Strategic Facilities Management Contingencies Implemented by Office Real Estate Owners in Response to Drought Risks in Cape Town

Saul Nurick Dr

Kathy Michell Professor

David Porter Mr

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Dr Saul Nurick, sd.nurick@uct.ac.za
Urban Real Estate Research Unit (URERU), Department of Construction Economics and Management, University of Cape Town, South Africa

Professor Kathy Michell, kathy.michell@uct.ac.za
Sustainability + Cyber-oriented Research Unit for the Built Environment (S+CUBE), Department of Construction Economics and Management, University of Cape Town, South Africa

Mr David Porter, david@steer.co.za
Urban Real Estate Research Unit (URERU), Department of Construction Economics and Management, University of Cape Town, South Africa

Abstract
Climate change has impacted the natural water supply in South Africa. This has resulted in a more intentional adoption of environmental, social and governance (ESG) initiatives, specifically within the context of real estate. Water management is one of the key ESG factors, which became apparent to office real estate owners during the 2018 drought in Cape Town. Strategic facilities management (FM) is recognised as the crucial link to ensure that strategic real estate goals are achieved. A form of strategic FM pertaining to water is defined as water management features and initiatives (WMFIs). The research comprised a multiple case study analysis where senior real estate practitioners were intereviewed in a semi-structured format. The data was analysed via thematic analysis, where the following prominent themes emerged: strategy towards WMFIs; implementation of WMFIs; drought preparedness; benchmarking and consumption; and barriers and drivers of WMFIs. The results indicated that office real estate owners were relatively well prepared for the 2018 drought. The majority of WMFIs were reactionary, as they appeared to form part of future strategic risk plans and ESG objectives. The barriers and drivers to the implementation of WMFIs were explored where one of the main barriers was cost, however drivers were identified as cost effective measures that were successful in reducing water consumption and addressing ESG strategies. The Cape Town drought tested the resilience of office real estate owners and fast tracked a change in addressing water supply problems.

Keywords
strategic facilities management (FM), water management features and initiatives (WMFIs)

1 Introduction

The Intergovernmental Panel on Climate Change (IPCC) refers to climate change as any change in climate over a period of time, caused both naturally and as a result of human activity (IPCC, 2007). Global warming is caused by an increase in carbon dioxide (CO_2), methane and nitrous oxide (IPCC, 2014). Since the pre-industrial era, greenhouse gases (GHG) have increased substantially due to economic activity and population growth causing the earth to retain heat, where previously it would

be absorbed back into space (IPCC, 2014). The demand for electricity globally is expected to increase threefold by the year 2100 (Mukheibir, 2017). Burning fossil fuels to generate electricity is one of the main causes of greenhouse gas emissions. South Africa's emissions profile is not dissimilar to that of developing countries, "In terms of global environmental impacts, South Africa is one of the most carbon-emission intensive countries in the world, with per capita CO_2 emissions higher than those of some European countries" (Mukheibir, 2017: 4). Bates *et al.* (2008) recorded warming over several decades and has seen a direct link to changes in the global hydrological cycle. This has amongst other factors led to a change in precipitation patterns resulting in intensity and extremes; precipitation has increased over land in high Northern latitudes and a decrease has been found in Southern latitudes; and there has been an increase in extreme weather events. Bates *et al.* (2008) state that during the 21st century, the percentage of land surface experiencing an extreme drought is projected to increase, and continental interiors will have a tendency for drying in the summer months, especially at low and mid-latitudes. According to Ziervogel *et al.* (2014: 606) "climate change poses a significant threat to South Africa's water resources, food security, health, infrastructure, as well as its ecosystem services and biodiversity". To ensure sustainable development, water security and to reduce levels of poverty and inequality, there is a need to implement both reactionary and preventative measures as a reaction to climate change. Firstly, by reducing GHG emissions and, secondly by adapting to changes as a result of global warming (Mukheibir, 2017). The results of climate change have placed an emphasis on sustainable development, which has become a popular discourse in the facilities management (FM) sector (Elmualim *et al.*, 2010). Warren (2010) suggests that the risk of climate change in office buildings is significant and it should be addressed by all facilities managers. According to Ziervogel (2019) the drought in the Western Cape developed over a three year period between June 2015 and June 2018. Wolski *et al.* (2018) states that rainfall between 2015 and 2017 was only 50% - 75% of the long-term average and 2017 is recorded as being the lowest level of precipitation ever recorded in Cape Town. Towards the end of 2017, it was forecast that Cape Town could potentially run out of water, which was popularly termed "Day Zero" (Wolski *et al.*, 2018). Droughts and other extreme weather events are increasing which will add pressure to South Africa's water supply (Mukheibir, 2017). In addition to this, there is a drive towards corporate social responsibility (CSR) (Nurick *et al.,* 2014) and environmental, social and governance (ESG) factors that are becoming increasingly important, has resulted in a change in organisational objectives. The role of the FM is to identify the organisational objectives and future risks and implement strategic plans that address these factors. The implementation of green building principles and green building features and initiatives (GBFIs) into strategic plans of an organisation will address the drive to satisfy CSR and ESG requirements and mitigate the risks of drought.

This resulted in the research question: *What strategic FM contingencies have office real estate owners implemented to mitigate the potential risks of drought?* The objectives of the study were to: (1) determine the strategic FM contingencies implemented by office real estate owners in relation to drought; (2) establish if the strategic FM contingencies were preventative or reactionary to the drought; and (3), establish the level of preparedness of real estate owners and whether there has been a strategic FM initiative, in the form of green building features and initiatives (GBFIs), resulting in changes to address future droughts or extreme weather events.

2 Literature Review

2.1 Facilities Management

The term Facilities Management (FM) emerged in the 1970s and surprisingly there are few studies that investigate the origin of the FM practice (Jensen, 2008; Drion *et al.*, 2012). Nor and Azman (2014) acknowledge this however they suggest that FM practices far precede the prescribed dates where the

term FM was established. Traditionally FM was seen as the management of buildings and building services (Amaratunga, 2001). However, this has evolved into a multi-disciplinary concept (Alexander and Brown, 2006; Chotapanich and Nutt, 2008; Michell *et al.*, 2008; Tammo, 2014). Moreover, FM not only seeks to increase economic viability but also to encourage social and environmental benefits in the form of efficient management of real estate assets, both strategically (long-term) and operationally (short-term) (Alexander and Brown, 2006). The International Standards Organization (ISO) 41011 (2017: 8) defines FM as an "organisational function, which integrates people, place and process within the built environment with the purpose of improving the quality of life of people and the productivity of the core business". In addition, the International Facilities Management Association (IFMA) has fully endorsed this definition in its entirety (IFMA, 2023).

Jack (1994) differentiated between strategic FM and operational FM by arguing that 'strategic' implies planning to meet objectives over the long term. Furthermore, Tucker (2012) argues that it comprises a clear understanding of resource allocation, which aligns with an orgnisations overall strategic objectives. According to the Royal Institution of Chartered Surveyors (RICS) and IFMA, strategic FM is more than simply managing real estate assets, but also includes "the design of space, and the development and promotion of new working methods and technology, to create and deliver workplaces which enhance staff recruitment, retention, and overall success for the organisation". In addition, it should focus on operational sustainability, energy usage, safety and the well-being of users (RICS, 2018: 8).

2.2 Green Buildings

Green building has increased as a response to mounting concerns about climate change in recent years (Nurick *et al.*, 2015a). The Green Building Council of South Africa (GBCSA, 2017) defines a Green Building as one that through design, construction and operation, reduces the negative effects development has on the environment. Water conservation is one of the key elements in green buildings. green building features and initiatives (GBFIs) can contribute to a green building certification (Nurick *et al.*, 2015a). GBFIs can be found in both new buildings and retrofitting of existing properties, in addition to this they are found in both green certified and uncertified buildings (Nurick *et al.*, 2015a). An example of a feature would be the fitment of energy-efficient lighting, while a green initiative would be installing a shower facility, increasing consumption but encouraging users to walk, run or cycle which reduces the building's carbon footprint (Nurick *et al.*, 2015b). Expanding on the concept of green building features and initiatives (GBFIs), the term water management features and initiatives (WMFIs) can be used to identify factors that specifically relate to water management. Toilets and urinals account for a considerable portion of water usage in office buildings and if modified efficiently can substantially reduce water consumption. Water usage can be reduced to an average of less than three litres per flush. The installation of spray or low flow reduction taps can save 10 – 12 litres per minute. Other water related features and initiatives include, low flow shower heads, rain collection systems, grey water treatment systems, and water monitoring systems to benchmarks and detect leaks (Chanan *et al.,* 2003).

2.3 Office Buildings

The Central Business District (CBD) precincts in almost all developed countries include dated high-rise office buildings (Reed and Wilkinson, 2005). Despite the demand for new buildings, they only comprise between 1.5%-2% of the current building stock in developed countries (Nguyen, 2017). Office buildings require continuous maintenance to avoid obsolescence, which in turn can negatively impact the buildings financial performance. Reed and Wilkinson (2008) and Nguyen (2017) state that triple bottom line (TBL) principles can be applied as interventions to address obsolescence and future proof office buildings, which include: (1) economic sustainability: aiming to consume resources with more efficiency: (2) environment sustainability: aiming to avoid damaging impacts on the

environment; and (3) social sustainability: aiming to have reasonable effects in all phases for the requirements of people in the building process and to supply superior stages of contentment to clients, suppliers, employees and communities. There are multiple drivers and barriers that motivate and hinder, respectively, the adoption of green building features and initiatives (GBFIs) within the office real estate sector. The intentional development of corporate social responsibilty (CSR) initiatives by real estate companies, which address environmental, social and governance (ESG) factors are deemed to be drivers for overall sustainability and the adoption of GBFIs for real estate companies (Armstrong, 2020; Gillan *et al.,* 2021). Tenants and landlords have varying CSR/ESG requirements and a study recently found that tenants are the greater driver towards implementing sustainable solutions in properties, where landlords are interested in securing long-term tenants (Rameezdeen *et al.*, 2017). Additionally, Oguntona *et al.* (2019) identified tenants are demanding GBFIs for not only the environmental impact but also for occupancy costs. During the period 1996-2020 electricity and water tariffs increased at four times the rate of inflation (Capes and Moolman, 2022). The City of Cape Town (CoCT) used increased water tariffs as a deterrent against consumption, especially during the 2018 Cape Town drought (CoCT, 2019). One of the main drivers for the adoption of green building features and initiatives (GBFIs) is reduced operating costs and overall superior returns of green certified versus conventional buildings in South Africa (GBCSA, 2019). Nurick *et al.* (2015a) suggests that one of the barriers to the adoption of GBFIs is that the associated costs do not result in the required return on investment. Furthermore, another barrier to implementing GBFIs is that there is a lack of knowledge of sustainable new technologies (Nguyen, 2017). Additonally, Bond (2010) noted that there was a lack of skilled FM professionals that had the capability to ensure the high performance of real estate assets. Bond (2010) also identified split incentives as a barrier to the implementation of GBFIs, where landlords invest in green buildings but they do not see the financial benefit, where as tenants enjoy a reduction in consumption and related costs and enjoy increased employee productivity.

2.4 Water Management

The Western Cape Government (WCG) released its 2020 – 2021 property efficiency report, which benchmarked 37 buildings totalling 210,578m^2 against the private sector (WCG, 2022). The report focuses on four areas including energy and water consumption, space utilisation and occupancy cost (WCG, 2022). It was reported that water consumption reduced from 1.1 kL/m^2/pa in 2015/2016 to 0.54kL/m^2/pa in 2019/2020. In the 2020/2021 period consumption was further reduced to 0.41kL/m^2/pa and this outperformed the industry benchmark of 0.85 kL/m^2/pa (WCG, 2022). It is however noted that COVID-19 made a large impact to the efficiency of buildings given the reduced workforce during this time (WCG, 2022). The City of Cape Town released its water strategy in 2019 where it envisioned by 2040 the city will be water sensitive by optimising water resources which will improve resilience, competitiveness and progress the lives of people (CoCT, 2019). The city includes five commitments: (1) safe access to water and sanitation; (2) wise use; (3) sufficient reliable water from diverse sources; (4) shared benefits from regional water resources; and, (5) being a water-sensitive city (CoCT, 2019). The plan is to change the way all stakeholders (people, organisations, institutions, government) think about water, change/sustain usage habits and implement a diversified water resource mix.

2.5 Linking Strategic Facilities Management to Water Management

Basson *et al.* (2018) identified that as a result of the 2018 drought property owners were looking for ways to reduce water consumption. This was a priority for both the reduction of cost, importantly for the sustainability of Cape Town and the ability for properties to continue to be occupied and produce income as intended. Strategic objectives of organisations that own properties have changed drastically considering the development of the climate change and ESG agenda's more recently, and the 2018 drought brought water management to the forefront. This is imperative, as water management is a key

strategic FM line item for asset and portfolio managers, which directly impacts commercial tenants, and thus real estate performance (Nurick, 2022). Several South African listed property funds emphasised the importance of sustainability, and green star-rated buildings, which include both energy and water-related initiatives (Growthpoint, 2023; Redefine, 2023; Spear, 2023). It is clear that sustainability, specifically water conservation during the 2018 drought period, became one of the primary objectives of property owners in Cape Town.

3 Research Methodology

The chosen research methodology was a qualitative multiple case study where purposive and convenience sampling was applied. Real estate companies owning office portfolios located in the Cape Town CBD were identified and considered suitable as they were directly impacted by the 2018 drought. Executives and upper management were targeted as respondents for the research so as to obtain thick descriptions (Drew, 2022), resulting in data saturation. The respondents all understood the strategic objectives of the organisation and had oversight of the real estate operations. Semi-structured interviews were conducted and the transcripts imported into NVivo qualitative data analysis software. The transcripts were analysed inductively using reflexive thematic analysis, which encompasses the following phases: familiarisation with the data; generating initial codes; generating the themes; reviewing themes; and lastly, defining and naming the themes (Braun and Clarke, 2006; 2020). The thematic analysis of the semi-structured interview transcripts revealed five emergent themes. Prior to the interviews occurring ethics clearance was obtained, and interview respondents were presented with an informed consent document, indicating that they could withdraw their voluntary participation at any point. The overarching research methodology was ideally suited, as it was replicated from similar studies that focused on strategic FM related research. The case studies coding and respondent labelling are indicated in Table 1.

Table 1. Respondent Labelling

Respondent Label	Position in the company	Size of office portfolio – gross lettable area (GLA)
CS1R1	Asset manager 1	85,000m^2 – 100,000m^2
CS1R2	Asset manager 2	85,000m^2 – 100,000m^2
CS1R3	Property manager 1	85,000m^2 – 100,000m^2
CS2R1	Chief Operations Officer (COO)	>100,000m^2
CS3R1	Operations Director (OD)	>100,000m^2
Key to respondent labelling: CS1 = Case Study Number; R = Respondent		

The research comprised three case studies, each owning a minimum of 85,000m^2 of gross lettable area of office real estate. CS1 is an independently owned real estate investment fund with a focus on redeveloping office buildings, specifically in Cape Town. CS1 was founded in 2016 and currently owns approximately 85,000m^2 of office real estate. CS1's approach is to acquire underperforming properties in well-located nodes and undertake redevelopment/refurbishment projects to meet the company's objectives of sustainable income and increase asset value. The management team has a hands-on approach to asset management and is directly involved with strategic direction and operations. Since inception, they have completed three large ESG focused redevelopment projects in Cape Town's CBD. CS2 is a real estate investment fund (REIT) listed on the Johannesburg Stock Exchange (JSE). CS2 focuses on properties located in the Western Cape and specifically Cape Town.

It has a total gross lettable area of approximately 450,000m^2, of which office space in Cape Town comprises approximately 132,000m^2. CS2's asset management functions are overseen by the executive team, this direct approach attempts to maximise value and generate growth. CS3 is a privately owned property group which holds a substantial portfolio in the Western Cape. The portfolio includes residential, office, retail and industrial real estate. CS3 does not openly report on the size of the portfolio, however, a deeds search of a number of CS3's companies and trusts indicated that the office real estate component is in excess of 100,000m^2. CS3's majority shareholders have direct management functions and the majority of the strategic and operational FM functions are handled in-house.

4 Findings and Discussion

4.1 Findings

The qualitative data analysis revealed the following emergent themes: (1) strategy towards WMFIs; (2) implementation of WMFIs; (3) drought preparedness; (4) benchmarking and consumption; and, (5) barriers and drivers of WMFIs.

4.1.1 Theme 1: Strategy towards water management features and initiatives (WMFIs)

CS1 was established just before the initial onset of the drought and implemented an aggressive acquisition strategy, which ran into the drought period. According to CS1R1 green building was a strategic focus for CS1 from the onset and they wanted their buildings to be certified with a four-star green rating. Among other greening elements, capex-heavy installations like grey water systems and groundwater collection were planned from the onset for when CS1 undertook to refurbish and retrofit properties. As noted by Reed and Wilkinson (2008) buildings undergo a major refurbishment every 20-25 years, which mitigates against the risk of obsolescence. Since the drought, CS1's strategic approach to green buildings and WMFIs has changed and there is a greater emphasis on water-saving installations. CS1R1 stated that previously when it came to tenant fit-outs, they would accept tenants' requests for installation that would not be consumption-reducing. Whereas now they work with tenants highlighting green building practices and have insisted on consumption-saving installations (e.g., industrial sized water tanks to collect rain water). When it came to redeveloping properties, which is an area of focus for CS1, CS1R1 confirmed that water consumption-reducing measures (e.g., waterless urinals) became more important. CS1R2 stated that the strategic outlook for water management as a result of the drought has changed and noted that it is also important to implement water-saving strategies at properties located in areas not affected by the drought.

CS2 had already installed a number of capital-intensive WMFIs prior to the drought, as strategic plans to meet the ESG requirements were in place. When the drought started, CS2R1 stated that their implementation plans and water-saving measures were accelerated. Part of their risk plans included having the executive team meet with the facilities managers and reviewed every building and identified both small ("low hanging fruit") and bigger interventions that could reduce water consumption (CS2R1). CS2R1 confirmed that since the drought, CS2's strategy has shifted where they are more water conscious. Particularly when the organisation is considering new acquisitions, there is a heightened focus on what WMFIs are currently installed and what could be implemented to enhance consumption-reducing measures. However, the focus has shifted away from water, back to energy as a result of increased load shedding (scheduled power blackouts), but WMFIs remain front of mind (CS2R1). They are however mindful of tenant installations and redevelopments and are more water conscious compared to their approach prior to the drought. CS2R1 noted that they do not intend to install WMFIs in the smaller properties that are earmarked to be sold.

CS3R1 said that before the drought CS3 had no strategic approach to reduce water consumption, it

was a relatively small expense and they were satisfied provided they were able to collect the recoveries from their tenants and they were able to manage their leaks effectively. As water tariffs increased, so did the need to recover those tariffs from tenants. The majority of the office portfolio consisted of older buildings which included older plumbing installations and very few had separate meters installed in different sections (CS3R1). The systems were dated, in some of the high-rise buildings they would include only one supply line and in order to repair a leak the entire building's supply would be turned off. CS3R1 stated that if sections were not metered, recoveries would take place on a participation quota percentage. CS3R1 explained that when the drought started water saving initiatives have became increasingly important in strategic decisions. The cost of water and associated municipal costs increased substantially and CS3R1 stated that as a result of this, WMFIs had garnered more attention. This was partly driven by tenants who wanted to see the actual amount of water consumption by their respective sections, and they were resisting the previous method of water expense recovery. CS3R1 noted that as the City of Cape Town's (CoCT) water tariffs had increased their strategy focused more towards water-saving measures. In addition, WMFIs form part of their considerations when purchasing new properties. These factors are reviewed with all new acquisitions and when considering refurbishing property CS3 intends to install consumption-reducing sanitaryware. CS3R1 noted that larger capital-intensive projects like grey water and filtrations systems were not something that the group was currently considering.

4.1.2 Theme 2: Implementation of water management features and initiatives (WMFIs)

CS1R1 stated that during the drought, where possible they installed consumption-reducing taps. Larger capex-intensive installations, like waterless urinals, toilets, and showerheads were planned for when buildings were redeveloped (CS1R1). As a result of the drought CS1 actively removed or deactivated various fixtures to encourage lower consumption. CS1R1 mentioned that some of the toilets were closed off, so there were not as many toilets to flush on tenanted floors and closed-off bathrooms on vacant floors. Similar WMFIs were implemented by CS2 and CS3, as these are common water consumption points in office real estate portfolios. In addition, CS1R1 noted that when construction was underway they closed off or locked taps that were not required. CS1R2 stated that industrial sized water storage tanks were installed during the drought and rainwater was collected from the roof. According to CS1R2 the only notable WMFIs installed at the properties prior to the 2018 drought was that of metering systems. However, CS1R1 stated that they were not being managed correctly and measures were implemented to ensure that they were utilised properly. This is consistent with Bond (2010) who identified that there was a lack of skilled managers who could monitor consumption and ensure that buildings are run efficiently.

4.1.3 Theme 3: Drought preparedness

All three case studies were adequately prepared for the drought because long-term water savings is part of general property management, and adequate risk management plans had been developed in advance, which took the form of various WMFIs and developing strategic FM budgets that contain a drought contingency line item. Risk management was identified in the literature as being an important part of strategic FM (IFMA, 2009). Preparedness for another drought, CS1R1 stated that CS1 knows what works and those measures can be efficiently implemented. Fuerthermore, CS1 have the equipment and/or plans in place. CS1's drought experience has resulted in being more prepared for future droughts and water supply issues in South Africa. Similar sentiments were expressed by CS2R1 and CS3R1.

4.1.4 Theme 4: Benchmarking and consumption

CS1R2 stated that together with their utility meter service providers they obtained benchmarking data, resulting in CS1 assessing consumption performance on a per square meterage basis. Additonally,

CS1R1 noted that CS1 benchmark against the requirements needed for four and five-star green certified buildings. CS2R1 noted that CS2 does not have a benchmarking programme. Their meter reading service providers give CS2 a monthly report, and they provide consumption data for the previous month, three months and twelve months, respectively. CS2, therefore, benchmark against their own or previous consumption. CS3R1 stated that CS3 operate in similar manner to CS2 with regards to benchmarking water consumption.

4.1.5 Theme 5: Barriers and drivers of water management features and initiatives (WMFIs)

The cost of implementing WMFIs was deemed to be the main barrier, which was identified by all three case studies. CS1R1 stated that it is easier to introduce WMFIs when undertaking a new development, but when you are trying to retrofit an old building the original infrastructure is not optimal for newer installations. CS1R2 also indicated that it can be a "catch-22". If you install a pump system and filtration system, your water consumption may be lowered, but the systems would need the energy to run and be connected to a generator. This would both increase electrical consumption and increase maintenance and future capital replacement costs. Nurick *et al.* (2015a) identified that one of the prominent barriers to implementing green features is that the associated costs do not result in the required return on investment. CS1R1 identified another barrier being that there were not enough practical solutions available in the industry, which is consistent with Nguyen (2017) who identified that there is a lack of knowledge of sustainable new technologies. CS1R1 noted when WMFIs are implemented, the recovery cost is less for tenants and ultimately, they will pay lower gross rentals compared to competition. This ultimately leads to a more profitable building which has a direct impact on value. This aligns with Alexander (1992) who notes that strategic FM establishes important advantages for the organisation which includes cost-effective initiatives and creating a competitive advantage. Alexander (1992) also identified that by implementing strategic FM functions the organisation can avoid underutilised and redundant facilities. Refurbishing underperforming and dated properties with an emphasis on green building is part of CS1 organisational strategy, this has been identified as a driver to the implementation of WMFIs. Tenant's and the organisation's CSR/ESG requirements were identified as a driver to encourage the implementation of WMFIs by CS1 and CS2. CS1R2 suggested that if a tenant has green objectives, then they will make sure that green initiatives are implemented as part of the lease structuring process, which is consistent with Oguntona *et al.* (2019). Regulatory barriers are another factor that works against the implementation of WMFIs. CS2R1 explained that numerous hurdles needed to be overcome during the drought when obtaining water licencing (e.g., permission to dig for boreholes from the underground water tables) for their operations which could take up to a year at the time, despite the City of Cape Town calling for these initiatives. Conversely, CS3R1 identified regulation, speficially usage limits as a successful driver for the implementation of WMFIs. CS2R1 stated that water supply challenges would be a constant threat in a relatively arid/water restrained climate, and therefore this was a driver for real estate companies to be proactive with regards to implementing WMFIs.

4.2 Discussion

A cross-case analysis was conducted to highlight similarities and differences between the three case studies within the context of the five emergent themes. Table 2 provides a summarised version of the cross-case analysis, where the key findings are highlighted with regards to before/after the drought and the main barriers and drivers pertaining to water management features and initiatives (WMFIs), which are predominantly focused on addressing ESG/CSR strategies and costs, respectively. Furthermore, Table 2 provides an overview of WMFIs implemented in office real estate, which pertain to water storage, reduced water consumption in the form of upgraded sasnitaryware, filtration systems, reverse osmosis (RO) systems, improved water monitoring and education of facilities managers and tenants.

Table 2: Cross-case Analysis

	Strategy towards WMFIs	WMFIs implemented	Drought preparedness	Benchmarking & consumption	Barriers & drivers of WMFIs
CS1	**Before drought** - green rating, competitive advantage and CSR/ESG. **After drought** - as before but more water focused.	Taps, industrial sized tanks, improved reporting, tenant education, leak detection, property inspections, waterless car wash, closing off fixtures.	**Before drought** - prepared (planning in process). **After drought** - more prepared.	Supplier and GBCSA benchmarking. Retained low levels of consumption after the drought.	**Barriers** - capital costs, running costs, limited solutions. **Drivers** - Landlord CSR/ESG, Tenant CSR/ESG, competitive advantage.
CS2	**Before drought** - CSR/ESG, green rating and risk mitigation. **After drought** - as before but more water focused.	Taps, industrial sized tanks, waterless urinals, reverse osmosis (RO) & filtration systems, water truck, boreholes, chillers, closing off fixtures, tenant education, property inspections.	**Before drought** - prepared (systems implemented, planning). **After drought** - more prepared.	Owner benchmarking. Retained low levels of consumption after the drought.	**Barriers** - capital costs, running costs, regulation. **Drivers** - Landlord CSR/ESG, Tenant CSR/ESG, risk mitigation.
CS3	**Before drought** - recoveries and leaks. **After drought** - as before but more water focused.	Metering systems, staff education, taps, toilets, showerheads, irrigation systems, tenant education, closing off fixtures.	**Before drought** - not prepared. **After drought** - more prepared.	Owner benchmarking. Retained low levels of consumption after the drought.	**Barriers** - Capital costs, limited solutions. **Drivers** - Tenant CSR/ESG, tenant costs, regulatory, recoveries.

Figure 1 provides an overview of the main findings highlighted in the cross-case analysis (Table 2), within the context of an empirical model. Figure 1 highlights the need for a strategic FM function in terms of an organisational water strategy, which is underpinned by triple bottom line (TBL) factors. There were similarities between the literature and the qualitative data pertaining to the drivers and barriers with regards to the implementation of WMFIs as a form of strategic FM contingencies that were implemented as a response to the 2018 drought. Furthermore, it was indicated by all three case studies that WMFIs will result in sustainable water reduction. This simulataneously addresses TBL factors and strategic FM objectives that yield improved building performance in the form of improved water metering/management, reduced water consumption, improved filtration systems, and enhanced employee/tenant awareness of WMFIs. Additonally, the implementation of WMFIs can also positively contribute to ESG/CSR policy development, real estate risk mitigation, competitive advantage, potential green certification and operating cost recoveries.

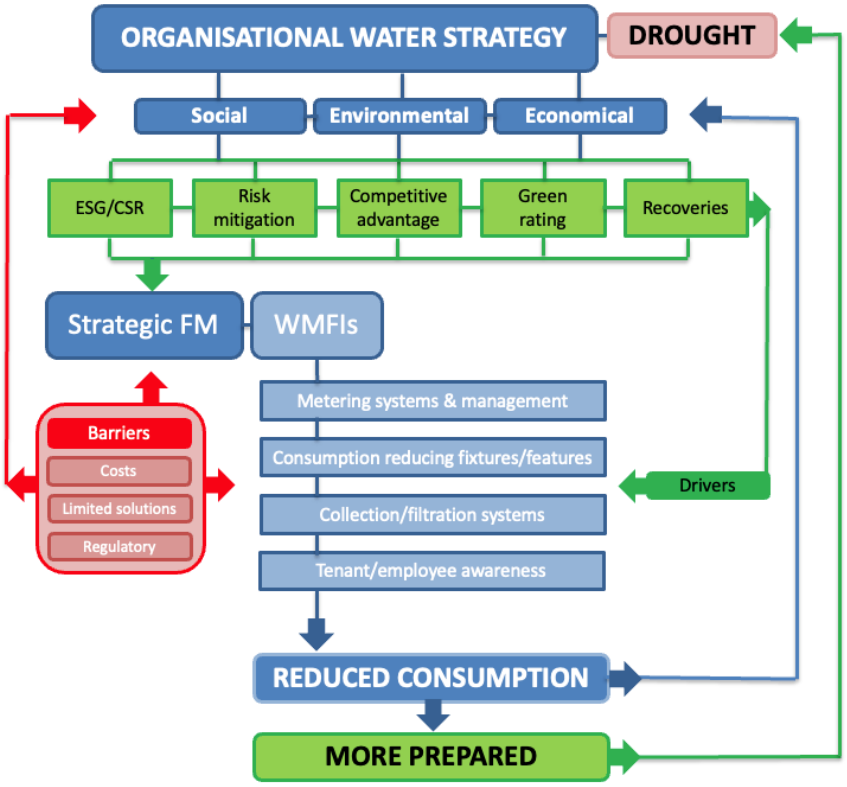

Figure 1. Empirical model indicating the link between TBL, strategic FM and WMFIs

5 Conclusions and Further Research

The research investigated strategic FM contingencies in the form of water management features and initiatives (WMFIs) to address water restrictions as a result of the 2018 drought in Cape Town, within office real estate portfolios. The real estate companies that partipated in the study provided insight into their respective water related approaches before and after the drought. Generally, the three case studies were relatively well prepared to address the challenges presented by the drought, however the physical implementation of WMFIs was reactive for CS1 and CS3, where CS2 only needed to accelerate their WMFIs strategy. There are challenges pertaining to accurate benchmarking and education of the specialist WMFIs practitioners within the office real estate sector. The drought was viewed as an opportunity to continue with further advancement of WMFIs as a form of long term strategic FM. Recommendations for future research include: (1) quantitative analysis of various WMFIs to provide a more detailed benachmarking analysis; (2) conduct the study in different parts of South Africa, which experience different climatic conditions to that of Cape Town; and (3), conduct similar studies in different real estate sectors, such as residential properties, where water usage patterns are vastly different to the office real estate. Due to the qualitative nature of the study, the findings are not necessarily generalisable to the office real estate sector globally. However, it is likely that there would be parallels to other regions that experience similar climatic conditions.

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