective that challenges the conventional assumption that action change is driven solely by logical and rational decision-making processes. It serves as a valuable framework to examine the intricate connections between meanings, skills, and objects within broader social practices, emphasizing the need to address these complex linkages when modifying individual activities. Shove and Pantzar's (2005) concept of practices offers a useful heuristic tool in this regard. By adopting this perspective, it became possible to observe interactions between cleaners and water nozzles and explore the underlying meanings that influenced their actions. Moreover, the activities associated with central waste bins highlighted the importance of understanding the practices of relevant businesses when engaging with intended users. It is important

to note that while entities and performances are distinct, they are interconnected recursively. Any changes in the practice as an entity will result in corresponding changes in the everyday performance of individuals (Schatzki, 2010).

Additionally, it investigated how designers and sustainability initiatives have created a disconnect between users and their daily activities (Friedman, 2012). The examination of facts and statistics presented in the sustainability report and LEED grading systems revealed the marginalization of certain critical concerns expressed by users, as observed during the fieldwork. For example, the evaluation process of LEED has largely overlooked users' perceptions of its rating criteria, as witnessed through the work conducted by the committee. Users were only given a simple survey to gauge their perception of specific elements, which is considered the lowest form of evaluation compared to energy and water consumption, for instance. Furthermore, sustainability initiatives have been implemented as separate entities, treating users as passive participants (Patel and Green, 2019), which has caused conflicts in practices. Despite these challenges faced by users in their daily lives, the building has obtained certification as a sustainable building by meeting the LEED criteria, and the sustainability reports have shown positive indicators of resource utilization and environmental impact.

Finally, the activities of BMF users have demonstrated a resistance to certain artifacts, resulting in rebound effects and increased resource consumption. Adopting practices as the primary unit of analysis is crucial for addressing rebound effects, user acceptance issues, and gaining a deeper understanding of the interactions between artifacts and users, as proposed by Scott *et al*. (2012) and Shove *et al*. (2007). For instance, observing how cleaners interact with the water nozzle provides insights into the relationship between entities and users. This example demonstrates the importance of using practices as an analytical unit in building design rather than relying solely on quantitative measurements. In addition, social practice theory offers valuable insights for achieving technically-oriented improvement strategies that effectively reduce resource consumption. Pettersen (2015) asserted that by coordinating comprehensive interventions, applying social practice theory can contribute to sustainable building design.

6.7 Discussion: Insights from Social Practice

By employing an SPT-based approach discussed in Section 5.5.1, the chapter has conducted an analysis of sustainable initiatives that does not focus on individuals and their decision-making processes. Instead, it posits that sustainable initiatives for behaviour change entail a collective and more comprehensive process of social adjustment and reorganization. Accordingly, the chapter highlights first the importance of the sustainability team recognizing a community of practice (Wenger, 1998) to develop potentially viable alternatives to existing social practices. In doing so, the chapter illustrates how such initiatives are fundamentally shaped by the specific roles, rules, and rationalities of the workplace. Consequently, behaviour change is depicted as a contextually rooted process, requiring distinct social dynamics and practical considerations in various settings. Second, it utilized Schatzki's (2002) differentiation between orders and practices to provide a detailed account of existing sustainability initiatives at the PDO. Subsequently, it placed these initiatives into context by considering three interconnected elements: material, skills and meanings associated with them.

Individuals, acting as practitioners, play a significant role in the intricate connections between practices and orders. Throughout the PDO site, as they integrate their personal and professional lives within communities of practice, their practices and communities intersect, clash, and develop. Through these interactions, individuals derive identities and meanings from the practices they undertake. The way people participate in practices is additionally influenced by the nature of and their position within various communities of practice. As such, efforts to modify practices, such as enhancing their environmental sensitivity, have to consider and address the diverse range of social meanings associated with these practices across various communities of practitioners.

One of the critical meanings that were attached to some practices of individuals is the culture. Drawing upon Hofstede's cultural consequences, an examination is conducted to investigate the proposition that skills may be influenced by regional characteristics over others (Hofstede, 1980). This vital area was explored through the social practice theory which has helped to uncover the conflict between the

sustainability initiatives and actual practices. The results suggest that sustainable initiatives aimed at promoting pro-environmental behaviour should be tailored to the specific context, rather than following a universal approach. Training programs need to be customized to align with the characteristics specific to each region.

Lastly, a significant advantage of SPT lies in its focus on the enactment of practices, offering a more accurate portrayal of how behaviour unfolds within a context. In reality, practices are interconnected, just as practitioners are inseparable from their surroundings. An analysis of sustainability initiatives through an SPT lens unveils their complexity, indicating that it goes beyond mere education of individuals and elimination of contextual barriers. Instead, it underscores the need for a fundamental redesign and reorganization of social practices and systems that have evolved gradually over time.

6.8 Summary

By establishing a connection with the arguments presented in chapter three, this chapter has examined PDO's understanding of sustainability. The data analysed in this chapter has reinforced the literature's assertions, underscoring PDO's emphasis on sustainability's environmental and economic dimensions to advance its objectives. The organization adheres to international standards throughout its various business sectors and employs statistical measurements to evaluate its sustainability progress, encompassing social aspects. Nevertheless, this chapter also underscores the socially constructed nature of sustainability, emphasizing the significance of assessing how individuals incorporate sustainable practices. Such evaluation is crucial in providing vital insights into PDO's sustainability initiatives' interaction with the building users.

The following chapter focuses on exploring the organisational approaches for sustainability in design, specifically in the case of BMF. The chapter aims to delve into the design intentions of BMF and the tools employed to promote sustainability within the building, particularly in how these systems have treated the building users. The overarching argument put forth by the research study is that humans play a crucial role in promoting sustainability, and this is particularly relevant in the

context of building design. To this end, chapter seven seeks to evaluate the objectives of the design in BMF by examining the regular practices of the building users in chapter eight. In essence, the chapter serves as a preliminary exploration of the design and sustainability aspects of BMF, setting the stage for a more detailed analysis of how these initiatives have been received and implemented by the building users. By examining the design intentions and tools used in promoting sustainability, the study hopes to shed light on the organisational understanding of sustainability in the context of building design and how this understanding shapes the approaches taken by organisations like BMF in promoting sustainable practices.

Chapter 7 : Users Response to Sustainability Initiatives

7.1 Introduction and Background

The previous chapter has discussed the organisational understanding of sustainability in response to research question one, "To investigate how organisations implement sustainability initiatives related to their office buildings". In addition, it has explored how Petroleum Development Oman PDO addresses such a vital area across its business to promote sustainability. The data discussed in Chapter Six drew upon the criticisms addressed in Chapter Three around the concept of sustainability and the approaches used for understanding its three pillars. Accordingly, the PDO's understanding of sustainability has primarily supported the arguments in the literature review. It has been demonstrated that the organization relies heavily on technology to approach its goals for sustainability. It has been explored that the PDO is more concerned with the environmental and economic aspects of sustainability than the social pillar. The limitations of these approaches have been explored through an analysis of users' actual behaviours, revealing a discrepancy between sustainability goals and their day-to-day actions.

Based on the discussion in the previous chapter, this research is also concerned with the organisational approaches to promote sustainability in building use. Therefore, this chapter explores how cultural context of Oman impacts sustainability practices of office buildings, which is the second question of this study. Accordingly, it is concerned with studying and understanding how the building aids or limit sustainability practices within the context of Oman's cultural norms. It has been argued that buildings once constructed, influences and transform how people live, shaping their future "ways of living" and cultural practices (Dessein *et al*., 2015). Consequently, as discussed in the methodology chapter, this study has relied on different methods to access the relevant information for this study. As a result, this chapter discusses the data which has been collected to answer the second question. It has included interviewing the designers involved in the design process, analysing the policies used in the design of buildings, participant observation to the committee concerning evaluating the sustainability of the BMF, and observations to the daily practices of users.

In this chapter, data were presented and analysed in connection with the criticisms covered in Chapter Four of understanding sustainable office buildings. The data demonstrates how the actual activities of designers at PDO substantiate the arguments raised in the literature. Therefore, this chapter presents and discusses the data in several sections using the lens of social practice theory. First, it has provided an overview of the policies used in designing the buildings for sustainability in Section 7.2. This section has relied on analysing the policies concerned with building designs and management to promote sustainability. It has included three sub-sections showing that the organization has relied on some approaches to sustainability in building design. Second, section 7.3 discusses client's intentions in designing the BMF building, which is the case study. Then, Section 7.4 demonstrates the approaches used to achieve those intentions. The section has covered data demonstrating those strategies, including over-reliance on international standards, which ignore the local context (Section 7.4.1), emphasis on satisfying users' needs motivates them to act more sustainably, which ignores other contextual influences (Section 7.4.2), and believing that people are passive by using technical solutions to direct their actions (Section 7.4.3). Following that, each strategy of those used in the promotion of sustainability was criticized by discussing some daily practices that were observed at the BMF.

Then, section 7.5 presents the evaluation tools the designers rely on to assess their intentions in buildings, including surveys, direct user interaction, and a technical communication platform. It illustrates that such systems were dependent on statistical data, showing the perceptions of individuals as criticized in the literature shown in chapter four. Finally, the chapter has concluded by a summary of the main findings (Section 7.6) and some insights from social practices on those findings to promote sustainability in future buildings.

7.2 Policies for Sustainability in PDO's Buildings

Sustainable design has become increasingly important in building construction and management as the need for environmentally responsible practices becomes more apparent. This section will analyse documents related to building design and management policies at PDO, focusing on how the organization promotes and

encourages sustainable practices. Using the lens of social practice theory, it will examine how the social dimension of sustainable design is understood within the organization and how broader institutional and political structures shape policies and practices. The analysis of these policies aims to enhance the understanding of how sustainable design practices are fostered and manifested in building design and management within PDO.

7.2.1 Building Standards

The PDO policies show organisational tendencies toward relying on international standards for sustainability, as indicated in the literature. The policies for promoting sustainability in buildings demonstrate that the organization relies heavily on international standards. For instance, the policy to manage construction projects called "Real Estate Technical Guidelines for Buildings & Infrastructure" has indicated that the design has to meet international standards. The policy has stated that the design has to follow such standards shown in Figure 7.1, which supports the argument mentioned in the literature. However, PDO is also concerned about integrating local policies in building design. The control instrument equipment must conform to the prevailing climatic conditions in Oman. For instance, for controlling health and safety, the local authorities must approve the measurement instrument for metering purposes following applicable Omani law governing civil defence and other governmental bodies. Furthermore, planting suitable Omani trees in landscaping is advisable to preserve water since Oman is experiencing a scarcity of water resources.

IRC 2015	:	International Residential Code 2015
IECC 2015	:	International Energy Conservation Code 2015
Estidama Pearl Rating System by Abu Dhabi - Urban Planning Council	:	Sustainable design construction and operation of communities, buildings and villas
BREEAM Gulf	:	Sustainability Rating methodology for the design stage and post construction review

Figure 7.1 International Standards in Design for Sustainability (Source: Real Estate Technical Guidelines for Buildings & Infrastructure)[15]

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[15] This report is part of the documents that this research has relied on (Table 5.3, Document No 2)

To better understand the social dimension of sustainable design, it is essential to consider how stakeholders perceive and implement these policies. It is also necessary to examine the broader institutional and political structures that shape sustainable design practices and address power dynamics and inequalities in the design process. In summary, the social practice theory highlights the importance of taking a socially informed approach to sustainable design and considering the influence of social practices, cultural norms, and institutional structures. Both international and local policies influence the PDO's efforts to promote sustainability in building design. Therefore, understanding stakeholder perceptions and institutional structures is crucial in promoting sustainable design practices.

The social practice theory emphasizes assessing how the organization addresses the dimensions of image, competencies, and materials in promoting sustainability. The reliance on international standards suggests a focus on shaping a positive image by conforming to widely recognized sustainability norms. However, this approach may overlook contextual factors and the unique needs and challenges within the local context. Regarding competencies, PDO's emphasis on international standards implies a reliance on external expertise and knowledge. While international standards can provide valuable guidance, developing local competencies and building capacity within the organization and its stakeholders is crucial to address sustainability effectively. Regarding materials, the data does not explicitly mention the choice of sustainable materials in PDO's design policies. This omission raises questions about whether the organization considers the environmental impact of materials used in building construction and whether alternative, more sustainable options are explored.

7.2.2 User-Centered Approach

The user-centered approach is commonly utilized to enhance the fulfilment of sustainability goals in buildings. This approach addresses the diverse needs of various users, such as those related to operation and maintenance, occupants, facilities management, visitors, and the security team. In PDO, the data has shown that the design process employs similar concepts of user-centered strategies. This fact has been approached from a design policy that demonstrates the planning and

initiation of design for buildings, called "UIB 2 Process Maps". Figure 7.2 shows that the design team has to engage different users during the initiation phase of design as a tool to ensure meeting their requirements, highlighted in the red circle. Despite the critical role such an approach plays in improving building sustainability, it prioritizes the users' needs, which has disadvantages. As a result, sociological perception has criticized this approach since it has overlooked the contextual influencers that have roles in steering users' intentions.
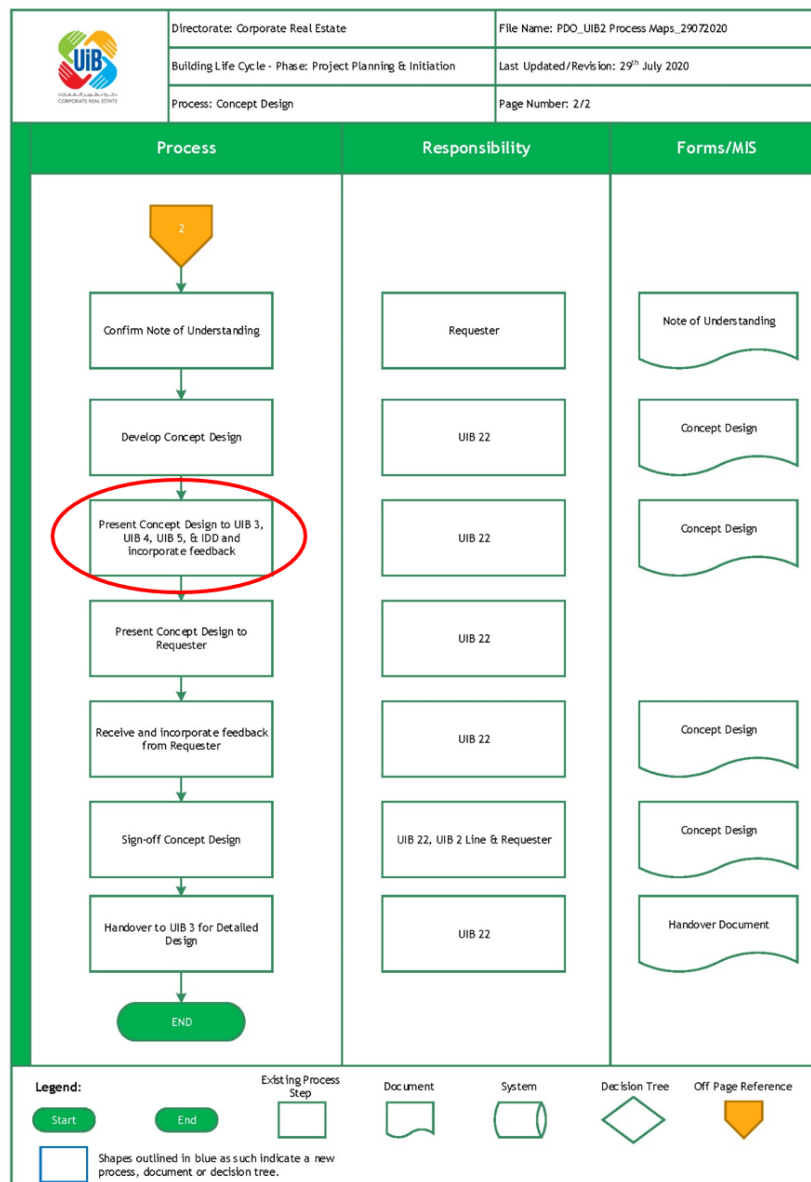
Figure 7.2 Design Process (Source: UIB 2 Process maps)

Social practice theory emphasizes the importance of understanding how social norms, expectations, and infrastructure shape people's behaviours and practices. In sustainable design, it is necessary to consider how stakeholders perceive and implement sustainability policies and practices. By taking a user-centered approach, PDO acknowledges the importance of involving different users in the design process to ensure their needs are met and implement sustainable design practices effectively. However, implementing user-centered design strategies may be influenced by power dynamics and societal inequalities. For example, certain groups of people may have more influence over the design process than others, and their needs and interests may be prioritized over those of other groups. This can marginalize certain groups and perpetuate social inequalities (Luck and McDonnell, 2006).

Therefore, it is necessary to consider the social and political context in which design takes place to promote sustainable design practices that are socially just and equitable. This includes examining the power dynamics between different stakeholders involved in the design process and the broader institutional and political structures that shape design practices. By taking a critical approach to design practices, designers can work towards creating more socially just and equitable outcomes. This involves actively seeking out the perspectives and needs of marginalized groups, considering the social and political implications of design decisions, and advocating for sustainable design practices that promote social justice and equity. Ultimately, this approach can lead to more sustainable and equitable design outcomes that better serve the needs of all members of society.

Considering image, competencies, and materials, critically analysing the organization's implementation of user-centered strategies is essential. The provided data suggests that PDO recognizes the significance of addressing the diverse needs of various users. However, a critical assessment reveals potential areas for improvement. Regarding the image aspect, while PDO demonstrates a commitment to user-centered strategies, ensuring that these practices effectively communicate the organization's sustainability values to stakeholders and the broader public is essential. Strengthening the visibility and communication of PDO's sustainable design initiatives can enhance its reputation as a leader in promoting sustainability.

In terms of competencies, the data does not explicitly mention PDO's endeavours to cultivate the essential skills and expertise within the organization for the successful implementation of user-centered strategies for sustainability. Strengthening internal competencies, encompassing a deep understanding of sustainable design principles and practices, can empower PDO to enhance and innovate its sustainability initiatives consistently. Concerning materials, the data does not offer insights into PDO's approach to material selection and its implications for sustainability. PDO may contemplate the environmental impact of building materials and explore alternative options that align with sustainable practices. By doing so, PDO can significantly contribute to its sustainability promotion efforts.

7.2.3 Technology-Based Approach

In analysing PDO's efforts to promote sustainable design, the use of technology in creating sustainable buildings is emphasized. The "Real Estate Technical Guidelines for Buildings & Infrastructure" contains the guidelines for designing sustainable buildings, including using technology in building materials. In addition, the guidelines in Appendix 4 of the policy discuss various tools for design to enhance energy efficiency and create a healthy built environment. The guidelines primarily focus on integrating technology into the materials of buildings. According to the guidelines, technical solutions for thermal performance and interior comfort are promoted in the design process. As such, the design must consider using technology to control internal thermal comfort, including glazed windows, air tightness, air barriers, and a building management system BMS.

It is important to note that social practice theory highlights the need to examine how power dynamics and inequalities may influence the implementation of sustainable design practices. This critique includes considering the influence of various stakeholders and the broader institutional and political structures that shape design practices. While using technology in sustainable design is important, it is essential to use it socially and equitably. By considering the social and political implications of design decisions and actively seeking out the perspectives and needs of marginalized groups, designers can work towards creating more sustainable and

equitable outcomes that better serve the needs of all members of society. However, the guideline has neglected the role of users in such a process, which was ignored in that policy. Therefore, the argument made in the literature supports the idea that this policy's emphasis on technology in promoting sustainability in design while ignoring the users is justified (Scott *et al*., 2012).

A thorough assessment of crucial elements such as image, competencies, and materials should accompany PDO's dedication to integrating technology into sustainable design. Conducting a critical evaluation will help identify areas needing improvement to enhance the effectiveness of PDO's sustainable design efforts. Concerning image, PDO's recognition of technology's role in the sustainable design must be effectively communicated to stakeholders and the wider public to reinforce its dedication to sustainability. Strengthening the visibility and communication of PDO's sustainable design initiatives will enhance its reputation as a sustainability leader, as Strengers (2011) suggested. Regarding competencies, the available data does not explicitly discuss PDO's efforts to develop the necessary skills and expertise within the organization to implement technology-driven sustainable design practices successfully. By enhancing internal competencies, particularly in understanding and leveraging technological advancements for sustainable design, PDO can continuously improve its sustainability initiatives and foster innovation. Regarding materials, the provided data emphasizes PDO's focus on integrating technology into building materials to address thermal performance and interior comfort. However, it lacks insights into PDO's broader approach to material selection and its sustainability impact. Wever *et al*. (2010) asserted that conducting evaluations of the environmental implications associated with building materials and exploring alternative options that align with sustainable practices will significantly contribute to PDO's sustainability promotion efforts.

7.2.4 SPT's Understanding of PDO Approaches for Buildings

To summarise the discussion of approaches used in promoting sustainability in PDO building design, this section highlights a summary to describe these tools. The literature cited in Chapter Four discusses different methods for creating sustainable building designs. Kimbell (2012) categorizes these approaches into three basic

types. The first type relies on global norms and standards to design services and facilities that meet users' needs, using the modelling and predictive measures (Ding, 2008). This approach assumes that a standardized set of practices and guidelines can be applied across various contexts to achieve sustainable design. As Vischer (2008) argues, the second approach prioritizes meeting user needs as the primary goal for sustainable design. This approach focuses on understanding the needs and preferences of building occupants, facilities management staff, and other users and incorporating these factors into the design process. Finally, the third approach aims to reduce user influence over the building by employing technology to coordinate and oversee the operation of facilities (Scott *et al*., 2012). This approach relies on building management systems and other technical solutions to regulate energy use, maintain comfortable indoor environments, and monitor and optimize building performance.

To promote sustainable design practices in its buildings, PDO has employed various design policies that rely on global norms, user-centered approaches, and the use of technology. These policies have been developed to ensure that the buildings meet the needs of their users while promoting energy efficiency and a healthy built environment. However, the effectiveness of these policies in promoting sustainability and addressing broader social issues such as power dynamics, equity, and justice needs to be examined further. Social practice theory provides a useful lens for examining these policies and their underlying assumptions about the social dimensions of sustainable design. This theory emphasizes the importance of understanding how broader institutional and political structures shape design practices and how they can either reinforce or challenge existing power dynamics and inequalities.

By applying social practice theory to the examination of PDO's design policies, it is possible to identify areas where the organization may be overlooking the social dimensions of sustainable design. For example, user-centered approaches may be designed to meet the needs of the building's occupants, but they may not necessarily address issues of social justice and equity, such as access to the building by people with disabilities or the incorporation of cultural and social values in the design process. Similarly, the use of technology to coordinate and oversee the operation of

facilities may reduce user influence over the building, but it may also exacerbate existing power dynamics and inequalities by giving more control to those who have access to the technology.

Hence, by utilizing the social practice theory to analyse PDO's design policies, it becomes possible to pinpoint specific areas where the organization can enhance its approach to sustainable design. This involves developing a more holistic understanding of the social aspects embedded within design practices. This examination enables the promotion of sustainable design practices that are not only environmentally responsible but also socially just and equitable. As this study focuses on sustainable design in the context of buildings, it is crucial to delve into the practices of BMF designers, which serves as the case study for this research.

7.3 Client's Intentions for the BMF

This section discusses the client's intentions expressed in the design brief issued to the design team for the BMF building. The investigation results indicated that the BMF design incorporated strategies commonly mentioned in the literature, including adopting global standards, a user-centered approach, and using technology to facilitate user activities. However, to fully comprehend the design approaches, it is essential to first understand the intentions established during the initial phase. This step allows tracking and evaluating each intention and examining the approaches employed to promote them. Consequently, the study examined the intentions for the BMF building through a member of the design team, as demonstrated in the following excerpt.

Excerpt from an interview with a member of the design team, conducted on April 09th, 2022:

Me: "what were the main intentions for the BMF?"

The designer: *"Six main themes or criteria that have been considered for the design of the BMF, including health, safety, comfortable and collaborative environment, low operation cost, link it with the existing building and future building, and consideration of users' requirements."*

To meet these intentions, the organization invested all its resources to ensure the design was practical and incorporated the latest technology and materials available at that time. First, the interior design materials were also up-to-date, and the initial design focused on an open workspace, following international standards in designing offices. The design team focused on creating a comfortable and collaborative environment that would promote social interactions among employees. Second, using the user-centered approach, the designers provide all the necessary employee services, including restaurants, rest areas, cafes, banking services, and prayer halls for both men and women. The prayer building adjacent to the BMF lets employees practice their worship rituals during break time. There are also internal chapels within the building for women to allow them to practice their worship during breaks. Finally, using technology to manage users' activities was intended to promote sustainable practices by encouraging efficient resource use. The following sections examine how the designers have employed these strategies to promote each design intention for the BMF.

By applying the social practice theory to analyse the case study of the BMF building, it becomes evident that the design team aimed to promote sustainable practices by giving importance to the requirements and preferences of the building users. First, the design team focused on creating a comfortable and collaborative environment that would promote employee social interactions. Providing necessary services such as restaurants, rest areas, cafes, and banking services within the building was intended to reduce employees' need to travel outside, promoting sustainable transportation practices. Moreover, using electronic systems to manage the building's operation can be seen as a practice promoting sustainable energy consumption. Finally, constructing a prayer building adjacent to the BMF and internal chapels within the building demonstrates an understanding of the social dimension of sustainable design, including issues of power, equity, and justice. The following sections examine how the designers have employed these strategies to promote each design intention for the BMF.

7.4 Strategies for Enhancing BMF Client's Intention

This section is to analyse the various approaches used to promote the client's

intentions of the Bait Mina Al Fahal (BMF) building. The design team employed several strategies to achieve their goals. These approaches will be critiqued based on the literature and explored by examining users' daily activities to determine how well they align with the designers' expectations. The objective is to evaluate the effectiveness of the design strategies in promoting sustainability and address any gaps between the design's intentions and the building's actual use.

7.4.1 Using International Standards

As previously mentioned, the design team of the BMF building had a set of intentions in mind, as indicated by certain individuals involved in the design process. To achieve these objectives, the designers employed various strategies. Using social practice theory, we can examine how these strategies and design intentions are embodied in the daily practices of employees in the BMF building. Social practice theory focuses on people's everyday practices and how social norms, cultural values, and material conditions shape them. For example, we can look at how the building's layout and amenities affect how employees interact and collaborate, how technology affects their daily routines, and how the building's design facilitates or hinders their access to resources and services. By analysing the social dimension of sustainable design in this way, we can better understand how design interventions can influence and shape everyday practices and contribute to more sustainable and equitable societies.

According to the data, it is evident that the design of the BMF building adheres to international design standards, which is one of those strategies employed, as confirmed by a design team member involved in its development. The excerpt below demonstrates this fact.

Excerpt from an interview with a member of the design team, conducted while visiting him at his office on March 15th, 2022:

The designer: *"International standards have been used in designing all building features, including health and safety, furniture, and other facilities."*

As a result, the BMF building was evaluated for LEED standards by an external

group and an internal committee comprising various parties, including designers and the operation and maintenance team members specialized in sustainability. Opportunity to joined this committee as a participant observer during the research fieldwork from February to May 2022 was provided by the host. This participation allowed for the exploration of critiques in sustainability standards, which the literature has highlighted in Chapter Four. In addition, participation in the committee provided valuable information to examine these issues and understand how the standards for promoting design sustainability can lead to poor results. The observations made during the assessment process are discussed in the following sections. These include the marginalization of predicted data used in the design, overlooking users' concerns, neglecting local policies used in the construction industry, and ignoring cultural differences.

a. Poor Connection between Predicted and Actual Use

During the evaluation process, it became evident that the data used for designing the BMF building was marginalized. The design team primarily relied on specific data, such as the number of users and rooms, to determine the requirements for water, energy, waste management, and other facilities. However, the assessment process solely relied on current operating data without comparing it to the anticipated data during the design stage. Consequently, a noticeable discrepancy emerged between the design and evaluation data utilized by LEED. Furthermore, the assessment process highlighted that LEED conducts independent assessments for building sustainability, focusing on the design and construction, while the other concerns operation and maintenance. Unfortunately, there is no connection or relationship established between these two assessments. Each assessment follows distinct criteria and grants separate certificates. The following excerpt is provided to illustrate this concern.

Field notes, excerpt from the discussion at the BMF certification committee during the weekly meeting, March 02nd, 2022:

During a committee meeting held on a weekly basis, there were deliberations concerning the water and electricity usage in the BMF building, which was deemed

necessary to be submitted to LEED for certification purposes. The meeting attendees engaged in discussions about the meter readings related to the building's water and electricity consumption. At a certain juncture, it became imperative to enquire from the committee whether the present consumption should be compared to the projected data utilized during the building's design phase to evaluate the design intention. In response to this inquiry, the representative from LEED provided a response:

"*This process for such an existing building is nothing to do with the design process as each stage has different data for certification.*"

The data provided in the field notes highlights the marginalization of design data for the BMF during the evaluation process, which indicates a misalignment between the design and evaluation stages. According to social practice theory, this misalignment can be attributed to how designers approach sustainable design. For example, designers may focus on designing sustainable buildings without necessarily considering how people will interact with these buildings and how their behaviours and routines can affect the building's sustainability outcomes. Furthermore, the data shows that LEED carries out two types of assessments for building sustainability, one for the design and construction phase and another for the operation and maintenance phase, with no connection or relationship between them. However, relying solely on project design or appropriate on-site management to achieve sustainable development goals and reduce environmental impact is insufficient. The pursuit of sustainability must extend beyond the project design stage and be considered early in the development process, even before any commitment is made to proceed with the project (Ding, 2008; Li *et al*., 2018).

From a social practice theory perspective, this indicates a lack of understanding of the social dimension of sustainable design. Sustainable outcomes are not only dependent on the physical design of the building but also on the practices and behaviours of people who use and maintain the building. Therefore, it is essential to consider the social practices involved in building use and maintenance to ensure sustainable outcomes. As such, social practice theory can provide a useful lens for analysing the efforts of designers to encourage and promote sustainability and its

manifestation. By examining the social practices involved in sustainable design, we can better understand how designers can design buildings that align with sustainable outcomes and ensure that the social dimension of sustainability is adequately considered.

Furthermore, the data indicates the pursuit of LEED certification by PDO, reflecting its commitment to promoting sustainability in its buildings. However, there is a concern regarding the marginalization of design data during the evaluation process. This raises questions about the organization's ability to effectively convey its commitment to sustainability to stakeholders and the wider public. Therefore, PDO should prioritize enhancing the visibility and communication of its sustainable design initiatives to reinforce its image as a sustainability champion.

Second, the data suggests that PDO has engaged with the LEED evaluation system to assess the sustainability of the BMF building representing the competencies. However, a concern is raised regarding the discrepancy between LEED's design and evaluation data. This indicates a potential competency gap in effectively aligning the anticipated data during the design stage with the current operating data for evaluation. Therefore, PDO should aim to develop competencies within its design team to ensure a more seamless integration of data throughout the design and evaluation phases, enabling a more accurate assessment of sustainability performance.

Finally, while the provided data focuses more on the evaluation process, it indirectly highlights the materials used in the BMF building design. The data suggests that the design team has considered the integration of technology into building materials to address thermal performance and interior comfort. This indicates an awareness of the importance of material selection for sustainable design. However, the data does not provide further insights into PDO's specific approach to material selection or whether sustainable material considerations extend beyond thermal performance. PDO should consider expanding its focus on materials to encompass a broader range of sustainability criteria, such as environmental impact, resource efficiency, and occupant health, in line with LEED's requirements and industry best practices.

b. Overlooked Users' Concerns

During the fieldwork, the participant observer noted that the committee's evaluation process exhibited minimal consideration for the concerns and perspectives of building users. Although the LEED sustainability assessment criteria aimed to capture users' perceptions and concerns regarding the built environment through a questionnaire survey. However, it was observed that the survey administered to users consisted of only two questionnaires, one focusing on their commuting experiences and the other on interior environmental quality. Furthermore, the surveys relied on subjective measures and yielded a low response rate, representing only ten percent of the total users. As a result, the participant observer, actively involved in the evaluation process, intervened during the committee session to inquire about the treatment of building users within the evaluation process.

Field notes, excerpt from the discussion with a member of the certification committee for the BMF, March 08th, 2022:

Me: "Is there any consideration for the concerns of users about the building design as part of the certification process?"

The member: "*Yes, a simple survey will be distributed to all users remotely, which can be filled out in two minutes. This survey mainly concerns transportation, which only has to be filled by 250 users. The weight of this criteria is only 10% among the other criteria used for the evaluation.*"

In this instance, the committee's approach to sustainability assessment appears to prioritize quantitative measures over the qualitative experiences of building users. Consequently, the simple survey administered to users only offers a limited understanding of their concerns and perceptions regarding the design of the building. This indicates that the users were disregarded in this process, thereby supporting the criticism raised in the existing literature. The current state of the built environment has received significant attention in recent years, highlighting the need for sustainable development. Green building, which aims to minimize the adverse environmental impact of buildings, is a crucial aspect of sustainable development. However, existing studies have disproportionately focused on the environmental

dimension of green building while neglecting other dimensions of sustainability, particularly social sustainability (Zuo and Zhao, 2014).

Furthermore, the observation provided additional evidence to support the notion of users being marginalized during the evaluation process. The committee had instructed distributing surveys to the users as a crucial step in the process. However, the fieldwork uncovered that users were not adequately informed about the significance of this procedure. Consequently, the behaviour of users within the building was closely monitored. The findings revealed a lack of responsiveness from users towards the emails sent by the committee, indicating their limited awareness regarding the importance of the survey. These results strongly suggest that the evaluation process failed to prioritize the perspectives of users and inadequately addressed their concerns. The following excerpts exemplify this observation:

Field notes, excerpt from the discussion with some users about the survey sent out to them by the committee as part of the certification process, February 14th, 2022:

While observing the practices of users at the BMF, it was noticed that the survey received less attention from them, as they did not discuss it amongst themselves. This observation resulted in interactions with several users to inquire whether they had received the committee's email about the survey. However, the users appeared uncertain regarding transportation and asked whether they should consider transportation from one building to the other within the camp or from their homes to the building. This observation highlights the users' lack of awareness of the survey's content and suggests the committee needs to engage with users regarding the survey's purpose. This concern was raised with the committee at the following weekly meeting as some cases were observed that show lack of consideration to the users' actual concerns. Those observations have demonstrated the need for understanding the actual practices of users rather than relying on predictive data used by the evaluation systems. An example of those concerns is discussed below.

i. Lighting

Lighting plays a crucial role in enhancing the comfort and productivity of individuals in the built environment (Frontczak and Wargocki, 2011). Consequently, buildings must be designed to ensure appropriate lighting conditions for users to carry out their activities effectively. There are two primary approaches to lighting buildings: natural lighting through windows and artificial lighting using lighting fixtures. On the one hand, research has demonstrated that occupants prefer offices with windows to benefit from natural lighting, as it contributes to user satisfaction (Newsham *et al.*, 2009). As a result, building designers strive to incorporate natural light into their designs to enhance user contentment. However, on the other hand, studies have indicated that excessive natural lighting through windows can lead to increased energy consumption due to heat gain through glass surfaces (Hee *et al.*, 2015). Hence, window design requires careful consideration of various factors, including the selection of insulating materials and the angles and orientations concerning the sun's movement.

In designing the BMF building, natural and artificial lighting was considered to maximize the utilization of the seaside location and minimize operational costs, as understood by the designers. However, the fieldwork conducted at BMF has revealed some issues regarding the lighting design of the building. For example, the study has shown contradictory problems between employees with access to natural lighting and those without access. First, those who work in departments away from windows and natural lights have raised concerns about poor artificial lighting and its impact on their health. The following excerpts provide insights into users' opinions on lighting design at BMF.

Field notes, excerpt from the interaction with an employee from the finance directorate at the BMF, 13th March 2022:

"Lighting in the non-window area is poor."

Field notes, excerpt from the interaction with an employee from the oil north directorate at the BMF, 21st February 2022:

"No natural light in some areas such as cooperation work environment CWE"

Field notes, excerpt from the interaction with an employee from the HR directorate at the BMF, 22nd August 2022:

"The areas with no natural light or sea view have to have at least another feature to be equivalent to others."

Thus, the lighting design may be criticized for not considering the users' skills, stuff, and images. The lack of consideration of these elements might have led to contradictory problems between employees with and without access to natural lighting. Such issues can arise when designers assume employees must fully comply with these technical influences. The image aspect, which encompasses the symbolic meanings and perceptions associated with lighting, has not adequately addressed the well-being and comfort of employees in areas with poor artificial lighting. The skills dimension, which refers to the abilities and practices of individuals, has not been considered in terms of providing suitable lighting solutions that support the work activities and health of employees. Finally, the stuff element, which pertains to the physical design elements and materials, has not sufficiently catered to employees' diverse lighting needs and preferences throughout the building.

The excerpts from the field notes above demonstrate the users' discontent with the lighting design at BMF. It becomes evident that PDO's design intentions and sustainability initiatives concerning lighting design have fallen short of meeting the users' needs and preferences. This case underscores the significance of considering users' social practices and experiences in design processes. The lighting design has not adequately addressed the diverse requirements of employees regarding access to natural and artificial lighting. To effectively promote sustainability, PDO should consider the insights provided by social practice theory, ensuring that the lighting design caters to the well-being and productivity of all employees, regardless of their location within the building.

Secondly, feedback from users in departments with access to natural light has shed light on their perspectives regarding window design, uncovering distinct concerns

compared to employees who work in windowless areas. These concerns encompass the lack of openable windows, which limits the availability of fresh air, and the influence of large windows on internal temperature. The following excerpts offer an indication into the viewpoints expressed by users.

Field notes, excerpt from the interaction with an employee at the BMF, 16th February 2022:

Me: "You are lucky since you have a sea view."

The employee: *"So what? I can't access the fresh air as I cannot even smell the sea air!"*

Field notes, excerpt from the interaction with the building manager on this issue at the BMF, 17th August 2022:

"Users who sit near the window feel hot in the summer, which has enforced the facilities management to fix curtains to all windows."

These findings can be further comprehended through the lens of the social practice theory, which encompasses the elements of stuff, skills, and images. For example, the building design, such as the lighting and window design, can be categorized as "stuff" that influences the practices and experiences of the users. However, users also have skills and knowledge that influence how they interact with the building, such as their preferences for fresh air or access to natural lighting. In addition, the images associated with the building, such as its seaside location or modern architecture, also shape how users perceive and experience it. Overall, the data highlights the importance of user-centered design and the need for designers to consider users' diverse needs and preferences when creating sustainable buildings. By using a social practice theory lens, designers can better understand the practices and experiences of users and develop designs that meet their needs and enhance their well-being.

Thirdly, alternative perspectives have been voiced by different user groups, contrasting with the previously mentioned groups. Interactions with these users have revealed valuable insights the design team may have overlooked. Specifically,

these users have raised concerns regarding the absence of natural lighting in specific building areas, such as staircases and ground-floor restaurants. Criticisms have been directed toward the design team for neglecting such vital considerations in a building of the magnitude of BMF. Consequently, a visit was paid to these facilities to observe the issue. Figure 7.3 visually represents one of the staircases, illustrating the lack of natural light. Photography of the restaurants posed a challenge due to the presence of individuals since privacy was considered in this research. This design issue underscores the significant impact that design choices made by the building's design team can have on the users' overall experiences.
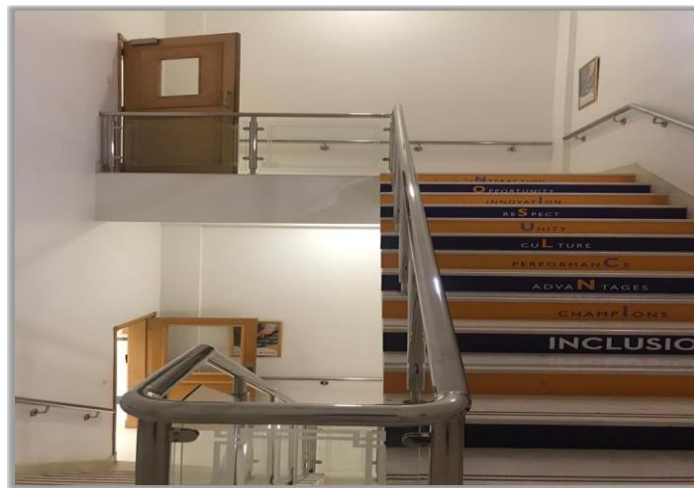
Figure 7.3 Example of the design of the staircase (Source: Author)

The air conditioning distribution system presents another design issue when users are considered passive participants. The fieldwork conducted in this study examined users' daily activities, revealing concerns about the design of air distribution in the building. For example, Figure 7.4 illustrates how some diffusers have been designed to be placed right on top of workstations, providing some users with excess cooling. Additionally, several users have brought up the issue of the airflow disparity between desks that are close to windows and those that are not. Such an issue has led to a situation where the employees who sit near windows often feel warm, while those who sit far from windows often feel cold. This situation may be due to poor coordination between the building designers on the one hand and the team in charge of the interior design on the other.
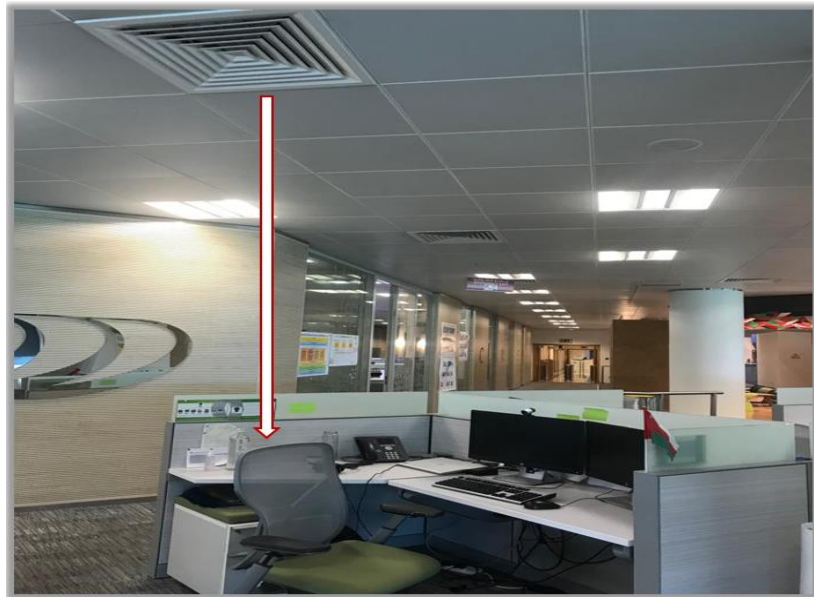
Figure 7.4 Location of the Air Diffuser (Source: Author)

The data suggests that designing buildings that consider users' practices is essential for achieving sustainability goals. Giving users the freedom to decide on the appropriate climate for them is crucial because it is associated with several influences that cannot be dealt with through unified models and global standards. Moreover, flexibility in design is necessary to accommodate the various cultural, religious, and geographical differences that affect users' daily activities. Finally, designers need to recognize that users are active participants in shaping their practices and that the success of sustainable design initiatives depends on their engagement and participation. In conclusion, the data presented highlight the importance of considering users as active participants in building design to achieve sustainable outcomes. By incorporating social practice, designers can create buildings more responsive to users' needs and practices, leading to better sustainability outcomes.

Scott *et al*. (2012) have criticized the approach of considering human users as passive and having no presence and influence, which has led to poor results. For instance, the operation and control of air conditioners in the BMF have been delegated only to the operation and maintenance team, assuming that the employees will fully comply with these technical influences. However, this approach is

inaccurate since humans should be considered active participants in the design process, as indicated in the literature (Bluyssen *et al*., 2011). Accordingly, studies have shown that giving users the freedom to decide on the appropriate climate for them is essential, as it is associated with various influences that cannot be dealt with through unified models and global standards (Roaf *et al*., 2011). For example, some countries have relied on being more flexible with workers in choosing lighter clothing during the summer to adapt to the building's internal environment. However, due to cultural and religious barriers, this flexibility may be challenging to apply in some Eastern countries. Accordingly, the literature has demonstrated that designing buildings is a complex process that must consider various influencers on users' daily activities, including social, geographical, political, and cultural considerations related to society (Chappells and Shove, 2005), and such consideration is significant for buildings with a global presence, such as the BMF building.

c. **Lack of Consideration for Local Policies**

In the context of the PDO's sustainability assessment of buildings, it is essential to review the reliance on a global system. The evaluation process revealed that the assessment criteria do not consider the institution's culture and the country's climate. Furthermore, the evaluation process overlooks the policies that are specific to building construction in the Sultanate. For example, the LEED assessment system is tailored to the needs of a particular country. Therefore, it may not suit the Sultanate's cultural and policy context and weather conditions. As a result, using such a system in other countries may not produce the desired outcomes. The following excerpt illustrates this concern:

Excerpt from an interview with the head of the certification committee, conducted on April 17th, 2022:

Me: "Why are you relying on the LEED rating system to assess the BMF"?

The head of the certification committee: *"Because it is less complicated and more global."*

Using a global system may not necessarily align with the social practices and policies specific to the Sultanate. Instead, designers should consider more inclusive and considerate of the social practices and concerns of the users. Furthermore, the head of the certification committee's statement that the LEED rating system is used because it is less complicated and more global highlights the need to prioritize social sustainability in sustainable design approaches. The use of a global system that overlooks the cultural and policy context specific to the Sultanate is not sustainable in the long run. Therefore, designers should strive to develop sustainable design practices that are more inclusive, engaging, and participatory to promote sustainability in buildings that align with the social practices and concerns of the users.

Sustainability has become an increasingly important concern worldwide, with many countries looking to implement green building practices to reduce their environmental impact. To achieve this, many countries have developed their own rating systems for sustainable buildings tailored to meet their specific needs and suit the local culture. These rating systems offer a set of guidelines and criteria for assessing the sustainability of buildings, considering factors such as energy efficiency, water conservation, waste reduction, and indoor air quality (Shirazi and Keivani, 2017). One example of such a rating system is the BREEAM system, developed in the United Kingdom and widely adopted in Europe and other parts of the world. The BREEAM system assesses the sustainability of buildings based on various environmental factors, including energy efficiency, water use, and materials selection, as well as social factors, such as accessibility and health and well-being.

Similarly, the Estidama system, developed in the United Arab Emirates, offers a set of sustainability standards for buildings in the region, considering the area's specific environmental and cultural context. The system considers factors such as energy use, water efficiency, indoor air quality, and the impact of buildings on the surrounding environment and communities. Other countries, including Australia, Japan, and Qatar, have also developed rating systems for sustainable buildings, reflecting their regions' unique environmental, cultural, and economic factors. These rating systems are designed to promote sustainability in the built environment and encourage the development of energy-efficient, environmentally friendly, and

socially responsible buildings.

d. Neglection of Cultural Differences

Utilizing global standards in building design without considering cultural factors is a crucial issue that requires re-evaluation. While the open environment system provides benefits in efficient communication and enhanced collaboration, it may not be suitable for other cultures, particularly regarding social and religious considerations. The implementation of the open work environment system is aligned with the Dutch Shell Company, a strategic partner of the institution. It is consistent with the office environment regulations of developed countries. Nevertheless, this work environment model may not be effective in other societies, such as those in the Middle East. The following excerpts illustrate the dependence on international standards to promote collaboration and communication in building design.

Excerpt from an interview with a member of the design team, conducted while visiting him at his office on March 09th, 2022:

"One of the design's main themes was to create a comfortable and collaborative environment: modern open space design."

One crucial issue that needs re-evaluation is the utilization of global standards in building design without considering cultural factors. According to social practice theory, individuals' daily practices are shaped by their social context, including culture, values, and beliefs (Bourdieu, 1984). Thus, it is crucial to consider cultural factors in building design to align with local practices and promote sustainable behaviours. The data reveals that while the open environment system benefits communication and collaboration, it may not be suitable for other cultures, particularly regarding social and religious considerations. For instance, some cultures may prefer a more private work environment. This highlights the need to consider social practices in building design to ensure that the design aligns with local practices and preferences.

Furthermore, the data suggests that the open work environment system aligns with the Dutch Shell Company and developed countries' office environment regulations. However, this may not be effective in other societies, such as those in the Middle East. Practice theory emphasizes the importance of context-specific practices and as such, designers must consider the social context in which the building will be used to promote sustainable practices effectively. Therefore, incorporating social practice theory in the design process can help identify and address the social dimensions of sustainability to ensure that building design aligns with local practices and promotes sustainable behaviours.

The importance of integrating findings from interpretative social sciences into professional practices to challenge prevailing intervention design processes is emphasized by Hoolohan and Browne (2020). Practice theories provide a framework for design thinking that facilitates a shift in design practices toward a deeper understanding of the intricate social and material connections that underlie daily routines. Traditionally, design professionals have emphasized design's technical and aesthetic aspects, often neglecting the social dimensions. By incorporating interpretative social sciences and practice theories into design, this gap can be bridged, encouraging designers to consider the social context of their work. Practice theories center on the practices and routines of everyday life, exploring how social and material factors shape them. By integrating these theories, designers can better understand the social contexts in which their designs will be implemented. The following observations have demonstrated the role of culture on the promotion of sustainability in buildings such as the BMF.

i. Open Space Environment

Adopting an open space environment is one of the models employed to optimize space utilization and foster employee cooperation. This approach fosters a sense of equality among employees by providing them access to the same amenities and services while working in the same area. As a design objective, the PDO has sought to promote collaboration and communication in office buildings by adopting the open environment model, as illustrated in Figure 7.5. The initial introduction of this model took place in the BMF building, which serves as the company's main facility.

Subsequently, this model was extended to encompass all other buildings. During my interaction with a senior employee at the BMF on August 22, 2022, it was mentioned that PDO formed a partnership with Dutch Shell Company, which had effectively implemented this model in its offices, which has led to enhanced collaboration and communication among employees. The expectation was that the favourable outcomes observed in Shell's offices would improve work performance at PDO. However, there have been some issues associated with this approach.
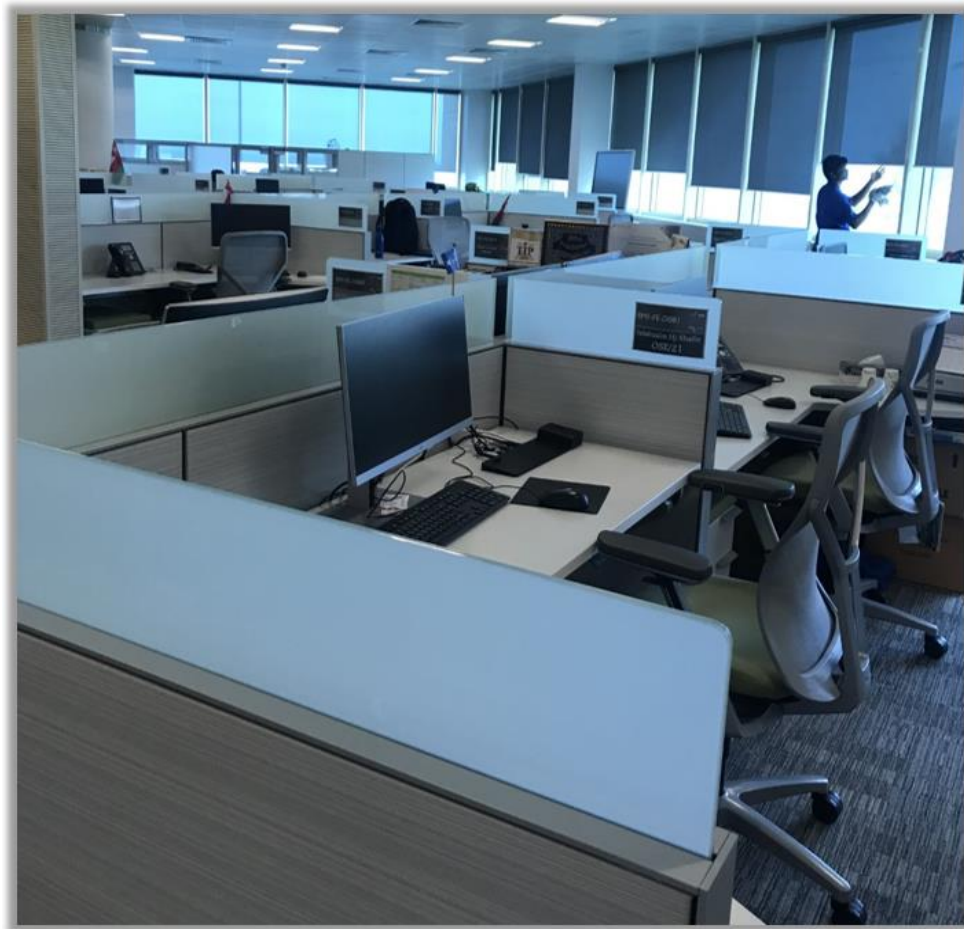
Figure 7.5 Open Work Environment (Source: Author)

Initially, implementing an open work environment has generated specific challenges, as some employees have found it distracting and contrary to the intended goal of fostering collaboration and communication. Despite employing acoustic control methods as a design strategy discussed in section 7.4.3, the fieldwork has verified that this issue was among the primary concerns raised by the BMF staff. This observation has revealed the limited effectiveness of the technical

solutions employed to manage noise. Several employees expressed significant apprehension about the noise, resulting in some occasionally choosing to work from home. While multiple individuals have expressed their concerns, the following excerpts illustrate these issues.

Field notes, excerpt from the interaction with an employee at the BMF, 16th February 2022:

"Many staff tend to avoid coming to the building in the morning because of the noise as most meetings have to start."

Field notes, excerpt from the interaction with an employee at the BMF, 03rd August 2022:

"The layout design is promoting noise and distraction."

The data presented highlights the challenges associated with implementing open work environments in organisations. According to the social practice theory, users' responses to new designs are influenced by their pre-existing practices, skills, and images. For instance, the ability to focus and concentrate may be seen as a crucial skill for completing tasks, and noise levels that disrupt this skill may lead to negative responses to the open work environment. Additionally, the image of the workplace as a space that values individual privacy may be challenged by the lack of physical boundaries in the open work environment. Therefore, an in-depth analysis of the social practices of employees in relation to the open work environment may provide valuable insights into the factors that affect their responses to the design intentions and sustainability initiatives. Such insights can inform the development of tailored strategies that consider the skills, knowledge, objects, and images relevant to employees' daily routines and habits. They can ultimately contribute to the successful implementation of sustainable workplace design.

The open office model has been widely adopted in developed countries to enhance employee communication and collaboration, for instance, in the case of the Dutch Shell company. This model has received praise for its potential to improve

productivity, stimulate innovation, and promote a sense of equality among employees. However, criticisms have emerged regarding implementing the open office model in the literature. One significant concern raised by critics is the potential for mental distractions and the loss of privacy. Research studies have indicated that noise levels in open offices can harm employee productivity and increase stress levels (Kim and de Dear, 2013; Haapakangas *et al*., 2018). Furthermore, the lack of privacy in open offices can challenge employees to focus on their work, resulting in frequent interruptions and distractions (Brennan *et al*., 2002).

These concerns highlight the importance of considering the social dimensions of design when implementing sustainable design initiatives. For example, while the open office model may effectively promote collaboration and communication, it is vital to consider the impact on employee well-being and productivity. This situation can be achieved by incorporating design strategies that address noise control and privacy and providing employees with alternative workspaces for individual focus and concentration. Implementing sustainable design initiatives requires a holistic approach considering the design's social, economic, and environmental dimensions. By considering the impact on employees and other stakeholders, designers can create more effective and sustainable solutions that meet the needs of all those involved.

The second primary concern raised by employees regarding the open work environment was the issue of privacy and confidentiality. Despite the original design intentions to promote collaboration and communication discussed in section 7.3, the lack of privacy in this type of workspace has caused distress for several employees, particularly senior managers. The privacy issue was brought to light through conversations with a manager who expressed profound concerns about the open environment. He asserted that this type of workspace had limited his ability to perform his duties as a manager as it hindered the discussion of confidential matters, such as the promotion of staff. The manager's concern is valid and understandable, as discussions regarding such sensitive topics require privacy and confidentiality, which isn't easy to achieve in an open environment.

Field notes, excerpt from the interaction with a manager at the BMF on the open work environment, 17th March 2022:

"It is hindering confidentiality and privacy. For instance, I can't leave any document on the desk which is classified as confidential such as the promotion of my staff, and the discussion of such matter can easily be observed by the concerned employees."

Field notes, excerpt from the interaction with an HR employee at the BMF, 22nd February 2022:

"Due to the nature of HR work, staff are tended to work from home if they have confidential work."

The idea of an open workspace as a cooperative and communicative environment has been presented as an attractive and modern design strategy in this context. However, employees' actual experiences and requirements in such a space may not align with this idealized concept. For example, the skill of maintaining confidentiality and privacy is essential for senior managers, but it can be challenged in an open workspace. Additionally, the physical elements of the workspace, such as the layout and proper control measures, can either facilitate or hinder the practice of maintaining privacy and confidentiality. In this case, the absence of physical barriers and effective sound control measures contributes to the difficulty of upholding privacy in an open workspace. Overall, the issue of privacy and confidentiality in an open work environment is a legitimate concern that needs to be addressed by designers and managers. Therefore, while the design approach of promoting collaboration and communication in workspaces is desirable, it is essential to consider employees' actual experiences and needs. Therefore, the design process should incorporate the necessary skills and physical elements to maintain privacy and confidentiality, which are crucial for creating a functional and supportive workspace.

Furthermore, implementing an open work environment has given rise to a third concern: the cultural issues that have been overlooked and marginalized in the design intentions. The fieldwork conducted with users has uncovered significant

resistance to this type of working environment, influenced by cultural factors that were not adequately considered during its creation. The study's findings indicate that both men and women, across various cultural backgrounds reject such an environment for cultural reasons. Specifically, the conservative culture in Oman strongly opposes the mixing of genders in a single environment, an aspect that the designers neglected in their design approach. The following excerpts are provided to illustrate this concern.

Field notes, excerpt from the interaction with a male employee at the BMF on the open work environment, 20th February 2022:

"Open space is against a human culture which maintains male and female in the same area."

Field notes, excerpt from an interview with a member of the change management team concerned with convincing the users on the open plan environment, which was the first case in PDO, 10th February 2022:

"*One of the main challenges in the open work environment was to convince the female about this new layout. It was so difficult for women to accept such a layout. I remember that one of the women was carrying!"*

To understand this concern, Shove highlights the importance of understanding the material, social, and cultural aspects of practices that shape and are shaped by the use of things, skills, and images. In this case, the material aspect of the practice is the open work environment, which is designed to promote collaboration and communication. The social aspect of the practice is the employees who use the open work environment and the cultural factors that influence their behaviour and practices. Finally, the cultural aspect of the practice is the conservative culture in Oman, which opposes the mixing of genders in one environment. Therefore, to address the cultural concerns raised by the implementation of an open work environment, the designers should have considered the social and cultural practices of the employees who will use the space. In addition, the design should have considered the skills and physical elements required to maintain privacy and confidentiality and cultural factors that may influence user practices (Shove, 2010).

By doing so, the designers would have created a functional and supportive workspace that meets the needs and practices of the employees.

The practices above have highlighted the significant influence of culture on the behaviours and attitudes of building users, emphasizing the importance of considering cultural factors in the construction of practices. However, the designers of the BMF have failed to recognize the role of culture in shaping users' responses to the open work environment, assuming that implementing this design approach would yield similar results to those achieved in the Shell company, which disregarded the cultural differences. Consequently, PDO has addressed this issue by appointing a communication and change management team to engage with users and comprehend their concerns discussed in section 7.5.1. This team initially sent out a survey to gauge users' perceptions and expectations of the new work environment but received negative feedback and resistance. Consequently, the team adopted a direct interaction approach, including an opening statement, gifts, a tour, and a guide on using and behaving in the open work environment to motivate and physically understand the users' concerns.

Unfortunately, the attempts to persuade users to embrace the open work environment have yielded limited results. Despite the efforts of the change management team, the influence of culture has proven to be more significant, leading the designers to modify the layout of the workstations to accommodate the demands of the users. For example, as shown in Figure 7.6, a glass sheet was added to the top of the workstations to prevent eye contact between men and women, fulfilling a crucial requirement dictated by the cultural context. However, this modification compromised the designers' original objective of enhancing communication through an open workspace. As a result of the fieldwork, it was discovered that the intended collaborative and communicative environment was hindered as most employees were required to stand up when engaging in conversations with their colleagues.

Therefore, this situation has provided valuable insights to designers advocating for an open workspace. Firstly, it highlights that the design objectives often overlook the influence of non-personal factors, such as culture, on people's behaviours.

Secondly, it challenges the assumption that users are passive in the design process, as this experience has demonstrated that users are active participants capable of shaping the design. This finding aligns with the social practice theory, which underscores the significance of habitus in shaping people's practices (Bourdieu, 1984).
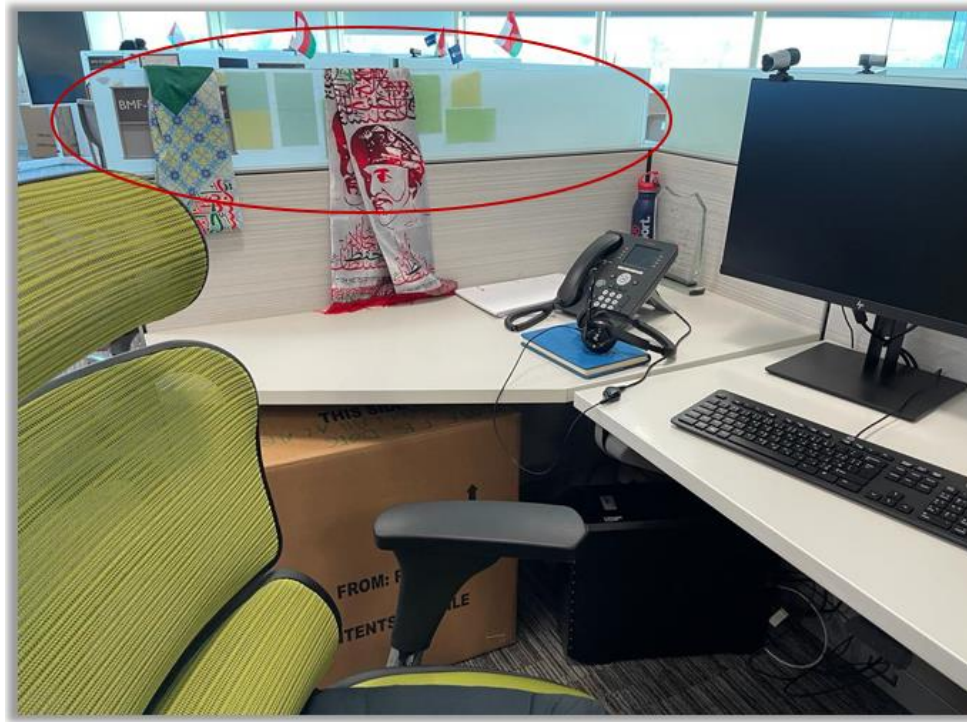
Figure 7.6 Modification of the Layout (Source: Author)

ii. Breakout Areas

Creating socialization areas is necessary for an open work environment to encourage employee communication and collaboration, as discussed in section 7.3. Therefore, the designers established breakout areas in each BMF building department with all the necessary employee resources. These areas offer high-quality services to employees during their free time and include various facilities such as coffee machines and spaces for discussion and eating. During the fieldwork, opportunities were presented to interact with employees in these breakout areas across different departments and utilize the facilities provided. Additionally, efforts were made to visit these areas during designated break times (9-9:30 am and 12-1 pm) to engage with employees regarding the research objectives. Accordingly, the

daily practices of users were observed, revealing that the intended objectives of the breakout areas had been achieved. However, valuable alternative insights have been revealed that go beyond the initial expectations of the designers. For example, the research explored two distinct practices highlighting cultural and business-related issues.

From a cultural perspective, it was observed that female employees used the breakout areas less frequently for eating and discussions than their male counterparts. This finding emphasizes the importance of stuff, skills, and images in shaping daily practices. By providing necessary resources and facilities, the designers of BMF buildings have attempted to create an environment that facilitates specific social practices. In this case, the "stuff" refers to the physical resources provided in the breakout areas, such as coffee machines and spaces for discussion and eating. The "skills" refer to the abilities and practices required to effectively use the breakout areas, such as socializing and communicating with colleagues. The "image" refers to the cultural and social perceptions associated with using the breakout areas, such as gendered expectations and norms surrounding socialization in the workplace.

This observation suggests that cultural barriers might hinder women's use of these spaces, possibly due to social norms restricting women from interacting closely with men or talking loudly in public environments (Bourdieu, 1984). It has been revealed that the influence of culture on the daily practices of users cannot be overlooked. This case aligns with the existing literature on the subject, as previously identified by Shove and Pantzar (2005). Unfortunately, the BMF design may have failed to consider this crucial aspect, leading to a gap in the intended use of the breakout areas. The social practice theory emphasizes the importance of understanding the relationship between culture and practices, including the role of objects, skills, and images in shaping behaviour. Therefore, designers and organisations should consider the cultural context of their users to ensure that their design meets the intended objectives and promotes sustainable practices.

iii. Privacy of Male and Female

During the fieldwork, it was discovered that the design of the BMF building's toilets

for men and women had placed them side by side, as depicted in Figure 7.7. This design issue was affirmed during a physical visit to the toilets reaffirming the sentiments of some employees. Female employees in particular, expressed reluctance to use these facilities, particularly during peak times such as breaks or the end of the workday. This finding suggests that the design of necessary facilities like restrooms has created resistance among female employees, possibly due to the lack of consideration for cultural factors during the design process. The close proximity of the male and female areas has compromised the privacy of both genders, making it difficult for them to use the facilities comfortably. This case is another example of disregarding cultural considerations in the design process, raising concerns about the designers' neglect of an essential aspect of Omani culture.

Figure 7.7 The Design Layout for Toilets of Male and Female (Source: Author)

Furthermore, there is discontent among certain employees regarding the design of the toilets. Both male and female users have expressed dissatisfaction with the partition design, which consists of half walls instead of complete walls, as depicted in Figure 7.8. This design flaw has led to a sense of discomfort among users, who have raised concerns about their compromised privacy. The absence of complete walls between the toilets has become a significant issue impacting users' daily experiences. Some users have questioned whether cost-saving measures drove this design decision, as it appears to prioritize financial considerations over user privacy and comfort. This design flaw has undoubtedly had negative consequences for users

and underscores the importance of incorporating user feedback and considering cultural practices and expectations in the building design process. Therefore, it is crucial to understand the needs and expectations of users and integrate them into the design process to ensure user satisfaction.

Figure 7.8 The Design of Internal Walls of Toilets (Source: Author)

iv. Local and International Employees

Considering cultural factors is deemed essential when designing buildings (Warde, 2005). Hence, the design team must prioritize understanding the culture of the building users as a significant factor. This entails taking into account the cultural norms and values that influence users' behaviour and aligning them with the design objectives. As a result, several countries recognize the importance of cultural aspects as criteria for ensuring the sustainability of buildings (Shirazi and Keivani, 2017). Consequently, the designers involved in the BMF project, being Omani themselves, are expected to have firsthand experience and understanding of these cultural constants, thereby enabling them to address these concerns effectively.

However, it was observed during the fieldwork that cultural considerations were not given much attention in the design of the BMF building. This observation was approached through interactions with male and female employees and observing their daily activities. One specific example is the design of the toilets, which did

not consider the cultural differences between local people and international employees. Despite these differences, the bathrooms were designed to be in the same area, as seen in Figure 7.9, causing significant concerns for users during their daily activities. As a result, many users due to their cultural background have expressed anxiety and discomfort while using these facilities. This case highlights a significant oversight in the design process, where cultural considerations were not taken into consideration, negatively impacting users' experiences.

Figure 7.9 Mixing of Toilets (Source: Author)

This disregard for cultural differences can be viewed as a gap in stuff, which refers to the physical objects, materials, and technologies employed in the design process. The design of the toilets, in particular, was a clear example of this lapse, as the restrooms had a similar configuration for local people and international employees, failing to account for the differences in their practices. This stuff gap resulted in considerable concerns and discomfort for users during their daily activities. Furthermore, the design process lacked the necessary skills to anticipate and address the effect of cultural differences on users' experiences. This skills gap was apparent in the design decisions for the toilets, which failed to consider cultural subtleties and led to adverse outcomes for users. The absence of attention to cultural considerations in the design process underlines a gap in the skills required to design

for diverse user groups. Lastly, the image in the BMF building did not prioritize cultural considerations, as evidenced by the design of the toilets. The failure to consider cultural differences in the design process suggests a gap in the image or social meaning linked to sustainability practices, which may prioritize environmental concerns over social and cultural considerations. This image gap may have contributed to the lack of attention to cultural differences in the design process, leading to unfavourable impacts on users' experiences.

e. **Neglection of Contextual Influences**

The observation of the committee's activities highlighted a lack of attention given to contextual factors that could significantly impact the operation of the building. The discussions mainly centered around topics such as water and energy efficiency and internal air quality, overlooking other contextual influences. The following excerpt serves to illustrate this particular issue.

Excerpt from an interview with a member of the certification committee, conducted while visiting him on March 03rd, 2022:

Me: "Since you are part of the BMF certification committee, has the evaluation considered the contextual influences such as the refinery pollution"?

The committee member: *"The building itself is a concern of the LEED process."*

The excerpt from the interview with the certification committee member illustrates how the evaluation process can neglect broader contextual factors that could impact a building's operation. This perspective highlights the need to reorient design practices towards a more holistic understanding of how the built environment interacts with its surroundings and influences social practices. By focusing solely on the building itself and its performance criteria, the committee overlooks the social and material relations that give rise to everyday routines and how external factors could affect these routines

To address this gap, Røpke (2009) emphasized that designers and evaluators must reorient their practices toward a more comprehensive understanding of everyday routines' social and material relations. This reorientation means considering the

broader contextual factors that could impact a building's operation and the practices of its users. The evaluation process should go beyond the building's physical performance criteria to include the users' experiences, perceptions, and practices concerning the built environment. This approach would enable designers and evaluators to create more sustainable and socially responsible buildings that are better suited to the needs and practices of their users. The fieldwork has investigated various cases that have shown the lack of consideration for contextual influences. The following examples demonstrate the impact of context on the daily activities of users at the BMF.

i. Central Prayer Hall

Due to the cultural importance of having a prayer room or mosque in the workplace, it is necessary to provide this facility for both genders. Recognizing the significance of this aspect, the designers of the BMF have given it considerable attention, as highlighted in section 7.3, as the intention is to ensure user satisfaction. As a result, a spacious prayer hall has been constructed outside the building specifically for men, as depicted in Figure 7.10. The hall is connected to the building via an air-conditioned pathway called a skywalk, as shown in Figure 7.11, to facilitate convenient access for employees, especially during the hot summer weather. Additionally, mini halls have been established inside the building to cater to the prayer needs of women, with careful consideration given to their privacy requirements.

Figure 7.10 Male Prayer Hall (Source: Author)

Figure 7.11 The Skywalk (Source: Author)

Discrepancies between the designers' plans for the prayer hall and the actual practices of the users have been brought to light through the fieldwork. For example, it has been revealed that certain interior rooms, initially designated as meeting rooms, are now being utilized by male employees for their devotional practices. In contrast, despite the excellent facilities of the main prayer hall, only a limited number of employees were observed who tend to use it. The underutilisation of the spacious prayer hall presents a critical case study for the design team to comprehend how practices are formed and evolve. This situation prompted the need to delve deeper into these practices by discussing with users and examining the factors influencing their behaviour. The investigation into this case has included the employees who use the internal prayer room and the few users who use the main prayer hall.

For the first group who pray in the rooms converted into prayer rooms for men, they were asked their perception of the main prayer hall and the factors influencing their current practice. These employees claimed that the allotted time for lunch and prayer was insufficient for them to engage in both activities. The break time is only an hour between 12 pm and 1 pm. Furthermore, they stated that most employees prefer having lunch outside the company's premises in external restaurants. Consequently, this may compel them to resort to praying within the building. However, after pointing out to the respondents the presence of restaurants in the building, the employees claimed that the existing restaurants do not meet their cultural and dietary needs and are more expensive than external restaurants.

Consequently, the need to meet the users' needs has led the PDO to convert some meeting rooms into prayer rooms. This task has been delegated to the facilities management team responsible for building management, who decided against the initial design intentions to modify some of the meeting rooms. However, this decision did not consider that these rooms were initially designed for meetings and equipped with specialized ventilation and air conditioning tools that may not support worship activities. One of the design team has expressed his deep concern about the action taken by the operation and maintenance team to modify such meeting rooms without consulting the design team, shown in the excerpt below.

Field notes, excerpt from the interaction with the building manager on this issue at the BMF, 16th August 2022:

"The issue is that if any new requirements from users, the process is to go to the facilities management to act upon it without consulting the designers, such as initiation of prayer rooms for males, which have not been included in the original design and have led to some technical issues around heath and AC system."

The conversion of these rooms from their original intended use as meeting rooms to prayer rooms has negatively affected the structural integrity of these modified spaces. The requirement for worshippers to wash before entering these rooms has led to persistent humidity. However, the facilities management team has overlooked the design adjustments necessary for converting these facilities for worship purposes, including considerations for air conditioning, ventilation, and furniture, as their expertise does not extend to designing such systems. Unfortunately, the action taken by the facilities team resulted in the circulation of humidity throughout the air conditioning system, causing anticipated negative consequences for the overall design. Throughout the fieldwork, numerous difficulties were observed within these rooms, including the emission of unpleasant odors from the mattresses, the emergence of termites in specific areas, and the inefficiency of the air conditioning system. Figure 7.12, captured in March 2022, visually demonstrates some of the harms resulting from the altered function of these rooms. The maintenance team continually grapples with issues associated with these modifications, as depicted in Figure 7.13, taken in August 2022, when attempting

to utilize the room for prayer.

Figure 7.12 A Converted Meeting Room to A Prayer Room (Source: Author)

Figure 7.13 The Modified Room is Closed for Maintenance (Source: Author)

The data presented highlights the importance of considering users' practices and needs in designing sustainable facilities. Users' actual practices, which are shaped by factors beyond the designer's control, including cultural and dietary needs, availability of external restaurants, and time constraints, often diverge from the original design intentions aimed at meeting their needs. The lack of alignment between design intentions and users' practices has resulted in the underutilization of sustainable facilities and wasted resources, as seen in the case of the prayer hall. Bourdieu (1984) argues that human action is not simply a matter of individual

preference but a reflection of one's social and cultural background. Therefore, designers and maintenance management teams must engage with users and incorporate their practices and needs into design decisions to address this issue.

In the case discussed the "stuff" refers to the physical facilities and resources provided by the company, such as the prayer hall, meeting rooms, air conditioning, and furniture. The "skills" refer to the cultural and religious practices of the users, including their prayer rituals and dietary needs, which influence their use of the facilities. Finally, the "image" refers to the company's perception and representation of itself as a provider of sustainable and user-friendly facilities. The social practice theory emphasizes the interplay between these three elements and how they shape users' practices and experiences. By understanding and incorporating these factors into the design process for the future, designers can create more sustainable and user-friendly environments that meet users' needs.

The circumstances in this example illustrate the complexity of users' practices. The marginalization of critical services, such as the prayer hall, by the users was not expected by the design team. This unexpected outcome may not be primarily attributed to design shortcomings but to external factors beyond the BMF designers' expectations. As Shove *et al*. (2007) have suggested, designers indirectly shape users' daily activities. The users have explained that their use of interior rooms for prayer was due to time limitations, as they tend to have lunch in external restaurants. The lack of suitable food in the building for lunch has influenced the users to consume most of their break time, leading to the emergence of this practice. Therefore, this practice did not arise as a design issue but rather as a result of another contextual factor associated with the organization, consistent with the existing literature on the topic (Kimbell, 2012; Gram-Hanssen, 2010; Spaargaren, 2011).

This case also highlights the involvement of multiple practitioners in changing meeting rooms to prayer rooms. Various roles played by different parties led to the outcome depicted in Figure 7.12. The organization, PDO, directed the facilities managers to modify some meeting rooms when staff neglected to use the prayer hall, causing problems for the maintenance team. These parties, including facilities

managers, maintenance teams, and employees, constituted the status quo through a collection of practices called communities of practices (Wenger, 1998). Additionally, this case demonstrates that the conventional and functionalist interpretations of designing for sustainability that solely focuses on users, such as in the BMF, would overlook critical challenges and occasionally surprising connections across activities (Hobson, 2002). This example offers at least two more applications for social practice-based research. Firstly, it argues for examining beyond individual practices and exploring the links between and within larger groups of practices that coexist in specific spheres of daily life (Warde, 2005). Second, it illustrates how closely practices are linked and how these practice-related social and microelements are marginalized (Røpke, 2009).

For the second group, observation and shadowing of employees revealed a noteworthy pattern in their prayer habits within the main central hall. Specifically, during the peak summer season, it was observed that a majority of employees, despite the presence of an air-conditioned skywalk connecting the hall to the building, preferred to make their way to the mosque for prayer directly. A situation was recorded while accompanying some staff members on a hot August day, the employees opted for a non-air-conditioned route to the mosque. When the employees were remined of the existence of an air-conditioned skywalk, illustrated in Figure 7.14, suggesting that it would have been more comfortable, in response, the employees explained that the air-conditioned lane is considerably longer than the non-air-conditioned route, and they found the experience of stepping out into the sun after being in a cold building to be refreshing. Furthermore, the employees expressed concerns about the extreme cold temperature within the office building, which they had no control over due to the air conditioning settings. This conversation shed light on the underlying reasons why employees may exhibit hesitation towards using the air-conditioned pathway. It is worth noting that the researcher also personally opted for the non-air-conditioned path throughout the fieldwork, citing similar justifications.

Figure 7.14 The Air-Conditional Walkway (Source: Author)

The social practice theory sheds light on the complex interplay of factors influencing users' practices (Shove *et al*., 2007). In this case, the stuff, skills, and images are intertwined and influence users' behaviour. For example, the air-conditioned skywalk is designed to provide a comfortable and sustainable pathway for employees to access the prayer hall. However, users' skills and habits, such as their ability to adapt to weather conditions, override the intended purpose of the skywalk (Giddens, 1984). The image of being refreshed by the sun also plays a role in users' decision-making, highlighting the importance of perception and behaviour in sustainable practices. Furthermore, the lack of control over the air conditioning in the office building is another basic image that shapes users' practices. Employees' reluctance to use the air-conditioned skywalk may be due in part to their perception of the office building as too cold, emphasizing the need to consider not only the design of specific facilities but also the overall environment in which they are situated. Therefore, engaging with users and incorporating their practices and needs into design decisions is necessary to ensure the success of sustainability initiatives.

ii.Breakout Areas

From the business perspective, the design of breakout areas has negatively impacted the work environment, as revealed by examining users' daily activities. The fieldwork has uncovered instances where specific areas have caused distractions for certain workers, which might not have been taken into account during the design process. Users have expressed concern about the loudness from these breakout areas during break times. The main concern is that these areas are not isolated from the workplace stations, causing noise and distraction for those whose desks are nearby. During break times, it was observed that some employees continued working at their desks, and therefore, the use of breakout areas by other users further disrupted these employees. Figure 7.15 provides an example of the space between a breakout area and the workstation of some employees.
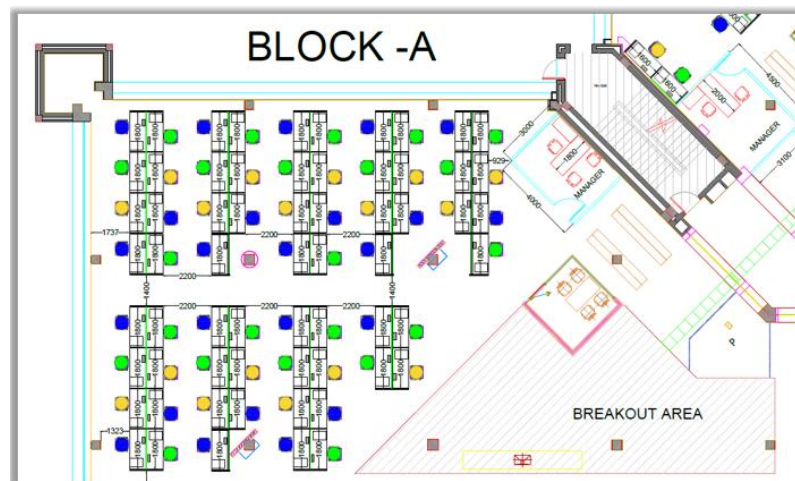
Figure 7.15 Location of Breakout Area and Workstations (Source: Design layout of BMF)

This data highlighted further the importance of considering the interactions between stuff, skills, and images in designing work environments. The design of breakout areas aimed to provide socialization to encourage communication and collaboration between employees, which can be considered a stuff element of the work environment. However, the investigation into user activity reveals that the design did not consider the skills and images associated with the daily practices of users. Users' skills, including their work routines and habits, are essential to the social practice theory. The fieldwork has revealed that some users continue working

during break times while others use the breakout areas for socialization. This finding indicates that the design did not consider users' skills in managing their work and break times. Therefore, the design did not provide a suitable solution that caters to the skills of all users. Furthermore, the image associated with the use of breakout areas has also affected user behaviour. Users' concerns about the loudness and distraction caused by the breakout areas during break times indicate that the design did not consider the image of the work environment.

This case reinforces the existing literature highlighting the significance of understanding user practices. Gaining a comprehensive understanding involves visualizing the patterns of users' daily activities and identifying the factors that shape these practices. Shove and Walker (2010) have emphasized recognizing the diverse influences that shape user practices. By understanding these influences, designers can develop designs that accommodate user practices within their contexts. Thus, this case serves as a reminder of the criticality of conducting thorough research to gain insights into users' practices and create designs that effectively meet their needs and expectations. Developing insights for designers requires them to engage in real-world observations of people's experiences instead of solely relying on extensive quantitative data. Designers can gain valuable insights beyond numerical metrics by actively observing and studying individuals in their natural environments. This approach allows designers to understand the nuances of human behaviour, preferences, and needs, which may not be fully captured by quantitative data alone (Brown and Katz, 2011)

iii. Glass Rooms

In open work environments, the provision of dedicated meeting spaces is essential. Following this objective, the designers of the BMF building have incorporated glass rooms specifically intended for meetings, as well as smaller private rooms for confidential discussions or phone calls. Figure 7.16 illustrates the design of the rooms with varying sizes, capable of accommodating two to six individuals. In addition, the designers have separated these rooms using glass partitions. The users' daily activities have indicated that the design goals have been successfully realized, as the rooms are being regularly utilized. However, through interactions with users, diverse perspectives regarding these facilities have emerged, prompting an

investigation into critical issues associated with the design of these glass rooms.
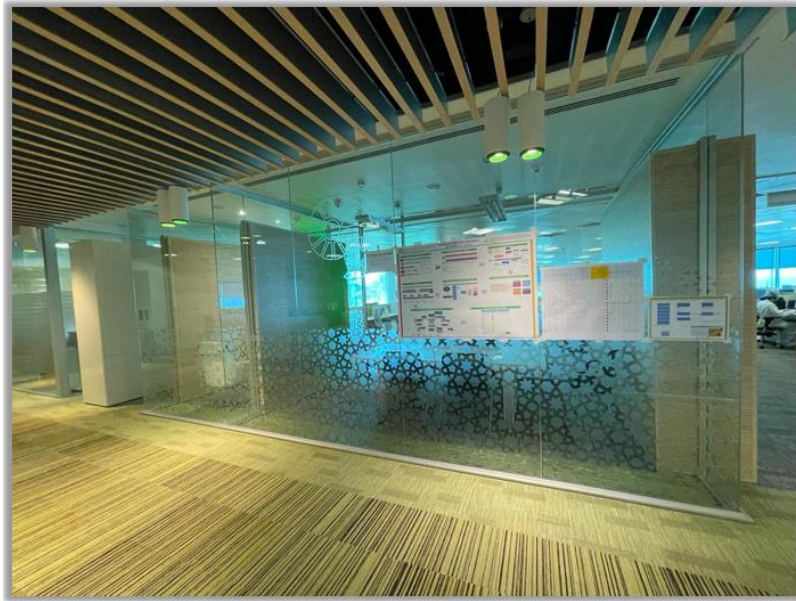
Figure 7.16 Glass Rooms (Source: Author)

The design of glass rooms intended for meetings and private conversations has led to the emergence of practical issues for users. For instance, users have expressed significant concerns regarding glass walls, as they create distractions and allow anyone passing by to see inside the room. Additionally, simultaneous meetings in adjacent rooms have caused hearing problems for users, which can be attributed to the inadequate design of insulators. Furthermore, unlike non-glass rooms, users have limited autonomy in choosing how to utilize them; the design of these glass rooms has also restricted users' privacy and flexibility in their usage, particularly during break times leading to frustration. Therefore, these operational issues with essential facilities are a genuine concern for users, contradicting the design intention of meeting users' needs. The following excerpts show examples of the users' perspectives on this design intention.

Field notes, excerpt from the interaction with an employee at the BMF, 16th February 2022:

"Silent room and glass room: if both been used by different teams, they can hear each other."

Field notes, excerpt from the interaction with an employee at the BMF, 02nd August 2022:

"Glass rooms assigned for private conversations such as personal calls and relaxation time during breaks time are not practical as it is not comfortable, and anyone can see you while you are there which restricted personal comfort."

When designing glass rooms for meetings and private conversations, the stuff refers to the physical design elements of the rooms, such as the use of glass walls and partitions. The skills refer to the practices and behaviours of the users in utilizing the rooms, such as their ability to conduct private conversations and hold meetings effectively. Finally, the image refers to the perceived social meaning and status of using the rooms, such as whether they are seen as prestigious or practical. In this case, the designers intended to create dedicated rooms for meetings and private conversations to meet the users' needs. However, using glass walls has resulted in practical issues for the users, such as the lack of privacy and distractions caused by anyone passing by. This suggests that the physical design elements of the rooms, i.e., the stuff, have not fully met the users' needs.

Additionally, the users' skills in utilizing the rooms have been affected by the shortcomings in the design of insulators, leading to hearing problems during simultaneous meetings in adjacent rooms. This shows that the practices and behaviours of the users are influenced by the physical design elements, i.e., the stuff. Moreover, the image of the glass rooms as prestigious or practical is influenced by the users' perceptions of the rooms' privacy and comfort levels. The lack of privacy and comfort has caused frustration among the users, which contradicts the design intention of meeting users' needs. This observation suggests that the perceived social meaning and status of using the rooms, i.e., the image, is influenced by both the physical design elements and the practices and behaviours of the users.

This case of user practices shows that the current assessment tools utilized for evaluating building performance are limited in revealing the hidden knowledge brought to light by the data related to glass rooms. This is primarily because this valuable knowledge can only be accessed and understood through observations and interactions with users as they engage in their daily activities within the building

environment (Patel and Green, 2019). While building performance assessment tools rely on quantitative data and predefined metrics, they often fail to capture the nuanced and context-specific insights that arise from the real-life experiences and practices of the building users. These assessment tools generally focus on standardized criteria, overlooking the situational aspects that shape user experiences.

iv. Gas Emissions

Designers of the BMF recognized the crucial importance of user health and safety in the building's design, given its proximity to both an oil refinery and an export port. These facilities pose a significant danger to building occupants due to their emissions, which can potentially seep into the building and cause harm. The design prioritized user health and safety to safeguard against the potential hazards posed by nearby industrial facilities. To mitigate this risk, the designers heavily emphasized employing technologies to seal potential areas where emissions may enter. One approach used involved designing sealed windows to minimize user control over them and utilizing sensitive techniques to close ventilation dampers on the building's roof when emissions are detected in the vicinity.

Despite the intention of improving users' health and safety, the design decisions implemented have significant limitations that have been revealed through user practices. The daily practices of users have demonstrated that the design measures taken for health and safety purposes were ineffective. Several users, including pregnant women, have expressed deep concerns, confirming that several gas emissions leaked into the building. In addition, this was also personally observed during the fieldwork. As a result, these observations have highlighted that the design measures intended to promote health and safety using technical solutions are not always practical. The issue concerning the users prompted the conduct of a more in-depth investigation.

Therefore, with prior experience as a maintenance engineer, the maintenance team was approached to assist the building users facing this difficulty. The goal was to gather more information and address this crucial issue. Consequently, a meeting

was organized with the head of operation and maintenance to discuss the field observations. During the discussion, doubts were expressed by the head regarding the designers' approach to sensor placement on the roof. He believed emissions could enter the building through the front doors before reaching the sensors. Additionally, suspicions were raised regarding previous leaks, suggesting that technical issues with the implemented solutions or direct entry through the front doors might have caused them. Consequently, this case highlights a noticeable flaw in the designers' strategy, resulting in significant health and operational concerns for users.

The excerpt from the interview with the certification committee member, discussed in Section 7.4.1 (e), illustrates how the evaluation process used by the LEED can neglect broader contextual factors that could impact a building's operation. This perspective highlights the need to reorient design practices towards a more holistic understanding of how the built environment interacts with its surroundings and influences social practices. By focusing solely on the building, itself and its performance criteria, the committee overlooks the social and material relations that give rise to everyday routines and how external factors could affect these routines. For instance, the users' concerns about pollution from an adjacent oil refinery demonstrate how external factors can impact the building's operation, its users' well-being, and their practices.

7.4.2 Users-Centered Approach for the BMF

User-centered design is an approach that places the needs and preferences of the end-users at the forefront of product and service design. Its primary focus is on comprehending the users' requirements, objectives, and limitations and developing products or services that are user-friendly, efficient, and capable of effectively meeting their needs. The underlying principle of this design approach is the recognition that the end users possess valuable insights and knowledge that can guide the creation of products that truly cater to their needs. Through active involvement of users in the design process, the user-centered design aims to deliver products and services that are functional, enjoyable, and satisfying to use.

It is evident that PDO's design process heavily relies on stakeholders' involvement, including users, to ensure that all needs are met, as discussed in section 7.2.1. The construction project management policies of PDO are designed to be executed through the Front-End Engineering Design (FEED) team, which includes representatives from different disciplines to review the designs of construction projects. The team comprises members from the operation and maintenance team, facilities management team, construction team, main contractors, and subcontractors, all of whom collaborate with the design team to prepare and deliver the project. This strategy aims to ensure that the building meets the needs of all stakeholders. The same approach has been followed in the design process for the BMF to meet the users' needs. The provided excerpts below demonstrate this fact.

Excerpt from an interview with a member of the design team, conducted on 23rd February 2022:

Me: "Have you involved users in the decision-making for designing the BMF building?"

The designer: *"all stakeholders have been engaged throughout the project's life cycle. In the design stage, all stakeholders have been invited to see a mockup of the project conducted outdoors (Tent near the sea). All feedback has been considered. In the construction phase, a steering committee involved a focal point from each department to attend a weekly meeting with the project team to ensure they met their requirements. All users have been trained in the occupancy phase, and a guide to all users has been provided to understand how to use all facilities."*

Excerpt from an interview with a member of the design team conducted on April 09th, 2022,

"*The end-users have been involved throughout the project's life cycle from initiation to completion. They have been engaged in the conception phase, construction, and mobilization.*"

In order to comprehensively examine PDO's sustainable design approaches through the perspective of social practice theory, it is crucial to develop an understanding of

how the design process emphasizes the creation of social and material connections that shape daily routines. By actively involving stakeholders in the design process, including those from various disciplines such as operation and maintenance, facilities management, construction, main contractors, and subcontractors, the design team gains insights into the intricate web of social and material relations that contribute to everyday routines. This inclusive approach recognizes the importance of collective action in shaping social practices and ensures that the building design effectively addresses all users' diverse needs and requirements. Furthermore, the data demonstrate that users have been actively engaged in the decision-making process from the project's initiation to its completion. This user involvement is crucial as it enables the design team to understand the specific practices and routines that shape user behaviour. By gaining this understanding, the design team can create a design that aligns with and supports these practices and routines, ultimately promoting sustainability in the built environment.

However, ethnographic investigations have explored conflicts over a method involving stakeholder participation in design. As shown in the previous excerpts, the design team has invited all stakeholders to a meeting in which they were requested to provide their input on the mock design. Also, regular meetings were held for an internal committee involving members from every department in the construction phases to ensure the design met their requirements. While some stakeholders, including users and the facilities management team, confirmed their participation, other important teams, such as the operation and maintenance team, did not confirm their involvement. For example, a member of the operation and maintenance team members reported an incomplete handover of the building and not receiving the operation and maintenance manuals during interviews. The excerpts below are to demonstrate this fact.

Excerpt from an interview with a member of the facilities management team, conducted while visiting him on February 08th, 2022:

Me: "Have you been involved in the design of the building?"

Facilities management team lead: "*Yes, at certain stages, and I have some suggestions to the design team that has been implemented.*"

Me: "How was the building handed over to you as a user?"

Facilities management team lead: "*Yes, during the final stage of the building, we visited the building to check the materials, such as marble of the corridors. Overall, we have been involved, and our requirements have been met***".

Excerpt from an interview with a member of the operation and maintenance team, conducted while visiting him at the BMF on February 14th, 2022:

Me: "Have you been involved in the BMF project?"

Maintenance supervisor for BMF: *"No, no involvement in the design. No proper handover for the building. No final drawings for HVAC have been received from contractors of construction, which have led to difficulties in operation and challenges to order spare parts as no specifications are provided".*

The conflicts identified in the data highlight the potential limitations of current sustainable design approaches in addressing the social dimensions of sustainable development. The lack of involvement of some key stakeholders, such as the operation and maintenance team, may indicate a lack of attention to the social practices involved in sustainable design. The incomplete handover of the building and the absence of proper operation and maintenance manuals may also indicate a lack of consideration for the social practices involved in building management. To address these limitations, designers could benefit from a more comprehensive understanding of the social practices involved in sustainable design. To promote sustainability, designers could develop strategies to promote more effective stakeholder engagement, ensure the long-term sustainability of built environments, and enhance the overall social value of sustainable design. In addition, this understanding could help designers identify and address potential conflicts early in the design process and promote more effective communication and collaboration among stakeholders. Ultimately, this approach could lead to more sustainable and socially responsible built environments that meet the needs of all stakeholders.

While user-centric design has its advantages in promoting sustainability, it has also faced criticism for its limitations. While it prioritizes meeting the needs of users, it

tends to overlook other factors associated with the institutional structure that can influence users' practices within the work environment. This limitation indirectly impacts users' activities within the building and has been widely criticized as a drawback of this design approach (Shove, 2010; Røpke, 2009). Additionally, the user-centered design strategy involves the inclusion of building users in the design process. However, this process has been criticized for primarily focusing on users' immediate needs and neglecting the potential impact on future stakeholders (Bjögvinsson *et al.*, 2012). The literature also suggests that the relationship between actors in this strategy often exhibits tokenism or participation without genuine authority, with the designer holding the highest level of decision-making power (Luck and McDonnell, 2006).

Considering these limitations, a design team member has expressed that focusing on meeting users' immediate needs is insufficient to achieve design intentions. The designer explained that the design of the BMF aimed to accommodate all PDO employees, considering that the organization previously had multiple smaller buildings. The intention was to reduce resource consumption by consolidating operations into a single capital building, the BMF. The excerpts below are to demonstrate this fact.

Excerpt from an interview with a member of the design team, conducted while visiting him on August 08th, 2022:

"*The main intention was to accommodate higher predicted staff in one larger new building since the staff were housed in different scattered buildings with different ages.*"

However, the designer emphasized that this design intention has been hindered due to government instructions given to PDO as a governmental institution. He had demonstrated that in 2011, just a year before the opening of the BMF project, the government had requested PDO to recruit hundreds of young individuals from Oman. This contextual influence has posed a challenge to the design intention and has compelled PDO to maintain the operational status of all buildings until now. This example demonstrated the role of contextual influences that goes beyond the designer's authority. As a result, a significant concern observed during the fieldwork

by users was the inadequate space within the building,

The second example of design intentions that illustrates the limitations of the users-centered approach was construction of a central prayer hall. The intention behind this design was to meet the users' needs, particularly considering their long working hours. Although the design successfully fulfilled the users' requirements, the users' marginalization of this facility can be attributed to various contextual influencers beyond the design team's control (Robinson *et al*., 2015). These influences emerge from the daily interactions between users and the building entities and are interconnected. This research has examined these influences by observing the practices of the users, which differ from the criteria typically used to assess building performance. The following cases were observed from the daily practices of users at the BMF, showing the extent to which, such a strategy has led to enhance sustainability in the work environment.

a. Security Checkpoints

The BMF building is the central hub of the PDO, which plays a vital role in the economy of the Sultanate. Due to its significance, ensuring the building's security is of utmost importance. To this end, the building designers have incorporated several security checkpoints at various locations to restrict unauthorized access. These checkpoints are situated on the ground floor, at the department entrances, and allow only authorized individuals to pass through using their job cards. However, despite the procedure's effectiveness, the fieldwork has revealed some shortcomings in the design of these security points. Therefore, interactions took place with employees and the security team to address those issues and obtain critical data on the influences that have led to those observed practices.

After evaluating the initial modifications that were made to the security points, as shown in Figure 7.17, discussions with the head of the security team to gain further insight into this matter took place. As shown in the excerpt below, the head of the security team explained that the modifications were carried out to relocate the security points. In addition, he emphasized that the previous design of these checkpoints had inadvertently restricted visitors' access to the restroom while they

waited in the lobby.

Field notes, excerpt from the interaction with a member of the security team at the BMF, 16th February 2022:

"Certain visitors have been impeded from accessing essential services, such as toilets, due to the positioning of the security checkpoints on the ground floor."

Recognizing the importance of addressing this issue, the security team raised their concerns with the building manager, advocating for relocating the security points to provide visitors convenient access to essential services, such as the restroom. Figure 7.18 serves as an illustrative example of one of these security checkpoints that have been relocated. This particular case highlights a discrepancy between the original design intention and its practical implementation, as it became evident that visitors' needs were overlooked during the design process.

Figure 7.17 The Previous Location of a Security Checkpoint (Source: Author)

Figure 7.18 The Existing Location of a Security Checkpoint (Source: Author)

In this case, the physical design of the building, including the location and design of security checkpoints, represents the "stuff" that users interact with. The availability of job cards and the knowledge required to navigate the security checkpoints represent the "skills" required to use the building. Moreover, the "image" of the building and its associated practices may influence how users perceive and interact with the space. As such, relocating security checkpoints highlights the importance of stuff, skills, and image in building design. Unfortunately, visitors' needs were overlooked during the design process, and their skills and practices were not considered when locating the security checkpoints. This contradiction between the design intention and the actual practice has impacted the building's image and reputation, leading to concerns among users and the security team. Therefore, it is crucial to consider the stuff, skills, and image when designing buildings to ensure their sustainability and effectiveness.

The second observation on the security checkpoint revealed some concerns among users about the effectiveness of such a system. The security team and some employees have expressed this issue. They have indicated that the ground floor of the building has several security checkpoints. In contrast, the upper floors, including the first and second floors, lack any such checkpoints, as intended by the design. As a result, if any visitors go to the ground floor departments, they can access the upper floors. This situation has made users concerned that unauthorized individuals could access the upper floors and move freely between departments

without restrictions. During the fieldwork, several visitors were observed moving between different departments, highlighting the security team's and employees' concerns. In addition, the building lacks CCTV systems, as indicated by a security team member, which presents a significant challenge in detecting security incidents. This situation is a genuine concern, mainly since several incidents have contradicted the building's intended level of safety.

In this case, the "stuff" refers to the physical resources used by the building, such as the security checkpoints and CCTV systems. These resources are designed to restrict access and monitor the building's premises to ensure the safety of its users. However, as discovered during the investigation, the lack of security checkpoints on the upper floors indicates that the stuff was not appropriately designed and implemented to meet the users' needs. The "skills" refer to the users' abilities to use the building's resources effectively. In this case, the security team's skills in managing the security checkpoints are essential to ensure that only authorized individuals can access the building's upper floors. The employees' skills in identifying security risks and reporting incidents are also crucial in maintaining the building's safety. However, the absence of CCTV systems in the building limits the users' ability to detect and respond to security incidents effectively. The "image" refers to the users' perceptions of the building's design. In this case, the users' concerns about the building's security system reflect their perception of its image. Users expect the building to provide a safe and secure environment that meets their needs. However, the absence of security checkpoints on the upper floors and the lack of CCTV systems undermines their confidence in the building's ability to provide a safe working environment.

Hence, to address the concern of users, the designers should consider the users' belongings, capabilities, and reputation to devise a building that caters to their requirements and guarantees their safety. Furthermore, the users' needs should be carefully considered when planning the design and placement of security checkpoints and closed-circuit television (CCTV) systems. In addition, adequate training must be provided to the security team and staff members to ensure efficient building security management. Finally, efforts should be made to enhance the building's image and instil confidence in the users, assuring them that their safety

and security are paramount.

b. Special Needs

The user-centered approach was adopted as a design strategy to enhance sustainability in the BMF building, as explained in section 7.4. The designers aimed to address the diverse needs of the users. However, during the fieldwork, five instances highlighted the neglect of specific requirements for different user categories. These cases shed light on the shortcomings of the design process used in the BMF building, as revealed by the practices of the users. Therefore, the following discussion revolved around examining the three interconnected elements of social practice to gain insights into the factors that motivated users to raise concerns about each of those issues.

Firstly, a female employee expressed concerns about the design's lack of dedicated car parking for pregnant women. She was distraught, as this service is crucial for female employees. This case indicates that the stuff, i.e., the physical infrastructure of the building, did not cater to the needs of this particular user group. The design team could have incorporated designated parking spaces for pregnant women, offering them increased comfort and convenience. The situation also highlights the importance of skills in shaping users' responses to design. The design team could have utilized their skills and knowledge to understand the needs of different user groups, including pregnant women, and incorporate them into the building's design. This would have ensured the building's design aligned with users' needs, contributing to a positive user experience. Lastly, the lack of dedicated parking for pregnant women may have negatively impacted the image of the building in the eyes of female employees. This could have reduced job satisfaction and productivity, affecting the organization's overall performance.

Secondly, a non-Omani employee raised concerns about the building's absence of a smoking area. As a result, he had to go outside multiple times a day, which was time-consuming, especially considering the building's size, mainly since the building consists of a ground floor and three upper floors. In this case, the absence of a smoking area in the building is a material absence impeding the employee's

smoking practice. This unavailable facility creates a challenge in his daily routine, as he has to leave the building multiple times daily, which is time-consuming and inconvenient. The second element of practice is the smoking employee has the skill of smoking and requires a designated area to perform this practice. The absence of a designated area in the building impedes his smoking skill. This case reveals that the building's design does not consider some users' smoking habits, and the absence of a designated smoking space shows that all users' needs were not considered when designing the structure. Therefore, the absence of a designated smoking area may contribute to a negative image of the building for smokers or create a perception of the building as unfriendly towards smokers. Overall, the absence of a smoking area in the BMF building illustrates how the design intentions can impact its users' daily practices.

Thirdly, the building manager highlighted the lack of essential services for disabled individuals on the upper floors, which creates challenges during emergencies. This issue has hindered the organization's ability to recruit employees in the departments located on the upper floors. The lack of essential services such as accessible elevators, ramps, and emergency exits on the upper floors of the building can be considered as a material element that hinders the practice of disabled individuals. These material factors are essential for disabled individuals to perform their everyday tasks and emergency procedures in the workplace. As such, the shortage of such essential services may lead to a situation where disabled employees find it challenging to work or may feel excluded from the workplace community, leading to the loss of valuable human resources. Regarding skills, the absence of such services may imply that the building management and emergency response teams lack the necessary skills and knowledge to deal with disabled individuals in an inclusive and accessible manner. This lack of knowledge and skills may also impact the organization's image as being less inclusive and accommodating to disabled individuals. Addressing this issue through inclusive and accessible design practices can not only improve the experience of disabled individuals but also enhance the overall reputation and practice of the organization.

Furthermore, the absence of rest areas for users in the BMF building was observed as a fourth special needs issue. This issue has been investigated through interaction

with some users on multiple occasions. Both employees and the cleaning team raised concerns regarding this matter. For the cleaning team, there was an attempt to arrange a meeting with some team members in their designated restroom, assuming such a facility was available. However, one of the team members expressed dissatisfaction with the lack of necessary amenities, particularly considering their strenuous work throughout the day. The following excerpt provides insight into this concern.

Field notes, excerpt from the interaction with a member of cleaning at the BMF, 11th August 2022:

Me: "I would like to talk with you during the break in your restroom."

The cleaner: *"I hope that we have a restroom! Sorry, we don't have a room, but you can find me in the first-floor corridor around 12:30 pm".*

Concerning the employees, the inadequate availability of restroom services has presented challenges that have affected their satisfaction. Investigations into this concern were carried out through two different cases. Firstly, during an interaction with a member of the human resources team, who expressed deep concern regarding the absence of restroom facilities, particularly given their preference for arriving at the building early to avoid traffic. The second case was observed during lunch break, where a staff member, dissatisfied with this specific issue, was seen resting in his office. The following excerpts illustrate both cases.

Field notes, excerpt from the interaction with an HR employee at the BMF, 02nd March 2022:

Me: "Do you have any challenges in this building?"

The employee: *"No restroom to staff if they need to sleep during breaks, which may help others coming from home early morning to void traffic like me so they can sleep until the start time of each day. Due to this, some people tend to sleep in their cars when they reach early to the office, and I am one of them".*

Field notes, excerpt from the interaction with an employee from the Gas

directorate at the BMF, 08th March 2022:

Me: "Why are you sitting in the office during break time?!"

The employee: *"I don't need to have lunch as I normally take my lunch later after working hours, but I need to sleep during this break hour, but no sleeping areas, unfortunately!".*

The data reveals that the absence of rest areas in the building is a significant material factor that negatively impacts the practice of users. This is evident in the experiences of different users, as highlighted in three distinct situations. First, the lack of designated resting areas affects the ability of employees to perform their tasks effectively and efficiently, particularly during break time. This can result in employees feeling excluded from the workplace community or finding it challenging to work, ultimately leading to the loss of valuable human resources. The lack of knowledge and skills in dealing with employee needs, such as the need for rest areas, may create an image of insensitivity and non-inclusivity, which can impact the organization's reputation. The negative image of the organization as insensitive and non-inclusive can also impact the employees' practices and the overall organisational reputation. Therefore, it is crucial for the organization to prioritize including designated rest areas in the building, which can positively impact employee well-being and overall work performance. This will improve the employees' practice and satisfaction and the organization's overall image as a diverse and inclusive workplace.

The fifth issue concerning special needs was explored by interacting with a non-Omani employee. He was concerned about two critical facilities that the building lacked that seemed significant for his daily activities: bike racks and showers. So first, this issue was physically investigated further and was found to be true, the building had no bike racks. Second, the shower service is available in the building but has no label, causing this distraction. The employee who has to spend a long time working in the building has assumed that the building has a shortage of such facilities, highlighting the importance of clear communication and signage. The excerpt below demonstrates this case.

Field notes, excerpt from the interaction with a non-Omani employee at the BMF, 02nd March 2022:

The non-Omani employee: *"I think the design of the building has missed essential services such as racks of bikes. I have to come to work by bike since I have failed to pass the driving test three times, but the issue is that no bike racks are available. Also, when I arrived at the building every morning after a long journey by bike, I needed a shower, which is also unavailable."*

Me: "But I have seen that such a shower service is available."

The non-Omani employee: *Wooo, can you please show me where it is as I have completed three years in this building and have not seen it?*

This case shows that it is crucial to consider the broader social context in addressing the issue of essential services within the building. For example, the lack of bike racks and the need for showers may indicate a more significant issue of transportation and sustainable mobility within the organization. Providing bike racks facilitates employee access to the building and promotes sustainable transportation practices that align with the organization's sustainability initiatives. Similarly, providing shower facilities can encourage employees to engage in sustainable transportation practices such as biking or walking to work. In conclusion, the lack of essential services such as bike racks and clear communication regarding shower facilities can impact user practices and the organization's reputation from a social practice theory perspective. The organization must prioritize user needs, provide essential services, and communicate them effectively to ensure user satisfaction and promote sustainable practices. This can positively impact employee well-being, work performance, and the organization's reputation as inclusive and sustainable.

c. Management of Events

Given the pivotal role of the BMF building as the primary office for the PDO, designers must take into account the diverse events and activities that are scheduled for different occasions. However, during the fieldwork, it was observed that some

events were held in the building's main lobby, as depicted in Figure 7.19, prompting an investigation into the role of design in shaping this practice. The investigation revealed that the building did not include a dedicated hall for hosting events, which meant that the staff responsible for event management had no choice but to hold public and private celebrations in the main lobby. This emergent practice arose out of the need to repeatedly reconfigure the space for events, resulting in wasted time and resources. The lack of such services in a building of such importance shows that the designers were only concerned with serving the demands of the direct stakeholders and employees, ignoring the macro stakeholders beyond the employees. This narrow perspective has led to this critical situation. The following excerpt illustrates this concern about the building.

Field notes, excerpt from the interaction with the head of events management at the BMF, 23rd February 2022:

"No dedicated hall for events, and we are using the open hall of the entrance for such purpose, leading to some concern around logistics and cost, especially as BFM is hosting around 100 events per year. Thus, if there is a specific hall for events can lead to saving time and costs."

Figure 7.19 The Main Lobby (Source: Author)

Drawing upon the social practice theory, the designers must recognize the importance of a dedicated space for hosting events because it is the PDO's main office. Due to the absence of such a space, the staff responsible for event management have adopted the emergent practice of organizing events in the building's main lobby, causing logistical and cost concerns. The stuff element is the absence of a dedicated events hall, which has led to the emergent practice of holding events in the main lobby. The designers must consider the physical elements of the building and how they can cater to the needs of all stakeholders, including macro stakeholders beyond the staff. In addition, the skills element assumes significance as designers must possess the expertise and knowledge to incorporate cultural practices and expectations in the design process. The lack of a dedicated events hall may stem from a lack of attention to detail or cultural nuances in the design process.

Lastly, the image element is critical as the design's perception reflects its values and priorities. The absence of a dedicated events hall in a building of such prominence showcases a narrow focus on meeting the direct stakeholders' and employees' needs, disregarding the macro stakeholders beyond the staff. To address the issue of holding events in the main lobby of the BMF building, designers must consider the elements of stuff, skills, and image under the social practice theory. This involves careful consideration of the physical components of the building, integrating cultural practices and expectations into the design process, and ensuring that the design reflects the values and priorities of all stakeholders involved.

d.   Building Entrance and Car Parking

Considering the BMF building's location in a secure area without access to public transport services, employees are expected to rely on personal vehicles for transportation. With an anticipated large number of employees, it is essential to ensure adequate parking spaces. Furthermore, designers must consider how employees will enter and exit the building. Therefore, the building's design has included a central parking area for employees in front of the building, as depicted in Figure 7.20. Consequently, due to this design choice, the employees must utilize the gate that overlooks the parking area, as depicted in Figure 7.21, for entering and exiting the building. The configuration of the parking and entrance areas

substantially influences employees' daily routines during their commute to and from work.

Figure 7.20 Car Parking (Source: Author)

Figure 7.21 The Main Entrance (Source: Author)

The interaction between these elements and users was observed, with particular attention paid to how they shape daily practices. For example, the study found that employees, especially women, arrive at work early to secure a parking spot close to the building, as there are insufficient spots for the number of workers. As a result, latecomers are forced to park farther away, which is a challenge for female employees during the summer months. This matter is among the daily challenges experienced by employees, as was affirmed during a focus group workshop conducted in August 2022, emphasizing that car parking was one of their foremost

concerns. Given the significant impact of parking on shaping user practices, interviews were conducted with both male and female users to elicit their perspectives on the design of the parking service. They expressed surprise at the current design solution and expected a more satisfactory one. The users proposed a floor-based parking design as a better alternative to the current centralized design, citing issues such as hot weather in the summer and limited space. This example highlights the interaction of users with these design elements and the emergent practices that may run counter to design intentions. It also underscores the importance of investigating daily user practices when designing for the future.

The Social practice theory can provide an understanding of how users respond to the BMF car parking design intentions. The 'stuff' element refers to BMF building's parking spaces and entrance gate. The 'skills' element refers to the early morning driving and navigating the parking. Finally, the 'image' element refers to the expectation that employees arrive on time and the gendered expectations that women will take on more household responsibilities. In this case, the parking and entrance design significantly impacts employees' daily practices when commuting to and from work. Various interconnected influences have led employees to act in that particular way. Some of those are due to the design team's narrow vision, while others are due to other contextual influences beyond the design intention. For example, the insufficient number of parking spots for the number of employees, which is a design issue, results in employees arriving early to secure a spot close to the building. The lack of accessibility for public transport services in the building's location, which is beyond the design responsibility, makes personal vehicles the primary mode of transportation for employees. This situation highlights the importance of designing parking and transportation options that align with the values and priorities of all stakeholders, including sustainable transportation options and accessibility for all employees.

e. Operation and Maintenance

The operation and maintenance team is the second category of users influenced by the BMF design intention. In section 7.3, the design intentions for the BMF building included a focus on low operation and maintenance. Therefore, it is crucial to

comprehend the interactions between the design elements and the maintenance team, which is the subject of this section. The maintenance team is an essential user, and the fieldwork has explored their practices by observing some of their activities and engaging with key members. As a result, the fieldwork has uncovered discrepancies between the design objectives related to operation and maintenance and the actual practices of this field. Additionally, it has highlighted significant challenges the building faces, hindering its ability to function sustainably.

As discussed in section 7.4, involving users is an integral part of the strategy for sustainability. Given the low operation and maintenance objective, the operation and maintenance team, particularly, was expected to be involved in the design process. However, the fieldwork revealed that the BMF designers marginalized this team. The maintenance team leader for the BMF provided critical information during the interaction, indicating that his team was not involved in the design process. An example of the lack of involvement of this significant user in the building is that the final drawings "As-built" have not been handed over, demonstrating a considerable gap in the process. As a result, the building is also experiencing daily challenges in operation and maintenance, especially with the air conditioning and other materials used. This situation has led the head of the maintenance team to classify the BMF building as "Unsustainable" in operation and maintenance, as indicated in the provided excerpt.

Field notes, excerpt from the interaction with the head of operation and maintenance at the BMF, 14th April 2022:

Me: "Do you think the BMF is a sustainable building?"

The head of operation and maintenance: *"No, I don't think it is a sustainable building."*

In light of the concerns expressed by the head of the maintenance team, the fieldwork has revealed several maintenance issues in the BMF building. Firstly, the building lacks sustainable and environmentally friendly materials, increasing resource consumption. Secondly, the design has overlooked considerations for health and safety in certain building elements, creating ongoing risks for the

maintenance team when carrying out their tasks safely. Consequently, the following sections will address the accessibility concerns and challenge the operation and maintenance team faces regarding building materials.

i. Materiality

Achieving sustainability in a building requires careful consideration of the materials chosen, as they contribute to operational efficiency and ease of maintenance. To accomplish this goal, the design and maintenance teams must collaborate effectively. The expertise of the maintenance team plays a vital role in selecting the most suitable materials and equipment to promote sustainability. This is particularly important for achieving economic sustainability by reducing the long-term financial expenses associated with operating and maintaining the building. The operational phase of a building is significantly longer, constituting approximately 80% of its lifespan compared to the design and construction phases (Zhu, Shan and Xu, 2019). Therefore, selecting sustainable materials during the operation and maintenance phase is crucial in alleviating the financial burden of managing the building in the long run.

However, the operation and maintenance team has expressed dissatisfaction with the design team's inadequate attention to the importance of materiality in achieving sustainability. During the fieldwork, two cases that raised concerns were observed. Firstly, defective lights in the main lobby was observed, as depicted in Figure 7.22. This observation prompted questions regarding the importance of this facility, the lobby, which serves both employees and visitors. Upon investigation with the maintenance team, it was revealed that the specific type of light has been non-functional for approximately six months due to its non-availability in the local market. These lights were sourced from an external supplier, which requires several months to fulfil orders. This indicates that the design decision overlooked the maintenance aspect, resulting in a prolonged period of the lights being out of order.

Figure 7.22 Lighting (Source: Author)

Secondly, it was also observed that some of the toilet doors in the building are made of wood. Additionally, it has been observed that the cleaning team uses water to clean the toilet doors, which has resulted in damage to these wooden doors, as depicted in Figure 7.23. The choice of wooden doors for the toilets appears impractical, indicating a disregard in the design process for the role of the cleaning and showing how such an unauthorized team was marginalized. This example highlights the interconnectedness and mutual influence of different practice communities, as Wenger (1998) emphasized. The designers have opted for wooden doors that have been damaged by the cleaning team, posing challenges for the maintenance team. Consequently, promoting sustainability in building design requires a comprehensive understanding of how these communities of practice engage with the built environment.

Figure 7.23 Wooden Door for Toilets (Source: Author)

ii. Accessibility

The effectiveness of operation and maintenance is hindered by the issue of accessibility, which is the second concern. During the fieldwork, the researcher observed several defective lights, as depicted in Figure 7.24, that had not been replaced by the maintenance team. This observation prompted further exploration, revealing that the lack of accessibility was the underlying cause. The maintenance team expressed their inability to reach these lights as they were positioned in the high ceiling, making it unsafe to approach. Additionally, the maintenance team provided pictures demonstrating the challenges they face in accessing other building elements for maintenance purposes, such as painting, as shown in Figure 7.25. Moreover, the daily maintenance of the air conditioning systems on the rooftop is also challenging due to limited accessibility, which is essential for carrying out the necessary services for these sensitive systems. These examples of accessibility issues have demonstrated that the intended design for safety has not been met.

Figure 7.24 Ceiling Lights (Source: Author)

Figure 7.25 Touch-up Paint (Source: The maintenance team)

iii. Cleaning

The cleanliness of the BMF building is the responsibility of facilities management, encompassing the daily cleaning of various areas such as offices, kitchens, corridors, restrooms, and prayer halls. Despite the essential nature of their role, cleaners frequently experience marginalization and possess limited authority within the hierarchical structure of the building. By shadowing the cleaning team, critical data was collected and different challenges that the team encountered were identified.

Some of these challenges are linked to initiatives implemented by the sustainability team, as discussed in Section 6.4.2, while others stem from design decisions made for the building, which will be addressed in this section. Through the fieldwork, two specific cases have been examined to shed light on the difficulties encountered by the cleaning team.

First, while observing the activities of a cleaning team member in the kitchen, I noticed the presence of stains on the marble surface, as depicted in Figures 7.26 and 7.27. Initially, I presumed that the cleaner had overlooked these stains. However, she informed me that the tea drops had caused the stains, which had persisted for a considerable duration. She also mentioned that the cleaning team had made numerous attempts to remove the stains, but their efforts had been in vain. Moreover, the cleaner emphasized that this issue was recurrent across the kitchens of the BMF. Subsequently, she guided me on a tour of all the kitchens that exhibited the same problem, aiming to provide evidence of this issue. The following excerpt exemplifies the concerns expressed by the cleaning team regarding the materials used in the kitchens.

Field notes, excerpt from the interaction with a member of the cleaning team stated at the BMF, 23rd February 2022:

"The kitchen is where the staff prepares tea, and there will likely be drops of tea on the table during the tea preparation process. Therefore, if these stains are not cleaned directly, the process will be difficult to clean the table and may take hours".

Figure 7.26 Stains in Kitchen 1 (Source: Author)

Figure 7.27 Stains in Kitchen 2 (Source: Author)

Thus, the practices of the cleaning team at the BMF building are heavily impacted by the design choices and material objects within the building. An instance of this is the utilization of marble surfaces in the pantries, which, while visually appealing, presents a challenge in removing stains caused by tea drops during the preparation process. This design decision has resulted in frustration and difficulties for the cleaning team, impeding sustainability by increasing the time and resources required to clean such surfaces. To address this issue, it is crucial to consider the daily activities of the cleaning team and the material objects they employ in their work while selecting such materials.

According to social practice theory, activities are not solely individual actions but are also influenced by material objects. Therefore, designers can opt for alternative

materials for pantry surfaces that are more resistant to stains or easier to clean. This change could reduce the time and effort needed by the cleaning team to maintain cleanliness within the building. Furthermore, alongside modifying the material objects, providing training or resources to the cleaning team can foster more sustainable practices. For instance, offering training that enables the cleaning team to adapt their cleaning techniques to the new material could decrease the time and effort required for surface maintenance.

Second, challenges are faced by the cleaning team concerning the carpet in the building. According to the designers, the carpet covered and safeguarded specific devices installed on the floor to reduce echo in the open office space. As a result, the carpet creates a comfortable work environment by effectively absorbing loud sounds as intended by the designers. However, despite this system's efficiency and expected benefits of using carpet, it presents practical cleaning issues that the designers may have overlooked. During the shadowing process, the cleaners highlighted the difficulties in cleaning this particular carpet in terms of the material and the time required. Additionally, if any liquid is spilled on the carpet, it can emit unpleasant odors for the users. Hence, using carpets in office buildings may not be feasible and could have adverse health effects, as illustrated by this case. The following excerpt aims to illustrate this concern.

Field notes, excerpt from the interaction with a member of the cleaning team stated at the BMF, 15th August 2022:

"This carpet takes a long time to clean and sometimes emits unusual odors."

In order to foster sustainability in future designs, the consideration of the "stuff" utilized in a building, the "skills" necessary for cleaning, and the "image" of the practices of the cleaners are crucial for designers. In the specific case of the carpeting installed to reduce echoes in the open office space and enhance user comfort, its practical cleaning concerns underscore the importance of designers considering the skills required for the cleanliness of such materials. Thus, the efforts made by the cleaning team to address these challenges can also contribute to sustainability in future designs. Furthermore, collaboration between the cleaning team and designers can be beneficial. The cleaning team can provide valuable

feedback on the feasibility of using certain materials or designs and suggest alternative, more sustainable solutions. By incorporating the input and feedback from the cleaning team, designers can create more sustainable buildings and better tailored to the users' needs.

7.4.3 Employing Technical Solutions for the BMF

Based on the ethnographic investigations, it was found that the design team heavily relied on technology to guide the users' actions in the building. In section 7.3, the design team outlined six objectives that they aimed to achieve through the building's design. To attain these goals, they implemented various technical solutions to promote health, safety, and cost-effectiveness. The design team created different technical solutions for each of these objectives. For example, the building was equipped with tools like the building management system (BMS) to optimize operation and maintenance. Also, some technical solutions were used to manage the user's health and safety. Therefore, the following sections will discuss these areas where the technology was employed and the response of the building users.

a. Building Management System

The BMS manages the building's operations, including the HVAC system, to ensure the efficient use of assets. For instance, the BMS controls the air conditioning system, set to operate at 23 degrees, as recommended for optimal operation. The excerpts below are to demonstrate this fact.

Excerpt from an interview with a member of the design team, conducted on February 09th, 2022:

"For low operation cost: through Building Management System BMS for managing the operation and maintenance of the building."

Given that the building is used by a diverse range of occupants, including both men and women, it is crucial to consider the indoor environment in terms of heating, cooling, and ventilation. In order to address these concerns, the designers of the BMF opted to rely on technological solutions provided by the building management system (BMS), which allowed for greater control over the building's operations,

including air conditioning. The BMS was considered an effective tool in the building design to achieve low operational and maintenance costs and maintain a standard temperature of 23 degrees Celsius, as shown in Figure 7.28. However, despite its potential benefits, several concerns have been raised regarding implementing this system, as evidenced by user practices.

Figure 7.28 AC Control (Source: Author)

Initially, the fieldwork revealed concerns regarding the air conditioning system, which has become a significant preoccupation for some building users. Several concerns about the air conditioning system's efficiency have been identified through interactions with employees. One of the main concerns relates to the inability to adjust the temperature to meet individual needs, which is a primary concern for employees. Although a series of users have expressed their suffering from such technical solutions, an example of individuals is depicted in the following excerpt.

Field notes, excerpt from the interaction with the building manager at the BMF, 21st February 2022:

"The main issue in the AC that concern many users are no personal control, distribution of air, location of the diffusers, window and non-window issue."

The designers of the BMF building, in this case, intended to create a sustainable and energy-efficient environment by relying on the technological solutions provided by the Building Management System (BMS) to control the indoor environment, including the air conditioning system. However, user practices have demonstrated several concerns regarding implementing this system. One of the main concerns is the lack of personal control over the temperature, which is critical in achieving comfort and productivity in the workplace. This lack of personal control is related to the "stuff" of the air conditioning system and the distribution of air through diffusers. The users of the building also raised concerns about the location of the diffusers, as well as the window and non-window issues, which suggests that the design of the building and its features are critical factors that affect user practices related to indoor climate control. Furthermore, the data indicates that the social practice of indoor climate control is shaped by "images" related to comfort and productivity in the workplace. The concerns raised by the users of the building demonstrate the importance of these images and suggest that they are integral to the social practice of indoor climate control. In summary, the data shows that user practices related to indoor climate control are shaped by the physical infrastructure and features of the building, as well as the knowledge and abilities required to adjust the temperature to suit individual needs. Additionally, the importance of comfort and productivity in the workplace is a crucial image shaping indoor climate control's social practice.

As evidenced by the literature on the built environment, implementing the BMS in the BMF building represents an apparent attempt to employ universal methods while overlooking other critical factors, such as social and geographical considerations (Chappells and Shove, 2005). The literature has previously critiqued the approach of using technology tools in design and relying on such systems to maintain a standard indoor temperature, which fails to account for the diverse needs of building occupants. For example, it includes differences between genders (Bluyssen *et al*., 2011; Karjalainen, 2007), regional variations in climate, and cultural differences in clothing preferences (Roaf *et al*., 2011). Hence, adopting BMS in the BMF building is a limited approach that fails to consider the building's intricate social and geographical setting. The criticism of relying on technical

solutions in building design highlights the importance of incorporating a more comprehensive approach considering human diversity, cultural factors, and regional differences. This situation calls for a shift in the design paradigm to adopt a more holistic approach that accounts for different groups of people's specific needs and preferences. By doing so, the design can better address the needs of diverse user groups and ensure that the indoor environment promotes comfort and productivity for all occupants.

In light of the use of technological tools to regulate human behaviour, the fieldwork has uncovered user discontent with these tools. For example, the study found that some employees wore heavy clothing during the summer months, as depicted in Figures 7.29 and 7.30, indicating their challenges with using such technology. Using air conditioning and other technological tools can be seen as an attempt to provide a comfortable indoor environment. However, this data shows these tools do not always meet users' needs. Adjusting temperature settings to suit individual preferences as skills is also crucial for creating a comfortable indoor environment. However, the technological tools used in the BMF building may limit users' ability to exercise these skills, leading to dissatisfaction. Finally, images play a significant role in shaping users' expectations and experiences of indoor climate control. For example, images of comfort and productivity may influence the design intention of providing a standard temperature of 23 degrees Celsius in the workplace. However, the data shows that this image does not always correspond to the needs and preferences of users, leading to user dissatisfaction.

Figure 7.29 Example one of Wearing a Jacket (Source: Author)

Figure 7.30 Example two of Wearing a Jacket (Source: Author)

The effectiveness of sustainable design can be limited by technical solutions, as they assume that users will always adhere to the expected behaviours (Cole and

Brown, 2009). However, users often reject the digital practices that businesses, technological experts, and policymakers anticipate. The designers employ a building management system (BMS) as a technical solution to optimize the operation and maintenance of the building. The BMS controls various aspects such as the HVAC system to ensure efficient asset utilization. While this system may result in cost savings, it disregards the social practices of building users who may override the system's settings to achieve their desired thermal comfort levels. This approach has been criticized in the literature for its heavy reliance on technology and the consequent neglect of user preferences, leading to inefficient outcomes (Scott *et al.*, 2012; Kuijer and Bakker, 2015).

b. Health and Safety

One of the intentions was to promote the health of building occupants, and the designers accomplished this by implementing various technical solutions to control noise levels in the open work environment. The issue of noise pollution was considered essential by the designers due to the potential adverse effects it could have on the health and well-being of individuals. To achieve this objective, the designers created several technical solutions. One example is using unopenable windows to restrict user control over them. This measure not only promotes safety by preventing external risks such as theft but also promotes health by protecting users from any emissions from the nearby refinery that may impact their health. In addition, using unopenable windows also supports the design objective of low operation cost, as it prevents the air conditioning system from being exposed to the harsh seaside environment, which can lead to corrosion and increased maintenance costs. The excerpts below are to demonstrate this fact.

Excerpt from an interview with a member of the design team, conducted on February 09th, 2022:

"For health: it was through noise control, humidity control, and air quality. Different technologies have been used, some for the HVAC, others for printing machines, and others for furniture. For instance, the selection of the furniture takes into account ergonomics criteria and is a noise absorber. In addition, for the air quality and humidity, different systems have been installed to control carbon dioxide

and humidity." Furthermore, the building was equipped with technical systems for airtightness, which reduces the predicted emissions from the nearby refinery, making it a safer and healthier environment for occupants. Additionally, using technology to regulate users' entry and exit from the building is another safety measure that was implemented. These technical solutions were designed to address the critical design intentions of health, safety, and low operation cost. In addition, they showcase the innovative ways in which designers can use technology to create sustainable and effective building designs. The excerpts below are to demonstrate this fact.

Excerpt from an interview with a member of the design team, conducted on February 09th, 2022:

"For safety: the BMF is located near the Oman refinery, which is high risk and dangerous. Hence, different actions have been adopted. For instance, all windows facing the refinery have been designed to be double glass with a protection sheet. Also, sensors have been installed for the detection of pollution. Additionally, fire systems and evacuation have been designed to take into account all the surrounding risks."

While noise pollution can significantly impact people's health and well-being, addressing this issue through technical solutions alone may not be effective, as it fails to consider how users' practices can contribute to noise pollution. Similarly, using unopenable windows to restrict user control over them was a technical solution aimed at promoting safety and health. However, while this solution may prevent external risks such as theft and protect users from harmful emissions from the nearby refinery, it overlooks the social practices of users with preferences for natural ventilation.

Ewart (2018) has highlighted that technologies support building design and methods but ultimately rely on people's knowledge and actions in their physical surroundings. Therefore, unforeseen actions should be expected, and the social aspect of the digital world should be emphasized. In practice, sustainable design should consider the social dimensions of sustainability better to understand users' habits, preferences, and behaviours. Bourdieu (1984) suggests that social norms and

contexts shape habits and routines, and designers should consider these factors in their design process. This theory encourages designers to focus on the social aspect of sustainability, emphasizing the importance of engaging with users and considering their preferences and habits when designing sustainable solutions. Therefore, while the technology-based approach may have some benefits, it may not be relied upon as the sole approach to sustainable design. Instead, designers may adopt a more holistic approach that considers the social dimensions of sustainability to create effective and efficient sustainable solutions.

7.5 Post-Occupancy Evaluation (POE) for the BMF

According to Patel and Green (2019, p. 469), the concept of post-occupancy evaluation (POE) views buildings as fixed physical objects rather than entities shaped by practices. However, interviews with key individuals involved in the building, including designers and those responsible for operation and maintenance, revealed the neglect of POE. The data gathered from these interviews supports the criticism that the designers have not adequately acknowledged the importance of the occupancy phase, which is recognized as the most prolonged phase in a building's life cycle. Furthermore, the interviews uncovered a lack of interest from the design team in assessing the extent to which their intended goals were achieved. The provided excerpts from the interviews serve as evidence of this disregard.

Excerpt from an interview with a member of the design team, conducted remotely through the Microsoft team, February 27th, 2022:

"We don't have a systematic feedback survey, but we collect users' feedback through the O&M, then evaluate it to find solutions that must comply with design standards. We cannot meet all users' requirements, and most of the feedback is subjective."

Excerpt from an interview with a member of the operation and maintenance, conducted while visiting him at his office, 02nd March 2022:

"No dedicated system for POE, but we have a focal point in the building which is in charge of communicating with users if they need any support."

Excerpt from an interview with a member of the operation and maintenance,

conducted on February 27th, 2022:

"There are two different systems for the POE, one for the soft services which belong to the facilities management, and hard services, which is under the O&M. However, no idea on the way to implement."

This lack of attention to the POE can have significant consequences for the sustainability of the building. Without a thorough evaluation of the building's performance during occupancy, it becomes difficult to identify any design flaws that may be impacting energy efficiency or occupant comfort. Moreover, ignoring the POE can lead to missed opportunities to improve the building's sustainability during its operational life. By gathering feedback from occupants and analysing building data during this phase, designers can identify areas for improvement and make adjustments to optimize the building's performance. Unfortunately, the absence of legal and regulatory standards within the construction industry has resulted in practitioners giving less consideration to these processes (Li *et al*., 2018, p.199).

The neglect of the POE also suggests a broader issue with the design process itself. If the design team is not interested in evaluating the success of their design, it raises questions about the effectiveness of the design process. Designers should be encouraged to take a more holistic approach that considers the entire building life cycle, from design to demolition (Wilde, 2014). This approach can lead to more sustainable buildings that meet occupants' needs while minimizing environmental impact. In addition, designers should consider engaging with building occupants and stakeholders throughout the design process to ensure that their needs and preferences are incorporated into the design. This practice can help promote ownership and accountability among building occupants, leading to more sustainable behaviours and a more successful POE.

By applying social practice theory to the collected data, we can examine how designers promote and encourage sustainability and how these efforts are manifested. Based on interviews conducted with key personnel involved in the building, it is evident that designers have not adequately emphasized the significance of the occupancy phase, which represents the longest period in a

building's life cycle. This neglect can be attributed to prevailing social practices in sustainable building design that prioritize technical solutions over social considerations. The first excerpt from an interview with a design team member reveals the absence of a systematic feedback survey to gather user input. Instead, feedback is obtained through the operation and maintenance team, and only subjective feedback is taken into account. This approach reflects a narrow understanding of sustainability that primarily focuses on meeting design standards rather than accommodating the needs and preferences of users.

The second interview with another operation and maintenance team member indicates that there are two different systems for POE, one for soft services under facilities management and one for hard services under operation and maintenance. However, there is no clear understanding of implementing these systems effectively. This lack of clarity may indicate a broader organisational failure to understand and address the social dimensions of sustainable building practices. Overall, these data suggest that designers and building managers have not fully considered the social dimensions of sustainability in building design and operation. The social practice can help explain this neglect by highlighting how the dominant social practices in sustainable building design prioritize technical solutions over social ones. These data suggest a more comprehensive and participatory approach to sustainable building design that prioritizes user needs and preferences while addressing technical solutions.

Despite the concerns expressed in the previous excerpts regarding the building evaluation system, this responsibility lies with a technical communication and change management team, as depicted in Figure 7.31 below of the design policy. The role of the change management team is to facilitate effective communication among stakeholders throughout the entire life cycle of the building, ranging from its initiation to completion. Consequently, the evaluation of the BMF building encompasses a range of approaches, such as direct interaction with users and utilization of a digital platform. These evaluation methods prioritize individual perceptions as a means to enhance services by focusing on the needs of individuals. The upcoming sections will delve into the tools employed by PDO to evaluate the services provided to users, with a specific focus on the BMF building.
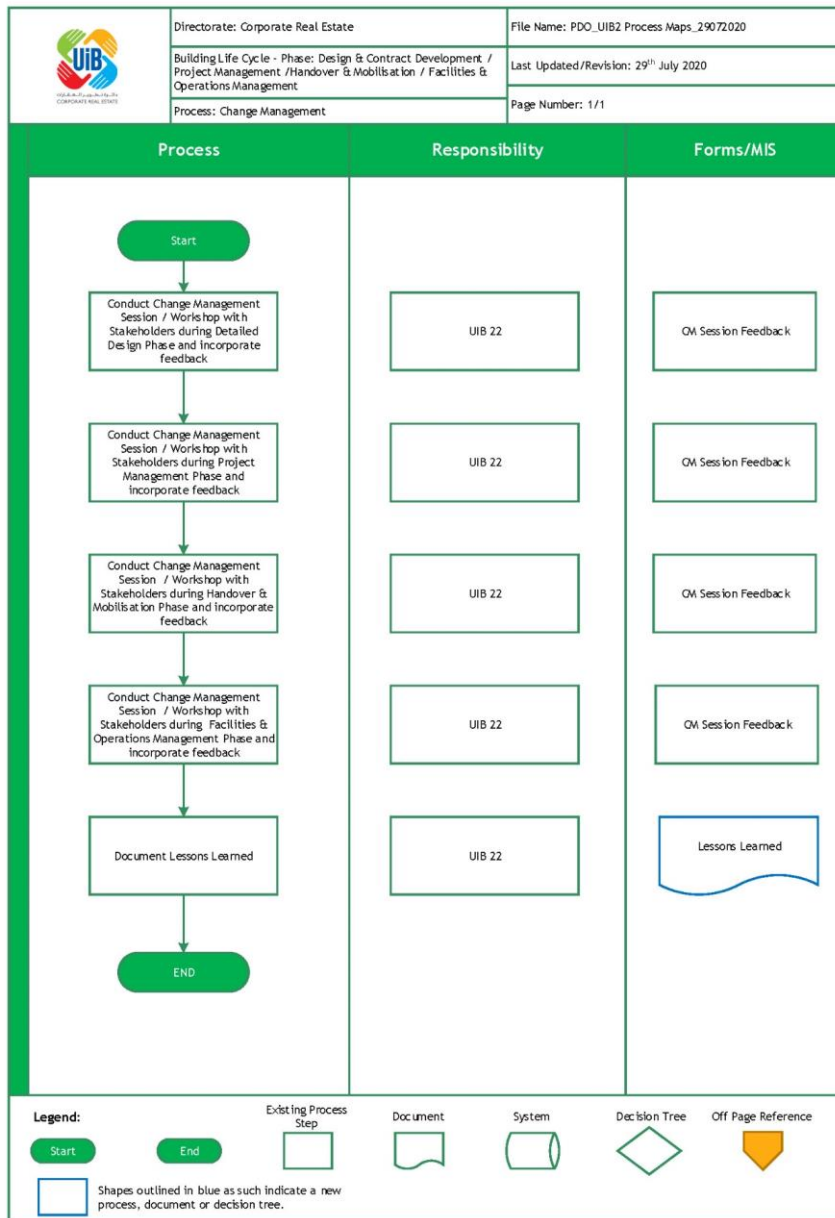
Figure 7.31 Change Management Process (Source: UIB 2 Process maps)[16]

7.5.1 Direct Interaction with Users

The policy depicted in Figure 7.31 demonstrates that the institution has adopted a strategy to acquire an understanding of users' perceptions of the built environment

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[16] This report is part of the documents that this research has relied on (Table 5.3, Document No 4)

through direct engagement. This approach carefully examines the users' needs during the transition phase as part of the PDO techniques. The responsibility for this specific tool during the occupancy phase lies with the change management team. As a result, the team has generated diverse data compared to the expected data from the questionnaire survey. The provided excerpt serves as proof of this discovery.

Excerpt from an interview with a member of the communication and change management team, conducted remotely through the Microsoft team, April 24th,2022:

"During the occupancy phase and before movement, a survey was sent to users to obtain their perceptions and expectations. The feedback has shown high resistance and negative comments, which show unsatisfied and unhappiness with the new work environment. Then, the team decided to change the tool of convincing people through direct interaction with people. The idea is to motivate them and lessen their concerns physically. The revised approach now involves an attractive introduction, presents, a tour, and instructions on proper conduct and usage in the given environment.

This data highlights a discrepancy between the anticipated results of the survey and the actual feedback received. It also underscores a shift in the approach used by the change management team, emphasizing direct interaction and physical interventions to address user concerns. The change management team's responsibility for this one-off tool during the occupancy phase suggests an organisational understanding of the social dimension of sustainable design. By engaging directly with users and their routines and habits, the team is attempting to identify and understand the social practices involved in the use of the building. However, the data also suggests that the initial survey method of gaining user feedback was ineffective, as the feedback revealed high resistance and negative comments. This finding aligns with criticisms of exclusively relying on individual perceptions for evaluating sustainable design interventions. The critique is based on the understanding that individual perceptions can be subjective and may not fully capture the broader social practices involved (Watson, 2015).

Hence, the shift in approach towards motivating and addressing concerns through

an appealing introduction, offering tours, and providing instructions on proper conduct and usage within the given environment can be regarded as an endeavour to actively involve and enhance engagement with the social practices associated with the utilization of the building. Overall, the data provided highlights the importance of understanding the social practices involved in sustainable design interventions and the need to use multiple approaches to gain insight into these practices. It also demonstrates the importance of adapting interventions to address the specific social practices at play in a particular context. However, further analysis is required to assess the effectiveness and impact of these revised strategies on promoting sustainability in PDO's buildings.

7.5.2 Platform for Continuous Improvement (CI)

The PDO has recognized the necessity for a different approach to meet users' needs following the direct interaction conducted during the occupancy phase. To address this need, the organization has developed an online platform for ongoing modifications, allowing users to express their dissatisfaction with the working conditions and offer suggestions for improvement. Although staff members have expressed their support for the platform to improve the work environment, its scope is limited and incomplete because it relies solely on individual perceptions, failing to account for other factors such as cultural, institutional, or structural influences. Furthermore, an examination of the platform indicates that it primarily focuses on the organization's core activities. Only "three issues" related to the built environment have been raised since its establishment in 2018. These issues do not correspond to the current concerns that the study has uncovered.

The reliance on individual perceptions to identify issues with the built environment is consistent with the social practice theory's focus on the importance of subjective experiences in shaping practices. However, the platform's limited scope ignores other contextual factors that may influence the success of sustainable practices. For example, this approach does not consider the cultural, institutional, or structural factors that shape how users interact with the built environment. Furthermore, the fact that the platform primarily focuses on the organization's core activities suggests that the social dimensions of sustainable design are not fully understood.

Accordingly, the success of sustainable practices is contingent on the alignment between individual practices and broader socio-cultural norms and values. Therefore, the limited focus on the built environment suggests that the PDO may not completely understand the social practices that influence sustainability. In summary, the data presented highlight the importance of a comprehensive understanding of the social dimensions of sustainable design.

7.6 The Main Findings

This chapter delves into the strategies employed to foster and advance sustainability for the BMF buildings. The primary objective of this chapter is to gain valuable insights into the process of constructing sustainable buildings and the various systems and methods utilized to achieve this goal. The research findings shed light on three fundamental approaches PDO has embraced to promote sustainability in building design. These approaches have been identified by analysing the organization's practices and aligning with the criticisms raised in the existing literature (Kimbell, 2012).

The first approach highlights the PDO's reliance on international standards in design for sustainability, as Ding (2008) has emphasized. The design policies of the PDO show the organization's strategies for promoting sustainability in building design rely significantly on international standards. For example, the "Real Estate Technical Guidelines for Buildings and Infrastructure" building project management policy requires designs to adhere to international standards. Ding (2008) has criticized the PDO's current design approaches that rely on modelling and predictive measures to evaluate the sustainability of buildings. Using international standards to promote the PDO's sustainability objectives in buildings has marginalized cultural differences and local requirements, as Hoolohan and Browne (2020) stated. The lack of consideration for the local context and human culture is a critical issue in sustainable design. For example, LEED was used to assess the sustainability of the BMF building in PDO, showing an apparent indication of the overlook of local culture and requirements. It also marginalized the differences between Oman and the US regarding construction tools and management procedures for such buildings. Therefore, specialized sustainability

grading systems have been created by many nations to suit their needs and local culture, such as the BREEAM system in the United Kingdom, the Estidama system in the United Arab Emirates, and others, including Australia, Japan, and Qatar (Shirazi and Keivani, 2017).

The second strategy PDO employs is the user-centered approach (Vischer, 2008), which is considered a critical objective for designers to achieve to ensure their work's sustainability. This approach is evident in a design strategy called "UIB 2 Process Maps," as indicated by the design team, which outlines the planning and initiation process for building design. The strategy focuses on addressing the requirements of various users, including operation and maintenance staff, residents, facilities management, guests, and security personnel. While this approach is essential for enhancing building sustainability, it has certain limitations. Sociological perspectives have challenged this technique by highlighting its neglect of contextual influences that shape users' intentions. For instance, Redström, (2006) argues that there will always be a discrepancy between the intended use of the final design and its actual use. The issue lies not in the information produced by user-centered approaches but in how designers interpret and utilize that information. The user-centered design acknowledges the uncertainty between user requirements and actual use, so iterative procedures and user evaluations are crucial (Pettersen, 2015). In contrast, a practice-oriented approach focuses on the broader system, considers individuals as carriers and components, and recognizes shared emotions as integral to the practice (Shove *et al.*, 2007). Therefore, involving potential users or practitioners alone may not be sufficient, especially when including a more diverse range of actors in the workplace, such as the BMF, is necessary.

Finally, technology plays a significant role in PDO's efforts to develop sustainable building designs. The "Real Estate Technical Guidelines for Buildings and Infrastructure" emphasise the importance of promoting technology to enhance building sustainability. The guide incorporates various design tools to improve energy efficiency and create a healthy built environment. However, the role of users in this process has been overlooked, aligning with the criticism raised in the literature. Consequently, these objectives are based on the belief that demand can be predicted and inefficient use can be avoided through the implementation of

technical solutions. This assumption conflicts with the practice theory perspective, which posits that individuals' actions are constantly evolving and influenced by diverse notions of desirability, appropriateness, and societal norms, reinforcing and transforming these notions over time (Scott *et al*., 2012). Moreover, the focus on well-defined scopes necessary for making predictions and calculations in the context of persuasive technology means that while some concerns become evident and receive attention, others may fade into the background. Consequently, designing for sustainability using such approaches tends to overlook expected service levels and fails to consider the underlying motivations and factors shaping human actions (Brynjarsdóttir *et al.*, 2012). This has led to conflicts in the expectations of sustainability approaches employed in the BMF building, which will be further discussed in the following section.

7.7 Discussion: Insights from Social Practice

This chapter addresses the second research question, "To understand the cultural context of Oman impacts the sustainability practices of office buildings". The investigations conducted were based on ethnographic studies of the social practices of users at the BMF building. The primary focus of this research is to examine how building entities interact with users after being promoted by the design and sustainability team. The chapter has concentrated on studying both practices, the doing and saying, carried out by users, based on the theoretical underpinnings of this research described in Chapter Two. Moreover, the facilities management team, another participant in this process contributing to the structure of users' everyday activities, has also been examined. In this chapter, Shove and Pantzar's (2005) conception of practices as assemblages of meanings, skills, and stuff has been utilized to analyse users' practices, which has been employed to develop the framework discussed in section 4.6.

Consequently, the chapter has outlined the effects of prioritizing social practice over individual behaviours and attitudes in sustainability approaches. By focusing on social practices, the research has provided a deeper understanding of how users respond to the design aims and sustainability initiatives. Furthermore, the chapter has demonstrated that users' practices are not only influenced by the building design

and sustainability initiatives but also by their own experiences, cultures, and contexts. Therefore, the social practices of users should be considered when designing and implementing sustainability initiatives in buildings. According to Shove (2014), there is a commonly held belief that visible elements, such as rational self-interest, attitude, motivation, or habit, determine human behaviour. However, Shove argues that the literature on this topic varies significantly in emphasis. For instance, habits often characterized by automaticity, frequency, and a stable environment can complicate the effects of regulations based on purposeful, logical action (Shove, 2010). Despite these differences, all theories suggest that behaviours are influenced by both internal and external factors, with some being more deliberate than others. As a result, the relative importance of many elements, such as environment, cultural context, or setting, can impact human activities.

The ethnographic data gathered on users' daily activities in the BMF building supports the view that various factors influence behaviour. Despite the intentions of various influencers to encourage users to take specific actions that align with the building's goals, the actions of users often contradict these intentions. This suggests that many strategies employed to promote building entities have neglected to consider how these entities interact with building occupants. Consequently, this Chapter highlights the importance of using user practices as a basis for building analysis. Through ethnographic investigations into user practices, it becomes possible to explore how different influences that shape user behaviour overlap. Moreover, the chapter examines the most critical impact revealed by anthropological studies: culture, which building entities have overlooked, emphasized by Reckwitz (2002), Bourdieu (1984), and Hofstede (1980).

The ethnographic investigations conducted in this study reveal the significance of users' culture in shaping their daily activities, as evidenced by meaningful social practices (Shove and Pantzar, 2005). The influence of culture on user practices is evident in several instances within the BMF building. Firstly, the intended open work environment, aimed at fostering collaboration and communication among employees, faced cultural barriers due to resistance against gender mixing in a shared space. Secondly, the users' disregard for modern coffee machines and internal restaurants holds a deeper meaning for facilities managers, highlighting the

role of culture in shaping daily practices. Thirdly, the design of Omani and non-Omani toilets raises cultural issues for certain users. Thus, employing practices as essential units for research and governance serves as a strategy to address the challenges of culturally interpreting sustainability (Spaargaren, 2011).

In addition, the prayer hall case demonstrated the role of contextual influences on users' daily activities, as Shove (2010) suggested. The design team did not anticipate that users would marginalize essential functions such as the prayer hall. This unique case may be attributed to an external context factor that the BMF designers did not consider. The case supports Shove's argument that designers indirectly influence people's daily lives (Shove *et al*., 2007). The occurrence was not a result of a design flaw but rather an organisational contextual factor that was disregarded by the designers (Kimbell, 2012; Gram-Hanssen, 2010; Spaargaren, 2011). This case highlights the importance of designers' understanding of users' activities in the constitution of sustainable designs in the future. By recognizing and accounting for the various contextual factors that can impact users' experiences, designers can ensure that their designs are more sustainable and better tailored to users' needs.

Furthermore, it was revealed through fieldwork that technical solutions must undergo social recontextualization (Ewart, 2018). One of the design goals of the BMF was to reduce operational and maintenance costs, which the designers aimed to achieve through the use of BMS to control the air-conditioning system. Due to the building's open work environment with varying occupants and needs, this strategy has resulted in the human user being viewed as passive and having no presence or impact, which has had adverse effects (Scott *et al*., 2012). Furthermore, this approach has failed to account for differences in human anatomy and requirements between genders (Bluyssen *et al*., 2011; Karjalainen, 2007). In some nations, users have more flexibility in clothing to manage themselves with such technology during winter and summer. However, cultural restrictions have limited this flexibility for BMF users, particularly women, as noted in the literature (Roaf *et al*., 2011). This case underscores the need to understand the relationship between technology and humans. According to Wilhite (2008), the understanding of how technologies and socio-cultural contexts interact to shape energy-using practices is

often oversimplified by both technologists and behaviouralists. The oversimplification arises from a tendency to overlook the complexities and nuances inherent in these interactions.

Moreover, the vitality of social practice theory as a design analysis unit has been revealed through the analysis presented in this chapter. The analysis highlights the inadequacies of assessments that isolate individual practices and ignore the relationships, allies, and conflicts between practices. During the fieldwork, some observations emerged, which helped further helped in understanding the importance of considering the interconnectivity of practices (Warde, 2005). For instance, the lack of food options that suited the users led them to ignoring the prayer hall and initiate new rooms inside the building, demonstrating how different practices are interconnected and how they form communities of practices (Wenger, 1998). This example also illustrates the linear thinking of the designers, which resulted in overlooking the impact of other practices on the intentional worship practice. Watson (2012) has examined the connections among different practices and their interdependence, reliance, and impact on each other within everyday life. The study investigates how these practices contribute to forming societal systems or complexes.

7.8 Summary

The chapter critiques the literature on the approaches in use for sustainability and connects it to the existing practices at PDO. Specifically, the chapter critically examines the intentions for the BMF case study, and the tools used to achieve these objectives. The limitations identified are that the BMF focused primarily on meeting the users' needs as the primary objective, adhering to international standards while marginalizing the influences of the local setting. In addition, the organisation overlooked other factors, such as organisational rules or cultural barriers. This practice highlights a gap in understanding sustainability's social dimension.

To address this gap, the lens of the social practice theory is applied to examine how PDO encourage and promote sustainability and how these efforts are manifested.

This theoretical framework suggests that social practices shape our daily lives, and changing these practices is necessary for promoting sustainability. However, this requires understanding the complex interplay of various factors, including social norms, cultural values, institutional rules, and physical infrastructure. In applying this theory to PDO's sustainable efforts, it is clear that more attention may be paid to sustainability's social dimension. This means an understanding of the local context, including cultural norms and institutional rules, is essential. Additionally, PDO may consider the role of users as active agents who shape and are shaped by social practices. By considering these factors, PDO can create more sustainable buildings that better reflect the needs and values of the local community.

The significance of this study lies in its emphasis on acquiring a deeper understanding of social practices and interactions among various elements, including technology, infrastructure, and individual behaviours. To achieve this understanding, the research has employed ethnography as a methodology. Ethnography is regarded as a fundamental approach to comprehending how users actively participate in sustainability initiatives within the workplace. Through the implementation of ethnographic research, valuable insights into user behaviours, which can facilitate the development of more effective and sustainable workplace sustainability initiatives has been gained. As a result, PDO may adopt such approaches, specifically ethnography, to promote sustainability in future buildings. Subsequently, the following chapter will explore the implications of this research on sustainability and propose ways to enhance such approaches to foster sustainability in future designs undertaken by PDO and beyond.

Chapter 8 : The Research Contribution

8.1 Introduction and Background

This chapter does not serve as the conclusion of the thesis but rather as a new starting point. The thesis began by recognizing the need to re-evaluate existing theories focusing on individual decision-making processes to promote sustainability in office buildings. These theories may be reconsidered to account for the complexities of users' daily lives. To this end, Chapter Two explored the theoretical foundation of this study, highlighting the potential value of social practice theory (SPT) as a framework. Thus, the main objective of this thesis is to examine the implications of shifting the focus from individual behaviours and attitudes to social practices as the central subject of investigation (Reckwitz, 2002; Schatzki, 2002; Warde, 2005; Shove *et al*., 2012). Understanding how social contexts shape and structure practices beyond being mere variables in individual decision-making processes is crucial, especially in the Middle East, an area often overlooked in this discourse.

Accordingly, this research explores the gaps between the intended sustainability approaches and the actual practices of users using ethnographic methods. This ethnographic case study was conducted in an office building in Oman to gather detailed information. The study employed various techniques such as observations, interviews, shadowing, and analysis of documents. One distinctive aspect of this method is its inclusion of users who are typically not recognized or given authority in knowledge development, such as cleaners, compared to maintenance and facilities managers, who are usually seen as authoritative. As a result, several intriguing instances were observed where individual actions contradicted sustainability principles. The implications of these novel findings are essential for promote sustainability in office buildings.

This study started out by trying to answer two very important research questions viz:

- To investigate how organizations implement sustainability initiatives related to their office buildings.

- To understand the cultural context of Oman impacts the sustainability practices of office buildings.

The study set forth to answer these questions using an ethnographic approach and a specific case study office building in the Sultanate of Oman. In relation to the first question, it was found that the case study project used a variety of methods to implement sustainability initiatives within their office environment. It was found that the organisation focused its sustainability practices around only two of the three pillars of sustainability viz environmental and economic sustainability. This is consistent with literature on sustainability as organisations only adopt what will contribute to their bottom line. The organisation in question was also found to have relied heavily on the use of technology, international standards, and a user-centered design approach to achieve its sustainability initiatives. It was also found that despite these approaches, users did not achieve the desired comfort that was promised because of adopting sustainability initiatives. Other additional findings unearthed while answering the first research question can be found in section 6.7.

The second research question sought to understand how cultural context of Oman impacts sustainability practices of office buildings. It was found that considering the cultural context was a very significant factor that can contribute to achieving the sustainability objectives of organisations. Failure to consider the cultural context of users has led to a situation where a LEED-certified building was not providing the comfort anticipated by the management of the case study organisation. The user practices went contrary to what was expected of normal office practices mainly influenced by their cultural practices, which were not considered in the course of designing the sustainability initiatives. Other additional findings unearthed while answering the second research question can be found in section 7.7. Subsequently, the study also resulted in additional findings that contribute to ethnographic research methods, theory, and practice as highlighted below.

8.2 Contribution to Method

Section 4.5 has demonstrated that the buildings in Oman have been influenced by

climate and culture. While existing studies predominantly concentrated on climate factors in the design of buildings in Oman, often employing quantitative approaches like modelling or surveys, this research stands out by acknowledging and exploring the influence of culture. The literature review highlights a gap in studies that delve into the impact of culture on the promotion of sustainability in building use in Oman.

The methodological contribution of this research is particularly significant by advocating for and implementing ethnographic research in the Omani context, the study takes a qualitative and context-specific approach. This departure from traditional quantitative methods allows for a more in-depth exploration of the cultural aspects influencing building design for sustainability. Ethnographic research involves immersive observation and interaction within the Omani context, providing a richer understanding of the cultural nuances that shape the use of sustainable buildings. This methodological choice contributes to a more comprehensive perspective on the interplay between climate, culture, and sustainability in the context of Omani building use. Therefore, this research may lay the foundation for future ethnographical studies in Oman workplace buildings.

8.3 Contribution to the Theory

This research can enrich theoretical development in workplace use, sustainability assessment, and cultural studies. The study emphasizes the significance of considering the intricate interactions between users, building entities, contextual factors, and local requirements and influences in sustainable workplace utilization. Consequently, the findings of this study have the potential to contribute to the advancement of more efficient and context-specific approaches to sustainability. The research makes a substantial contribution to the sustainability field by focusing on the inclusion of cultural factors in sustainable workplace and sustainability rating systems for Oman context. Unlike previous studies that may have overlooked the cultural dimension and primarily concentrated on technical aspects, this research emphasizes the significance of cultural factors in shaping sustainable workplace environment.

One notable contribution is the recognition of the diverse user groups and their daily practices. By understanding the routines and behaviours of different user groups within the workplace, the research adds a layer of complexity to the understanding of sustainable workplace. This approach acknowledges that cultural factors play a pivotal role in influencing how individuals interact with their work environment on a daily basis. For instance, this research has identified significant gaps in Oman workplaces' current sustainability assessment tools. By focusing on local requirements and influences, the study has provided valuable data that can be used to initiate a sustainability rating system tailored explicitly to Oman's workplace context. Such a rating system can incorporate the unique cultural, social, contextual, and economic factors influencing the use of Oman's sustainable workplace. It also may combine quantitative and qualitative approaches to assess building performance. By doing so, the rating system can help to address the shortcomings of the current assessment tools and provide more accurate and meaningful evaluations of workplace sustainability.

Therefore, this research extends its impact by proposing the incorporation of these cultural insights of Oman context into sustainability rating systems. This suggests a more holistic and inclusive approach of evaluating the sustainability of workplace buildings. By considering the diverse needs and practices of various user groups, the proposed rating system can better reflect the real-world effectiveness and cultural appropriateness of sustainable workplace designs. In essence, the research contributes to a paradigm shift in sustainable workplace by advocating for a more culturally informed and user-centric approach. It underscores the importance of understanding the daily practices of diverse user groups and incorporating these insights into both the design process and the evaluation criteria for sustainability rating systems.

8.4 Contribution to Practice

This research can advance the practice-oriented design field by defining the components of a practice orientation and examining the compatibility and usefulness of current sustainability principles and approaches. Considering the research's focus on the use of sustainable workplace buildings and the influence of

the contextual and cultural factors on the practices of users, Spurling *et al*. (2013) emphasized that it is crucial to reconceptualize the existing approach and practices for promoting sustainability in buildings. Therefore, this research proposes potential pathways to assist PDO in enhancing their strategies for promoting building sustainability, as outlined in Table 8.1. Adopting more inclusive, context-sensitive, and participatory methods in building design is essential for reframing the organisational understanding of the social dimension of sustainability. Recognizing the dynamic and cultural nature of practices, avoiding rigid perspectives, and involving users and stakeholders as active participants in the design process are necessary steps to achieve this goal. By doing so, PDO can effectively encourage sustainable behaviour and bridge the gap between intended sustainability objectives and actual outcomes in the building use.

Table 8.1 Pathways Towards Promoting Sustainability in PDO Buildings

Pathway	Practice	Procedures
1	User-Centric Design	Transcend the conventional strategy of limiting attention to user requirements.
		Adopt a user-centric design approach that acknowledges users' practices, needs, and cultural significance and incorporates them as active participants in the design process.
		Integrate their viewpoints and expertise at every stage of the design process to produce environments that better reflect their beliefs and habits.
2	Participatory Design	Participate with users and other stakeholders in the design process to give them a sense of ownership and allow for their valuable input.
		Organise workshops, focus groups, and consultations to gather ideas, co-create design solutions, and ensure that various viewpoints are represented.
3	Contextual Understanding	Recognize how context influences users' everyday behaviours.
		Understand the cultural, social, and environmental context of the area in which the building will be located by conducting

		extensive research and analysis.
		Designing buildings that respond appropriately to the unique context and support sustainable practices requires considering regional customs, traditions, and community dynamics.
4	Collaborative Partnerships	Encourage cooperation and alliances between designers, users, communities, and pertinent stakeholders.
		Encourage the exchange of knowledge, mutual learning, and co-responsibility to make the most of collective skills and provide sustainable building solutions that cater to regional requirements and aspirations.
5	Holistic Sustainability Assessment	Avoid depending simply on predicting techniques and limited analyses of sustainability.
		Create comprehensive sustainability evaluation frameworks that consider building design's social, environmental, and economic aspects.
		Use qualitative and quantitative metrics to assess the building's actual performance and long-term effects.
6	Adaptive Evaluation Processes	Adapt the evaluation procedure from a one-off linear technique to a continuous, adaptive procedure.
		Continue to keep close tabs on the building's performance, interact with users for feedback, and make necessary improvements to improve sustainability outcomes.
		Encourage continual improvement based on customer feedback and actual usage.
7	Capacity Building	Invest in programs that increase the ability of designers, stakeholders, and community members to enhance their knowledge and abilities in the design of socially sustainable buildings.
		Promote a sense of community and provide stakeholders with the knowledge they need to contribute effectively by providing training on participatory design techniques, cultural sensitivity, and sustainable practices.

8	Knowledge Sharing and Documentation	Record and share the experiences, lessons, and stories from ethnographic research and participatory design procedures.
		Promoting a deeper awareness of the social aspect of sustainability inside the organization and among the larger design community by sharing this knowledge will encourage others to adopt comparable practices.
9	Policy Support	Promote legislation that acknowledges the significance of the social component of sustainability in building design.
		Encourage the incorporation of social factors into the norms, guidelines, and laws governing sustainability.
		Encourage policymakers to consider the cultural value of buildings and contextual factors to promote sustainable practices and encourage user-centered design methodologies.
10	Continuous Learning and Improvement	Encourage an environment within the organization where learning, reflection, and progress are valued.
		Keep up with cutting-edge techniques and expertise in the design of socially sustainable buildings and encourage interdisciplinary cooperation, research, and innovation.

8.5 Limitations and Future Research Directions

The thesis argues that prioritizing socializing processes over individual behaviour modification is a bold and vital step toward achieving sustainable building use. From the beginning, this study aimed to approach familiar issues in novel ways, and the findings suggest that the initial starting points, methodology, and new questions and answers have the potential to offer unique and valuable insights into the relationships between building and users. Furthermore, the conceptual advancements of this research, which I will briefly discuss, provide a strong foundation for future practice-oriented studies in buildings and highlight potential areas for future research. Overall, this research offers promising opportunities for advancing sustainable building practices by focusing on socializing processes and a more holistic understanding of the interactions between users and buildings.

First, by conceptualizing the BMF building as a series of enactments, it becomes evident that the activities conducted within the building can be accomplished by manipulating different entities, either by modifying the entire building or through other means of control. Consequently, the actions of building users are not solely reliant on the physical structure of the building but rather on their interactions with other diverse entities. This perspective raises doubts about the efficacy of current sustainable design approaches that only focus on the physical building. It highlights the need for new design processes for buildings that prioritize the interactions of building users with other entities. As a result, this study suggests future research to explore the different types of buildings in Oman and the Middle East, such as hospitals, residences, theatres, and hotels, and compare them to the workplace analysis in this study. Such research may provide additional insights into the practices of diverse user groups and help to understand better how designs consider the local context of Oman. This potential direction for research may yield valuable insights for enhancing sustainable building practices in Oman and beyond.

The second point of this thesis argues that while behaviour change and the gradual transformation of social norms are possible, communities of practice are the primary setting for such change to occur. The current focus of research and policy in this area is to target specific consumer categories for behaviour change interventions. However, such approaches often concentrate on the individual in isolation and neglect the social dynamics of communities of practice, which are crucial for negotiating changes in actions. This study provides examples of how sustainability initiatives affected cleaning procedures and how a shortage of suitable food in the building led people to bring food from home, highlighting the role of communities of practice in shaping behaviour. Therefore, it is suggested that the future research need to explore the best ways to involve communities of practice, including examining the impact of facilities management practices on building design functionality. For instance, the research reveals that the facilities team is making changes to the building without consulting the design team, such as modifying the existing meeting rooms to be prayer rooms, indicating the need for further investigation in future research.

Thirdly, this study proposes an alternative methodological approach for investigating sustainability in design by drawing on the issues identified through ethnographic investigations of the BMF. Using large-scale questionnaire surveys is deemed inappropriate and unnecessary in this field. They tend to maintain a methodological individualism and cognitivism that fails to capture the complexity of the challenge and generates the realities it purports to explain. Therefore, research in this area requires methodological techniques that are adaptable and sensitive enough to account for the contextual performance of activities by social actors. This study employed a combination of participant observation and interviews to observe and engage with practitioners while also considering their perceptions of the activities they carry out. Future research to consider adopting a longitudinal, contextual, and dynamic perspective to understand how processes evolve over time and in specific locations, telling stories about the acts of specific people rather than relying on statistical models.

Fourth, the study finds that Social Practice Theory (SPT) provides a practical paradigm for analysing building-user relationships. This is because it helps to understand the influences that encourage users to carry out particular activities, using the correspondences between the elements of such theory, skills, stuff, and meanings. However, to use this theory effectively in building research, this study suggests that future research may consider the significance of approaching the design team to understand their intention and the design process, then move to the building to examine the practices of users. In other words, it's crucial to investigate the contradictions between design and use by involving designers and users as the main actors. One of this study's advantages is that when users' unfamiliar actions were observed, it spurred the need to return to the design team to investigate deeply. This approach is crucial for correspondence between design and use. It allows the researcher to identify where and how designers and users differed and how they can be brought into alignment.

Fifth, this study stands out from similar research in the same field by taking a unique approach to data collection. Unlike previous studies that mainly focused on users with authority, such as the operation and maintenance team, this research targeted all practitioners, including those with weak authority, such as cleaners. Doing so

aimed to gather more comprehensive and accurate information about users' relationships with the environment. By shadowing the cleaning team, this research uncovered critical knowledge previously overlooked by other studies. Additionally, this approach positively impacted the morale of the cleaners, who were encouraged to pay more attention and cooperate to the research subject. Therefore, future research may pay greater attention to involve all users in data collection because of its significance in obtaining the knowledge that will aid in developing sustainability aspects. By doing so, researchers can uncover critical insights into how all users interact with the environment, including those whose voices are often unheard. This approach can lead to more accurate and comprehensive data and provide meaningful gestures to practitioners, encouraging them to participate and contribute more to research. Ultimately, this can help develop sustainability initiatives that benefit all users, regardless of their authority or position.

The sixth point of this research highlights the importance of exploring the cultural differences between employees in workspace buildings, such as the BMF, as an avenue for future research. Despite the BMF building's design aiming to accommodate the requirements of both genders and multinational staff, this study has discovered some unexpected circumstances that the design has not considered. For instance, the mixed-gender layout design of the toilet facilities for national and international employees highlights an apparent marginalization of cultural differences between both groups. Another instance is the provision of modern coffee machines in every department to facilitate both local and foreign staff, which has led to local employees' marginalization of this service. Therefore, future studies may address these issues by examining the design standards in this critical area and the most effective ways of incorporating cultural considerations into creating multinational workspace buildings. This research recommends a more holistic approach that accounts for the cultural differences between employees, such as their values, beliefs, and practices, to create a more inclusive and accommodating workspace.

Seventh, this study found that the cultural background of the researcher can affect the research outcomes when examining the relationship between culture and building design. When the researcher shares the same culture as the building users,

it is easier to identify cultural practices that shape their behaviour. As the researcher of this study shared a similar cultural background with the users of BMF, it was more straightforward to identify how the building's components affected their cultural practices. Growing up in a similar environment and sharing a common culture with the users made it easier to understand their perspectives on specific building components that they found undesirable. Therefore, future research to understand user practices may consider involving researchers who share a similar cultural background with the users they are targeting. For example, if the study is based on an Eastern society, a researcher from the same society will likely be more effective, and vice versa.

Eighth, it was shown in this research that a researcher's social skills play a crucial role in investigating user practices. In other words, a researcher may be able to engage, communicate and interact with individuals they have never met before. Moreover, researchers are to be skilled in building relationships with participants, mainly since they will reside in their environment for an extended period. Therefore, a vital recommendation for future research is that researchers may develop their social skills to assimilate into previously unexplored environments. In addition, a researcher may be proficient in interacting with individuals of both sexes and must exercise caution in selecting appropriate times and locations to observe the practices of each gender. For instance, certain areas, such as observing female rest areas, may be challenging to monitor and deemed culturally unacceptable.

Observing female rest areas in research related to building practices can be sensitive and challenging. In some cultures, monitoring and observing female rest areas may be considered inappropriate or even offensive. This issue could be due to cultural norms and values prioritizing privacy and modesty, particularly for women. As such, researchers must be mindful of cultural considerations when conducting research in building environments. They may have to respect the social and cultural norms of the community they are studying and ensure that their research does not violate ethical principles and legal frameworks. It is essential to balance obtaining accurate and comprehensive data on building practices and ensuring that the research is conducted ethically and culturally. Researchers may consider alternative

methods for gathering information, such as conducting interviews or focus groups with female respondents, to avoid invading their privacy or violating cultural norms.

Finally, the COVID-19 pandemic has significantly impacted various aspects of daily life, including research. This research, which relied heavily on observing building users' practices, was also affected. As a result of the pandemic, the organization, PDO, implemented regulations allowing only half of the users to access the building. Consequently, the building's peak times when the total capacity was being utilized was not observed. In addition, the reduced sample size has led to several limitations in the research, such as the inadequate examination of issues like noise and car parking. These factors could have significantly influenced the practice of users during peak times. Furthermore, the pandemic has also impacted community interactions, potentially affecting the observed practices. The reduced capacity and social distancing requirements may have influenced how users interacted with one another and their surroundings, potentially impacting the applications of the findings. Despite these limitations, this research project still provides valuable insights into the practices of building users and the influence of culture and design on these practices. However, future research may strive to effectively address practices and community interactions, considering the challenges and limitations of the pandemic.

Appendices

Appendix A: The Presentation

WHY ETHNOGRAPHY IN DESIGN?

Design → Psychology → Design for Sustainable Behaviour DfSB (Prototype and POE survey)

Design → Sociology → Design for sustainability DfS (Social practices)

Design → Anthropology → Ethnography (Reflection in action)

3

LIMITLESS POTENTIAL | LIMITLESS OPPORTUNITIES | LIMITLESS IMPACT
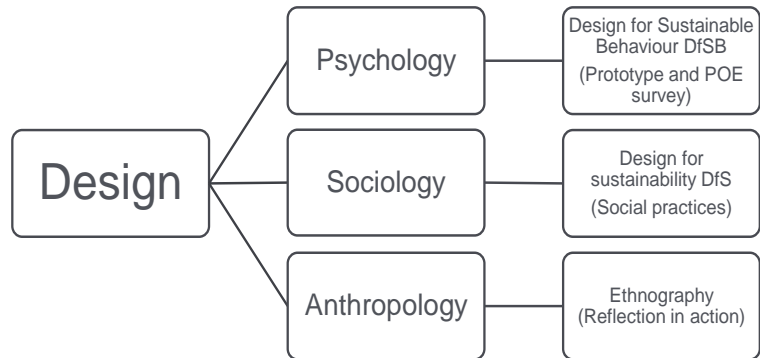
WHAT IS DESIGN AND ANTHROPOLOGY?

Design: is a problem solving activity, and designers treat all problems as ill-defined

(Cross, 2006)

Anthropology: places design as a human-centered activity that uses ethnography to understand human action

(Suchman, 1987; Shove et al., 2007)

4

LIMITLESS POTENTIAL | LIMITLESS OPPORTUNITIES | LIMITLESS IMPACT
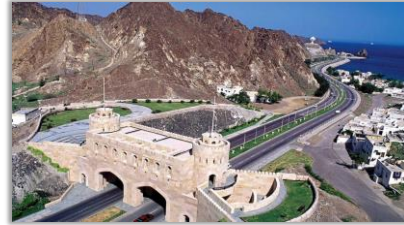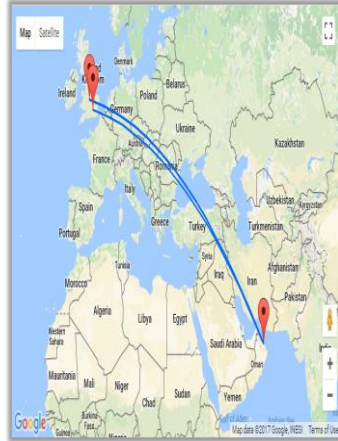
297
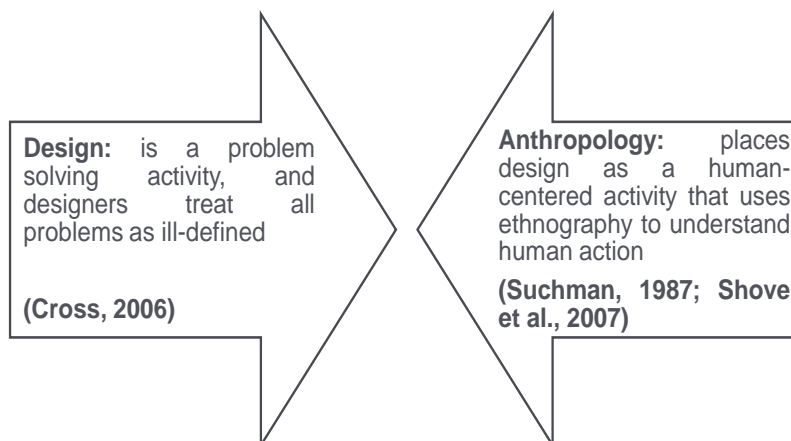
OMAN: THE RESEARCH CONTEXT

LIMITLESS POTENTIAL | LIMITLESS OPPORTUNITIES | LIMITLESS IMPACT

CASE STUDY
PETROLEUM DEVELOPMENT OMAN PDO

LIMITLESS POTENTIAL | LIMITLESS OPPORTUNITIES | LIMITLESS IMPACT

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EXAMPLE: PRAYER HALL "MASJID"

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7

DESIGN INTENTION: SKY WALK

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8

PRACTICES OF USERS
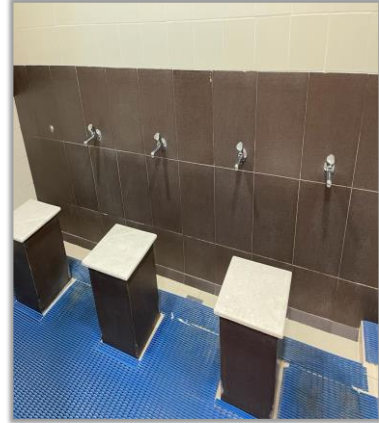
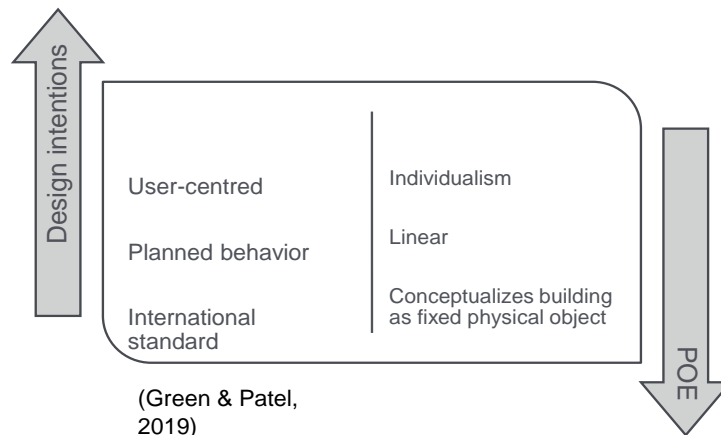LIMITLESS POTENTIAL | LIMITLESS OPPORTUNITIES | LIMITLESS IMPACT
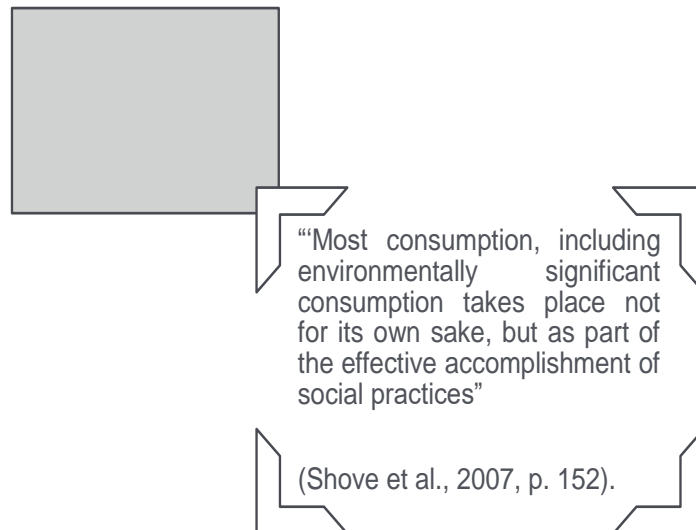
THE IMPACT OF INACCURATE DESIGN INTENTION

LIMITLESS POTENTIAL | LIMITLESS OPPORTUNITIES | LIMITLESS IMPACT
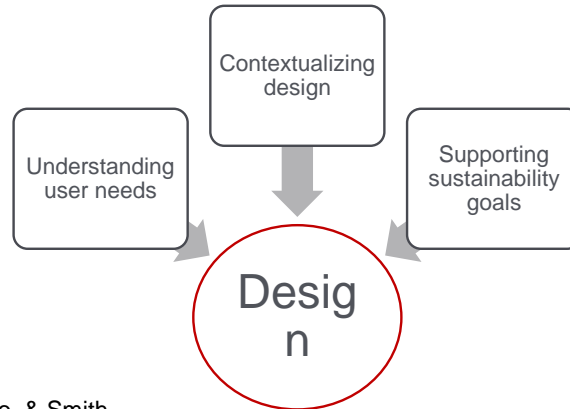
WHERE IS THE SOURCE OF THE ISSUE?

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Design intentions

User-centred

Planned behavior

International standard

Individualism

Linear

Conceptualizes building as fixed physical object

POE

(Green & Patel, 2019)

11

LIMITLESS POTENTIAL | LIMITLESS OPPORTUNITIES | LIMITLESS IMPACT

THE WAY FORWARD

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"'Most consumption, including environmentally significant consumption takes place not for its own sake, but as part of the effective accomplishment of social practices"

(Shove et al., 2007, p. 152).

12

LIMITLESS POTENTIAL | LIMITLESS OPPORTUNITIES | LIMITLESS IMPACT

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