The perceived influence of the integration of GBFIs into a FM strategy on social, economic and environmental value of a facility.

Submitted in partial fulfilment of the requirement for the award of the Master of Science in Property Studies, Department of Construction Economics and Management, University of Cape Town

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Date:
8th November 2017

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Abstract

As facilities have to adapt to changing environments along with the increasing awareness with regards to sustainability, Facilities Management (FM) has an important role to play in facilitating the motivation, adoption and implementation of sustainable practices in strategic facilities plans. Green Building Features and Initiatives (GBFIs) impact on the Triple Bottom Line (TBL) and add significant value to facilities. Whilst FM used to be focused on economic value, it has the potential to impact on numerous stakeholders and add to the social, economic and environmental value of facilities. Hence, the facility manager can generate long-term value to an organisation by developing, applying and maintaining sustainable facility practices. However, little is known about the perceived added social, economic and environmental value of the integration of GBFIs into a FM strategy.

This research focuses on four cases within the office property sector in Cape Town and involves a series of interview and surveys to assess the perceived value added by GBFIs on commercial properties. In this research it was found that GBFIs add value to facilities in numerous ways both directly and indirectly. They impact on future proofing, revenue growth, profitability growth, waste management, resource conservation, energy efficiency, reduced carbon footprint, sustainable or reduced travel, workplace attractiveness, staff perceptions, work environment, comfort levels, health and safety.

However, all GBFIs do not have the same impact on value and it is important to get the right mix and the right level of implementation to experience holistic value added. It was also found that the accolades, such as a green star rating, which comes from the implementation of GBFIs can lead to further added economic and social value as such ratings impact directly on the perception of the facility.

As the performance of GBFIs is directly linked to the operations of the building, it is vital to adopt a pro-active and strategic approach to FM in order to optimise the impact of GBFIs on the value of a facility. The implementation of GBFIs is the first step and to ensure the success of those GBFIs, the FM strategy must provide for the green operations of the facility and must be in line with the vision of the main tenant or owner-occupier. Hence, the tenant also plays a significant role in the value adding process, as they must also be sustainability-driven. The FM team must have different initiatives in place to ensure the proper functioning of the GBFIs and to deal with the people management and change management requirements that usually accompany the implementation of GBFIs.

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List of Abbreviations

BCA	Building and Construction Authority
BCA-GM	Building and Construction Authority Green Mark
BIFM	British Institute of Facilities Management
BRE	Building Research Establishment
BREEAM	Building Research Establishment Environmental Assessment Method
BRI	Building Related Illness
CASBEE	Comprehensive Assessment System for Building Environment Efficiency
CFLs	Compact Fluorescent Lights
CIDB	Construction Industry Development Board
CIOB	Chartered Institute of Building
CSR	Corporate Social Responsibility
ESGB	Evaluation Standard for Green buildings
EVA	Economic Value Added
FM	Facilities Management
GBCA	Green Building Council Australia
GBCSA	Green Building Council South Africa
GBFIs	Green Building Features and Initiatives
GOBAS	Green Olympic Building Assessment System
GSSA	Green Star South Africa
GWP	Global Warming Potential
HK-BEAM	Hong Kong Building Environment Assessment Method
HVAC	Heating, Ventilation and Air Conditioning
IAQ	Indoor Air Quality
IEQ	Indoor Environmental Quality
IFMA	International Facility Management Association
iiSBE	International Initiative for Sustainable Built Environment
IoDSA	Institute of Directors of South Africa
ISO	International Standards Organisation
JaGBC	Japan Green Building Council
JSE	Johannesburg Stock Exchange
LCA	Life Cycle Assessment
LCC	Life Cycle Costing

LED	Light Emitting Diode
LEED	Leadership in Energy and Environmental Design
MHURD	Ministry of Housing and Urban Rural Development
NABERS	National Australian Building Environment Rating System
ODP	Ozone Depletion Potential
PDCA	Plan-Do-Check-Act
PV	Photo Voltaic
RICS	Royal Institution of Chartered Surveyors
ROI	Return On Investment
RPI	Responsible Property Investment
SAFMA	South African Facilities Management Association
SBAT	Sustainable Building Assessment Tool
SBS	Sick Building Syndrome
SBTool	Sustainable Building Tool
SFP	Strategic Facilities Planning
SRI	Social Responsibility Index
SWOT	Strengths, Weaknesses, Opportunities and Threats
TBL	Triple Bottom Line
TCO	Total Cost of Ownership
UK	United Kingdom
USA	United States of America
USBGC	United States Green Building Council
VAV	Variable Air Volume
VOC	Volatile Organic Compounds

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Chapter 1: Introduction

1.1. Introduction

This chapter starts with a brief background to Facilities Management (FM) and gives an overview of the evolution of the discipline highlighting the growing importance of sustainability in FM. The triple bottom line concept is then discussed to elaborate on the context of sustainability from a business perspective. Subsequently, sustainability in the property sector is covered by introducing green buildings along with Green Buildings Features Initiatives (GBFIs). Their impact on cost is discussed and the concept of value and value added is examined in the FM context.

The chapter further provides a description of the problem statement along with the research question and research proposition. The research aim is identified before stating the research objectives and the research method. This chapter ends with the scope and limitations of the research and an overview of the structure of the report.

1.2. Research Background

1.2.1. Facilities Management

FM is an emerging discipline which is gaining recognition internationally (Alexander, 1994; Nor *et al.*, 2014). It is believed that the origin of FM lies in the supervisory role of a building caretaker largely dealing with operational matters such as maintenance, cleaning and tenant security (Price, 2003). Indeed the function of planning, design and managing buildings has existed for as long as buildings have existed. However, its thoughtful, mindful and intentional practice as part of organisational design and development is what is now known as FM (Becker, 1990a).

With increasingly complex properties along with the sensitivity of the operations cost, strategic management functions had to be introduced (Becker, 1990b; Yim Yiu, 2008). FM has developed from only being concerned in the hardware, such as actual buildings, furniture, fittings and equipment, to being involved in the softer aspects such as people, processes, environment, health and safety (Becker, 1990b; Alexander, 1999; Then, 1999). However, FM is only concerned with buildings-in-use as opposed to other disciplines such as architecture or interior design (Becker, 1990a). Hence, in some form, FM is an internal response by businesses to the long-term economic and demographic trends. Being confronted with a changing economic climate, firms have endeavoured to make themselves more competitive by

optimising the value of all their assets (Melvin, 1992). Thus the profile of the discipline keeps rising and FM services as a global market was already worth 100 billion USD more than a decade ago (Price, 2003).

Despite the growing attention on FM, there are numerous varying definitions for this discipline but no precise and universally agreed definition as to what it is exactly (Price, 2003; Nor *et al.*, 2014). According to Nor *et al.* (2014), this divergence is due to the quick emergence of the discipline over less than fifty years. The term FM appeared in North America in the late 1970s to define an emerging area of study concerned with the design and management of workplaces and their influence on the businesses (Nor *et al.*, 2014). The differences in definitions comes from various authors and organisations, such as Becker (1990b), Nutt (2000), the International Facility Management Association (IFMA) (2016), the British Institute of Facilities Management (BIFM) (2014) and the South African Facilities Management Association (SAFMA) (2016).

However, despite the differences in their exact definitions, most of these have, in principle, a common vision and mission with some variances on the objectives and scope of FM (Tay and Ooi, 2001; Nor *et al.*, 2014). Moreover, this apparent lack of clarity in the definition of FM in no way hinders the strong and consistently increasing presence of FM in today's service-oriented business management world (Nor *et al.*, 2014). On an international level, the IFMA (2016:1) defines FM as "*a profession that encompasses multiple disciplines to ensure functionality of the built environment by integrating people, place, process and technology*". A slightly different view is provided in the South African context, which is more relevant to this research, where FM is defined, by the SAFMA (2016:1), as "*an enabler of sustainable enterprise performance through the whole life management of productive workplaces and effective business support services*".

The numerous definitions make it clear that FM is more than a mere set of defined tasks but rather a model of a way in which to deal with buildings (Finch, 1992). FM revolves around strategic areas of management for resources such as financial resources, physical resources (buildings), human resources, information and knowledge (Nutt, 2000). Furthermore, the management of financial resources has three dimensions, namely: property investment decisions, property asset management, and management of the facility's operating costs (Nutt, 2000).

At a national level, the strategic objective of FM is to deliver improved infrastructure and logistic support to business and public endeavours that vary in nature and occur across every sector. At a local level, FM's objective is the effective management of facility resources and services in providing shells of support to everyone. This support is given to the operations of organisations, their working teams, project groups, and individuals. Hence, the main purpose of FM is resource management, at both the strategic and operational levels (Nutt, 2000).

Furthermore at the firm level, FM looks at continued productivity and sustainable growth of the firm through integrated management principles (Nor *et al.*, 2014). This integrated approach involves maintaining and improving the property assets of the organisation in order to create an environment that strongly supports their primary objectives (Barrett, 1992). In short, FM is a hybrid management discipline that joins people, all aspects of property, space, environment and process management know-how to provide essential services in support and enhancement of the businesses and organisations (Alexander, 1999; Then, 1999; Tay and Ooi, 2001).

FM relates to all workplaces as it integrates people, purpose and workplace and is therefore applicable to all businesses and firms as they occupy space in one form or the other (Tay and Ooi, 2001). Hence, FM can be viewed as the interface between people, property and technology as illustrated in Figure 1 (Then, 1994). Thus, FM is an essential part of property management, and facility managers are in a pivotal position to provide strategic information relating to property (Finch, 1992).

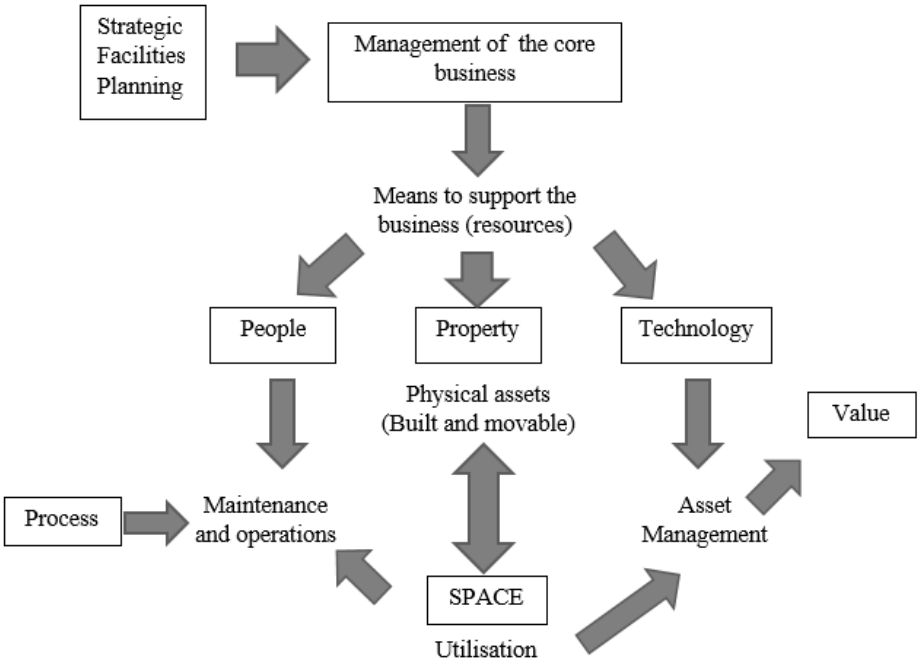


Figure 1. Space in the context of facilities management [Source: Adapted from Then (1994)]

The role of the facility manager is of critical importance in the current built environment as the facility manager, as opposed to the maintenance manager for example, is involved from the inception stage to ensure that knowledge gathered from previous properties are taken into consideration in new buildings (Finch, 1992). FM has progressed as a positive means of managing a portion of the physical environment at a time when traditional means of management had failed. Hence, effective FM has been a significant factor in the subsistence of businesses which have succeeded in adapting to new operating environments (Melvin, 1992). With more complex properties together with the increasing sensitivity of the operational cost, strategic management functions had to be adopted (Becker, 1990b; Yim Yiu, 2008). Price (2002) suggested a model alignment to strategic business from the existing operational FM in order to address the changing nature of FM. In the same vein, the four principle components of FM identified by Then (1999) are strategic facilities planning, strategic asset management, asset maintenance management and facilities service management.

Strategic management is the discipline of formulating, executing and assessing cross-functional decisions that will allow a business to attain its objectives (David, 1989). Strategic FM requires a combination of technical and managerial skills, which appears in three cases in fluctuating levels as competitive advantage, decision-making processes and a proactive approach. Operational FM in contrast is a combination of building systems and support services and concentrates on maintenance and elemental retrofits (Michell and Nurick, 2014). There are numerous factors driving the move towards strategic FM such as the need for reduced operating costs, the need for optimised return on assets, risk reduction, workplace productivity and legal considerations (Shah and Dwyer, 2010).

1.2.2. FM and Sustainability

With the current international trends, such as the Australian market (Michell and Nurick, 2014), sustainability is one of the functions within management and customer interest which all facility managers must accommodate (Cotts *et al.*, 2009). Sustainability is a critical social and economic issue and the benefits of sustainability and green practices in FM are well established (Hodges, 2005). The reduction of a firm's impact on the environment has become a strategic issue spanning from supply chains down to the customers in order to guarantee optimised performance (Heerwagen, 2000; Hodges, 2005). In the long term reduction in energy consumption, productivity increases, waste reduction, and many other beneficial effects of sustainability can be seen, quantified and presented to an organisation's leadership in order to

encourage sustainable practices and demonstrate their positive effect on the bottom line (Hodges, 2005).

It is a natural fit for facility managers to appreciate and embrace the concepts of sustainability (Cotts *et al.*, 2009). The facility manager is in a unique position which allows him/her to view the whole process along with being the leader of the only group that can influence the entire lifecycle of a facility (Hodges, 2005). As the facility manager is often required to work with a limited budget, the value added by green practices is not a new concept (Cotts *et al.*, 2009). Hence, the facilities manager frequently becomes the proponent of sustainable and green practices (Hodges, 2005). Considering this along with some of the above mentioned factors, a common strategy is the implementation of GBFIs which are considered to be a sustainable strategy to reduce costs whilst maintaining a competitive advantage (Michell and Nurick, 2014).

With the tools available to the facility manager such as life cycle costing (LCC) and benchmarking various alternatives can be compared, taking into account their lifetime economic and environmental costs, and the most sustainable option for the long term can be selected (Hodges, 2005; Wauters, 2005). LCC is thus a critical tool that helps the facility manager to meet the organisation's economic, environmental, and social goals. Hence, the benefits of sustainability practices are clearly demonstrated once LCC is applied (Hodges, 2005).

1.2.3. Triple Bottom Line (TBL)

Over the past decades, with the inevitable growth of the environmental agenda, the concept of sustainability has gained momentum (Elkington, 2004). This is due to a number of drivers affecting the investment decisions in the context of sustainability. A key driver of sustainability will be the unsustainability of current consumption patterns as today's economy is highly destructive of natural and social capital (Elkington, 2004). However, at the firm level, Corporate Social Responsibility (CSR) remains the major driver for companies to adopt an approach showing interest in the community (Alexander, 1996).

Joint consideration now needs to be given to economic prosperity, social advancement and protection of the environment (Levy and De Francesco, 2009). This is also known as the 'triple bottom line (TBL)'. This concept has introduced the economic benefits of improved treatment of the environment (Hodges, 2005). Hence, the TBL agenda emphasises not only the economic

value added, but also the social and environmental value added or destroyed (Elkington, 2004). Figure 2 illustrates the optimal balance between the three elements that equate to sustainability in this context.

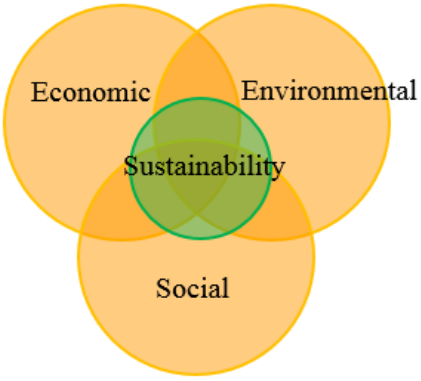


Figure 2. Sustainability and investment principles

Making sustainability issues mainstream still remains a key challenge (IoDSA, 2009). However, at an international level, the International Standards Organisation (ISO) does recognise the demand for consumer, health and environmental protection as being amongst the main drivers for new international standards (Bryden, 2005). The demand for greener buildings is slowly increasing backed by the tenant requirements, regulations, CSR, or the more attractive financial returns that they offer with their reduced operational costs. The globalisation of the property industry intensifies this trend such that investors are increasingly unwilling to invest in non-green properties (Nelson, 2008).

In the local context, the sustainability and TBL concept is backed by a number of laws and codes such as the publication of the King IV Report by the Institute of Directors in Southern Africa (IoDSA, 2016). According to this code for governance, companies are expected to be responsible with regards to the triple bottom line context in which they operate. Moreover, for listed companies, the Johannesburg Stock Exchange (JSE) has launched the Social Responsibility Index (SRI), in 2004. It reflects criteria such as environmental, social and governance practices and is seen as a means for investors to detect firms which incorporate sustainable practices into their business activities (IoDSA, 2009).

1.2.4. Green Buildings

The rapid multiplication of initiatives and tools on sustainability is proof of the increasing awareness of sustainability issues (IoDSA, 2009). According to Kats (2003), buildings are amongst the largest consumers of resources in the economy. This negative environmental impact of buildings drives the need for sustainable buildings. In the property sector sustainability can be achieved through various routes including green construction projects

(Gunnell *et al.*, 2009; McGraw-Hill, 2013). Green buildings are not a standard practice but have been on the rise in the US, Australia and Europe (Gunnell *et al.*, 2009).

Green buildings are defined as being "*energy efficient, resource efficient and environmentally responsible*" (GBCSA, 2017a:1). They integrate design, construction, and practices to eradicate or considerably decrease the negative impact of the development on society and the environment. Typically they have lower operating costs along with higher rates of return, portray higher efficiency whilst being future proof and promoting social well-being and productivity (GBCSA, 2017a). However, the standards for green building varies around the world due to the number of rating systems or rating tools that have been developed by national and international organisations. Most of those rating systems assess and guide the performance of the sustainable construction against the three pillars of sustainability, namely: economic growth, ecological balance and social equity (Mao *et al.*, 2009).

The common green building rating tools used internationally include the Leadership in Energy and Environmental Design (LEED), Building Research Establishment Environmental Assessment Method (BREEAM), Sustainable Building Tool (SBTool), Comprehensive Assessment System for Building Environment Efficiency (CASBEE), Green Globes, Green Calc, Ecoprofile, Hong Kong Building Environment Assessment Method (HK-BEAM), Building and Construction Authority Green Mark, Singapore (BCA-GM), Green Star, National Australian Building Environment Rating System (NABERS), Green Olympic Building Assessment System, China (GOBAS) and the Evaluation Standard for Green Building (ESGB) (Mao *et al.*, 2009).

In the United States, LEED was created by the United States Green Building Council (USGBC) to provide a rating system for assessing buildings that qualify as green buildings (Kats, 2003). It is considered as one of the most successful systems available due its strong market penetration (Mao *et al.*, 2009). The Building Research Establishment (BRE) developed the BREEAM in the UK during the year 1990. It is considered the first meaningful green building assessment tool in world and is widely used as an environmental assessment tool for buildings (Mao *et al.*, 2009). Locally, the Green Building Council of South Africa (GBCSA) has based the South African rating tool, the Green Star South Africa (GSSA), on the Australian Green Star system as it was the most convenient option to adapt to the South African environment. The GSSA was never designed to become regulatory but was rather intended to recognise

leadership at the upper end of the sustainability scale. Each of the GSSA rating tools is applicable to a different market sectors such a retail or office (Gunnell *et al.*, 2009).

In order to achieve a GSSA rating, several categories that consider the proposed design and the final built product need to be assessed. These categories include: Management, Indoor Environment Quality (IEQ), Energy, Transport, Water, Materials, Land Use and Ecology, Emissions and Innovation (GBCSA, 2008). The GSSA rating tool provides an objective measurement for green buildings whilst recognising and rewarding leadership in the real estate sector (GBCSA, 2008).

However, despite the increased importance laid on green building rating tools, it is believed that they do not really reflect true sustainability. This is because they do not capture the social and economic impacts of the building. The Sustainable Building Assessment Tool (SBAT), which is an alternative tool, would rectify this by measuring sustainability performance against social, economic and environmental criteria (Gibberd, 2008; Van Wyk, 2008). This would provide for the full assessment of buildings and their contribution to their more sustainable systems in their surroundings (Van Wyk, 2008).

1.2.5. Green Building Features and Initiatives (GBFIs)

Sustainable buildings use resources like energy, land or water more efficiently than conventional buildings (Kats, 2003). Such buildings, which are not necessarily green star rated, would contain GBFIs which are special characteristics that would permit the building to reduce its impact on environmental degradation (Nurick *et al.*, 2013). Typically the environmental considerations of the TBL can be tactically managed with GBFIs for the efficient management of a space (Milne, 2012). Moreover, GBFIs can be found in all buildings and not necessarily in certified green buildings (Michell and Nurick, 2014). For a building to be certified as a green building an additional step is required as it has to go through the rating process based on the rating tool (Nurick *et al.*, 2013). However, despite the growing emphasis placed on green buildings, the property industry is hesitant over the implementation of GBFIs (Myers *et al.*, 2008; CBRE, 2009).

GBFIs, which are implemented in numerous buildings in Cape Town (Milne, 2012), can be split into two categories, namely: features and initiatives. A green building feature is a building component that reduces resource consumption such as a motion sensor for lighting. A green building initiative on the other hand would be expected to increase consumption but effectively reduce the carbon footprint of building occupants such as bicycle and shower facilities (Michell

and Nurick, 2014). Initiatives, as opposed to features, consider the wider positive impact on the environment as a whole (Milne, 2012).

1.2.6. Value Added

The positive effect of green practices only become apparent in the long run (Hodges, 2005). Hence, it is important to consider the life cycle cost (LCC) and the total cost of ownership (TCO). This will allow organisations to develop a better understanding of those sustainable practices (Hodges, 2005). Sustainable buildings provide financial benefits that conventional buildings do not, as reflected in the savings in energy and water consumption as well as reduced waste, improved indoor environmental quality, improved productivity, reduced employee health costs and lower maintenance costs (Kats, 2003). Implementing sustainability and green building approaches to facilities will benefit an organisation through superior financial returns, improved status in the community, enhanced productivity and reduced harmful effects on the environment (Hodges, 2005).

Faced with a rapidly changing economic climate, organisations have endeavoured to make themselves more competitive by optimising the value of all their assets (Melvin, 1992). Equipped with the adequate financial and strategic planning tools the facility manager can generate long-term value to the organisation by developing, applying and maintaining sustainable facility practices (Hodges, 2005). Besides adding value to the core business of organisations it is becoming more and more important for FM to add value for society in terms of sustainability (Jensen *et al.*, 2013). Numerous models, such as the value map developed by Jensen (2010), have been used to demonstrate to practitioners the different ways in which FM can create value to different stakeholders. This particular model identified numerous areas in which FM may be considered to add value, namely: cooperation among companies, end-use, economy and costs, effectiveness and productivity, environment and sustainability, facilities and workplaces, overall management, staff satisfaction, risks and continuity and general services (Jensen, 2010).

For the survival of the discipline, the field needs to be developed from not only being able to deliver the same services at reduced cost, but also to provide qualitatively improved services to end users (Jensen, 2010). In the same line of thought, in certain parts of the world FM has shifted its focus from cost reduction towards value added to various stakeholders such as the company, the employees, the customers, and society. Cost reductions can be attained by using

general management principles as opposed to added value which can only be attained based on specific knowledge and techniques related to a particular field of practice (Jensen, 2010).

Cost reductions are often seen as a contrast to adding value where in fact the relationship between cost and value is more complex (Jensen, 2010). According to Jensen (2010), who looks at two concepts of value, namely: use value and exchange value, the reduction of costs by increased efficiency leads to added exchange value. Use value only relates to the productivity and increased effectiveness. This results in qualitatively different and improved output. Value as a concept can take numerous meanings and usages and added value is a relative perception (Jensen, 2010).

Value added to the core business, because of improved efficiency for example, can be seen in numerous ways such as more satisfied staff, improved productivity, increased reliability, and improved image (de Vries *et al.*, 2008; Lindholm, 2008). In short, three main categories can be said to relate to impacts on core business: people, processes and economy (Jensen, 2010).

In terms of facilities, optimising the asset value not only includes the financial viability but also the social and environmental benefits (Alexander and Brown, 2006). In that sense, FM not only adds value to the core business but also to the 'surroundings' in terms of social, spatial, economic and environmental factors (Jensen *et al.*, 2008). These non-core business goals impact on the surroundings are of specific importance for public organisations and for private companies concerned with CSR and the TBL (Jensen, 2010)

1.3. Problem Statement

The problem examined in this study can be described as:

The facility manager can generate long-term value to an organisation by developing, applying and maintaining sustainable facility practices. However, little is known about the perceived added social, economic, and environmental value of the integration of GBFIs into a FM strategy.

1.4. Research Questions

For the purposes of this study, the following research questions will be posed:

- How does the integration of GBFIs into a FM strategy influence the perceived social, economic, and environmental value of a facility?
- What are the FM requirements to optimise the influence of GBFIs on the value of a facility?

1.5. Research Aim

The aim of this research is to:

Develop an understanding of how the integration of GBFIs into a FM strategy influences the perception of social, economic, and environmental value of a facility and understand the role of FM in this process.

1.6. Research Proposition

The research proposition to be tested in this study is:

The integration of GBFIs into a FM strategy improves the perception of the social, economic, and environmental value of the facility.

1.7. Research Objectives

The research objectives to be achieved are to:

- Determine the impact of the integration of GBFIs into a FM strategy on the perception of social, economic, and environmental value of the facility.
- Determine the FM requirements for GBFIs to influence the value of a facility positively.

1.8. Research Method

The above objectives will be achieved by adopting a social constructivist approach. The following research methodology will be followed:

- A literature review of the material relevant to the research will be performed. The literature to be reviewed will relate to FM, strategic FM, sustainability, TBL, sustainable FM, green buildings, GBFIs, and the concept of value.
- A case study methodology will be adopted using mixed methods as a form of data collection. In this context, semi-structured interviews together with online surveys will be conducted. The chosen methodology and methods are backed by similar research, about the value added by FM, which also employ a similar approach. The interviews will be carried out with facilities managers and/or landlord representatives whilst the online surveys will be sent to the building occupants.
- The analysis and interpretation of collected data.
- Conclusions will be made based on the analysis and interpretation of data.

1.9. Scope and Limitation

This research covers properties in Cape Town only and will be subject to the following limitations:

- Social value will be considered in relation to the direct stakeholders, that is, the building occupants.
- The analysis of data collected from interviews is subject to bias.
- The investigation will be limited to the commercial (offices) property sector in Cape Town.
- The data collected and analysed will be limited to four cases.
- Any types of commercial building, green star rated or not, with GBFIs as part of their FM strategy will be considered.
- International literature will form the basis of the research due to the limited literature relating to GBFIs, green buildings and the value added of FM in the South African context.

1.10. Dissertation Outline

This research report is structured as follows:

Chapter 1 provided an overview of the research topic given, followed by concise statements of the research problem, the research questions and the research proposition. The aim and objectives of the research were stated before a brief description of the research methodology was provided.

Chapter 2 provides a critical review of the literature on FM, GBFIs and value along with the existing interrelationships between these bodies of knowledge. This chapter fundamentally addresses the question: *What has other research in this field revealed?*

Chapter 3 provides for an analysis and justification of the research methodology as well as the research methods. The chapter ends with the documentation of the limitations of the research.

Chapter 4 presents the data collected together with analysis and interpretation of such data in order to establish the perceived value added of GBFIs on facilities.

Chapter 5 is the concluding chapter which revisits the problem statement and the research question and critically reflects on the findings from chapter 4 in terms of the literature.

Chapter 2: Literature Review

2.1. Introduction

The purpose of this chapter is to review the relevant literature that underpins this research. The objective of this chapter is to create a theoretical framework that will support the exploration of the research problem in order to achieve the research objectives.

To begin with, the concept of FM will be introduced before exploring strategic FM. Current trends and sustainability considerations will be considered following which, the TBL concept will be explored in the FM context. The concept of value will then be introduced and value management will be discussed with regards to economic, social and environmental value. Lastly, green buildings and GBFIs will be examined in relation to sustainability and the value added principles discussed in this chapter.

2.2. FM Overview

The accelerating pace of change in the business is increasing the pressure on facilities delivery and performance (Lynch, 2002a). With the boom in the office administration in the twentieth century, there was a move towards better management of facilities in a holistic way rather than being narrowly focused operational issues (Amaratunga and Baldry, 2001; Pathirage *et al.*, 2008). As a result, facilities need to be managed effectively and FM is an emerging discipline in dealing with such pressures. The discipline is complex in nature and requires a multi-facetted approach (Barrett and Baldry, 2009; Elmualim *et al.*, 2010).

Despite being a neglected and misunderstood profession a few decades ago, FM as practice and discipline is gaining increasing recognition at international level (Williams, 1999; Elmualim *et al.*, 2010; Nor *et al.*, 2014). The discipline keeps progressing to offer management services meeting planned long-term and short-term requirements and goals of organisations (IFMA, 2009; Rondeau *et al.*, 2012). Whether the organisations own or lease their space, they find it necessary to delegate the tasks of planning, budgeting, maintaining, refurbishing, designing, securing a location or redesigning of the facilities, to one or more employees (Rondeau *et al.*, 2012).

As FM requires multiple skills, in many cases the facility manager is a corporate generalist recruiting and managing various specialists such as in-house staff, consultants or outsourcing firms from various professional disciplines and backgrounds (Tay and Ooi, 2001; Rondeau *et al.*, 2012). Traditionally FM services were provided by an in-house facility manager. However

presently numerous organisations consider the benefits of outsourcing support services such as FM (Probst-Wallace, 2015).

2.3. Need for FM

The function of planning, designing and managing buildings exists since the first buildings have been created. However, its careful and planned practice forming part of organisational design and development is what is known as FM (Becker, 1990a; IFMA and RICS, 2017). It is believed that FM was initially restricted to the day to day running of buildings and their associated services, with the operations working in isolation to the organisation (Then, 1999; Pathirage *et al.*, 2008; Mohd Noor and Pitt, 2009).

For several years businesses, universities and government agencies, with many large facilities, broad maintenance and operating with limited capital budget, have been developing and applying management practices that are now extensively accepted by professionals (Cotts, 1999; Rondeau *et al.*, 2012). However, FM has only become an internationally recognised and required process of organisations expending resources on people and workplace in the past three decades (Rondeau *et al.*, 2012).

The exact origin of FM is unknown but the first documented evidence of the term is from 1968 (Price, 2003; Nor *et al.*, 2014). Although numerous authors attribute the origin of FM to numerous sources, from the Roman Empire to American railroad development (Bröchner, 2001; Nor *et al.*, 2014). The term FM first appeared in North America during that period to define an emerging area of study relating to the design and management of workplaces and their impact on businesses (Shah, 2007; Nor *et al.*, 2014). Moreover, four to five decades ago, many businesses and organisations were much smaller than current businesses. These facilities required cheap energy, construction, work space costs and focused on short-term goals and requirements (Rondeau *et al.*, 2012).

Nevertheless, irrespective of the size of the organisation, external factors affect the core business at some point (Atkin and Brooks, 2009). For example, in the USA during the early 1970s, inflation along with fuel shortages led to a dramatic increase in the prices of resources and the cost of finance causing major changes in the structure of organisations (Krumm *et al.*, 1998; Cogley and Sargent, 2001; Primiceri, 2006; Rondeau *et al.*, 2012). One result of this crisis in the USA was the evolution of the management of scarce resources and the transition to managing facilities as an asset (Rondeau *et al.*, 2012). FM emerged as a result of such shifts in the business environment, the pervasive effect of technology, along with the independence of

workers (Alexander, 1994; Rondeau *et al.*, 2012). With scarce capital funds and resources, large organisations had to compete more effectively and efficiently in the market in order to remain competitive (Rondeau *et al.*, 2012).

Faced with such conditions, organisations with limited financial and human resources have to carefully manage their daily requirements and expenditures (Rondeau *et al.*, 2012). With limited budgets, every cent invested in the improvement or maintenance of facilities must be analysed for a return on investment (ROI) (IFMA, 2007). Moreover, based on the organisation's long-term goals, political reality and economic necessity, careful planning and development of facility programs is required (Atkin and Brooks, 2009; IFMA, 2009; Rondeau *et al.*, 2012).

About four decades ago, inefficient processes, counter productive work environments along with increased worker expectations drove senior management to find options to cater for the long term and to 'work smarter' in order to increase productivity and competitiveness (Rondeau *et al.*, 2012). Even though the property industry had been impervious to major changes for many years, there were significant changes in the preceding decades relating to new services being developed (Varcoe, 2000). Such innovations were a business imperative and not a mere option in competitive environments (Hauptfleisch, 2012).

Changing economic conditions drove firms to improve competitiveness by reducing costs and optimising the value of all their assets (Melvin, 1992; Alexander, 1994). FM was an internal response, from organisations, to the long term economic trends which developed as a positive means of managing part of the physical environment when traditional management had failed (Melvin, 1992). Moreover, with more and more complex properties, along with the sensitivity of the operations cost, strategic management functions had to be introduced (Becker, 1990b; Yim Yiu, 2008).

FM is about accomplishing management goals while operating within practical limitations, it is therefore a balancing act as there is never enough capital to support all management initiatives (Lynch, 2002b). Hence, effective FM has been a significant factor in the subsistence of businesses, which have succeeded in adapting to the new operating environments (Melvin, 1992). In contrast, Lynch (2002a) argues that the evolution of FM has been outpaced by the quicker rate of change in the business world causing much concern amongst business leaders.

2.4. FM Definition

There exist numerous varying definitions as to what FM is but there is, however, no precise and universally agreed definition for the discipline (Price, 2003; Shah, 2007; Atkin and Brooks, 2009; Nor *et al.*, 2014). This variance in definitions is attributed to various reasons such as the quick emergence of the discipline over the past fifty years or to the heterogeneous backgrounds of current facility managers or to the various organisations promoting their differing opinions. The FM definition is a debatable issue as definitions relate to the local principles as well as the organisation's interest and people's personal interest (Lindholm, 2005).

The term first appeared in North America in the 1970s, to define the emerging area of study relating to the design and management of workplaces and their influence on businesses (Nor *et al.*, 2014). In the 1990s, FM was described as responsible for coordinating all efforts related to planning, designing and managing buildings and their systems, equipment and furniture to enhance the organisation's ability to compete successfully in a rapidly changing world (Becker and Steele, 1990). In contrast, Nourse (1990) argued that the FM unit is seldom aware of the overall corporate strategic planning, and does not have a bottom-line emphasis. There have been additional definitions over the recent years coming from numerous authors and organisations such as Then (1999), Nutt (2000), Alexander (2013), SAFMA (2014), and IFMA (2016). The variety of definitions is depicted in Table 1 which shows the definitions of FM which were developed over the past two decades as the discipline has evolved.

These definitions clearly do not tally with each other in terms of providing guidance with regards to the objectives and scope of FM. This further sustains the uncertainty about the exact role of the facility manager (Tay and Ooi, 2001). For example, there are major contradictions on the strategic role of FM in the definitions given by Nourse (1990) and Nutt (2000); or inconsistencies on the contribution of FM to an organisation in the definitions from Nourse (1990) and Becker (1990b). Furthermore, the definition given by Becker and Steele (1990) depicts FM as being concerned with the hardware aspect of the buildings as opposed to the definition from Then (1999) and Varcoe (2000), a decade later, which include the softer aspects such as people, process, environment, health and safety. Hard services relate to the decoration, maintenance etc. whereas soft services relate to cleaning, security, recycling, pest control, waste disposal, space management, business risk assessment, benchmarking, procurement, utility management, business planning etc. (Probst-Wallace, 2015).

Table 1. FM definitions [Source: Tay and Ooi (2001:358); Nor et al. (2014:5)]

Author	**Definition of FM**
Then (1999:469)	The practice of FM is concerned with the delivery of the enabling workplace environment - the optimum functional space that supports the business processes and human resources.
Hinks and McNay (1999:31)	. . . common interpretations of the FM remit: maintenance management; space management and accommodation standards; project management for new-build and alterations; the general premises management of the building stock; and the administration of associated support services.
Varcoe (2000:386)	The practice of coordinating the physical workplace with the people and work of the organisation. It integrates the principles of business administration, architecture and the behavioural and engineering sciences.
Nutt (2000:124)	The primary function of FM is resource management, at strategic and operational levels of support. Generic types of resource management central to the FM function are the management of financial resources, physical resources, human resources, and the management of resources of information and knowledge.
Best *et al.* (2003:12)	FM is therefore about empowering people through provision of infrastructure that adds value to the processes that they support.
Barrett and Baldry (2009:xi)	An integrated approach to maintaining, improving and adapting the buildings of an organisation in order to create an environment that strongly supports the primary objectives of that organisation.
Alexander (2013:57)	FM is a total quality approach to sustaining an operational environment and providing support services to meet the strategic needs of an organisation.
SAFMA (2014:1)	FM is an enabler of sustainable enterprise performance through the whole life management of productive workplaces and effective business support services.
BIFM (2014:3)	FM is the integration of multi-disciplinary activities within the built environment and the management of their impact upon people and the workplace.
IFMA (2016:1)	FM is a profession that encompasses multiple disciplines to ensure functionality of the built environment by integrating people, place, process and technology.

Based on the numerous definitions of FM available, it is clear that FM is far more than a set of defined tasks but rather a model in the way in which to deal with buildings (Finch, 1992). Despite the divergence in the exact definitions, there are common repetitive themes which give FM its identity (Tay and Ooi, 2001; Nor *et al.*, 2014). First and foremost, the focus of FM is the workplace (Then, 1999; Varcoe, 2000; Barrett and Baldry, 2009; SAFMA, 2014). By extension FM is applicable to all organisations which occupy space for their work (Tay and Ooi, 2001). Secondly, FM plays a supporting role in improving the performance of an organisation (Then, 1999; Varcoe, 2000; Atkin and Brooks, 2009; Barrett and Baldry, 2009; Alexander, 2013). Thirdly, modern FM requires an integrated approach (Barrett and Baldry, 2009; BIFM, 2014; IFMA, 2016). As efficient and productive workers require quality environments to operate at their best, this integrated approach involves maintaining and improving the property assets of an organisation in order to create an environment that strongly supports their primary objectives (Barrett, 1992; Jones, 2000). In the same vein, FM looks at improved productivity and sustainable growth through integrated management principles (Nor *et al.*, 2014).

Furthermore, Nutt (2000) argues that FM revolves around strategic areas of management for financial, physical, human and knowledge resources. Based on those definitions it can be concluded that FM is a hybrid management discipline, having a single focus on the workplace and its enhanced performance, which require an integrated approach for financial management, space management, human resource management, environmental management and support services management (Alexander, 1999; Then, 1999; Tay and Ooi, 2001).

IFMA further identifies 9 competency areas in FM, namely: (1) Operations and maintenance; (2) Real estate; (3) Human and environmental factors; (4) Planning and project management; (5) Leadership and management; (6) Finance; (7) Quality assessment and innovation; (8) Communication; and (9) Technology (Hauptfleisch, 2012). By elaborating on these areas, FM can be seen as a discipline which:

- Provides support to people in their work and in other activities (Then, 1999; Best *et al.*, 2003; Shah, 2007; Hauptfleisch, 2012; Alexander, 2013; Probst-Wallace, 2015).
- Improves individual comfort (Best *et al.*, 2003; Hauptfleisch, 2012).
- Improves cost efficiency of assets (IFMA, 2007; Hauptfleisch, 2012; Rondeau *et al.*, 2012).

- Adds value to the assets and their surroundings environment (Shah, 2007; Jensen, 2010; Jensen *et al.*, 2013; Probst-Wallace, 2015).
- Provides for future-proofing of the workspace and adaptation (Melvin, 1992; McGregor, 2000; Hauptfleisch, 2012).
- Allows for effective service delivery from the organisation (Becker, 1990b; Then, 1999; Shah, 2007; Barrett and Baldry, 2009; Hauptfleisch, 2012).
- Improves the organisation's culture and image (Hauptfleisch, 2012).
- Provides competitive advantage to the core business of an organisation (Becker, 1990b; Hauptfleisch, 2012).
- Provides for innovation as a business imperative (Amaratunga and Baldry, 2002; Hauptfleisch, 2012; Rondeau *et al.*, 2012).
- Integrates people, place, process and technology (Then, 1994; IFMA, 2016; IFMA and RICS, 2017).
- Integrates sustainability practices (Hodges, 2005; Shah, 2007; Cotts *et al.*, 2009).

Hence, FM relates to the organisation as a whole as it encompasses and integrates multiple activities to ensure the functionality of facilities along with the integration of people, place, process and technology. There are numerous goals of FM which all relate to the holistic optimisation of the facilities and the organisation with regards to various aspects such as productivity, efficiency, innovation or sustainability.

2.5. Strategic FM

FM is the technique applied to develop and operate buildings and to deliver support services which contribute to achieving the business objectives (IFMA, 2009; Alexander, 2013). The ability to link the role of facilities to the core business of an organisation is vital to effective FM as facilities have a considerable impact on productivity, innovation, efficiency, employee satisfaction and the public perception of the organisation (IFMA, 2007; Shah, 2007). From an asset management outlook, FM can be classified as a non-core service but is fundamentally a service supporting the core business of an organisation (Shah, 2007; Hauptfleisch, 2012; Alexander, 2013). Nevertheless, FM is not broadly recognised as a strategic resource area like other corporate functions (IFMA and RICS, 2017). However, effective FM is very important as it is a critical link to the product/service value chain which looks at how organisations can configure their primary and secondary support activities to optimise competitive advantage (Porter, 1985; Hauptfleisch, 2012).

For FM to progress with increasing success, the facilities function must not be considered as a body that exists only for the benefit of those involved in it. Facilities can be successfully managed only when seen as an integral part of the organisation (Alexander, 2013). The facilities function is essentially a service to the main business. FM input should be started from the inception stage, be it the procurement of a new facility or at the operational startup phase of an existing facility, for the effective management of the facility (Shah, 2007; Alexander, 2013).

FM's goal is the effective management of facility resources and services in providing shells of support to everyone. This support is given to the operations of organisations, their working teams, project groups and individuals (Nutt, 2000). Then (1999) identified four main components of the discipline, namely: strategic facilities planning; strategic asset management; asset maintenance management; and facilities service management. Hence, the main purpose of FM is resource management, at both strategic and operational levels (Nutt, 2000; Tay and Ooi, 2001; IFMA and RICS, 2017).

The most visible parts of FM relate to operational FM dealing with operational issues which are considered to require "little management" from the facility users' perspective (Tay and Ooi, 2001). According to IFMA and RICS (2017) the focus on the operational aspect of FM continues to influence management's perception of FM whilst failing to identify its potential strategic impact on business outcomes (IFMA and RICS, 2017). Operational FM is often criticised for focusing on the micro level (the building) while neglecting the macro level (external factors, society, environment etc.) (Price, 2002; Alexander, 2006). It is important to distinguish between the two levels of FM but it is also crucial for the two to work in harmony (IFMA and RICS, 2017).

Operational FM is a combination of building systems and support services which concentrates on maintenance and elemental retrofits (Michell and Nurick, 2014). Strategic FM on the other hand requires a combination of technical and managerial skills which appear at varying levels of the organisation as competitive advantages, decision making processes and proactive approaches (Michell and Nurick, 2014). Strategic FM would tackle deeper issues such as property location, space forecasting and usage (Tay and Ooi, 2001). There is however no clear definition of strategic FM (Goyal and Pitt, 2007).

Based on the principles of management, there are different levels of management and as FM operates on two levels (strategic and operational) there exists more than one level of facility managers (Tay and Ooi, 2001). In the current built environment, high level strategic FM plays a vital role as the facility manager is usually involved from the initials stages - being design, build or finance - of the project, as opposed to a maintenance manager, to ensure that accumulated knowledge from previous projects are considered for new facilities (Finch, 1992; Tay and Ooi, 2001; Shah, 2007). According to Payne (2000), on top of being needed in various stages, FM requires various inputs relating to four key areas, namely:

1) The property and built environment professionals such architects and quantity surveyors.
2) Human resources, environmental engineers, and building services professionals for their input on the way people interact within the built environment.
3) Technical expertise of maintenance staff.
4) The operational requirements relating to the processes taking place in the facilities.

FM professionals are aware of the growing importance of the need to become proactive and strategic (IFMA, 2009). There exist numerous forces, such as the need for lower operating costs, improved return on assets, risk reduction and improved workplace productivity, which are driving the move towards strategic FM (Shah, 2007; Shah and Dwyer, 2010; IFMA and RICS, 2017). Moreover, with more complex properties, strategic management functions had to be introduced (Becker, 1990b; Yim Yiu, 2008). Techniques for managing quality, value and risk are crucial skills for a facility manager (Alexander, 2013). Developments in the field indicate that facility managers have a better prospect to add value to their organisations through efficient management, enhanced technology, innovation and strategic planning (Rondeau *et al.*, 2012; IFMA, 2014). Hence, in countries where FM is omnipresent, such as Japan, it is considered as a key to economic prosperity (Alexander, 1994).

With the increasing demand for efficiency and value for money, the facility manager's priority is to service and support the business in a cost-effective manner whilst considering non-financial goals of the organisation (Alexander, 1994; Shah, 2007; Hauptfleisch, 2012; IFMA and RICS, 2017). Hence, the facility manager is responsible for the development of a clear strategy for resourcing the service based on organisational objectives (Hauptfleisch, 2012). Strategic FM allows for optimal support of organisations through well informed decisions about facilities which ultimately support the business goals and corporate culture (Klein, 2003; Langston and Lauge-Kristensen, 2013; IFMA and RICS, 2017). With high quality FM services, the service chain provisioning of the physical environment and the strategic configuration of

facilities with business priorities are of the same importance and both are strategic (IFMA and RICS, 2017).

Hence, FM professionals must have a clear understanding of the business objectives, such as quality or cost effectiveness, so as to align the FM goals accordingly (Langston and Lauge-Kristensen, 2013; IFMA and RICS, 2017). Being centered on quality of life, cost-effectiveness, flexibility and environmental considerations, FM practices combine recognised and innovative approaches and techniques with the most recent technical knowledge to attain humane, prolific and effective workplaces (Rondeau *et al.*, 2012; IFMA and RICS, 2017).

According to IFMA and RICS (2017) there is a growing portion of the FM profession which is focused on the impact of facilities on work and the workplace thereby providing an opportunity to widen FM's remit and play an even greater role in organisational effectiveness and business success. In the same vein, McGregor (2000) argues that workspace management has evolved from a reactive role to a strategic proactive role emphasising and anticipating the future business needs and consistently adding value. Even though this type of transition is difficult it is only by a constant process of development and innovation that the FM discipline can grow (Krumm *et al.*, 1998; Amaratunga and Baldry, 2002).

FM, through recognised techniques, provides businesses with the opportunity to improve performance at a reduced cost (Tay and Ooi, 2001; Atkin and Brooks, 2009; IFMA, 2009). This is because buildings facilitate and enhance work (Atkin and Brooks, 2009; Alexander, 2013). With the increasing dependence on office productivity, FM is considered to be a means of improving the effectiveness of workers (Alexander, 1994; McGregor, 2000). A performing workplace is the end product of FM (Tay and Ooi, 2001). On top of an improved business performance and productivity, a performing workplace can also impact on talent retention or attraction and employee engagement, thus improving the overall organisation effectiveness (IFMA and RICS, 2017).

This emerging workplace management concept, involving corporate strategic planning or relationship management, is also being embraced by numerous senior professionals such as architects or interior designers (IFMA and RICS, 2017). Building operators should strive to optimise the building user's potential and should not merely attempt to achieve some minimum constraint (Alexander, 2013). According to IFMA and RICS (2017) the cost effective delivery of a quality physical environment is progressively originating from subcontracted service

providers. Moreover, in-house, workplace management tends to be inadequately aligned with other peer infrastructure groups such as IT or HR.

Considering the common functions falling in most FM departments, such as cleaning, maintenance, space planning, security, catering, engineering etc., it is clear that service to end-users is the purpose of the FM discipline. As customers expect quality and reliability along with value for money, customer satisfaction needs to be a target for every facility manager (Alexander, 2013). Hence, it is important to measure the internal processes having the most significant impact on customer satisfaction and on the organisation's goal (Amaratunga and Baldry, 2002). Strategic FM assists in the reduction of mistakes, delays, disappointments and improves customer satisfaction (IFMA, 2009). These critical internal processes allow the facility manager to satisfy stakeholder expectations (Amaratunga and Baldry, 2002).

The efficient management of facilities to support stakeholders' expectations requires an appropriate plan but there is no 'one size fits all' solution (McGregor, 2000; Alexander, 2013). According to IFMA (2009) strategic facility planning (SFP) is the key to FM. Similarly, McGregor (2000:404) defines strategic planning process as a "*method used by the enterprise to ensure that their Facilities, Infrastructure and Services are capable of meeting the seen and unforeseen needs of the organisation, in order that they are able to cost - effectively sustain changes in their external business environment"*. Portfolio management, directed by SFP, provides a critical link between the business strategy and facilities strategy needed to support business efforts (Lynch, 2002b).

As illustrated in Figure 3, SFP is a process which requires understanding, analysing, planning, and acting. The process is cyclical in nature in order to manage plans according to the changing future (IFMA, 2009). In the same vein, Grimshaw (1999) supports a change management approach to developing relationships between businesses, employees and facilities.

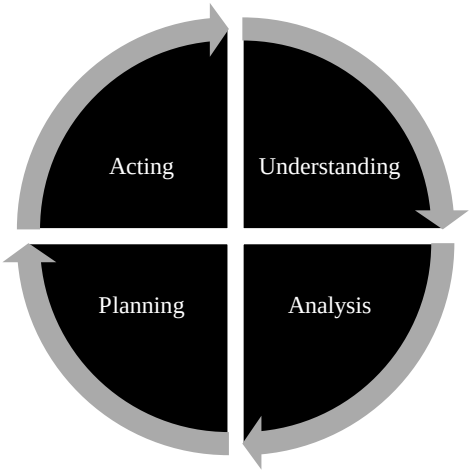


Figure 3. Strategic facilities plan four step process [Source: IFMA (2009:4)]

SFP ultimately optimises facilities to satisfy the strategic relationships between the organisation, services/product and facilities The first step of strategic planning is to understand the organisations goals and mission, then analytical techniques, such as SWOT analysis, are applied to explore the possible future outcomes and analyse the organisation's facility needs. Once the needs are identified, a plan is then developed to meet the long-range needs of the organisation. Finally, the plan is implemented and feedback from the actions of the current plan are fed into the next loop, thereby capturing the cyclical nature of change management (IFMA, 2009).

2.6. Life Cycle Costing (LCC)

Strategic FM is required at various stages, namely: design, build, finance, and operations throughout the life cycle of the facility (Tay and Ooi, 2001; Shah, 2007; IFMA and RICS, 2017). This allows FM to offer integrated strategic life cycle solutions (IFMA and RICS, 2017). Typically, the facility manager is concerned with a broad range of costs relating to the provision of premises, business and staff support services (Bottom, 2003). According to Hauptfleisch (2012) FM deals with 57,5% of the life cycle costs of a building as depicted in Figure 4. The property costs comprise the relatively fixed component of any budget as opposed to the remaining variable cost centres (business and support services) which are managed by the facility manager (Wauters, 2005).

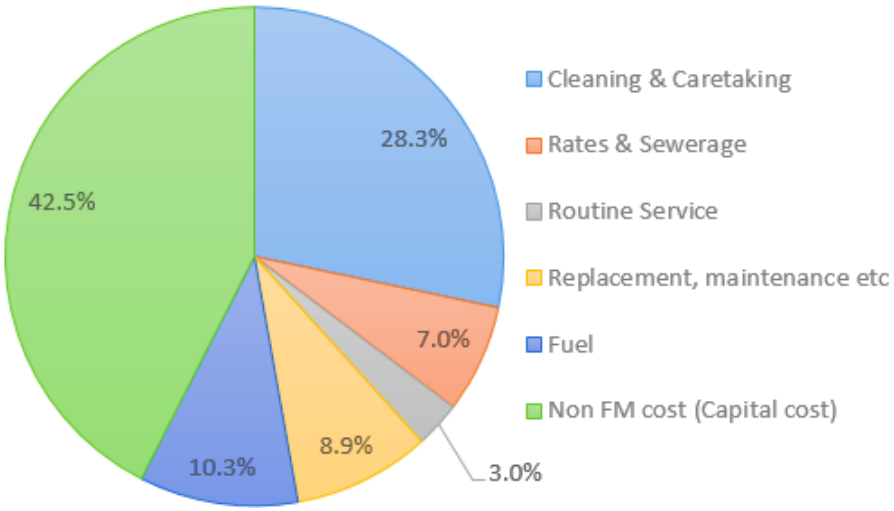


Figure 4. Life cycle cost [Source: Hauptfleisch (2012:12)]

The LCC relates to the sum of all costs incurred during the lifetime of an asset including procurement cost and ownership costs (Dhillon, 2013). Life cycle costs are receiving growing attention from various stakeholders both in the private and public sectors because in many cases, the cost of acquisition of an asset is less than the support cost over the life cycle of the asset (Hauptfleisch, 2012; Dhillon, 2013). Hence, procurement management requires the examination of the life cycle cost of an asset instead of the initial cost (Dhillon, 2013).

LCC duplicates the cash flow associated with an alternative for the least multiple years (cycle) so that the service life is compared over the total life for each alternative (Munther, 1997). Hence, it assesses the total cost of a system or product over either its complete life cycle or for the duration of the period of investigation, whichever is shorter (Norman, 1990). Furthermore, LCC considers the time value of money when looking at the anticipated future costs as different amounts, spent at different points in time, will have different values in today's monetary terms (Dhillon, 2013).

There are numerous formulas, essential to LCC, developed in economics to convert money from one point in time to another (Dhillon, 2013). Moreover, LCC is an essential tool to FM as it assists the facility manager in meeting not only the organisation's economic goals but also the social and environmental goals (Hodges, 2005). The value chain and its impact on the environment makes LCC critical in the modern economy (Hellweg and Milà i Canals, 2014). For example, LCC can also measure the environmental impact of resources use. In the FM context, LCC can be used to demonstrate the environmental and cost benefits of recycling (Shah, 2007).

2.7. Sustainability and TBL

The concept of sustainable development has gained momentum since the early 2000's (Elkington, 2004; Shah, 2007). However, its components date back many decades as seen with the Brundtland (1987) report which calls for development meeting the needs of the present without damaging the ability of the next generations to meet their own needs. Sustainable development is a framework which redefines social progress whilst redirecting economies, to allow people to improve their quality of life, whilst ensuring that the natural environment and resources are preserved for the benefit of future generations (Shah, 2007; Levy and De Francesco, 2009).

With growing popularity of sustainable development numerous organisations are considering the TBL approach (Shah, 2007). The approach giving joint consideration to economic prosperity, social advancement and environmental protection is the TBL (Elkington, 2004; Levy and De Francesco, 2009). Sustainability involves the three bottom lines and the social component of sustainable development places emphasis on social justice and development and therefore ensures community participation in decision making processes that impact on wider society (Hodges, 2005).

An increasing number of organisations and researchers have expanded sustainability objectives to address more carefully the social, environmental, and long-term economic stability considerations (Gladwin *et al.*, 1995; Starik and Rands, 1995; Carter and Rogers, 2008; Pullman *et al.*, 2009). These dimensions can effectively create competitive advantages for businesses (Wernerfelt, 1984; Barney, 1991; Peteraf, 1993; Pullman *et al.*, 2009). Sustainable development has evolved from being primarily concerned with environmental and health and safety issues in the 1980s to a more holistic approach merging with CSR in the 2000s (Shah, 2007).

CSR defines the ethical actions of organisations which contribute to social welfare over and over what is needed for profit maximisation (Holme and Watts, 1999; McWilliams, 2000). It includes a range of aspects such as business ethics, governance, business strategy, globalisation, supply chain and quality of life (McWilliams, 2000; Shah, 2007; Frederick, 2008). In the same vein, the TBL approach shifts responsibility from shareholders onto stakeholders such as employees and society (Robins, 2006). Furthermore, CSR can also consider the environmental norms relating to the protection of the environment (Holme and

Watts, 1999). There are numerous reasons, be it strategic, defensive or altruistic, for firms to adopt a more socially responsible form of behaviour (Vogel, 2005).

In the sustainability context, CSR is not only the right thing to do but it also leads to improved performance as seen with the adoption of sustainable practices (Bhattacharya and Sen, 2004; Levy and De Francesco, 2009; Benn *et al.*, 2014). Furthermore, as end users and investors also developed strong inclinations for socially responsible firms, big organisations mostly reacted positively, making CSR a significant element of strategic management (Pinkston and Carroll, 1994; McWilliams, 2000). Hence, there is an increasing role of society in the operation of businesses (Shah, 2007).

In the same vein, the demand for greener, more sustainable, buildings is increasing as buildings play a far greater role than providing basic infrastructure as they affect both social and environmental issues (Shah, 2007; Nelson, 2008). Pivo (2008) identified the underlying dimensions of responsible property investment (RPI) as being energy conservation, environmental protection, voluntary certifications, health and safety, transport oriented developments, urban regeneration, worker well-being, corporate citizenship, social equity and community development. According to Levy and De Francesco (2009), developed countries are the major investors in sustainable practices; for example: much investment can be seen in either energy conservation, green power, water conservation, solid waste management or design quality in the USA, UK, France or Australia.

Other than the unsustainability of current patterns of today's economy, there are other key drivers that influence sustainable investment decisions. These key drivers are the tenant demand, economic drivers, social drivers, natural environment conditions and government/regulations systems (Elkington, 2004; Nelson, 2008; Levy and De Francesco, 2009). In terms of tenant demand there appears to be a competition between large corporate tenants to occupy higher green star rated buildings (Levy and De Francesco, 2009).

According to Nelson (2008) this trend is further intensified by the globalisation of the property industry pushing investors to be more reluctant to invest in non-sustainable properties. Ultimately, sustainable development comes down to the international environment, the investment environment, the regulatory environment and the built environment including the asset managers and the facility managers (Levy and De Francesco, 2009). These interactions are illustrated in Figure 5.

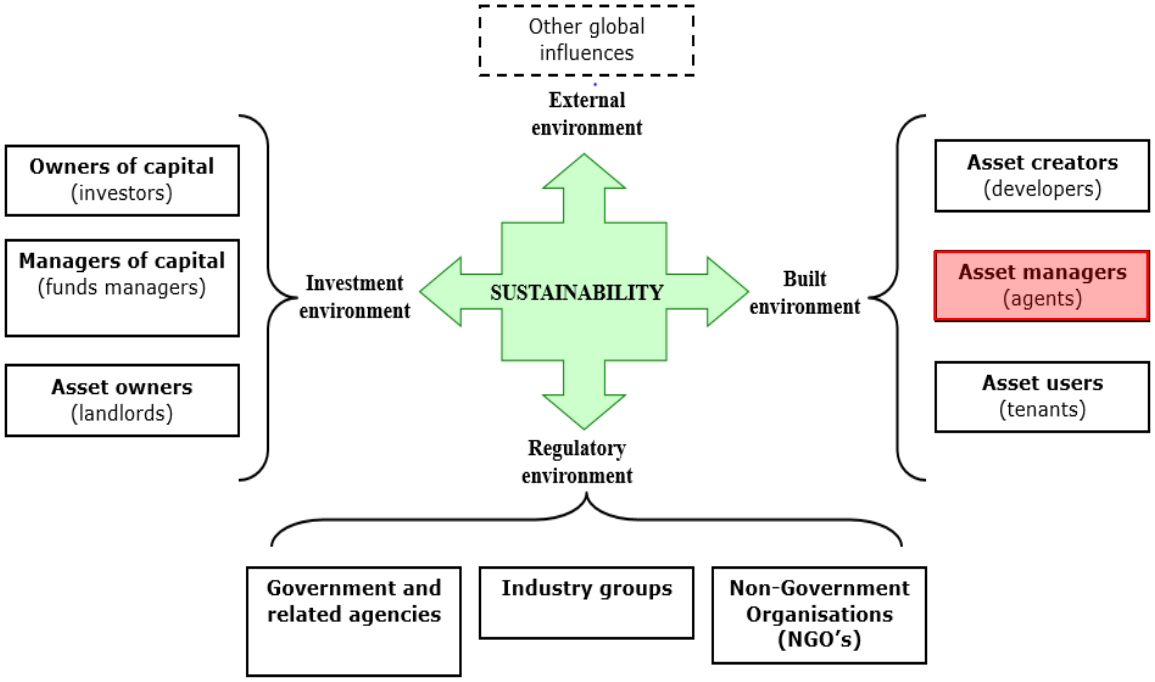


Figure 5. Sustainability and interplay between environments [Source: Levy and De Francesco (2009:9)]

Despite the numerous reasons to adopt sustainable practices, the conventionalisation of sustainability is still a significant challenge with numerous organisations further struggling to adopt social and ethical standards (IoDSA, 2009; Lindgreen, 2009). However, on the international platform the strong demand for consumer, health and environmental protection are recognised as being the main drivers for new ISO international standards (Bryden, 2005).

Numerous authors such as Casals (2006), Ayres *et al.* (2007), Shiers *et al.* (2007) and Elmualim *et al.* (2012) argue that the most important driver for the actual implementation of sustainable practices remains the regulatory environment as sustainability agendas are mostly influenced by regulated environmental issues rather than a balanced approach considering the wider social and economic aspects. Furthermore, according to the surveys from McKinsey (2008) and KPMG (2008), other than legislation, maintaining a good environmental, social and economic reputation is a key factor in the adoption of sustainable practices. Moreover, Robins (2006) argues that socially and environmentally responsible organisations accept a higher level of responsibility and moral obligation than what is required by law. Elmualim *et al.* (2012) identifies and ranks the main drivers for the implementation of sustainable practices based on a survey carried out amongst FM professional. This is depicted in Figure 6.

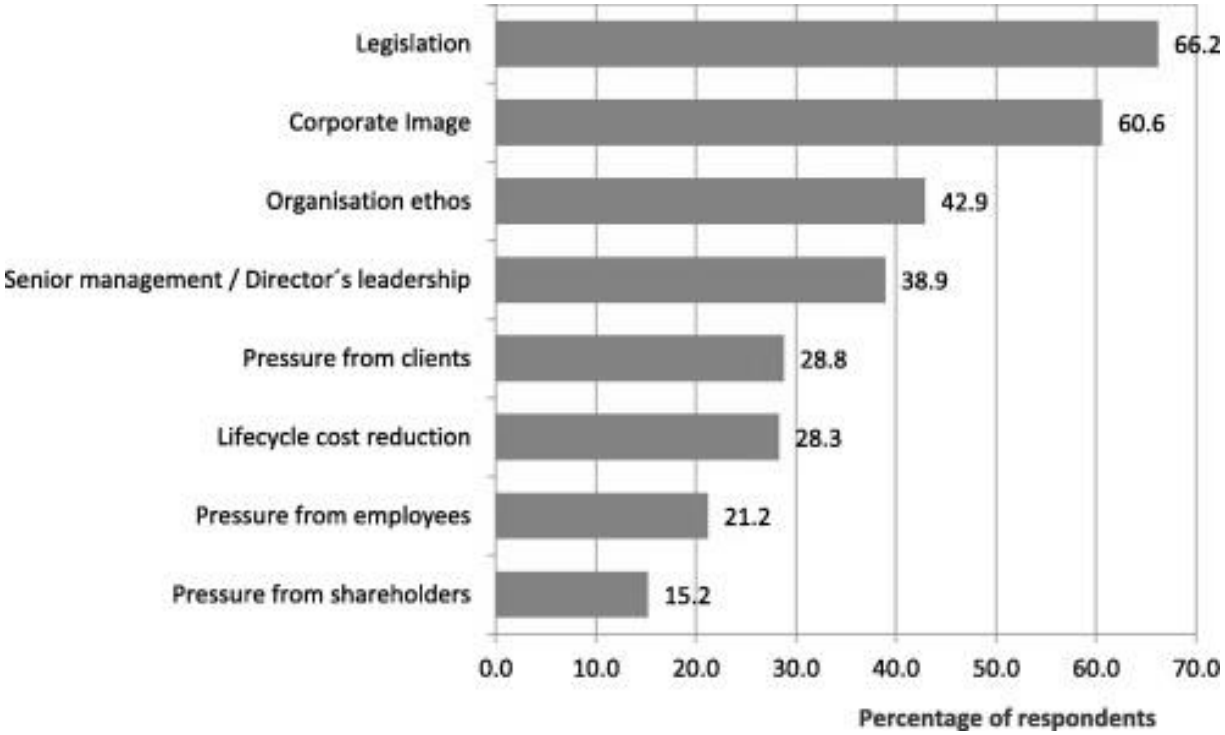


Figure 6. Ranking of drivers for the implementation of sustainable practices [Source: Elmualim et al. (2012:21)]

In South Africa, the TBL concept is partly supported by numerous laws and codes including the King IV Report prepared by the IoDSA which sets out that companies must be responsible with regards to three sustainability pillars (IoDSA, 2016). It must be noted that at the firm level, the major driver for the adoption of an approach with an interest in the community is CSR (Alexander, 1996). The SRI index was launched by the JSE to reflect the environmental, social and governance practices. Similar to CSR it is seen as a way for investors to detect firms which incorporate sustainable practices into their business activities (IoDSA, 2009).

2.8. Sustainable FM

Both FM and sustainability are substantial topics on their own (Shah, 2007). The concept of sustainable FM has developed and evolved in parallel with the predominant concept of sustainable development and the increasing understanding of the magnitude of the forecasted climate change (Elmualim *et al.*, 2008). FM, as an industry, is quickly expanding with vast economic as well as environmental impact (Elmualim *et al.*, 2010). For the success of FM, there must be constant improvements in existing services, operations and processes, as well as developing and introducing new ones. It is only via this constant process of development and innovation that the FM discipline can grow (Amaratunga and Baldry, 2002). The changing nature of FM along with current international trends are such that sustainability is one of the functions, together with significant management and customer interest, which facility

managers must now provide for (Cotts *et al.*, 2009; Elmualim *et al.*, 2010; Elmualim *et al.*, 2012).

FM can contribute to the performance of organisations in numerous ways, namely: strategy; culture; resource management; service delivery; supply chain; and, perhaps most importantly, change management (Amaratunga and Baldry, 2002). It is timely that the FM discipline has embraced the agenda for change and is developing practical sustainability goals in this fast evolving discipline (Shah, 2007; Elmualim *et al.*, 2008). FM professionals have an important role to play in the reduction of the built environment impact on the environment and thereby promoting the sustainability agenda through the three bottom lines of sustainability, the economic, environmental and social strands (Shah, 2007; Elmualim *et al.*, 2010). FM inherently functions and exists in the TBL context of organisations as shown in Figure 7.

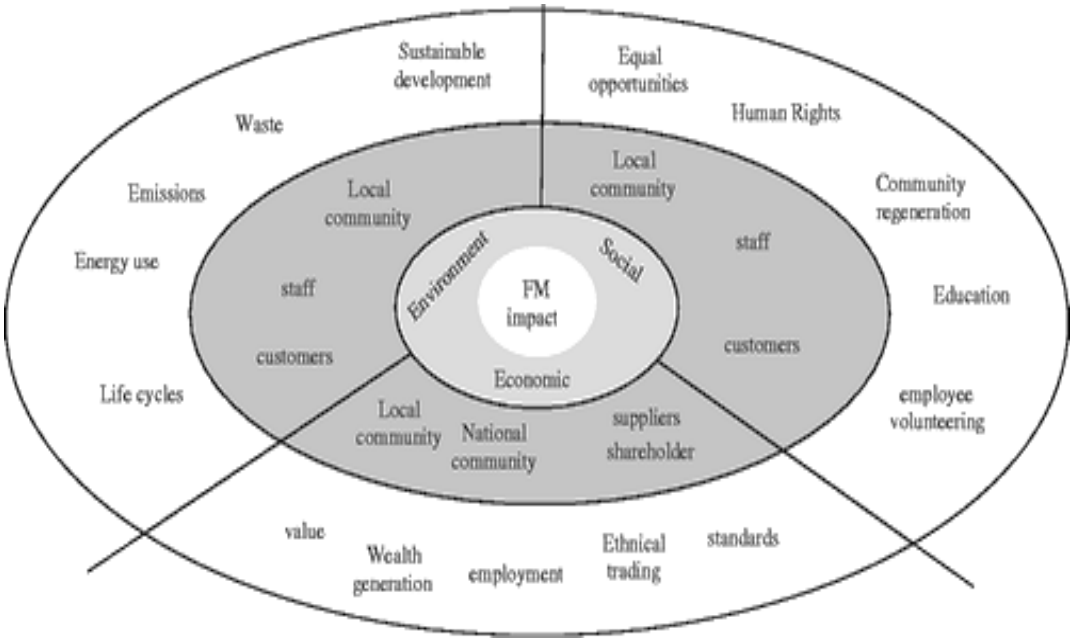


Figure 7. FM ripple effect on TBL [Source: Alexander and Brown (2006:256)]

The built environment is one of the major resource consumers and waste producers (CIOB, 2004; Prasad and Hall, 2005; Cousins, 2009; GBCA, 2013). It accounts for about 40% of the consumption of limited natural resources and 40% of waste and greenhouse gases generated (CIOB, 2004). The fast pace of development makes environmental depletion a growing concern and drove the rapid evolution of sustainability from an 'optional nicety' to an essential requirement and expectation in many sectors (IFMA, 2007). Furthermore, most buildings currently in use will continue to exist for the next half a century or so, carrying their high energy requirements into the future. As a result of growing environmental awareness coupled with legislative pressure, FM has adopted the sustainability agenda (Elmualim *et al.*, 2010).

Hence, it is a natural fit for FM professionals to appreciate and embrace the concepts of sustainability (Cotts *et al.*, 2009). Facility managers, as the leaders of the only group that can influence the life cycle of facilities, are in a unique position allowing them to view the entire processes associated with facilities (Hodges, 2005; Elmualim *et al.*, 2010). As a result, FM professionals are often the proponents of the implementation of sustainable practices (Hodges, 2005). The benefits and value added by sustainable practices are well known to FM professionals who often have to work with limited budgets (Cotts *et al.*, 2009).

With the current trends, CSR is a significant element of strategic management (Pinkston and Carroll, 1994; McWilliams, 2000). Numerous organisations, dedicated to the sustainability agenda, have established sustainability policies as an integral part of their CSR (Walker *et al.*, 2007; Loosemore and Phua, 2010). Moreover, with growing regulations in place to manage energy efficiencies and environmental impact, much of this pressure needs to be handled by facility managers (Elmualim *et al.*, 2008). The strategic and tactical decisions by businesses to develop the sustainability plan have to be transformed into assessable operational goals. Hence, facilities managers need to be involved at all three levels, in terms of the TBL, for any sustainability target to occur in terms of resource acquisition, usage, disposal and waste (Elmualim *et al.*, 2010).

At the corporate level, FM contributes to the delivery of strategic and operational goals demonstrating CSR. However, numerous firms focus primarily on financial or logistical aspects and fail to include sustainability targets as part of performance management (Shah, 2007). Moreover, there is also lack of knowledge and skills within the FM profession to achieve the sustainability targets. The rapid diversification of FM resulted in a lack of time available to address sustainability issues and adapt accordingly (Elmualim *et al.*, 2008).

In order to overcome the lack of skills and knowledge in the FM context, a more collaborative approach is required between people management and change management (Brand and de Bruijn, 1999; Carpenter and Meehan, 2002). Furthermore, in addition to the timing and lack of skills and knowledge, there are other barriers to the implementation of consistent and comprehensive sustainable FM policies, namely: perception issues and a lack of senior management commitment (Pitt and Hinks, 2001; Elmualim *et al.*, 2010).

FM should be perceived as a discipline capable of contributing to the bottom-line of a firm as FM offers the opportunity to improve performance (Tay and Ooi, 2001). Perception is key to the advancement of the sustainability cause in FM, as FM is too often undervalued and

considered as a conservative discipline involved with cost management instead of the strategic enhancement of complexities of organisational management. A change in perception would require a cultural change instigated by senior management (Pitt and Hinks, 2001).

A lack of involvement from senior managers, who inherently play a vital role in supporting sustainable FM, is observed in larger organisations as opposed to smaller ones which are more likely to be affected by tight budgets and therefore see the benefit of sustainable FM (McKinsey, 2008). The financial constraints relating to the high initial cost of sustainable solutions forms a barrier for senior management against the adoption of those practices (Elmualim *et al.*, 2012). Despite the high initial cost, in the long-term reduction in energy consumption, improved productivity, reduced waste and many other benefits of sustainability can be seen, quantified and presented to an organisations senior management to encourage sustainable practices and their positive effect on the organisation. Hence, it is critical to consider the life cycle cost and total cost of ownership to better understand and motivate sustainable practices (Hodges, 2005).

2.9. Green Buildings

Buildings are the largest consumers of resources and represent a sizeable opportunity to reduce energy and resource consumption to benefit stakeholders and the environment through sustainable construction (Cousins, 2009). There are numerous terms being used to describe the topic of sustainable construction such as green building, sustainable buildings, sustainable construction or high performance buildings (Mao *et al.*, 2009). However, according to Kibert (2004) these are essentially different with the exception of sustainable and green buildings. Sustainable/green buildings are facilities which promote occupant health and resource efficiency whilst reducing the environmental impact of the building (Kibert, 2004; Gunnell *et al.*, 2009).

Green buildings are described by the GBCSA (2017a) as being energy efficient, resource efficient and environmentally responsible. They integrate design, construction and practices to remove or substantially lessen the negative impact of the development on society and the environment (GBCSA, 2017a). They perform better than conventional buildings in various different ways (Gunnell *et al.*, 2009). Lynch (2002b) argues that with the rising cost for energy and operating expenses, green architecture can increase performance and reduce operating costs through efficient building envelopes, design for climate, effective and efficient HVAC.

Typically as they have lower operating costs they also have higher rates of return, portray higher efficiency overall and better productivity whilst being future proof and promoting social well-being and health (GBCSA, 2017a). Sustainable buildings are expected to have longer economic lives than conventional buildings leading to higher marketability and a subsequent lower volatility in market value (Eichholtz *et al.*, 2010). For example, certified green buildings have a higher market value, lower operating costs, healthier and safer environments for tenants. Moreover, if energy inputs were correctly priced to reflect social and environmental costs then there would be increased investment in efficient buildings (Eichholtz *et al.*, 2010)

In South Africa, green building is not a standard practice but there has been growing awareness on the topic due the local challenges faced in the country with electricity and water shortages being amongst the primary drivers. The increasing awareness about climate change also aides in the movement towards sustainable construction along with the demands of international businesses operating in South Africa (Gunnell *et al.*, 2009).

Green architecture provides the opportunity to add benefit to the organisation, external environment and society at no additional cost in some cases (Lynch, 2002b; GBCA, 2013). In addition, green architecture is seen as a subset of sustainability. Sustainable buildings are facilities designed, built and operated efficiently in terms of energy, water and land use in order to reduce the lifecycle impact of the building. Despite the growing interest in green buildings along with the rapid developments in the field, the changes are only being implemented incrementally rather than radically (Kibert, 2004).

Green buildings emphasise the use of renewable resources for energy, recycling or reuse of resources, integration of adapted species for landscaping or passive HVAC. Through the reduced energy usage, water usage and waste production, green buildings are an ethical response to environmental issues both globally or locally (Kibert, 2004). Furthermore, they also make economic sense on a life cycle basis, for example: sophisticated system for lighting, HVAC or rainwater harvesting will have a higher capital cost but these systems will provide a payback on the initial capital in a short period only (Kibert, 2004).

With the growing awareness about green buildings, green rating systems for buildings are also under the spotlight (Mao *et al.*, 2009; Eichholtz *et al.*, 2010). The rating systems play a vital role in the implementation of sustainable principles to buildings (Mao *et al.*, 2009). They evaluate the energy footprint of buildings and provides stakeholders with a measure of sustainability (Eichholtz *et al.*, 2010). With the boom in sustainable construction in numerous

countries around the world, there have been various green buildings assessment tools developed by national and international research organisations (Mao *et al.*, 2009). This rapid multiplication of tools on sustainability is proof of the increase awareness in relating to sustainability issues (IoDSA, 2009).

As stated in chapter one, the common rating tools used globally include the LEED, BREEAM, SBTool, CASBEE, Green Globes, HK-BEAM, BCA-GM, NABERS, GOBAS, ESGB and the GSSA (GBCSA, 2008; Mao *et al.*, 2009). Most of the existing rating tools have the following purpose: (1) Assess the performance of the outcomes of sustainable construction; (2) Guide the process of sustainability in terms of the three sustainability pillars; and (3) Accelerate the adoption of sustainable practices (Mao *et al.*, 2009). A comparison of the various tools is summarised in Table 2.

One of the systems not covered in Table 2 is the Australian Green Star rating tool launched by the GBCA in 2003. It is a voluntary system that can be used for large communities or individual buildings of any types such as hospitals, schools, retail, or offices. To assess an individual building a number of factors, similar to those identified in Table 2, are analysed. These factors can be summarised as management, IEQ, energy, transport, water, materials, emission, innovations, land use and ecology. Based on the building's performance in terms of those criteria they can achieve a rating from 1 to 6 star Green Star. One of the main benefits of the Green Star System is that it assesses the sustainability of projects at any stage of the built environment cycle i.e., design, as built, interiors and operations (GBCA, 2013).

Based on the Australian Green Star system, the GBCSA has developed the GSSA system as it was the most suitable rating system to adapt to the South African context (Gunnell *et al.*, 2009). The GSSA rating tool uses the same assessment criteria as the Australian Green Star system but as opposed to the Green Star tool, it was mostly used for the commercial property sector until recently with the additional rating systems for a wider range of sectors such as office, retail, education, multi-unit residential and public buildings being implemented (GBCSA, 2008; 2017b). The objectives of the rating tools are to promote integrated, whole building design, reduce environmental impact of building, raise awareness on green buildings, and set up a common language and measurement system for green buildings (GBCSA, 2017b).

Table 2. Comparison of mainstream sustainable/green building rating tools [Source: Mao et al. (2009:4)]

Comparison items	The mainstream sustainable/green building rating tools					
	LEED	***BREEAM***	***SBTool***	***CASBEE***	***BCA-GM***	***ESGB***
Version	V2.x	BREEAM-2008	SBTool-2007	Update to 2008	V3.0	ESGB-2006
Organizations providing rating tools	USGBC(*non-profit third party*)	BRE(*non-profit third party*)	iiSBE *(international non-profit collaboration)*	JaGBC (*joint of government, industry, academy*)	BCA (*dominated by national government*)	MHURD(*dominated by national government*)
Market-orientated	Fully market-orientated and strong market penetration	Fully market-orientated and strong market penetration	Moderate market-orientated	Moderate market-orientated and moderate government involvement	Moderate market-orientated and high government involvement	Low market-orientated and high government dominating
Accredited professional	LEED AP	BREEAM AP	Depending on local third part, and iiSBE provides skill and education supports	CASBEE AP	Certified Green Mark Manager & Green Mark Professional	null
Flexibility	Increasing flexibility in USA, and relative moderate flexibility in the overseas	Increasing flexibility in UK, and relative moderate flexibility in the overseas	High flexibility around the world	Increasing flexibility in Japan, and relative low flexibility in the overseas	Increasing flexibility in Singapore, and only focus on native field	Low flexibility and more improvement required
Usage domains (building types)	Residence, school, retail, commercial building, multi-function building, healthcare	Residence, office, retail, industry unit, court, education, healthcare, prison, unusual building type, multi-function building	Almost any type of the building	Residence, temporary construction, heat island, multi-function building, etc.	Residential and non-residential building	residence, office, hotel, commercial building
Assessment issues	Sustainable sites, Water Efficiency, Energy & Atmosphere, Materials & Resources, Indoor Environmental Quality, Innovation & Design process	Management, Energy, Transport, Pollution, Materials, Water, Land Use and Ecology, Health and Wellbeing, Pollution (***Eco Homes only contains the former eight issues***)	Site Selection, Project Planning and Development, Energy and Resource Consumption, Environmental Loadings, Indoor Environmental Quality, Service Quality, Social and Economic aspects, Cultural and Perceptual Aspects	***Building environmental quality issues:*** Indoor Environment, Quality of Service, Outdoor Environment on Site; ***Environmental Load issues:*** Energy, Resources & Materials, Off-site Environment	Energy Efficiency, Water Efficiency, Indoor Environmental Quality, (***all included by NB and EB***); Environmental Protection, Other Green Features(*Special for NB*); Building Management & Operation, Innovation(*Special for EB*)	Land saving & Outdoor Environment, Energy saving and usage, Water saving and usage, Material saving and usage, Indoor Environment Quality, Operational Management
Life cycle coverage (building phases)	Programming, Design, Construction, Operation	Programming, Design, Construction, Operation	Programming, Design, Construction, Operation	Programming (*Tool-0, underdevelopment*), Design, Operation, Renovation	Programming, Design, Construction, Operation	Programming, Design, Construction, Operation
Weighting system	Null (*LEED V3.0 will contain a weighting system*)	Yes	Yes (*the iiSBE provides a default weighting system, and the regional third parts can develop a new one*)	Yes	Null	Null
Rating benchmarks and labeling systems	***Total points: 69***. 26-32 points (*Certified*), 33-38 points (*Silver*), 39-51 points (*Gold*), 52 or more points (*Platinum*)	*Total percentage of credits achieved,* for example, **Eco Homes**: 36%-47% (*Pass*), 48%-57% (*Good*), 58%-69% (*Very good*), 70% and more (*Excellent*).	**Score:** -1 (*Deficient*), 0 (*Minimum acceptable performance*), +5 (*Best practice*), 1-4 (*Intermediate performance level*)	BEE=3.0 or more(*Excellent*), BEE=1.5~3.0 (*Very Good*), BEE=1.0~1.5 (*Good*), BEE=0.5~1.0 (*Fairy Poor*), BEE=less than 0.5 (*Poor*)	**NB**:50-74 (*Certified*), 75-84 (*Gold*), 85-89 (*Gold*^{plus}), 90 and above (*Platinum*); **EB**: 55-69 (*Certified*), 70-79 (*Gold*), 80-84 (*Gold*^{plus}), 85 and above (*Platinum*)	Depending on how many common items, and priority items have been satisfied, the participants will be rewarded as three levels: *one star, two stars, three stars*

In terms of the assessment factors for the various rating systems, it can be seen Table 2 that energy, resource consumption (in terms of water or material) and IEQ are the collective factors considered in all the rating tools. Other recurring factors are innovation, building management and operations, site selection and land use, health and wellbeing, outdoor environment and environmental protection, pollution and social, economic and perceptional aspects. Points are then allocated based on these assessment factors. In the case of LEED for example, points can be allocated for factors such as availability of bicycle racks, changing rooms for cyclists or

brownfield redevelopment (Eichholtz *et al.*, 2010). Similarly, such initiatives would also receive points with the GSSA rating tool (GBCSA, 2015).

2.10. Conventional Green Building Features and Initiatives (GBFIs)

The conventional assessment criteria identified from the various rating tools can be broken down into a number of features or initiatives that contribute to the efficiency of the building and reduce its environmental footprint. In the case of the GBCSA rating tool for the commercial sector, there are 69 points spread over nine categories as depicted in table 3. IEQ, which is a main concern for FM, is the single category which presents the most options (17) for improved performance of a facility. IEQ is followed by resources (water and material) with 11 factors identified (GBCSA, 2015).

Table 3. Conventional category and credit within the GSSA [Source: GBCSA (2015:2)]

MANAGEMENT

- Green Star SA Accredited Professional
- Commissioning Clauses
- Building Tuning
- Independent Commissioning Agent
- Building Users' Guide
- Environmental Management
- Waste Management
- Airtightness Testing

INDOOR ENVIRONMENT QUALITY

- Ventilation Rates
- Air Change Effectiveness
- Carbon Dioxide Monitoring and Control
- Daylight
- Daylight Glare Control
- High Frequency Ballasts
- Electric Lighting Levels
- External Views
- Thermal Comfort
- Individual Comfort Control
- Hazardous Materials
- Internal Noise Levels
- Volatile Organic Compounds
- Formaldehyde Minimisation
- Mould Prevention
- Tenant Exhaust Riser
- Environmental Tobacco Smoke (ETS) Avoidance Energy

ENERGY

- Energy - Conditional Requirement
- Greenhouse Gas Emissions
- Energy Sub-metering
- Lighting Power Density
- Lighting Zoning
- Peak Energy Demand Reduction

TRANSPORT

- Provision of Car Parking
- Fuel Efficient Transport
- Cyclist Facilities
- Commuting Mass Transport
- Local Connectivity

WATER

- Occupant Amenity Water
- Water Meters
- Landscape Irrigation
- Heat Rejection Water
- Fire System Water Consumption

MATERIALS

- Recycling Waste Storage
- Building Reuse
- Reused Materials
- Shell & Core or Integrated Fit-out
- Concrete
- Steel
- PVC Minimisation
- Sustainable Timber
- Design for Disassembly
- Dematerialisation
- Local Sourcing

LAND USE & ECOLOGY

- Ecology – Conditional Requirement
- Topsoil
- Reuse of Land
- Reclaimed Contaminated Land
- Change of Ecological Value

EMISSIONS

- Refrigerant/Gaseous ODP
- Refrigerant GWP
- Refrigerant Leaks
- Insulant ODP
- Watercourse Pollution
- Discharge to Sewer
- Light Pollution
- Legionella
- Boiler and Generator Emissions

INNOVATION

- Innovative Strategies & Technologies
- Exceeding Green Star SA Benchmarks
- Environmental Design Initiatives

Some of the factors identified in Table 3 can be seen to be GBFIs. A green building feature, such as motion sensors for lighting, is one that would reduce the resource consumption of the building whilst a green building initiative, such as cyclist facilities, would increase consumption but effectively decrease the carbon footprint of the building and its users (Michell and Nurick, 2014).

It is important to note that any buildings can implement strategies with respect to the 69 or more factors identified. The green building accreditation is just an additional step requiring the rating procedure based on an appropriate rating tool (Nurick *et al.*, 2013). By using a distribution of buildings in respect of green building practices, Cousins (2009) shows a positively skewed graph (figure 8) implying that only an elite few facilities, categorised as leaders, go through the rating process. Nonetheless, there are non-green star rated buildings which also adopt green practices, as GBFIs can be implemented in any facility (Michell and Nurick, 2014).

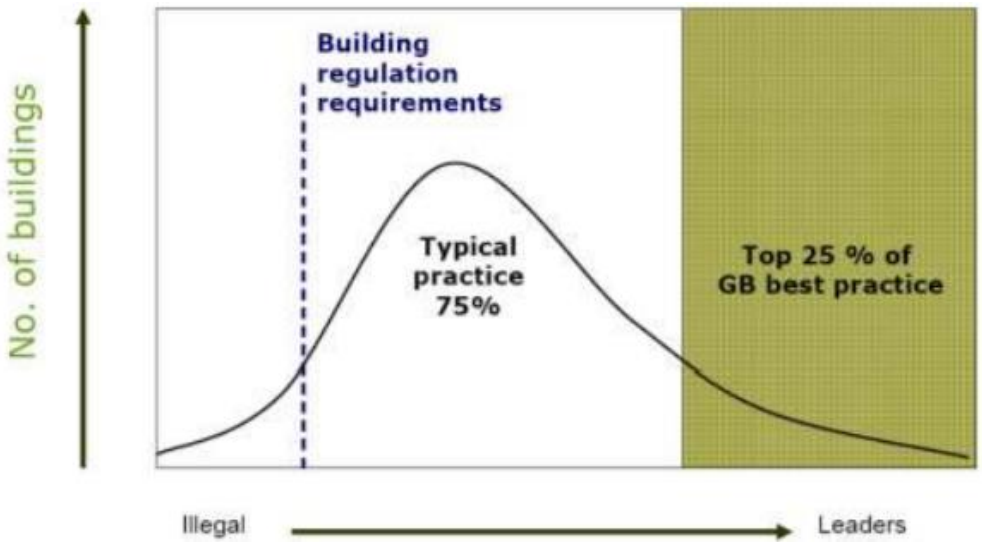


Figure 8. Proportion of accredited buildings [Source: Cousins (2009:4)]

Moreover, a shift from building new green facilities to greening existing ones is expected. This can be done by adopting energy efficient strategies post-construction through renovations, upgrades and retrofitting. In the commercial sector this can be done in numerous ways such as utilising variable-speed drive HVAC, replacing magnetic ballasts with electronic ones to increase efficiency in lighting or by replacing incandescent lights with compact fluorescent lights (CFLs) (CIDB, 2009). FM professionals should remain well-informed with regards to further developments in this domain in order to add financial, social and environmental value to businesses (Lynch, 2002b).

2.10.1. Management

Management initiatives also play an important role in sustainable buildings. For example, the building tuning of new buildings with regards to energy efficiency, environmental management and waste management are functions that require particular attention for proper sustainable practices. Environmental management improves the overall environmental performance. Despite the fact that from a management point of view there is no law linking environmental performance with business performance, it is agreed that environmental performance affects business performance and vice versa (Schaltegger and Synnestvedt, 2002).

Waste minimisation and management are two important aspects in the context of sustainable FM and GBFIs. Improper management of waste may cause hazards to the society (Sharholy *et al.*, 2008). For waste management to be sustainable it needs to be environmentally friendly, affordable and socially acceptable (Morrissey and Browne, 2004).

2.10.2. IEQ

The provision of outstanding IEQ is one of the key goals of sustainable buildings (Kibert, 2016). Healthy IEQ depends on the light, indoor air, smells, pollutants, noise levels, vibration control, electromagnetic radiations, ergonomics, potable water monitoring, HVAC along with other building attributes such as minimisation of indoor volatile organic compounds (VOCs) or formaldehyde emissions (GBCSA, 2013; Kibert, 2016). The factors which affect IEQ can be classified as physical, chemical or biological (Kibert, 2016). Based on these factors, there are various building elements which affect the IEQ of a facility as shown in Table 4.

Table 4. Building element affecting IEQ [Source: Kibert (2016:422)]

Building elements affecting IEQ	
Operation and maintenance of the facility	Ventilation and performance standards
	Ventilation system operational routines and schedules
	Housekeeping and cleaning
	Equipment maintenance
Building contents	Equipment: HVAC, elevators
	Materials
	Furnishing, appliances, fit out

The majority of IEQ problems relate to the electrical to mechanical infrastructure of facilities (HVAC or lifts) which lead to noises, poor lighting, poor thermal conditions, and smells. The control of sound in facilities is challenging as noise from mechanical and electrical plants are hard to suppress. Dysfunctional lights and ventilation systems can also produce irritating noises for the building occupants (Kibert, 2016). In addition, in an office space the interior lighting is of critical importance (Kim and Kim, 2010). Hence, malfunctioning lights can cause significant discomfort in an office space. These nuisances can eventually lead to health problems in some instances. To reduce those nuisances, particular attention must be given to the services installations in the building. For example, to reduce the vibration or noise of ventilation ducts without altering the air quality, larger ducts can be used (Kibert, 2016).

The indoor air quality (IAQ) is one of the most important subsets of IEQ and it is heavily dependent on the HVAC system, which maintains proper airflow rates and humidity levels. Humidity and flow rates influence concentrations of biological contaminants. High humidity can lead to moisture or fungi, which can act as breeding grounds for bacteria and insects. This can lead to health issues leading to Sick Building Syndrome (SBS) or Building Related Illness (BRI). SBS is when affected employees feel better as soon as they leave the building and BRI is when the illness is directly attributable to an IAQ problem (Kibert, 2016).

In order to tackle the challenges or maintaining an excellent IEQ, a number of strategies can be implemented: (1) Good operations and maintenance; (2) Integration of natural and man-made elements; (3) Provide thermal comfort with a high degree of personal control on temperature and airflow; (4) Provide suitable levels of ventilation and outside air; (5) Use of effective HVAC systems to prevent humidity and proliferation of bacteria and insects; (6) Ensure acoustic privacy; (7) Provide for adequate smell control; (8) Integrate natural and artificial lighting to provide for high performance work environments; and, (9) Provide for potable water (Kibert, 2016).

With an excellent IEQ, energy requirements for lighting can be reduced as a result of efficient use of daylight. In addition, by providing the optimal level of comfort to the building occupants energy is not wasted in overheating or overcooling the facility (Cousins, 2009).

2.10.3. Energy

Investments in energy efficiency in buildings can reduce the consumption of resources spent on energy, water and waste disposal (Eichholtz *et al.*, 2010; GBCSA, 2017a). The impact of energy costs directly affects tenants and owners. For the facility manager the energy costs also represent the largest and most manageable operating expense (Eichholtz *et al.*, 2010). In order to achieve energy efficiency in buildings specific consideration must be given to lighting and HVAC (Gunnell *et al.*, 2009).

In order to maximise energy efficiency in relation to lighting, the use of daylight must be prioritised (Nicolow, 2004). However, with increasing building densities it is often difficult to provide all the lighting required by the building from daylight only (Cheung and Chung, 2005). The maximised use of daylight, through its use for the partial lighting of the building, can still cause a significant reduction in lighting and cooling loads whilst meeting the occupants' needs (Ghisi and Tinker, 2005). Emerging technologies such as optical sun lighting systems allow sunlight to penetrate into the core of multistorey buildings and light tubes are used to transport and distribute the natural light (Mirkovich, 1993).

As daylight is rarely sufficient for most commercial buildings due to their density, artificial lighting is required. In terms of artificial lighting, there exist numerous effective options instead of the traditional incandescent lights or fluorescent lights. Amongst the various possibilities are light emitting diodes (LEDs) which have reduced energy consumption whilst impacting positively on the environment and the health of individuals (Pimputkar *et al.*, 2009; Beaupré *et al.*, 2010).

With regards to artificial lighting, sensing and light control systems can lead to reduced energy consumption. Control systems deliver light where and when the controller wants it (Han and Lim, 2010). The lights can automatically turn on, off or dim at set times or under set conditions whilst also allowing the users to have control of their own lighting (Singhvi *et al.*, 2005). With today's offices there is often no preset start or finish times which makes occupancy sensors a convenient way of addressing flexible working or to control lights in areas with irregular usage patterns (Han and Lim, 2010).

In terms of HVAC, one of the simplest ways of reducing the energy consumption for HVAC is through temperature control. Comfortable indoor climate can be achieved through the use of passive heating and cooling systems that harness natural ventilation and shading. Controllable natural ventilation, increased solar shading and high thermal mass considerably reduce energy

consumption and carbon emissions (Gunnell *et al.*, 2009). Numerous techniques which can be used to achieve energy efficiency are listed in Table 5.

Table 5. Techniques to achieve HVAC energy efficiency [Source: Cousins (2009); Gunnell et al. (2009)]

Technique	**Description**
Passive solar	Using of buildings elements (such as rock) to collect and store heat
Passive cooling	Strategic shading combined with ventilation and evaporative cooling
Active solar	Captures solar energy in specialised collectors, stores and uses it to heat or cool
Earth shelter	Placing part of the building underground to reduce its heating and cooling load
Super-insulation	Isolating a building so that body heat will heat it and summer heat is kept out
Energy devices	Heat pumps: refrigeration technology that moves heat from a cool space to a warm space
	Photovoltaic panels: generates electricity directly from sunlight
	Domestic hot water solar collectors
	Cogeneration: Generating electricity and heat in one process
Earthen materials	Reduce temperature extremes due to their large thermal mass (but should be insulated in colder areas)
Insulative material	Clay, plant materials, straw bales etc.
Biomimicry	Ventilation system similar to termite mounds. Outside air is drawn in and either cooled or warmed by the building mass depending on which is hotter between the building concrete or the air. The air is then vented into the building's floors and offices before exiting the building.

The provision of energy efficient equipment, such as lifts, also reduce the energy consumption of buildings. Moreover, energy sub-metering of essential energy use allows for the ongoing management of energy consumption. For a typical office this would include chillers, lifts, air handling units, common area lighting and power (Cousins, 2009).

2.10.4. Emissions

Greenhouse gas emissions can be reduced through energy efficiency and through the use renewable sources of energy such as solar heating for water, photovoltaic panels, wind turbines, biogas, co-generation or alternative fuels for electricity generation (Cousins, 2009).

2.10.5. Green roofs

There is growing interest in green roofs as a means of being in harmony with the natural environment. A green roof is one that is partly or entirely covered with vegetation, earth or a growing medium over a waterproofed structure similar to the ancient sod roofs of Europe. In addition to being aesthetically pleasing, those roofs assist in providing climatic stabilisation whilst blending into the natural environment. These roofs reduce heating through the addition of thermal mass and resistance, reduce cooling loads through evaporative cooling, reduce storm water runoff, filter pollutants, and provide for wildlife habitats (Cooper, 2008). Similarly, green walls or vertical gardens are a means of controlling the building's air circulation. The walls make use of biofiltration and phytoremediation to draw air through the roots of the green walls (Gunnell *et al.*, 2009).

Using Toronto as an example, Cooper (2008) argues that if 8% of the city roofing was green, then the ambient temperature in the city could be reduced by up to 2 degrees Celsius. These roofs can also serve as informal gathering spaces for employees. In South Africa green roofs are not very common but they have been used at the Nelson Mandela Square in Sandton, the Grace Hotel in Rosebank and the library of Stellenbosch University amongst others (Gunnell *et al.*, 2009).

2.10.6. Transport

Since cars are being increasingly labelled as a "problem", by encouraging the use of bicycles, the emissions relating to motor vehicles will decrease (Horton, 2006). Facilities that encourage this have to make provisions for bicycle racks close to entrances or lobbies and shower facilities for cyclists (GBCSA, 2012). Bikes provide numerous benefits such as reducing obesity, increasing physical fitness, have no CO_2 emissions, are affordable and alleviates traffic congestion (Horton, 2006). Moreover, promoting car share or carpool through dedicated parking bays can also reduce the carbon footprint of the building (GBCSA, 2012). Similarly, accessibility to public transport is also a green initiative (Von Paumgartten, 2003).

2.10.7. Resources

Sustainable consumption of resources can be achieved through appropriate selection, reduction, use, reuse, recycle, and efficient management practices. The environmental and health impacts from buildings are reduced when particular attention is laid on the selection of ecological and health-desirable material whilst restricting the use of virgin material. The environmental impact of building can also be improved by considering the lifespan and lifecycle of resources (GBCSA, 2013). LCC can measure the environmental impact of resources used. For example, through LCC the environmental cost and benefits of recycling are clearly seen (Shah, 2007). In the case of metal and steel, recycling is clearly better than producing from virgin ore. With glass, there are also benefits but there are some output restrictions in terms of the colour of recycled glass. Lastly, paper and cardboard are more finely balanced (Shah, 2007).

With the growing awareness about the water crisis in South Africa, more specifically in the Western Cape, water consumption needs to be reduced with more conservative fixtures, rain-water harvesting, grey water systems, ground water harvesting and other innovative water technologies (CIDB, 2009). Water saving can include simple flow reduction valves or tap aerators but can also include more complex installations such as waterless urinals (Bristow *et al.*, 2006). Rainwater harvesting systems collect and store stormwater for the building use (non-potable). These systems are costly as they required pumps, tanks, filtration, valves, piping and other fittings (Kibert, 2004). Grey water systems allow for water recycling and reuse (Pettipas, 2012). Water from wash hand basins, showers or sinks is treated for re use in toilet flushing systems or garden irrigation (Christova-Boal *et al.*, 1996).

Other than the resource usage, resource procurement is also critical. Ethical procurement is integral to CSR. It relates to the purchase of high quality resources or services from suitable, innovative, fair, consistent and sustainable sources, even though not legally required (Lindgreen *et al.*, 2009). This ensures sustainability throughout the supply chain.

Other innovative solutions adapted to particular buildings can be designed and implemented in order to reduce water consumption. Lynch (2002b) looks at the case of a traditional water retention pond, in Atlanta, which was swapped with wetlands spread throughout a parking area. The concept worked well for the environment and society by providing for stormwater run-off and natural habitats for animals. The company also reaped numerous benefits from the project that cost about the same as traditional retention ponds.

2.11. Value

There are numerous definitions of value, namely: (1) use value which relates to utility; (2) economic value which relates to exchange; (3) cultural value as meaning and sign; (4) perception value which relates to experience; and, (5) behavioural value which relates to morals and ethics (Pine and Gilmore, 1999; Bowman and Ambrosini, 2000; Graeber, 2001; Lepak *et al.*, 2007; Jensen, 2009; Hatch and Cunliffe, 2013). However, at the organisational level, exchange and use value are most commonly considered. Use value is a holistic concept relating to the quality as perceived by the end user and exchange value is the monetary sum realised at a particular time for the use value (Bowman and Ambrosini, 2000).

For product creation and development, use value is generally the starting point but use value is also often considered along with economic value and cultural value (Jensen, 2005). Use value can be measured by key performance indicators with a minimum level of customer satisfaction. As opposed to exchange value, which relates to cost, an increase in use value occurs when the output quality is improved, leading to higher end user satisfaction without impacting on profits as shown in Figure 9 (Jensen, 2009).

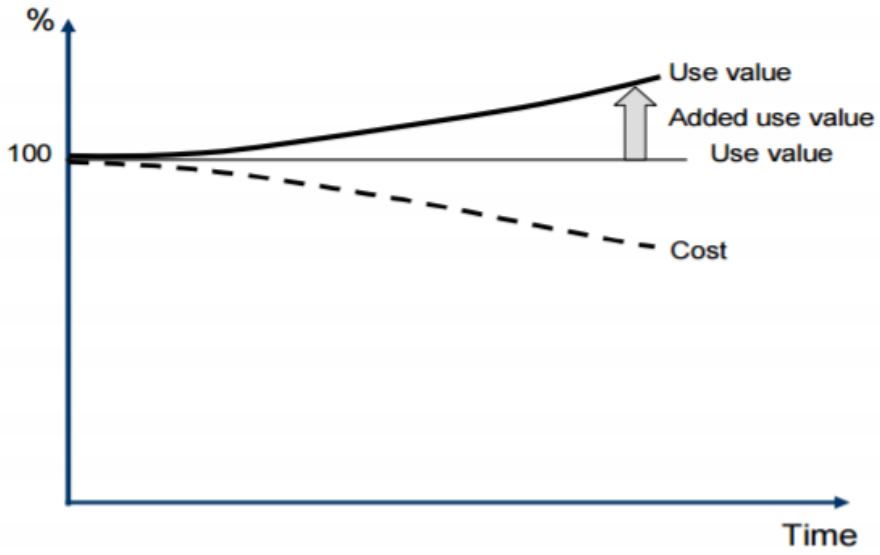


Figure 9.Added use value and cost reductions [Source: Jensen (2009:3)]

Value is most commonly examined in the economic sense. However, value and value added must not automatically be constrained to the economic sense as the field of added value has evolved from being purely economic (Treacy and Wiersema, 1997; Jensen *et al.*, 2012b). It has evolved to be a more holistic concept which can be studied from various perspectives including environment and social aspects (Kok *et al.*, 2011; Jensen *et al.*, 2012b). However, despite its importance in management literature, there is little unanimity on what exactly it is or how it

can be achieved and it is often confused with value retention or value capture (Lepak *et al.*, 2007).

Organisations create value in several ways for various targets and new value is created when organisations adopt new ways of doing things (Porter, 1985; Post *et al.*, 2002). Such innovations can come in the form of new technology, processes, management, products or services (Porter, 1985; Damanpour, 1995). In most cases the value created by the organisation is shared with other stakeholders such as employees or society (Coff, 1999; Makadok *et al.*, 2002). Such value sharing, or slippage, occurs when the use value is high relative to the exchange value. For firms focusing on economic value only, rather than a holistic approach to value, value slippage is not ideal (Lepak *et al.*, 2007).

The assessment of added value depends on the context as it is subjective, dynamic and relational and the evaluation of the innovation of a new feature or initiative cannot be performed independently of its social or cultural context (Zeithaml, 1988; Amabile, 1996; Lindgreen and Wynstra, 2005; Jensen *et al.*, 2012b). It is also important that users have a full understanding of the innovations whilst being aware of the existing alternatives for a relevant assessment on value creation or addition (Amabile, 1996).

Similarly, the value added by FM is subjective and difficult to quantify. FM value is multidimensional and results from linking input and amount to output (Jensen *et al.*, 2012b). However, there have been studies that attempt to quantify the value added from FM. The case study undertaken by Møllebjerg (2009) on the LEGO service centre describes the use of the balance score card as a management tool. The centre has defined an equation for value with volume, quality, flexibility and cost as parameters. Volume relates to scalability, quality relates to user ratings, flexibility relates to non-standard services and cost relates to the total cost of service provision. In that particular case, the equation is as follows: Value add = (Volume x Quality x Flexibility) / Cost.

2.12. FM and Value management

Cost reductions have been the focus of FM professionals for a long period. However, there has recently been a move towards the need for FM to create value (Jensen, 2009). Facility managers use the core skills of value management to add value to the operations of an organisation by contributing to its effectiveness (Alexander, 2013). The alignment of the core business and FM is key to achieve added value due to the strong relationship and linkages to the core business (Barrett, 2000). In order to commit to value-adding activities supporting and improving the

efficiency of the primary business, the tasks of FM professionals can involve identifying indicators to track advancement towards sustainable development (Elmualim *et al.*, 2012).

FM is still dependent on the cost-centre model causing business leaders to view facilities as a 'necessary evil' due to the performance metrics largely based on efficiency or cost control measures. This lessens the business value of workplace effectiveness, workforce wellbeing, environment sustainability or resource utilisation, that well supported and well developed FM can bring to an organisation (IFMA and RICS, 2017). A key element in the development of appropriate and relevant FM strategy is the analysis and understanding of strategic decision-making. Facility managers often focus on cost effective FM. However, it can sometimes be debatable as to what exactly 'cost effective' means in the FM context. There are important topics relating to value which must be considered in this regard, namely: strategies to add value; techniques to manage value; and, mechanics to demonstrate value (Alexander, 2013).

Efficient management of facilities has a positive effect on profitability, energy management, waste management, employee well-being and public opinion (Pitt, 2005; Ayres *et al.*, 2007; Smith, 2007; Ortiz *et al.*, 2009). Value management concepts and techniques will assist in focusing attention on providing facilities at best cost to an organisation instead of chasing the least cost and disregarding the other benefits (Alexander, 2013). Value management can provide a holistic approach which is promising in relation to positive engagement of all stakeholders (Jensen, 2005). When applying value management to facilities several concepts and techniques can contribute. Some of these techniques include the identification and management of costs, controlling overheads as well as the management of the physical environment (Alexander, 2013).

FM is too often considered as a commodity service responsible for reducing costs as opposed to a strategic discipline providing real value to organisations (Shah, 2007). This is because the perceived overall mission of corporate real estate is to provide cost effective facilities with maximised returns (Varcoe, 2000). In contract, added value results from a partnership at top board level between the fundamental interests of the business and the service interests that support them as represented by the facility manager (Alexander, 2013).

2.13. Benchmarking and Value Management

For every facility manager, service provision needs to be faultless. Service provision consists of three main interconnected aspects, namely: process, quality and costs. A common technique used to assess those aspects in the FM context is benchmarking (Wauters, 2005). It is a process

which compares a product, services, process, activity or system against similar samples from the industry so as to identify the best options thereby targeting oneself to replicate it (Williams, 2000). User satisfaction surveys and service level analyses help benchmarking quality in the appraisal of the value added (Wauters, 2005). Moreover, to create value for an organisation, numerous "layers" are required as illustrated in Figure 10. Trend analysis provides meaningful knowledge from information and data gathered in the two lower levels; whilst insights are obtained by benchmarking best practices. Benchmarking ultimately leads to changed efforts causing an improvement in productivity.

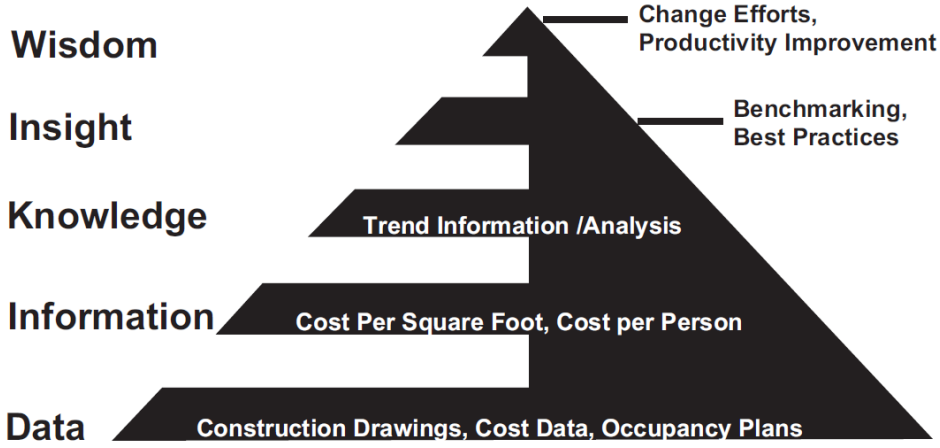


Figure 10. Pyramid of knowledge [Source: Lynch (2002b:228)]

As there has been growing interest in performance measurement, which is one of the three essential issues for the implementation of a FM strategy, benchmarking is receiving growing interest in the FM context (Amaratunga and Baldry, 2002). This technique is used internationally by numerous organisations, operating in competitive environments, as a way to improve goal attainment of an organisation and to check the deployment of resources, space use or FM strategies regarding cost, quality, time and risk (Amaratunga and Baldry, 2002). This would then aide in the evaluation of the physical, functional and financial performance of buildings (Wauters, 2005).

Traditional performance measurement is often linked to costs and the broader aspect of FM is ignored (Olve *et al.*, 1999; Wauters, 2005). However, cost reduction does not necessarily lead to improved profits. Profits will only increase if the savings can be made without prejudicing the performance of departments dependent on those facilities, else the profits will decrease. Hence, savings resulting from benchmarking are insignificant unless quality and risk to performance are considered (Wauters, 2005). In the long run facility managers must add value to the value chain and thereby it is argued that the discipline encompasses much more than costs alone (Williams, 2000). When benchmarking is performed correctly, it leads to effective

value management of facilities service provision and improves the overall FM service delivery (Wauters, 2005).

2.14. FM Value Added

It is important to understand how FM can become more effective and add value to the core business along with the different stakeholders (Jensen *et al.*, 2012b). Various authors, such as Lindholm (2008), de Vries *et al.* (2008), Smit (2008) and Jensen *et al.* (2008), have studied the impact of FM on core business each giving slightly different perspectives using different parameters. These authors use various parameters that can be grouped in three main categories: people, processes, and economy. The value map from Jensen *et al.* (2008) is the only model to capture both the impacts on the core business and on the surroundings.

This is summarised in Table 6 which provides a comparison of four main studies. However, there are other authors who assess value added in the FM context. For instance, Chau *et al.* (2003) and Hui *et al.* (2008) look at economic value enhancement of refurbishment projects; Sarshar and Pitt (2009) elaborate on the topic on customer value; and Inalhan and Appel-Meulenbroek (2010) focus on the added value of facilities through knowledge sharing in open plan offices.

Table 6. Comparison of parameters of FM value adding [Source: Jensen et al. (2008:10)]

	Lindholm (2008)	**de Vries *et al.* (2008)**	**Smit (2008)**	**Jensen *et al.* (2008)**
People	Increase employee satisfaction	Image Culture Satisfaction	Perceived success of FM	Satisfaction Culture
Process	Increase innovation Increase productivity Increase flexibility	Production Flexibility Innovation Risk control	Increase in productivity Advantages and savings	Productivity Reliability Adaptability
Economy	Increase value of assets Promote marketing and sales Reduce cost	Cost Possibility to finance	One time savings Yearly savings	Cost
Surroundings				Economical Social Spatial Environmental

Jensen *et al.* (2008) and Lindholm (2008) utilise the same methodology and both Jensen *et al.* (2008) and de Vries *et al.* (2008) use a process view. However, the FM value map sees facilities as input to the FM processes impacting on the core business and the surroundings as opposed to de Vries *et al.* (2008) who perceives facilities as a core business process only. The FM value

map effectively provides a more holistic framework and contains more parameters on the added use value aspects as opposed to the other three projects, which focused primarily on exchange value. For example, Smit (2008) looks at different types of cost reductions. On the other hand, the work from Lindholm (2008) and de Vries *et al.* (2008) focus on considerations such as the increase in asset value and the financing possibilities as depicted in Figure 11.

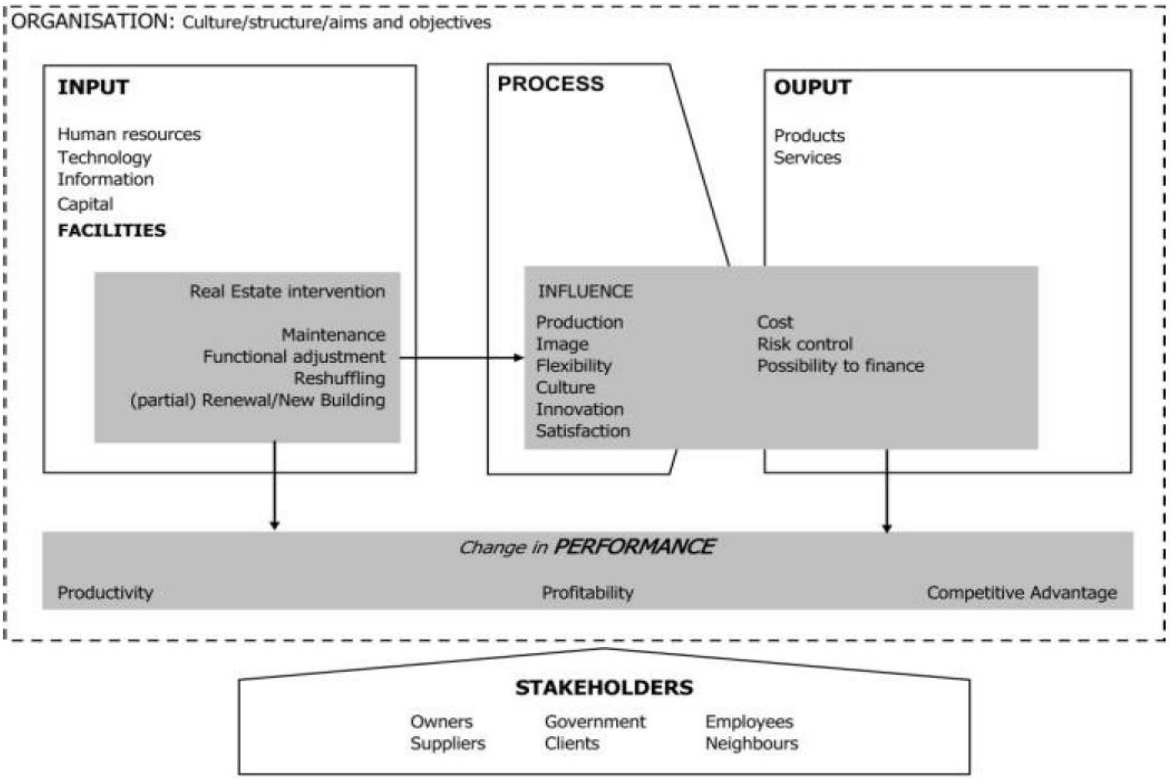


Figure 11 Model from de Vries et al. (2008) [Source: Jensen et al. (2012b:207)]

However, a comparison of the four models, as per Table 6, shows a degree of commonality and indicates the possibility of further developing a collective framework. Nonetheless, until this collective framework is developed, the FM value map provides the most holistic framework including the impact on surroundings and all relevant stakeholders (Jensen *et al.*, 2008; Jensen, 2010).

The FM value map, depicted in Figure 12, is based on the principle that resources are used as inputs to processes to generate outputs. The resources are divided into facilities, consisting of real estate and technology, and activities consisting of manpower and know how. The processes are segmented, based on the quality circle of Plan-Do-Check-Act (PDCA), into planning, coordination, control, and improvement. The output of these processes are grouped in two main categories: basic products and additional offerings. Basic products consist of space and services

and additional offerings consist of softer aspects such as development and relations (Jensen *et al.*, 2008; Jensen *et al.*, 2012b).

As can be seen in Figure 12, the impacts are broken down into nine sub categories relating to either the core business or the surroundings. For the core business, the impact are divided into satisfaction, cost, productivity, adaptation and culture where for the surroundings the impacts are divided into economic, social, spatial and environmental (Jensen *et al.*, 2008; Jensen *et al.*, 2012b). Hence, the impacts can add both exchange and use value. These impacts are then allocated to the respective stakeholders, being society, customers, staff and shareholders (Jensen *et al.*, 2008; Jensen *et al.*, 2012b).

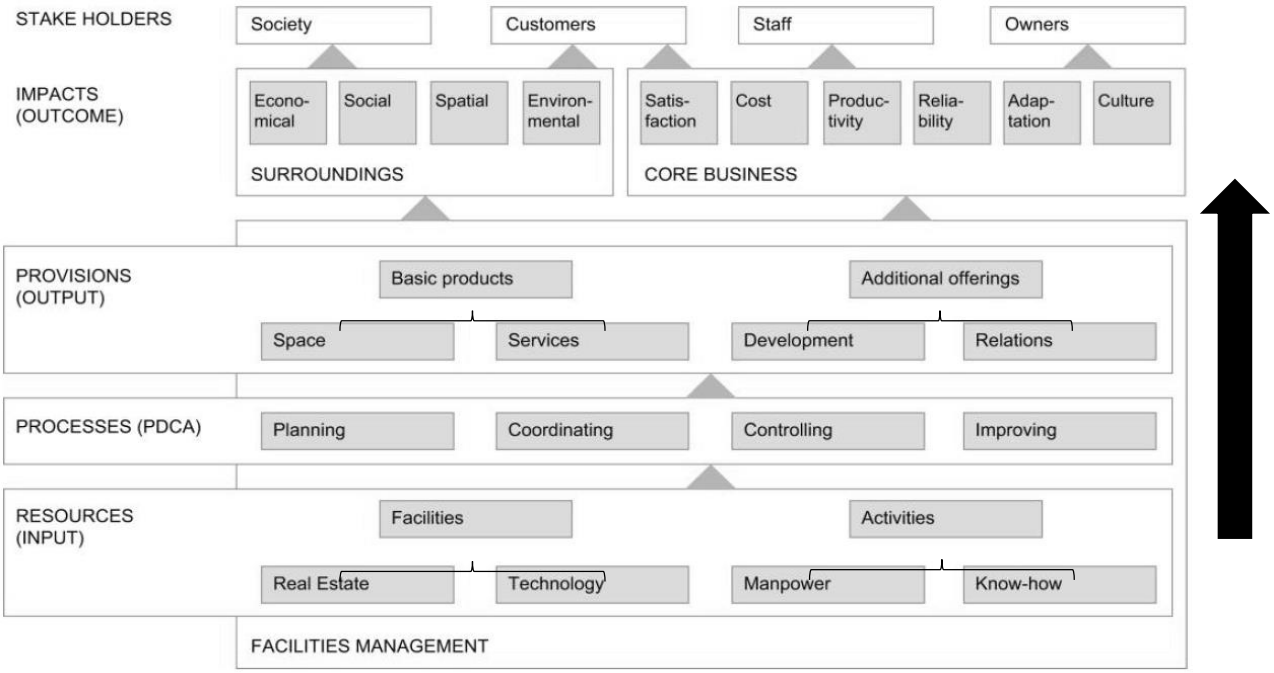


Figure 12. Generic FM value map: Bottom up approach [Source: Jensen et al. (2008:6)]

Jensen *et al.* (2008) tested a model by carrying out a number of case studies where FM strategies were being implemented. In one case, for example, a service reception was introduced therefore allowing the staff to focus on their work whilst increasing their status. This led to further improvement in the quality of environment, health, service and maintenance. In terms of the core business, there were significant improvements in staff satisfaction, productivity, reliability and image. Overall, the end users and society in general benefited from the improvement that came from the newly implemented FM strategy. Hence, there was an increase in both exchange and use value.

2.15. Value Added

Top organisations recognise the potential value added from effective management and service and they arrange FM to allow accomplishment at business level. Facilities value management considers the various ways in which value can be added to a business through FM (Alexander, 2013). The value added by FM can be measured through a number or parameters such as savings, productivity increases, advantages and the perception of FM itself (Smit, 2008). 'Off-the-shelf' solutions are rarely ideal in the value management context. Value comes through the professional management and the procurement of support services at inception (Alexander, 2013). There are numerous strategies which impact positively on value as outlined in Table 7.

Table 7. Strategies to create value [Source:Jensen (2005:5)]

	Economic value	**Use Value**	**Cultural Value**	**Perception Value**
Process	Cost reduction Maximise output	Doing things right Work Smarter Knowledge creation		
Product	Maximise income	Increased functionality Innovation	Products supporting branding	Improve end user experience
Process & Product		Integrating process and product		

2.15.1. Economic Value Added

Economic value added is often seen as shareholder value added. Authors such as Rutherford and Nourse (1988), Manning *et al.* (1999) and Manning (2009) focus on the added value of real estate as being the decisions, processes and inputs that create shareholder wealth. In those studies, added value was described in economic terms only either in terms of cost cutting measures or profitability growth. Conceptually, the creation of shareholder value sampling results from returns on investment higher than the cost of capital (Lynch, 2002a).

Value management is a method that encourages a systematic search for solutions providing improved cost effectiveness without compromising the function or service. It extends beyond boundaries but value as a concept is meaningless in the absence of a clear understanding of the context under examination (Alexander, 2013). In terms of value, in the 19th century the distinction between the two concepts of use and exchange value were critical (Jensen, 2009).

However, in the recent economy the concept of economic value added (EVA), relating to exchange value, is predominant (Jensen, 2005). There are a number of theories on value, such as Porter (1985) theory on value chains, most of which relates to exchange value i.e., economic value. When looking at exchange value the focus is on cost and the relationship between the output and input of the organisation. Economic value added is therefore dependent on cost reduction through increased efficiency (Jensen, 2009).

The value chain is the order of activities, which build to create the mix of goods and services for the entire organisation. How value is added along the chain generates both the costs and the uniqueness of what is sold to the customer. The ability of an organisation to generate uniqueness and a specific cost structure – and thus value – in its operations is affected by the arrangement of its resources including people, equipment, facilities, information systems, material and so on (Alexander, 2013).

Ever present pressures exist on organisations to control costs particularly where facilities are perceived as an overhead cost on the business operation (Alexander, 2013). A cost reduction is obtained when the cost is reduced without lowering the output quality thus increasing profits (Jensen, 2009). The significant, controllable and negotiable costs of operating facilities and delivering support services need to be identified by the facilities manager for him/her to be able to exercise proper exchange value control (Alexander, 2013).

Effective organisation and management can add significant economic value (Alexander, 2013). A number of strategies were identified by Lindholm (2008) to increase economic value. Revenue growth can be increased by increasing the value of assets and increasing innovation. Profitability can be increased by improving employee satisfaction, increasing flexibility and reducing costs. Moreover, it looks at the reduction of occupancy costs and facilitating production, operations and service delivery as a means to add economic value (Nourse and Roulac, 2009). According to Jensen *et al.* (2012b) improved productivity and decreased costs remain the most discussed means of adding economic value by FM. Improved productivity is provided by more efficient workspaces which support new ways of working and high quality output. Common real estate strategies to increase shareholder wealth are depicted in the Figure 13.

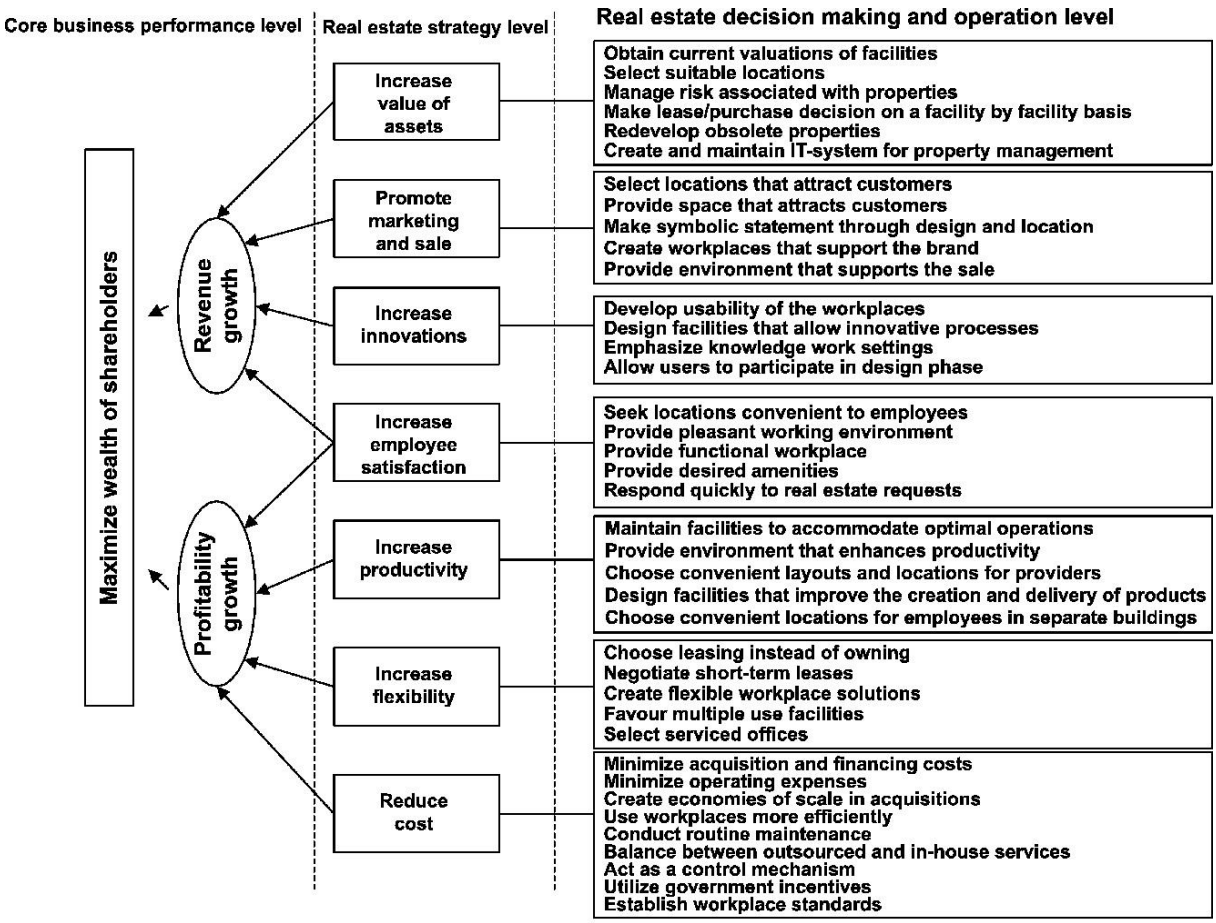


Figure 13. How real estate decisions support strategies and core objectives [Source: Lindholm and Leväinen (2006:42)]

Lindholm and Leväinen (2006) identify thirty-nine strategies to increase economic value as listed in Figure 13. These strategies ultimately have an impact on cost reduction, flexibility, productivity, employee satisfaction, innovation, marketing, and asset value. de Vries *et al.* (2008) share a similar framework considering production, image, flexibility, innovation, cost, risk control, and financing. Hence, any strategy which increases productivity, profitability, revenue, asset value or competitive advantage will add economic value (Lindholm *et al.*, 2006; Lindholm and Leväinen, 2006; Jensen, 2009). Furthermore, sustainable practices also impact positively on economic value (Reed and Wilkinson, 2005; Haynes *et al.*, 2009). Sustainable workplaces improve employee health and well-being thereby increasing productivity (Haynes *et al.*, 2009). Moreover, the increased energy efficiency of these workplaces lead to reduced cost and increased property value (Reed and Wilkinson, 2005).

With the growing interest in sustainability, it is vital to consider economic value added in this context as well. Economic sustainability is when the growth of the organisation is financially feasible through a combination of the factors of production (land, labour, capital and entrepreneurship) promoting social and environmental harmony (Robins, 2006). There is also

growing awareness that facilities is effectively the fifth factor of production (Joroff *et al.*, 1993; Szigeti and Davis, 2000). However, it is increasingly difficult for businesses, due to the new and significant challenges in aligning the facilities infrastructure with the changing needs of the organisation. The coordinated effort of professionals in various areas, such as accounting, finance, FM, property and project management, is required to get more benefit per rand spent whilst ensuring that facilities change to match the business needs (Lynch, 2002a).

2.15.2. Environmental Value Added

Environmental sustainability in achieved when the operations of an organisation does not hurt the natural environment along with resources (Robins, 2006). However, in many cases the economic value added is disproportionate to the environmental impacts (Clift and Wright, 2000). Figure 14 shows the difference between sustainable and unsustainable activities in terms of environment and economic value. High value with no environmental impact being the best outcome.

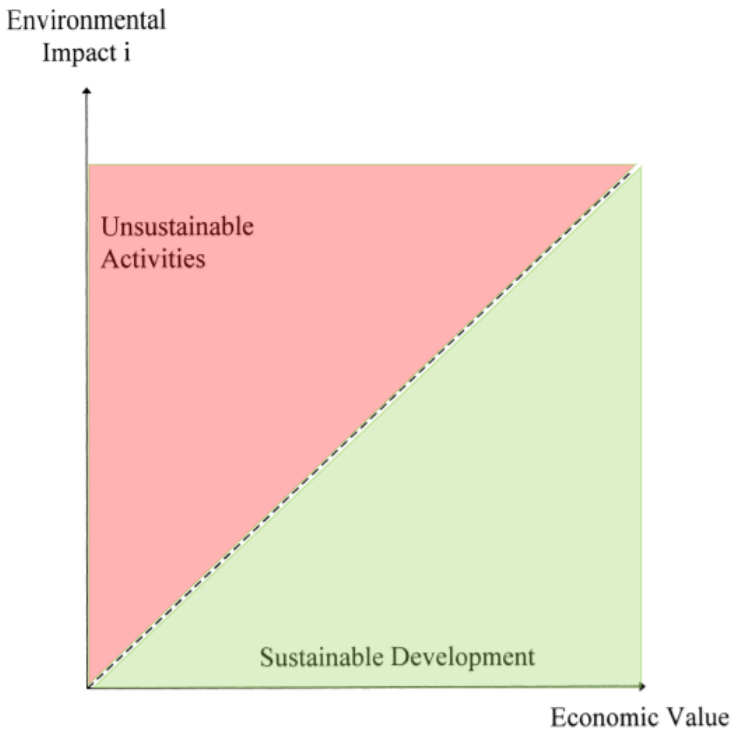


Figure 14. Selection of economic activities to promote sustainable development [Source: Clift and Wright (2000:291)]

With the development of Life Cycle Assessment (LCA) as a holistic approach there has been growing interest on environmental performance indicators (Hammond, 1995; Tennant *et al.*, 1997). The first phase of the LCA approach aims at identifying and quantifying all the consumption of primary resources along with all the emissions and wastes relating to the

service or product provision. In the second phase, the data is translated into a set of quantified environmental impacts.

Reducing an organisation's impact on the environment has become a strategic concern spanning from supply chains down to the end users in order to guarantee optimised performance (Heerwagen, 2000; Hodges, 2005). There are numerous strategies available to the facility manager. For example, a way of measuring environmental performance is waste reduction which falls under the main category of reducing resource consumption (Melnyk *et al.*, 2003; Pullman *et al.*, 2009). Table 8 shows the ranking of sustainability responsibilities of facility managers based on the study carried out by Elmualim *et al.* (2012). The top four sustainability issues dealt with by facility managers are energy management, carbon footprint, waste management and health and safety (Elmualim *et al.*, 2012).

Table 8. Ranking of sustainability issues by FM professionals [Source: Elmualim et al. (2012:20)]

Rank	Issues	Rank	Issues
1	Energy management	**8**	Training
2	Waste management and recycling	**9**	Building disposal
3	Health and safety	**10**	Ethical purchasing
4	Carbon footprint	**11**	Staff productivity
5	Targets, measurement and reporting	**12**	Community engagement
6	Specification of sustainable products and services	**13**	Flexible working
7	Sustainable travel	**14**	Biodiversity

According to IFMA (2007), for facility managers, energy conservation is the long term method of managing limited resources. However, while most of the emphasis is on energy, sustainable FM includes the life cycle of facilities, from cradle to grave, but very often has a strong emphasis on the operational phase (Shah, 2007). Furthermore, CSR relates to ethical purchasing which involves the procurement of goods and services from suitable, innovative, fair and sustainable sources even though not legally required (Lindgreen *et al.*, 2009).

In the same vein, there is a strong focus on sustainable resource usage which requires strategic management for the strategic resource use including the principles of sustainable development (Barton *et al.*, 2002). In terms of resource consumption sustainable buildings use resources like energy, land or water more efficiently than traditional buildings (Kats, 2003). These buildings incorporate GBFIs which allow for the reduction of the building's impact on environmental degradation (Nurick *et al.*, 2013). Typically, the environmental considerations of the TBL can be tactically managed with GBFIs for the efficient management of a space (Milne, 2012).

2.15.3. Social Value Added

Over time, the value added by FM has not been balanced between the three sustainability pillars as it has been focused on economic and environmental value gains (Elmualim *et al.*, 2012). Despite this apparent imbalance leading to the exclusion of the social pillar, sustainability practices remain vital in adding value to society and businesses (Shah, 2007; Elmualim *et al.*, 2008; Jensen *et al.*, 2013). In the same vein, in addition to adding economic and environmental value to organisations, it is critical that FM add value to society to achieve holistic sustainability (Jensen *et al.*, 2013).

Social sustainability occurs when there is unity between the organisation's operation and society (Robins, 2006). It involves people and the extent to which social values, identities, relationships and institutions can progress into the future (Vallance *et al.*, 2011). Value can be added for the business owners, customers or stakeholders (Lepak *et al.*, 2007; Jensen, 2009). In the FM and value added context, the stakeholders are the owners of the facilities, staff, customers and society (Green and Jack, 2004; Jensen *et al.*, 2008; Jensen, 2009; 2010; Jensen *et al.*, 2012b). Society, as a stakeholder, covers the remaining stakeholders whom the resulting value, created or destroyed, will affect (Green and Jack, 2004; Jensen, 2009). Environmental value added benefits society as a whole and does add social value in that context. However, it is also important to look at the direct social value added to the building occupants/end users of the facilities.

Farooq (2011) defines the basic component of society as the individuals. Hence, in an organisation, when individual employees are treated as the representatives of a larger society, the social sustainability practices can be developed and implemented. It is increasingly important to attract and retain employees by providing attractive workplaces to keep them happy as employee motivation is directly related to the enjoyment of work (Amabile, 1996; Jensen *et al.*, 2012a). Enjoyment of work, happiness, and satisfaction are the three criteria defining well-being at work (Luthans and Martinko, 1987; Foster, 2000; Parker and Martin, 2009). Furthermore, employee satisfaction is linked to key organisational health indicators like productivity, turnover, customer satisfaction, and safety (Saks, 2006).

Hence, a performing organisation with a performing workplace will also lead to employee satisfaction. On top of an improved business performance and productivity, a performing workplace can also impact on talent retention or attraction and employee engagement, thus improving the overall organisation effectiveness (IFMA and RICS, 2017). FM plays a vital role

in that and the apparent focus of FM on the physical environment itself weakens from its impact on the most important organisational resource: the users of the workplace who produce value for the business (IFMA and RICS, 2017).

The quality of the work environment affects productivity by indirectly influencing illness, absenteeism and attrition (McGregor, 2000; Lepak *et al.*, 2007). For example, cutting back on cleaning will affect the work environment and lead to increased health risks due to fungi and bacteria (Kok *et al.*, 2011). However, in the case of cleaning, the lack of hygiene factors can lead to dissatisfaction but people cannot necessarily be made satisfied by the provision of hygiene factors (Herzberg *et al.*, 2011). Moreover, cutting costs by reducing FM services also has an adverse effect on the social value. For example, irregular maintenance to reduce costs may lead to staff demotivation and dissatisfaction (de Vries *et al.*, 2008).

Improved IAQ in sustainable buildings can result in higher employee productivity. Poor indoor environment in commercial buildings lead to health and productivity costs (Eichholtz *et al.*, 2010). FM can influence the IEQ and staff performance by effectively managing noise levels (Moline, 2001), lighting (Nemcsics, 1993; Bronzwaer, 2008; Kok *et al.*, 2011), temperature (Griffitt, 1970; Nemcsics, 1993), air quality (Wilson, 1987; Kreiss, 1990) and physical layout and fit outs (Tibúrcio and Finch, 2005). Elements of FM such as lighting systems, acoustic systems, space planning and heating, ventilation, and air conditioning (HVAC) are hence critical for the performance of facilities (Kok *et al.*, 2011).

Deficient conditions in terms of temperature, humidity, noise control, lighting or layouts will impact negatively on the social value of facilities (Kok *et al.*, 2011). Noise level impacts on stress and concentration (Moline, 2001; Hutchinson, 2003), temperature impacts on comfort and concentration (Nemcsics, 1993; Hutchinson, 2003), lighting impacts on comfort, concentration and mood (Nemcsics, 1993; Knez and Kers, 2000; Hutchinson, 2003), layout and fit outs affect social interaction (Tibúrcio and Finch, 2005) whilst the use of plants is believed to impact on creativity (Klein Hesselink *et al.*, 2007; Mehta and Zhu, 2009). Based on the last principle, on top of providing additional recreational space or informal meeting areas for the staff (Gunnell *et al.*, 2009), green roofs can also improve creativity.

2.16. Conceptual Framework for Value Assessment

Based on the earlier discussion, a framework was developed to assess the value of FM strategies to organisations. Factors contributing to the economic, environmental, and social value added were identified and tabulated. This framework is depicted in Table 9. Each of the factors in Table 9 were identified as being contributors to added value in the respective field. Hence, these respective factors can be used as proxies to assess economic, environmental, or social value added.

Table 9. Framework for assessing value added

Value Added		
Economic	**Environmental**	**Social**
Cost cutting	Energy efficiency and management	Attractive workplaces
Increased flexibility	Waste management and recycling	Improved staff/customer satisfaction
Increased productivity	Reduced carbon footprint	Improved employee retention/engagement
Increased value of asset	Biodiversity	Improved quality of work environment (noise, lighting, etc.)
Increased innovation	Sustainable travel	Decreased health risks (improved IAQ)
Increased staff satisfaction	Ethical procurement	Increase comfort (influencing moods, interactions, creativity, etc.)

Strategies leading to cost cutting, increased flexibility, increased productivity, increased innovation, increase asset value, or increased staff satisfaction effectively add shareholder value and hence, improve the economic value of the facility. Strategies that lead to energy efficiency, waste reduction, reduced carbon footprint, biodiversity, ethical purchasing or sustainable travel reduce the negative impact of the facility on the environment thus increasing the facility's environmental value. When assessing the social value of a facility, the end users are considered. Strategies improving the workplace attractiveness, staff retention, work environment quality, comfort and health and safety conditions are considered to improve the social value of the facility.

2.17. Chapter Summary

In this chapter, the concepts of FM, value added and sustainability were analysed along with their respective interrelationships as depicted in Figure 15 below.

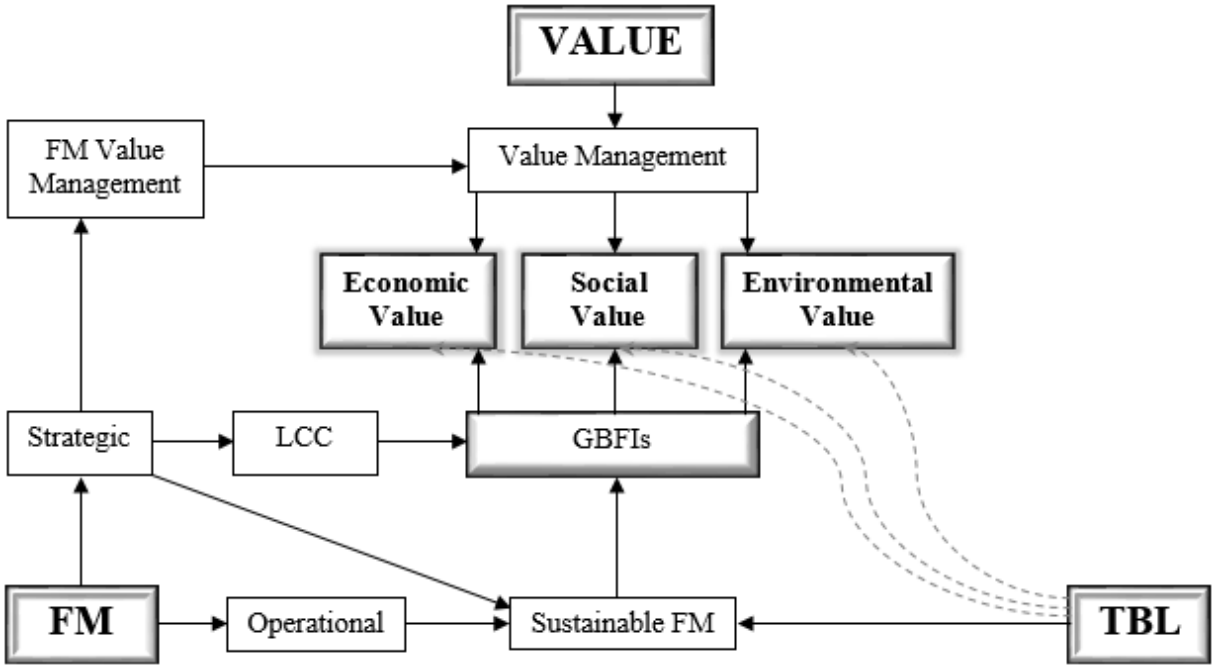


Figure 15. Summary of Chapter 2

Sustainability is becoming of critical importance to businesses that adopt the TBL approach to provide joint consideration to economic prosperity, environmental protection and social advancement. There are numerous drivers for this movement; one of which is CSR. By shifting the emphasis from shareholders onto stakeholders, the TBL approach ensures that the benefits or outcomes to the business are shared. This move towards sustainability is mirrored in the property sector as seen with greater demand for sustainable buildings, which incorporate GBFIs that contribute to the environmentally friendly development of facilities.

As facilities have to adapt to the changing demands, FM has an important role to play in facilitating the motivation, adoption and implementation of green practices in strategic facilities plans. FM occurs at two levels, strategic and operational, and can impact on sustainability at both levels. However, the benefits of sustainable practices are broader when implemented through strategic FM through the use of tools such as LCC. Whilst an exact definition of FM cannot be traced, a number of outcomes of FM were identified so as to capture the broader aspect of the discipline. Strategic FM and workplace management were identified as ways of optimising facilities with regards to several factors.

With the increasing pressure on businesses to add value, strategic FM and value management are becoming more and more important. Value was seen as a broad and subjective concept which can be split in terms of social, economic and environmental value when analysing facilities. Whilst FM used to be focused on economic value, FM has the potential to impact on numerous stakeholders and add value to facilities, in terms of the social, economic and environmental value. Similarly, GBFIs impact on the triple bottom line and add significant value to facilities.

The following chapter documents the research methodology employed in this study.

Chapter 3: Methodology

3.1. Introduction

The literature review provided an overview of the subject being studied in this research. This chapter outlines the research methodology and documents the justification for the research methods used. The questions covered in the interviews and surveys are reviewed and an explanation of the tactics employed to ensure the reliability and validity of the research are also outlined. The method of analysis is then explained before concluding with the limitations of the research.

3.2. Research Paradigm

A research design is about organizing the research activity, including the collection of data in ways that are most likely to achieve the research aims (Easterby-Smith and Thorpe, 2002). It depends on the research paradigm as it looks at the research strategy (methodology) and the research tactics (methods) (Johnson and Onwuegbuzie, 2004). The most appropriate strategy to meet the research objectives and aims lead to the methodology and methods. Hence, the determination and justification of the methodology and methods to be used is of critical importance (Crotty, 1998).

The research methodology is a procedural framework within which the research is conducted and the research methods relate the numerous techniques used to collect and analyse data in terms of the research question or hypothesis (Crotty, 1998). The choice of research methods is effectively influenced by the selected methodology (Gray, 2013). According to Deetz (1996), there exist a number of research methods and methodologies but often qualitative and quantitative research are simplistically reduced to the different data collection methods rather than differentiating between the different research paradigms. It is important to clearly distinguish between the different approaches to research which effectively permit researchers to understand different phenomena (Deetz, 1996). However, the terminologies applied to the wide spectrum of theoretical perspectives and methodologies are often inconsistent (Crotty, 1998).

A research paradigm is a basic set of beliefs that guide research actions (Denzin and Lincoln, 2005). Each research paradigm has five dimensions, namely: ontology, epistemology, human nature, axiology and methodology (Michell, 2010). Ontology is concerned with the assumptions made about the nature of reality (Urmson and Rée, 1991; Appleton and King,

1997; Michell, 2010), epistemology relates to the general set of assumptions about how knowledge is acquired (Appleton and King, 1997; Crotty, 1998; Michell, 2010), axiology relates to the assumptions about the nature of values and foundation of value judgment and human nature is about the relationship between man and society (Michell, 2010).

Smallbone and Quinton (2004) identified four paradigms that can be considered when conducting empirical research: positivist, interpretivist, critical and pragamatic. However, the positivist and interpretivist paradigms are the most common and influential (Smallbone and Quinton, 2004; Gray, 2013). Based on these research paradigms, there are two types of empirical research, namely: positivism and interpretivism (Gray, 2013). The two most common paradigms are analysed in Table 10.

Table 10. Research paradigms [Source: Amaratunga and Baldry (2001), Gray (2013)]

	Interpretivist approaches	**Positivist approaches**
Epistemological assumption	Interpretivism or subjectivism: Social world can only be understood from the perspective of individuals involved in the activities being investigated.	Positivism: Seeks to predict events in the social world by searching for regularities and causal relationships between the constituent elements.
Ontological assumption	Relativist or constructivism: Social world is internal to the individual and reality is perceived in diverse ways by different individuals.	Objectivism: Social world is an external reality to the individual with a pre-determined nature and structure.
Human nature assumptions	Voluntarism: Regards the individual as being completely independent and free-willed.	Determinism: Regard the individual as being completely defined by the situation they are in.
Axiology assumptions	Value-biased: Research is value-laden and completely subjective.	Value neutral: Research is value free and totally objective.
Methodological assumptions	Idiographic: Social world can only be understood by obtaining first-hand knowledge of the subject being investigated.	Nomothetic: Emphasis is laid on the importance of basing research on systematic protocol and technique epitomised by the approaches and methods used in natural sciences.
Basic beliefs	The world is socially constructed and subjective. The observer is part of what is observed.	The world is external and objective. The observer is independent.
Researcher should	Focus on meanings and try to understand what is happening by looking at the totality of each situation and develop ideas through induction from data.	Focus on facts and look for causality and fundamental laws to reduce phenomena to simplest elements in order to formulate and test hypothesis.

Positivist approaches rely on numbers and mathematical or statistical analysis whilst interpretivist research involves findings which are not produced through mathematical or statistical inferences (Strauss and Corbin, 1998). Hence, a positivist approach is quantitative in nature. Positivism can identify generalised patterns of event regularities but is unable to provide for a consistent causal explanation in an open social system (Smallbone and Quinton, 2004;

Lindholm, 2008). Interpretivism is based on the assumption that knowledge is gained through social constructions and acknowledges the relationship between the researcher and what is being explored (Klein and Myers, 1999). Interpretivist approaches are hence qualitative in nature.

Moreover, unlike with positivist paradigms, ontology and epistemology are interwoven within interpretivist paradigms (Appleton and King, 1997). Furthermore, Crotty (1998) maintains that there is an interrelationship between the theoretical stance selected, views on epistemology, the methodology and methods used as the epistemological stance influences the theoretical stance which in turns dictates the methodology and therefore the methods employed. Epistemological perspective is important to clarify issues relating to the research design as it provides a philosophical background for deciding on the legitimacy and adequacy of various kinds of knowledge (Gray, 2013). As shown in Figure 16, the research methodology is dependent on both the epistemology and the theoretical perspectives (Crotty, 1998; Gray, 2013).

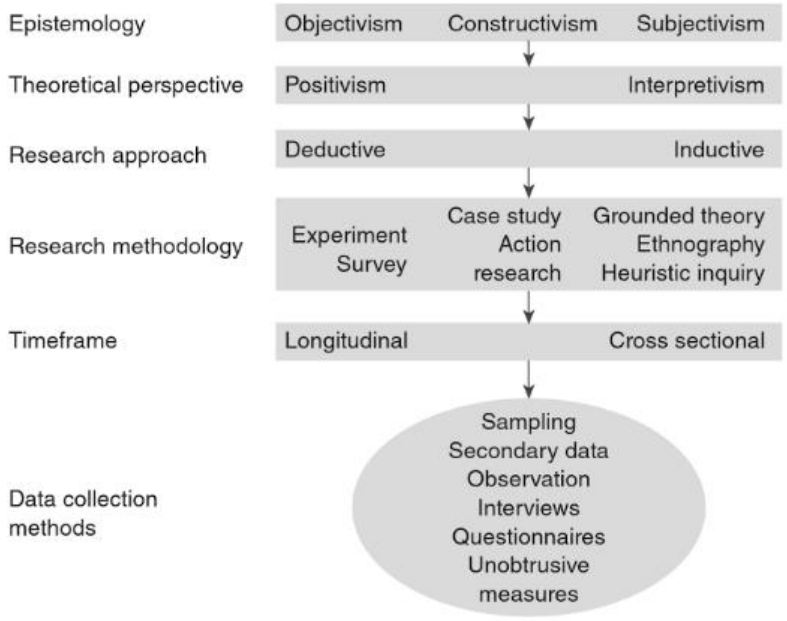


Figure 16. The elements of the research process [Source: Gray (2013:35)]

An interpretivist methodology does not predefine the dependent or independent variables but rather aims at understanding the phenomenon being investigated (Walsham, 1995). Unlike a positivist methodology, interpretative research attempts to understand phenomena through the assessment of meaning given to them by participants. Interpretative research discards the prospect of an 'objective' account of events and rather looks for a relativistic understanding of the phenomenon (Rowlands, 2005). Positivist methodologies include cross-sectional studies,

longitudinal studies, experimental studies, meta-analysis and case studies amongst others whereas interpretivist methodologies include action research, case studies, ethnography, ethnomethodology, narrative analysis, grounded theory and participative observation (Patton, 2005; Michell, 2010). Table 11 shows some methodologies and their suitability in terms of these two paradigms.

Table 11. Research tactics and philosophical bases [Source: Amaratunga et al. (2002:21)]

Research Approach	**Positivistic (Quantitative)**	**Phenomenological (Qualitative)**
Action Research		Strictly interpretivist
Case Studies	Have scope to be either	Have scope to be either
Ethnographic		Strictly interpretivist
Field Experiments	Have scope to be either	Have scope to be either
Focus Groups		Mostly interpretivist
Forecasting Research	Strictly positivistic	
Futures Research	Have scope to be either	Have scope to be either
Game / Role Playing		Strictly interpretivist
Large Scale Surveys	Strictly positivistic	
Participant Observer		Strictly interpretivist
Scenario research		Mostly interpretivist

3.3. Methodology

Despite the emphasis placed on the various methodologies that exist, it has been frequently observed that no single research methodology is essentially better than any other methodology (Benbasat *et al.*, 1987). Qualitative and quantitative research approaches often have different goals (Frankel and Devers, 2000b). The chosen methodology, be it positivist or interpretivist, ultimately depends on the research aim and the nature of the research problem rather than a commitment to a specific paradigm (Cavaye, 1996; Lindholm, 2008).

For example, management research primarily originated from a generally positivist approach (Smallbone and Quinton, 2004). However, research on FM and value have often made use of interpretivist methodologies. de Vries *et al.* (2008) used a case study methodology involving in-depth interviews and online questionnaires for their research on economic value added of FM. In the final stage of their research, a cross case analysis was performed to provide more detail. Similarly, for a study of the economic value added of FM, Lindholm (2008) adopted an interpretivist methodology with the use of semi-structured interviews as the primary research method. Smit (2008) on the other hand made use of a positivist methodology in his study about the economic value added of FM.

The FM value map, which is more related to our research topic, considers the holistic aspect of value as opposed to the studies from de Vries *et al.* (2008), Lindholm (2008) and Smit (2008). In the formulation of the FM value map Jensen (2009) and Jensen (2010) adopted a case study methodology with interviews as the main research method. In the same vein, the proposed research about the perceived value added of the inclusion of GBFIs in a FM strategy entails the epistemological assumption of subjectivism. Hence, this research is of an interpretivist and subjectivist nature, and an interpretivist methodology is most appropriate as opposed to a positivist methodology. The main interpretivist/qualitative methodologies are described in Table 12.

Table 12. Main interpretivist methodologies

Methodology	***Description***
Ethnography	Group of methods involving direct and continuous social contact with agents. The understanding and depiction of experience of a group of people is the rather essential to this methodology (Feagin *et al.*, 1991; Willis and Trondman, 2000).
Action research	It is "*a participatory, democratic process concerned with developing practical knowing in the pursuit of worthwhile human purposes, grounded in a participatory worldview… It seeks to bring together action and reflection, theory and practice, in participation with others, in the pursuit of practical solutions to issues of pressing concern to people, and more generally the flourishing of individual persons and their communities*" (Reason and Bradbury, 2001:1)
Case Study	A case study is a multi - featured profile which uses evidence gathered from various methods to form conclusions for the case being studied (Yin, 2002). A case study does not follow and stereotypic form (Yin, 2013).
Narrative analysis	Narrative analysis involves 'stories' told in interviews or in everyday life. The primary assumption is that people constantly telling stories to themselves or to others (Richardson, 1990). There is a particular interest in how people tell their own version of reality (Patton, 2005).
Grounded theory	Methodology for developing theory grounded in data methodically collected and analysed. The theory evolves during the research and does so through constant interplay between analysis and data collection (Strauss and Corbin, 1997).

From Table 12, it can be seen that a case study methodology appears to be more appropriate to answer the research question and meet the research aims. In support of this selection, similar studies looking at the value added of FM, from de Vries *et al.* (2008), Jensen (2009) and Jensen (2010), have adopted the case study methodology. As qualitative researchers are concerned with the meaning people attach to things in their lives, interpretivist – qualitative – case studies refer to research methodologies which produce descriptive data (Patton, 2005). However, the selected methodology, case studies, can be used for both qualitative or quantitative research (Yin, 2002).

3.3.1. Case Studies

Yin (2002:69) describes a case study as "*a three featured profile*". Firstly, it is dependent on the use of information from various sources of evidence such as direct observations, interviews, documents, archival files, or artifacts. The facts of the case study, which can be expressed in either quantitative or qualitative terms, are built on the consistency of the data from these multiple sources. Secondly, the methodology assumes abundance of data since case studies are meant to study phenomena in their real-life context. Lastly, the methodology can involve one or multiple cases. This broad definition allows for different styles including differing philosophies. Feagin *et al.* (1991) also give a similarly broad definition and further describes a case study as being an instance of a wider phenomenon as part of a broader set of parallel instances.

Case studies can contribute to different kinds of theory building for events that produce specific outcomes (Bennett, 2004). They can offer a richness and depth to the description and examination of micro events as well as larger structures that make up social life (Feagin *et al.*, 1991). They aim at providing a deep understanding of a phenomenon in its natural settings whilst recognising its context and its complexity. They offer a holistic focus which allows the researcher to understand the whole system whilst preserving the unity of the phenomenon (Punch, 2013). Through case studies different dynamics can be comprehended, detailing various interactions and mapping the multi-dimensional spaces of events that encompass the scenes of action (Schostak and Schostak, 2007).

Case studies have an explanatory or theory building purpose. Interpretative cases use theoretical variables to provide explanations of the particular cases (Bennett, 2004). Qualitative case studies include real-time case studies or retrospective case studies (Chandler and Lyon, 2001). In addition, they pay particular attention to the multiple sources of evidence within a case rather than the number of cases (Stake, 1995). Like most qualitative research, a case study methodology is suitable for theoretical generation and generalisation. The latter involves the suggestion of new interpretations and concepts or the re-examination of earlier concepts in innovative ways (Yin, 1984).

Numerous researchers have made their own variations to the methodological case study structure by mixing a number of data collection methods (Harris and Sutton, 1986; Gersick, 1988; Leonard-Barton, 1988; Eisenhardt, 1989). Furthermore, there is increasing agreement that research programmes progress more efficiently through the iterative or collective use of

diverse research methods than through the use of any single method alone (Bennett, 2004). The most common sources of data for case studies include document review, interviews and observations (Simons, 2009).

Furthermore, the case study methodology can involve a single case or numerous cases. The use of a single case, which is interpreted to be a deviant case, can help understand how the general process under examination works (Feagin *et al.*, 1991). They may also provide tests that can support or dispute theories and can regularly make inferred comparisons to broader groups of cases (Bennett, 2004). One approach to strengthen the assessment of the results of one case study is to use multiple case studies in a comparative framework (Feagin *et al.*, 1991). It strengthens the research results and the evidence from multiple case studies are considered to be more convincing (Amaratunga and Baldry, 2001).

3.3.2. Multiple Case Studies

The analysis of multiple case studies is based on the comparisons between first-hand evidence and the theoretical propositions established at the onset of the research. The process of using multiple cases requires detailed case study reports for each case. The goal is to know each case as a detached entity. This allows for the development of the individual case first before developing the generalised frameworks across the multiple cases. Hence, it provides rich knowledge within each case and accelerates cross-case comparisons (Amaratunga and Baldry, 2001). The analytical benefits of multiple case studies make them better than the single case study design (Yin, 2013).

For any case study, the definition of the case is important but for a multiple case study the careful selection of cases is also important (Coff, 1999). Cases that either forecast comparable results or those predicting opposing results, for predictable reasons, must be selected (Yin, 2013). The final phase of theory building is to compare the propositions developed for each case (Eisenhardt, 1989).

3.3.3. Justification of Selected Methodology

Case studies are useful when there is no precise definition between the phenomenon and the context itself. The methodology presents a mixed activity covering a series of research methods and techniques, a broad coverage and a range of various types for data (Hartley, 1994). Case studies are customised to understand new concepts or existing concepts which are not well understood. In this sense, case studies can help explore theories in the built environment (Amaratunga *et al.*, 2002).

Moreover, multiple case studies are more robust than single case studies and they allow for cross case analyses enabling the comparisons of similarities and differences in the units of analyses in the case studies (Khan and VanWynsberghe, 2008; Yin, 2013). In relation to the research question, the case study methodology is particularly suitable for research addressing "how" or "why" questions (Schell, 1992; Yin, 2013). Furthermore, detailed case studies can be essential in research where an intimate understanding of the meaning of particular concepts to various people is important (Amaratunga *et al.*, 2002). This is particularly important in this research so as to understand the perceived impact of GBFIs on value.

For these reasons, the multiple case study approach was selected for the purposes of this research. The selected methodology will provide stronger results than a single case study methodology and is also the most common methodology used in similar studies about FM and value as indicated in the literature review.

3.3.4. Unit of Analysis

Miles and Huberman (1994) describes the unit of analysis as some sort of phenomenon that occurs in a bounded context. In the literature, unit of analysis refers to a wide assortment of objects of study, for example a person, a program, an organisation, a classroom or a clinic (Mertens, 1998). The unit of analysis is subject to each case and the research is about some aspect of the unit only. The research proposition should point to the unit analysis but the research extends beyond the unit to relevant external areas of data (Yin, 2009). The unit of analysis of this research, at the level of the research question, relates to facilities integrating GBFIs as part of their FM strategy.

3.3.5. Case Selection

A case is a particular situation or event that may be used to discover what it teaches about reality (Wieviorka, 1992). Case selection is an elemental task of the case study and by choosing a case the researcher also sets out an agenda for the studying of the case (Seawright and Gerring, 2008). For the selection of a case to be studied, the research must make sure that the unit observed is available for analysis (Wieviorka, 1992). Hence, case selection and case analysis are intertwined (Seawright and Gerring, 2008). Most scholars consider practical factors such as time, money, expertise and access (Seawright and Gerring, 2008). This is known as convenience sampling, whereby cases are selected based on their availability and proximity to the researcher (Castillo, 2009).

However, there are other factors to consider. As most case studies seek to explain the features of a larger population, they are about something greater than the actual cases (Gerring, 2004). Often, and as is the case with this research, the cases are asked to perform the "heroic" role of representing a population of cases larger than the cases themselves. To address the issues of representativeness, the selected cases need to reflect on the broader population of cases. Furthermore, the chosen cases must also achieve variations on applicable parameters (Seawright and Gerring, 2008).

The cases were selected as follows:

- Firstly, all cases analysed involved facilities incorporating GBFIs in their FM strategy.
- Secondly, cases with varying levels of GBFIs implementation were selected.
- Thirdly, facilities providing convenience of access were considered. Hence, Cape Town based commercial facilities were selected.

To ensure that the facilities selected remain anonymous, a specific coding was applied. Each case was numbered from 1 to 4 and that number was used as suffix to the case study (CS) abbreviation. Hence, the four case studies were coded as CS1, CS2, CS3 and CS4. Interviewees from each case study were referred to with an alphabet starting from A as per the Table 13.

Table 13. Coding structure

CS1	CS2	CS3	CS4
A	B	C	D

3.3.6. Reliability and Validity

The concept of reliability is mostly used for testing or assessing quantitative research but the concept is also used for various types of research (Golafshani, 2003). Chandler and Lyon (2001) identified three specific ways to establish reliability:

- Using numerous item measures and establishing the internal consistency of the measures.
- Using several respondents and establishing inter-respondent consistency.
- Using archival data from inspected or other dependable sources.

As the goal of good qualitative research is to help understand a situation which would otherwise be inexplicable or unclear, the quality of the research relates to the generation of understanding (Stenbacka, 2001; Eisner, 2017). In the study about the quality of qualitative research,

Stenbacka (2001) argues that 'reliability' is misleading and irrelevant in qualitative research. On the other hand, Patton (2002) argues that reliability and validity are two factors which need to be considered in the design of qualitative research.

Using a different approach, Healy and Perry (2000) maintain that the quality of any study in each paradigm must be evaluated by its own paradigm terms. It is widely acknowledged that the term reliability is essential to the quality of quantitative studies. The quality in quantitative paradigms mostly relate to the terms like credibility, neutrality, confirmability, consistency, dependability, applicability or transferability (Lincoln and Guba, 1985). Lincoln and Guba (1985) use the term dependability to refer to the notion of reliability in qualitative research.

Similarly, the concept of dependability is accepted by Clonts (1992) and Seale (1999) with reference to consistency and reliability in qualitative research. Campbell (1997) argues that consistency of data is realised when the phases of the research are checked through the inspection of raw data, data reduction products and process notes. Reliability, or dependability, in a qualitative research study depends on an examination of trustworthiness (Seale, 1999).

Reliability in research is important but measures can be reliable without being valid but cannot be valid without being reliable (Lincoln and Guba, 1985; Chandler and Lyon, 2001). Hence, the demonstration of the validity of the research is enough to prove its reliability or dependability (Lincoln and Guba, 1985). The concept of validity is a contingent concept grounded in the particular research methodologies rather that a fixed construct (Winter, 2000). Similarly, to the concept of reliability, numerous researchers argue that validity is irrelevant to qualitative studies. However, most researchers acknowledge the need for some sort of quality check for qualitative research (Golafshani, 2003).

Creswell and Miller (2000) maintain that the validity of a research project is influenced by the researcher's perception of validity along with the choice of paradigm assumptions. Therefore, numerous authors have adopted their own concepts with various terms such as quality, rigour, or trustworthiness (Lincoln and Guba, 1985; Seale, 1999; Stenbacka, 2001; Davies and Dodd, 2002). Validity broadly refers to the setting up of evidence that the measurement is truly measuring the intended concept (Chandler and Lyon, 2001). Hence, if the validity is maximised then the results are more credible and can lead to generisability which is a concept for high quality qualitative research (Burke, 1997; Stenbacka, 2001).

In their discussion about validity, Gibbert and Ruigrok (2010) make reference to three concepts, namely: internal validity, construct validity and external validity. Internal validity refers to the presence of causal relationships between the variables and results. It is mostly relevant to the data analysis phase (Yin, 1994). On the other hand, construct validity refers to the degree to which a research project investigates what it claims to investigate (Denzin and Lincoln, 1994). It is mostly relevant to the data collection phase (Yin, 1994). For investigators with theoretical interests, Cook *et al.* (1979) rank the types of validity in order of importance with internal validity being the most important followed by construct validity and external validity respectively. Table 14 shows the case study tactics with regards to validity and reliability.

Table 14. Validity and reliability in case studies [Source: Yin (1994),Amaratunga and Baldry (2001)]

Tests	**Case Study Tactic**	**Phase of occurrence**
Construct Validity	Use multiple sources of evidence	Data collection
	Establish chain of evidence	Data collection
	Have key informants review draft case study report	Composition
Internal Validity	Do pattern matching	Data analysis
	Do explanation building	Data analysis
	Do time-services analysis	Data analysis
External Validity	Use replication logic in multiple case studies	Research design
Reliability	Use case study control	Data collection
	Develop case study database	Data collection

Furthermore, the validation model designed by Messick (1987) identifies numerous approaches to establish construct validity, namely:

(1) Content validity: For this to be established the content of the questions or measurement should be relevant and representative.

(2) Substantive validity: This is established through the analysis of the convergent and discriminant validity of a construct by procedures such as factor analysis.

(3) The structural validity: It requires analytical methods to be well matched to the theoretical construction of the variables and models (Loevinger, 1957).

(4) External validity: Referred to as generisability. It is grounded in the intuitive belief that theories must be shown to explain phenomena not only in the context in which they are studied (Gibbert and Ruigrok, 2010).

Whilst Patton (2002) agrees that generisability is one of the criteria for qualitative case studies, it depends on the cases selected and studied. Multiple case studies can be used to build theories and improve external validity (Eisenhardt, 1989). Hence, the multiple case study methodology

adopted in this research will inherently provide for external validity. Furthermore, Patton (2002) supports the use of triangulation as a way of strengthening the research by using numerous varieties of methods or data including both qualitative and quantitative techniques. Mathison (1988) attributes the rise of triangulation, as an important methodological concern in qualitative approaches to control bias and establish valid propositions, to the incompatibility of traditional techniques with alternate epistemologies.

The need for triangulation comes from the ethical requirement to confirm the validity of processes (Stake, 1995). In case studies, triangulation can be achieved using multiple sources of data (Yin, 1994). Even though triangulation is mostly used for quantitative studies, it can be applied to qualitative studies as well and it needs to be defined from a qualitative research's outlook in each paradigm (Barbour, 1998). Moreover, in terms of validity and, by extension, reliability, the case study methodology has an advantage in the sense that it does not allow the researcher to collect complementary and overlapping data of the same phenomena. Case studies can entail numerous methods, all of which can be used for cross-checking and triangulation (Feagin *et al.*, 1991).

Furthermore, Jick (1979) argues that triangulation is a combination of qualitative and quantitative methods as both are complementary. The effectiveness of triangulation is based on the assumption that the weakness of each method will be compensated by the strength of the alternative method(s). For example, quantitative methods can reveal relationships that would not have been identified with the use of qualitative methods alone (Amaratunga and Baldry, 2001).

Based on this discussion the qualitative methods used in this research will be backed by quantitative methods to improve the validity of the research i.e., a mixed methods approach was adopted. Furthermore, the method of analysis allows for triangulation and the findings were linked to the body of knowledge reviewed in chapter 2.

3.4. Research Methods

Qualitative research is best described as a family of approaches whose aim is to understand the experience of persons who share time, space and culture and does not seek to manipulate any phenomenon (Frankel and Devers, 2000a). Hence, methods such as interviews or observations are dominant in the interpretivist paradigm (Golafshani, 2003). These methods are required when the questions that are being asked create challenging dilemmas which are difficult to

address through conventional research approaches (Frankel and Devers, 2000b). They allow the research to develop an overall picture of the investigation (Amaratunga *et al.*, 2002).

Numerous factors drive the degree of structure or type of instrumentation used in a qualitative study namely: The purpose of the study; the extent of existing knowledge; and, the resources available in terms of the subject's time, the number and complexity of cases (Devers and Frankel, 2000). Three major aspects of qualitative research must be noted. Firstly, the logic informing the research is frequently inductive and this affects how complete the research design and process will be. Secondly, qualitative research is frequently emergent and malleable. Thirdly, the research process is regularly non-linear and non-sequential (Frankel and Devers, 2000b).

Qualitative data is a source of well-founded descriptions and clarifications of processes in distinguishable local contexts. The chronological flow of data, that is, the sequence of events leading to consequences, can be preserved with qualitative data. Qualitative data can be obtained from numerous methods but interviews are the most commonly used qualitative method in built environment research (Amaratunga *et al.*, 2002). In this research, interviews are the only source of qualitative data collected.

To add on the earlier discussion about triangulation and to further substantiate the use of mixed methods, a blended approach including qualitative and quantitative methods can produce a product emphasising the contributions of both (Nau, 1995). Notwithstanding the power of qualitative methods, through the use of mixed methods a quantitative analysis can be appropriate to assess the descriptive components of the built environment (Jones, 1997).

Furthermore, much of the built environment research is exploratory and the use of qualitative methods allows for unanticipated developments that could arise out of studies. Quantitative analysis can complement such qualitative findings by indicating their extent within the aspects of the built environment (Amaratunga *et al.*, 2002). In the built environment, descriptive survey is the most common type of quantitative method used as it is concerned with information usually obtained from interviews or questionnaires (Amaratunga *et al.*, 2002). In order to complement and strengthen the finding from the interviews, a survey was also carried out with the end-users of the facilities/case studies.

3.4.1. Interviews

One of the most common methods in qualitative research is to conduct interviews (Small, 2009). Interviews provide rich information about the participants' experience and perspectives of a particular topic (Turner III, 2010). King *et al.* (1994) identified a number circumstances where interviews are most suitable, namely:

- For studies focusing on the significance of a phenomena to the participants
- Where different perceptions of processes within a social unit are being studied
- Where historical accounts are needed about the development of a phenomenon
- To provide for exploratory information before conducting a quantitative study
- To provide for validation measures for quantitative studies

The current research proposition falls under the first two categories, thereby confirming the suitability of the research method for this study. Qualitative research interviews can be defined as an interview with the goal of collecting descriptions of the real life-world of the interviewee in order to understand the meaning of the phenomena being investigated (Kvale, 1996). The purpose of the interviews is to see the research topic from the interviewees' perspectives and to better understand those perspectives (Amaratunga *et al.*, 2002).

Social scientists started to use interviews to collect information about groups or classes of people and their opinions and outlooks about various issues (Frankel and Devers, 2000a). It is a highly flexible method which can produce rich data (King *et al.*, 1994). The extent to which the interviews and observations are structured varies in most qualitative research (Devers and Frankel, 2000). Gall *et al.* (2003) identified three main formats for interview designs, namely: informal conversation interview, general interview and standardised open-ended interview. Each of these formats entail a different approach and have various advantages and disadvantages. These are provided in Table 15.

Table 15. Interview formats

Format	**Description**	**Advantages**	**Disadvantages**
Informal conversational interview	Relies on spontaneous generation of questions in a natural interaction (Gall *et al.*, 2003).	Lack of structure allows for flexibility in nature of interview (Turner III, 2010).	Unstable because of inconsistency in interview question (Creswell, 2013).
General interview	More structured but still flexible in its composition and sequence (Gall *et al.*, 2003; Teddlie and Tashakkori, 2009).	Ability of research to ensure that the same general aspects of the interview are collected from each participant (McNamara, 1999).	Possible lack of consistency based on the way the questions are asked (McNamara, 1999).

Standardised open-ended interview	Most structured, participants are asked the same open-ended questions (Gall *et al.*, 2003).	Allows for follow up questions contributing to rich and thick qualitative data provided (Turner III, 2010).	Coding of data is more difficult (Creswell, 2013).

According to Turner III (2010), the most prevalent format is the standardised open-ended interview which is the most stable method in providing rich information. This interview protocol is such that open-ended questions are written such that 'probes' could be incorporated to instigate the interviewees to further reflect on topics of interest (Teddlie and Tashakkori, 2009). For this research, FM professionals for the selected cases were interviewed to gather the information about their perception of the value added by GBFIs. The general interview format or semi-structured approach, which provides for uniform data, was used for this research.

The standardised open-ended interview format can result in coding difficulties or discrepancies but when the wording and sequence of questions is uniform for all respondents, discrepancies are only due to the difference in interviewees and not the interview itself (Gorden, 1975; Gall *et al.*, 2003). However, Treece and Treece (1986) argue that, despite the importance of keeping the questions the same for all interviewees, the wording can be changed as it can allow for improved responses as not all interviewees use the same vocabulary. Hence, rather than having identical interviews, it is more convenient that the interviews are uniform, comparable and understandable (Denzin, 1989). Therefore, semi-structured interviews also provide for rich data as the interview style still has some degree of predetermination in the order of the questions but it allows for flexibility in the manner issues are addressed by the interviewee (Dunn, 2005). Semi-structured interviews develop in a conversational manner presenting participants the chance to explore issues which they believe are important (Longhurst, 2003).

3.4.2. Surveys

One way to overcome the potential bias of interviews is to recognise stakeholders other than the senior management (Flynn *et al.*, 1994). In this study, the end-users of the facility are also recognised to avoid any potential bias. Interviews are often combined with other forms of data collection in order to provide for a well-rounded collection of information for analysis (Turner III, 2010). Another method which gathers data from individuals for the purpose of describing, exploring or explaining phenomena is the survey technique. Pinsonneault and Kraemer (1993:77) describe a survey as a "*means for gathering information about the characteristics, actions, or opinions of a large group of people*".

Surveys are most commonly used to: 1) measure the opinion of the public or groups; 2) measure political perception; and, 3) perform market research (Fowler Jr, 2013). For this research, a survey was used for the measurement of the opinion of stakeholders not covered by the interviews. Individual level data was collected from facility managers and surveys were carried out for other stakeholders such as occupants/end users of the various facilities being studied in this research.

Surveys are used to quantitatively describe aspects of a given sample or sampling frame and the findings are then generalised back to the population (Kraemer, 1991). The sampling frame refers to the actual list from which participants are selected (Burton, 2007). As the data gathered from surveys are subjective, the basic rule is that all individuals must have equal chances of participating in the survey (Kraemer, 1991; Burton, 2007). In this study the samples would be the end users of the selected facilities who form part of the population of all occupants/end users of facilities incorporating GBFIs as part of their FM strategy.

From a sampling perspective, it is important to have the right number of participants to minimise sampling errors. However, one of the major downsides of surveys is the non-response bias (Armstrong and Overton, 1977; Bosnjak and Tuten, 2001). To reduce the non-response bias, the non-response rate needs to be reduced (Armstrong and Overton, 1977). Keeping the survey as short as possible is encouraged as opposed to long and onerous ones (McIntyre, 2013). It is also important that the survey questions are clear and understandable by the participants in order to avoid misinterpretation (Fowler, 1995; McIntyre, 2013). Finally, the rating scales must be balanced, providing for an equal number of positive and negative response options (Salant and Dillman, 1994). All these factors were considered in the survey design.

3.4.3. Design of the Interview Outline

The interview schedule, listing all interview questions along with justification for each question, is found in Appendix A. The questions included in the interview schedule are based on the framework derived at the end of chapter 2. Furthermore, all interviewees were provided with full and relevant information about the research and this was recorded through signed informed consent forms.

3.4.4. Design for Surveys

Similar to the interview schedule, the survey questions are based on the framework derived at the end of chapter 2. The survey was kept short and the questions did not allow for confusion. In most instances likert scales were used and the rating scales were balanced, providing for an

equal number of positive and negative response options. Likert scales were developed in 1932 as a five-point bipolar response that most people are presently acquainted to. The likert scale variables usually represent an underlying continuous measure (Allen and Seaman, 2007).

The schedule in Appendix B lists all survey questions under the different main topics addressed in the interviews. Furthermore, the justification of each question is also provided to explain the purpose of each question.

3.5. Method of Analysis

3.5.1. Cross-case Analysis

According to Eisenhardt (1989), people are poor processors of information and jump to conclusions based on limited data. The information processing bias can lead to premature and false conclusions (Eisenhardt, 1989). A proven way to counteract those tendencies is through case comparisons which look at data from different ways (Amaratunga and Baldry, 2001). There is a consensus in the literature that a case study is a constrained system where all evidences and measurements are interrelated to each other. Therefore, each individual case study is comprised of a whole study which can stand independently and a cross case analysis adopts an information building approach to build further information about the topic (Yin, 1994; Amaratunga and Baldry, 2001).

A cross-case analysis enables the comparisons of similarities and differences in the units of analyses in the case studies (Khan and VanWynsberghe, 2008). A cross-case analysis extends the research beyond an individual case, prompting new questions, revealing new dimensions and producing alternatives (Stretton, 1969). It improves the researcher's ability to understand how relationships between the variables exist and thereby improve and develop concepts (Ragin, 1997). With cross-cases analysis there is also the opportunity to compare cases from numerous settings (Khan and VanWynsberghe, 2008).

In their explanation of cross-case analysis, Khan and VanWynsberghe (2008) make the following observations: (1) Cases represent strong and complete examples of experiences; (2) Cases are comparable relative to commonalities and differences; (3) Comparisons among cases can create and produce significant linkages; and, (4) cognitive cross-case analyses are a valuable way to produce correlations, make interpretations and develop conditional generalisations.

A multi case method involves a set of case studies having similarities with regards to what is being studied. A cross-case analysis facilitates a greater understanding of the research problem. It allows the researcher to make statements about the research problem which are then applied to the individual cases. The level of congruity or discrepancy speaks to the uniformity of the research problem (Stake, 2013).

The multiple case studies in this research allowed for cross-case analysis providing strong comparisons allowing for interpretations with generalisations.

3.5.2. Component of Analysis

The analysis and interpretation of research data forms the major part of research (Amaratunga *et al.*, 2002). It is the key to building theory from case studies but it is also the most challenging and least organised part of the process (Eisenhardt, 1989). Defining the analytical method is hence of critical importance to the analytical strategy. This definition will determine the limit of data gathering and dissemination of the results. There exist numerous methods of analysis including examination, categorisation, tabulation or the alternate recombination of the evidence to address the proposition of the study (Amaratunga *et al.*, 2002).

According to Miles and Huberman (1994), qualitative data analysis consists of three parallel flow of activities, namely: data reduction; data display; verification and conclusion. Data reduction is also seen as data condensation and it occurs constantly during the life of any qualitative study (Amaratunga *et al.*, 2002; Tesch, 2013). It is about the selection, focusing, simplification and transformation of data which are in written-up field notes or transcriptions (Miles and Huberman, 1994). Data display for qualitative data is most commonly in the form of extended write-ups (Amaratunga *et al.*, 2002). Miles and Huberman (1994) argue that better displays are important paths to valid qualitative analysis. Data display, data reduction and conclusion verification are further described as being intertwined before, during and after data collection to form the analysis (Miles and Huberman, 1994). This is illustrated in Figure 17.

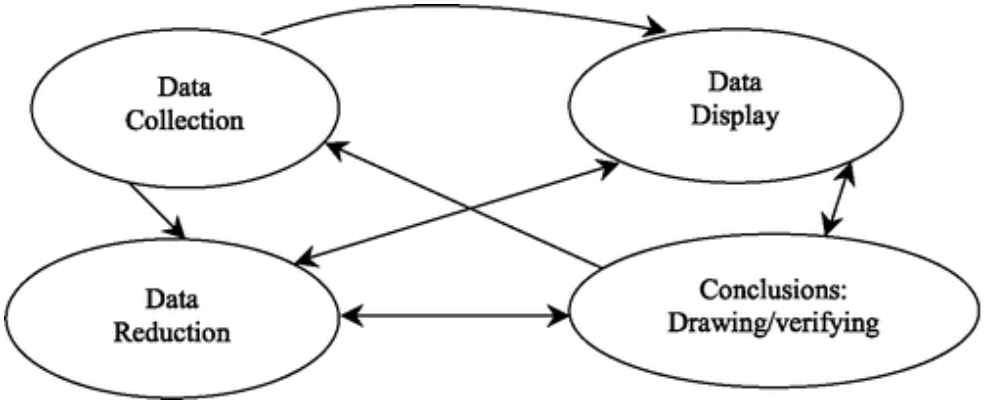


Figure 17. Components of data analysis [Source: Amaratunga et al. (2002:28)]

Connecting a theory to existing literature improves the internal validity and generalisability of case study research. After a cross case analysis of the proposition, the emerging theory is compared with the theoretical framework developed in the literature review chapter (Amaratunga and Baldry, 2001). Data interpretation is the last stage of the interview process (Turner III, 2010). The data should be compiled into sections or groups known as themes or codes which represent consistent ideas common to research participants (Kvale, 2007; Creswell, 2013). Figure 18 depicts the approach used for this study.

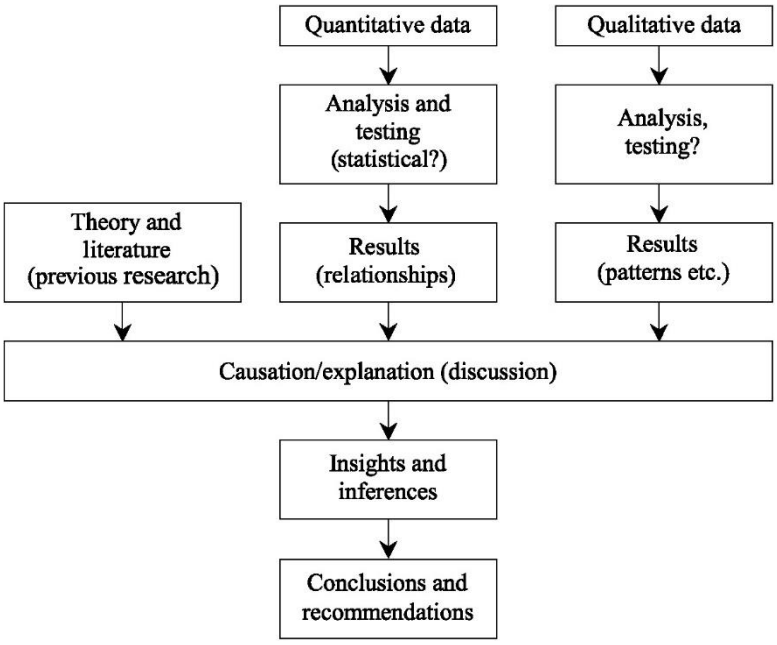


Figure 18. Triangulation for qualitative research [Source: Amaratunga et al. (2002:24)]

The data gathered from the interview(s) for each case were examined to understand the perception of the FM professionals/landlord representatives. Based on thematic analysis as explained by Aronson (1995), particular focus was placed on the findings based on the

framework identified in chapter 2. This is because it is important that the theoretical framework and methods match what the researcher wants to know (Braun and Clarke, 2006)

Thematic analysis is a process of encoding qualitative information (Boyatzis, 1998). In a thematic analysis, the data from the interview is transcribed and analysed in order to draw themes from the data pool (Aronson, 1995). This technique is suitable for both small or large sets of qualitative data as a means to describe the data (Braun *et al.*, 2014). Coding of the interview transcripts is performed in order to separate the text. In order to avoid duplication or overlapping of codes, it is of the utmost importance to clearly define the boundaries of the codes being applied (Attride-Stirling, 2001). The coded data which fit a specific theme are grouped together. Following the identification of specific themes, higher order themes must then be identified for each sub-theme to fit into (Aronson, 1995). The specific themes illustrate the individual's perception or experience (Joffe, 2004).

The data gathered from surveys, representing the perception of the occupant/end-users, were then summarised per case and compared with the findings of the interviews, all in accordance to the themes identified. A cross-case analysis and comparison of the findings from both research methods was then performed. Based on this information, explanations leading to insights and inferences, on the value added by GBFIs, were made.

3.6. Limitations

A key practical feature of case studies is that they will have more variables of interest than data points at all times (Yin, 2002). Case studies, like most qualitative methodologies, are susceptible to the individual biases of the researcher and can be at best descriptive because it cannot raise any more general principles than those provided by its own data. Hence, the reliability might be questionable (Feagin *et al.*, 1991). Moreover, the boundary between the phenomenon and the context is often not sharp. The potential influence of contextual conditions is inherent in all case studies (Yin, 2002).

A further limitation of case studies is the indeterminacy or failure to dismiss all but one explanation, lack of individuality of cases and impracticality of flawlessly controlling case comparisons (Bennett, 2004). However, each case has a possibly broad number of observations on principle variables and may allow numerous qualitative measures of several dimensions of the variables. Hence, case studies do not inevitably suffer from indeterminacy (Campbell, 1975; Bennett, 2004).

Furthermore, the other limitations of the study are listed below:

a) Social value was considered in relation to the building occupants.
b) The investigation is limited to the commercial (offices) property sector in Cape Town and the data collected and analysed is limited to four cases in accordance with the principles of convenience sampling.
c) For the purposes of this study, no distinction was made for green star certified buildings and non-certified buildings. Any type of commercial building with GBFIs as part of their FM strategy were considered.
d) The information gathered was linked back to the findings of chapter 2 mostly based on international literature due to the limited literature relating to GBFIs, green buildings and the value added of FM in the South African context.

3.7. Chapter Summary

The chapter identified the research paradigm which is the foundation of the research design. The theory behind the chosen qualitative approach was provided. The importance and relevance of qualitative research was also analysed.

The case study methodology and the concept of validity and reliability were addressed following which triangulation was introduced. The selected, mixed, research methods were examined and the interview and survey designs were explained. The reasoning behind each questions posed was also explained. The chapter ended with a review of the analysis of the data gathered for the proposed qualitative research.

Figure 19 depicts a summary of this chapter. Chapter 4 presents the data collected during the research and the data analysis.

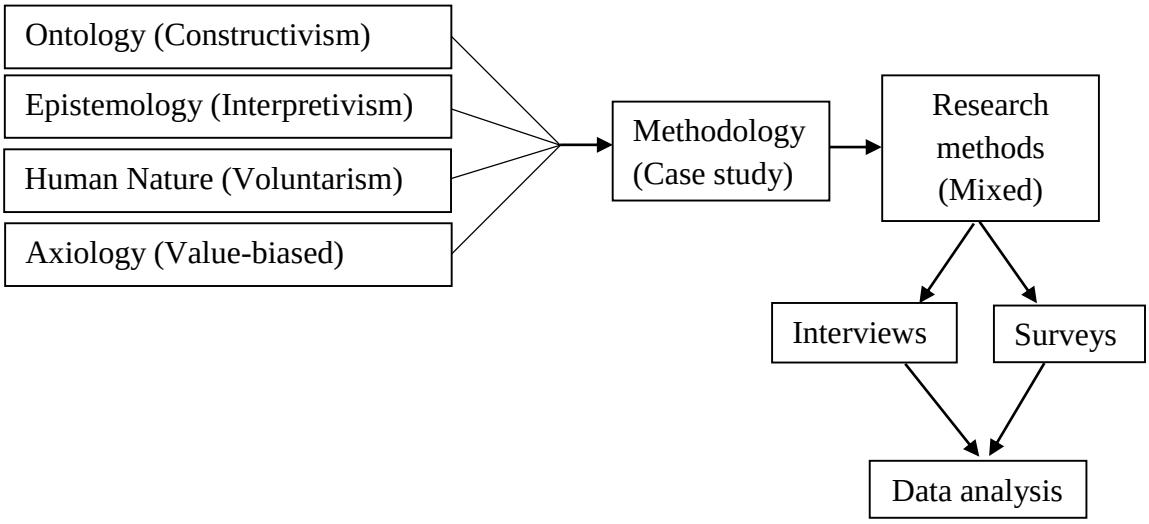


Figure 19. Summary of Chapter 3

Chapter 4: Findings and Analysis

4.1. Introduction

The purpose of this chapter is to present the data gathered from the interviews and surveys for each of the four cases chosen. A total of four interviews and two surveys were carried out. An alternative survey carried in 2016 was provided for CS3 and the public relations officer in CS1 declined the survey invitation.

In order to assess the value added by GBFIs, the findings from the various cases studied were analysed in terms of the findings in chapter two as well as other emerging themes. This analysis explains the impact that the inclusion of GBFIs in a FM strategy has on economic, environmental and social value in the commercial sector. However, various aspects surrounding the GBFIs implemented in each case are also discussed.

Lastly, a cross case analysis was carried out to analyse the differences and similarities between the cases. The cross-case analysis extends the research beyond an individual case to improve the understanding of the relationships between the variables by providing the opportunity to compare cases from numerous settings. This analysis allowed for a greater understanding of the research problem and for the drawing of conclusions.

The tree node structure for the themes identified is depicted in Appendix G and Table 16 gives an overview of the four cases.

4.2. Overview of Cases

Table 16. Overview of cases

	CS1	**CS2**	**CS3**	**CS4**
Building type	Low-rise	High-rise	Office park	High-rise
Grade	A-grade	P-grade	B-grade	A-grade
Building age	3 Years	3 Years	Various (1-65 Years)	3 Years
Green Rating	4 Star	5 Star	5 Star (Retrofitted)	No green rating
Occupancy	Owner-occupier	Developer-occupier and multi tenanted	Owner-occupier and multi-tenanted	Multi-tenanted
Interviewee	Facilities Manager / landlord representative	Facilities Manager	Facilities Manager / landlord representative	Facilities Manager
Survey	Declined	27 Responses	2541 Responses (Alternative survey results provided)	35 Responses
No. of occupants	Not disclosed	900	9000	220
Confidence	N/A	70%	99.9%	80%
Margin of error	N/A	10%	3%	10%

4.3. Case Study 1 (CS1)

4.3.1. Case Description

CS1 is a 4 star green star SA facility of about 9000m^2 and comprises 5 levels. The facility is fully owned and tenanted by an international organisation operating in the mining, coal, petroleum, and natural resources sector. This sector is known to have a negative impact on the environment which is why the organisation is committed to being environmentally sustainable in their operations. Hence, only sustainable and green rated buildings were considered for their local headquarters. In that sense, green leases were considered but the organisation eventually decided to develop, own and occupy a green facility.

CS1A believes that the concept of added value was not a driver in the implementation of GBFIs and the main driver behind the implementation of the various GBFIs was the environmental sustainability and the green star accreditation which reflects on the overall perception of the organisation and hence the share price. The vision and the corporate strategy of the international organisation is to operate responsibly towards resources, energy, and water:

> **CS1A:** *A green building fits in perfectly with the strategy of the company because we want to make sure that we are responsible, we operate in a responsible manner, so that decision came from actually quite high up in the corporation and it wasn't difficult to sell it to the business because it fell in line with the vision and the strategy*.

One of the goals of the organisation in developing, owning and occupying this facility was to provide for a work environment conducive to collaboration between the employees as this was a challenge in the previous office.

4.3.2. GBFIs

The GBFIs incorporated in the facility are as follows:

1. Rainwater harvesting: Water tank under the basement of the size on an Olympic swimming pool to capture rainwater. This water is then used in ablutions for flushing.
2. Water efficient sanitary fittings: 6 litre cisterns for toilet (in lieu of the conventional 11 litre cisterns), sensors for taps.
3. Double glazed façade in combination with unconventional HVAC system: Façade reduces heating and cooling loads and HVAC system maximises use of natural ventilation.

4. Glazed façade and open floor plans: To maximise the use of natural lighting and reduce the electricity consumption.
5. Recycling: Recycling systems for paper, glass, carton, and metals. This includes sorting bins and compactors in the basement. Wet wastes not recycled at this stage.
6. Digital Addressable Lighting Interface (DALI) lighting system: Digital lighting control system allowing for scaling of lighting systems for rooms, floors and beyond using time schedules, pushbuttons, switches, and sensors to control lighting and emergency lights.
7. Cyclist facilities: Showers and bicycle racks to increase the use of sustainable travel.
8. Electric car points: Provisions for electric cars charging points have been made in the parking.

4.3.3. FM Strategy

The facilities manager (CS1A) explained that the FM strategy is green-oriented as part of the vision of the organisation and water conservation is one of the most important targets of the FM strategy considering the severe drought in Cape Town. As a result of the various GBFIs, the facility consumes extremely little water from the municipal grid. The FM strategy provides for on-going building tuning and the facility is assessed on a regular basis by the FM team to identify gaps or areas of improvements. For example, in order to improve the recycling programme, which currently does not deal with wet wastes from their canteen, biodigestors are being installed to produce cooking gas from wet waste. This shows that the FM is not limited to the existing GBFIs but rather to an ongoing strategy in relation to the operations of the facility.

In terms of this pro-active approach to FM adopted by the organisation, GBFIs are also used as a future-proofing mechanism to ensure that the building conforms with stricter laws and restrictions, in terms of energy and resource consumption, that are likely to be implemented in the future to deal with worsening environmental conditions:

> **CS1A**: […] *it is going to be compulsory for buildings to perform on energy side or water side, along with certain restrictions.*

The FM department also does a great deal to inform and educate the tenants and end users about the various initiatives and features incorporated in the building as well as the energy and water usage of the facility. The organisation considers that it is vital for the employees' behaviour in the work environment to resonate with that of the firm.

In that sense, they provide for innovations in order to increase awareness about the GBFIs. For example, there are information screens around the facility that display how much water is used by the facility. From an FM perspective, staff education is a priority in CS1 as it was essential to inform staff about how to use the green features:

> **CS1A**: […] *it is very important that you educate the staff, educate them first before you put them in a green building otherwise they will be frustrated.*

For example, in the case of the 6 litre water cisterns, the FM department received numerous complaints about the toilets not flushing properly in the beginning and the staff had to be educated in that respect. Similarly, with a glazed façade, the issue of glare was raised by the occupants and the FM team had to install block out blinds.

In order to educate the staff about the green features and initiatives the FM department has also prepared a building operations manual (including a recycling policy) to explain the various features of the building to the occupants. The FM department also actively keeps track of the water usage and energy consumption in order to calculate their carbon footprint and this information is then reflected in annual reports.

4.3.4. Economic Value

Profitability growth (Cost cutting, flexibility and productivity)

According to the CS1A, cost cutting is seen through a number of ways such as the reduction of the utilities bill resulting from the reduction in consumption of water (Rainwater harvesting and efficient sanitary fittings) and electricity (HVAC, DALI lighting, façade & open floor plan). Considering the forecasted increase in electricity and water in the near future, augmented economic value added will be experienced through greater cost cutting. The GBFIs implemented will ensure that the operational cost of the facility will be kept low in the long terms:

> **CS1A**: *From an operations point of view we realising the economic benefits of having green features.*

However, the FM department struggles with procurement management in terms of green vendors. Due to the lack of such green contractors, there is often a premium associated to these vendors. Furthermore, in terms of recycling, additional cost are incurred as an employee was hired to sort all the various types of waste for the smooth running of the recycling programme.

The provision of efficient and adequate services also contributes to productivity of the tenants. However, as the building is owner and occupied by a single organisation those GBFIs had zero impact on flexibility.

Revenue growth (Asset value, innovation)

In terms of asset value, the facility is seen to have a higher value due to the future proofing and potential cash flow or saving it offers. Furthermore, this green building has potential to attract better cashflows through green leases. The GBFIs also provide for future proofing and hence reduces the risk associated with the cashflows over the long run. Hence, the asset value of the facility, which is linked to the income earning potential of the facility, is greater.

However, some challenges are seen in the maintenance of such building as some of the material tend to wear off more easily. For example, low VOC paints peel off quite easily and require more frequent maintenance. This impacts on asset value. The FM plan also provides for innovation through the constant improvement and development of the usability of the workplace.

Share price

For this organisation, which operates in an environmentally "hostile" sector, the sustainability of the operations including the facilities in which they operate is heavily linked to CSR and the share price:

> **CS1A:** […] *safety or responsible behaviour is always number one because it lends itself to the share price of the company.*

Occupying and owning a green building projects a positive perception of responsible operations in the stock market and this drives more clients.

Summary

In the operations phase the economic value added is seen through a number of ways such as cost cutting, productivity, asset value, future proofing and increase share price (linked to CSR). However, there are also instances where the GBFIs lead to increased cost such as increased maintenance, costly replacement costs, and additional employees to ensure the smooth running of GBFIs (recycling). The overall impact on economic value is nonetheless positive.

4.3.5. Environmental Value

Energy efficiency and carbon footprint

CS1A explained that the HVAC system combined with the double glazed façade results in a reduction in the heating loads and hence a lower energy consumption. Similarly, the glazed facades and the open floor plans allow for the use of natural lighting therefore reducing the need for artificial lighting and electricity. The DALI systems ensures that the artificial lighting is optimal and that no lights are left on in unoccupied areas of the building therefore preventing the wastage of energy. All of these features lead to energy efficiency and a reduced carbon footprint.

Waste management and resource conservation

The recycling programme in the facility ensures that all waste products are sorted, compacted and either sent to registered landfills or to recycling plants and this process is tracked by the FM department. Rainwater harvesting and efficient sanitaryware provides for water conservations and reduces the use of potable water in the building:

> **CS1A:** *I've just given you an example of how little we pay for water but then at the end of the day water is not really that expensive but the difference is that we are almost not using tap water. Do you understand? It is still making a big difference.*

Sustainable travel

Provisions for cyclist facilities and electric cars in the facility encourage staff to opt for sustainable travel options. The strategy adopted by the organisation is to install the bicycle and electric car parking bays closer to the lift lobbies or stair and the normal parking bays get located further away. In addition, in order to decrease the number of cars coming into the building, the number of conventional car parking bays were reduced.

Summary

The GBFIs add environmental value to the facility and organisation by decreasing the energy consumption, decreasing the carbon footprint, reducing water consumption, providing for resource conservation (recycling and water conservation) and by encouraging sustainable travel. This is in line with the vision of the organisation to "operate within design and environmental limits". The mix of GBFIs played an important role in the environmental value added.

4.3.6. Social Value

Workplace attractiveness, staff retention and staff satisfaction

CS1A believes that staff are generally satisfied to work in the green facility. However, considering issues relating to smaller water cisterns and glare associated with the glazed façade, initially staff satisfaction is reduced as users are not used to green features. However, once the end users are educated and are presented with the actual information and facts, they are able to see the bigger picture and they change their behaviour accordingly:

> **CS1A:** *They don't have patience to wait for the tank to fill again and then flush again, so education plays a role, so initially in terms of employee satisfaction they will say the green building is not working because people don't understand what it means.*

The education of the staff needs to be done before, during and after moving to a facility incorporating GBFIs because these buildings are different to conventional buildings. Hence, as they require people to leave their comfort zone and adopt new behaviours, this can lead to frustrations from the users. The FM strategy was crucial in terms of change management.

Work environment and comfort

The DALI lighting and the open floor plan ensures optimal lighting at all times to ensure the staff are operating in the best condition. The facility's open plan floors not only maximises natural light but also allows for collaboration and interactions between various employees as opposed to facilities with solid walls and isolated cubicles:

> **CS1A:** *One of the things that I know was that the company wanted people to collaborate because and most companies want people to communicate to each other.*

However, one of the problems associated with the open plans is the noise levels. Numerous occupants have complained about the noise levels and the lack of privacy resulting from the open floor plan.

Health and safety

The HVAC system in the facility maximises the use of outside air rather than air recycling. This is made easy considering that the building is a low-rise building. The use on natural air instead of recycled air re-injected in the HVAC system eliminates problems such as the sick building syndrome.

Summary

Despite the positive impact of the GBFIs on health and safety, the impact of those GBFIs on the overall social value was the most difficult to assess as there were a number of downsides to GBFIs from an end-user perspective. The GBFIs gave rise to a number of challenges but educating the staff was key in that aspect as it is the only way to get the occupants to adjust their behaviour with regards to the building. Once the building occupants were educated, staff satisfaction started to be seen along with improvements in the comfort levels. However, not all the challenges can be resolved through education as some other challenges, such as sound proofing, would be almost impossible to resolve without compromising other GBFIs.

4.3.7. Conclusion

The pro-active FM strategy adopted ensured that the environmental value, resulting from the implementation of the GBFIs, is optimised as per the vision of the company. Consequently, the GBFIs also led to increase economic value and the FM department has taken all the necessary steps to optimise the social value added from the GBFIs on the organisation. However, this was an almost impossible task as compromises had to be made.

4.4. Case Study 2 (CS2)

4.4.1. Case Description

CS2 is a 5 star GSSA facility of about 52,000m² and comprises 32 levels. The facility is a joint initiative between two organisations amongst which one of them is currently the main tenant in the multi-tenanted building. The core tenant operates in the financial services sector. This sector is often seen as one of the leaders in the sustainable property agenda considering the demand for green buildings from the different financial services operators. This is because financial institutions are usually big consumers of natural resources because of their size and space requirements. This is why the organisation (co-developer and tenant in this case) opted for a facility which performs better that conventional buildings:

> **CS2B:** […] *as corporations and big companies you do tend to use a lot of, in terms of your development* […].

The concept of added value was not a driver in the implementation of GBFIs and the main driver behind the implementation of the various GBFIs was to have a leading green star accredited building as this is linked to the branding and perception of the organisation:

> **CS2B:** […] *in the initial discussions it was a vision to have a green star building in Cape Town* […]. *So in the design of the building various features were incorporated in the design already, for instance it focused on energy, air conditioning, lighting, electrical, and water reticulation etc.*

In that sense, the organisation is converting other existing buildings into green operated buildings as well. However, despite not being a major consideration for the implementation of GBFIs in the FM strategy, there is consensus about the holistic (economic, environmental, and social) value added by those GBFIs to the organisation from an FM perspective.

4.4.2. GBFIs

The GBFIs incorporated in the facility are as follows:

1. LED lighting scheme and light harvesting systems: 99% of light fittings are LEDs that use less electricity than standard fluorescent lights.
2. Full glazed façade and open floor plans: To provide a 360 degree clear view and maximise the use of natural lighting.

3. Double glazed façade in combination with Variable Air Volume (VAV) HVAC system: Façade reduces heating and cooling loads and HVAC system providing better temperature control, less compressor wear and tear, lower energy usage, lower noise levels and passive dehumidification.
4. Recycling: Recycling systems for paper, glass, carton and metals. Composting plants allow organic wet waste to be converted into compost used for the plants in the building. The surplus compost is sold back to the food vendors.
5. Grey water system: Water recycling to provide water to ablutions.
6. Cyclist facilities: Showers and bicycle racks (inside and outside the building) to increase the use of sustainable travel.
7. Electric car points: Provisions for electric cars charging points have been made in the parking.

4.4.3. FM Strategy

The facilities manager (CS2B) explained that the FM strategy gives significant importance to the green operation of the building. The building was designed as "green" and the FM department ensures that it is also operated as "green" as possible and for this, the users play a key role. For the "green" operations, the FM department developed a number of initiatives to increase staff awareness about the various GBFIs as it is key to get the staff (end users) on board when it comes to GBFIs:

> **CS2B:** *So you will find there are some other initiatives that we did come up with that lends itself to getting us to a green rated building operated as green.*

The FM team runs campaigns about water conservation, energy saving and building operations in order to inform the staff about the features of the building, how they operate and what is needed from them. For example, the FM department noted that the recycling programme is heavily dependent on the staff and on the FM initiatives, in terms of informing the staff and the provision of receptacles around the buildings, to make sure that the waste is separated at the source without the need to incur additional sorting costs.

Once the tenants are informed and when they see what the FM professionals are doing, they become more environmentally conscious:

> **CS2B:** […] *if you can get people together involved in that that's already a great step. When they know what we're doing and what they need to do*.

This is done through correspondence or information screens around the building. The staff survey revealed that the tenants are aware of the GBFIs implemented in the buildings as indicated in the Figure 20 showing that 67% of the respondents (27 No.) are aware of all the GBFIs whilst the rest are aware of some of them. No tenant is unaware of the GBFIs. Hence, the FM initiatives are successful.

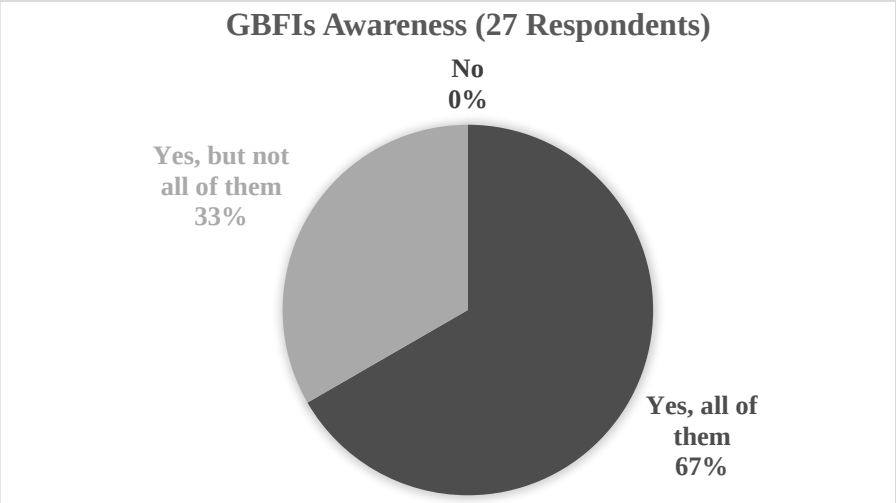


Figure 20. GBFIs Awareness in CS2

The pro-active FM strategy includes the ongoing development of the green operations of the facility. However, one of the main challenges of the FM department in that aspect was the management of the GBFIs in such a high-rise building with multiple tenants. However, having a core tenant driving the green agenda made the FM task easier

The pro-active FM team places a great deal of importance on the future-proofing potential of GBFIs. For example, with the drought situation expected to continue in the future, stricter water restrictions and law are expected. The GBFIs implemented in the building (grey water system and water efficient fittings) offer a long-term solution to this situation. This future proofing strategy is also seen with the provision for electric car charging points, which are not currently popular. However, with an expected growth of electric cars in Cape Town in the near future, provisions have been made for this expected change in behaviour.

4.4.4. Economic Value

Profitability growth (Cost cutting, flexibility and productivity)

CS2B explained that from a developer's perspective the implementation of GBFIs comes at a cost. However, from an FM perspective, when a life cycle costing exercise is performed those GBFIs are seen to be less costly than conventional systems in the long run:

CS2B: *Your investment is bigger but it pays off in terms of your return on investment. Your spending in the long term would end up to be less, for instance we would use about thirty two percent less energy in the building after design.*

This is because the various GBFIs (LEDs, HVAC system, façade & open plan) lead to reduced energy usage that is reflected on the reduced electricity consumption and associated cost. Similarly, the GBFIs (greywater system and efficient sanitary fittings) also lead to water savings as the building uses about 80% less than what a conventional building would use:

CS2B: *After occupying the building, we do have approximately eighty percent less water usage in the building more than a conventional building.*

Hence, the water bill is also considerably lower. The recycling programme also results in lower spending in waste management and waste transportation. Furthermore, the maintenance cost associated with the VAV HVAC system is also seen to be less.

The staff perception is in line with the management (FM) feedback, as most of the staff perceive GBFIs as cost cutting mechanisms. As illustrated in Figure 21, 44% of the survey respondents strongly agreed that GBFIs lead to cost cutting, 52% agreed and none of the respondents disagreed but 4% of the respondents were neutral on the matter. This shows awareness of the implications of the GBFIs on the operations of the buildings and also backs the management claims.

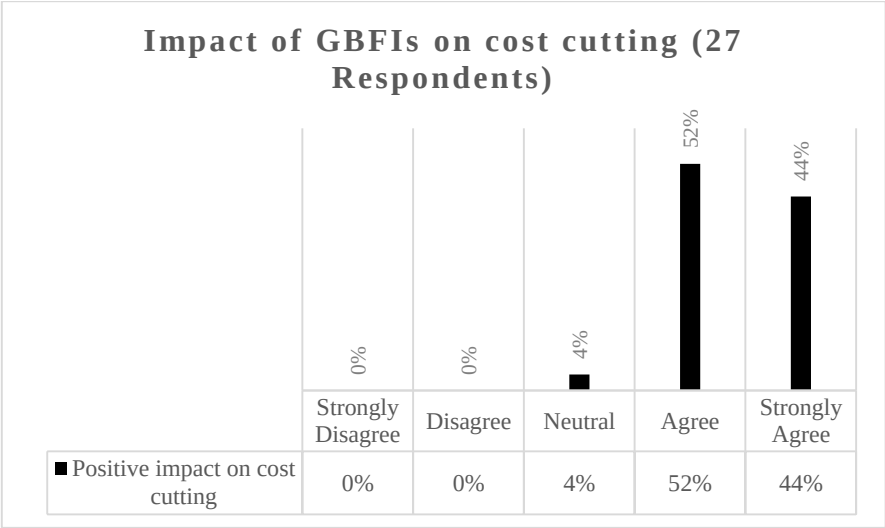


Figure 21. Perception of the impact of GBFIs on cost cutting in CS2

The facility also provides for flexibility as there are multiple tenants that currently occupy the building besides the main organisation. In terms of productivity, the building provides for

creative environment, open floor areas as well as private cubicles to optimise the output levels of the staff. Furthermore, users of the facility are also fascinated by the building and its various features. This is often linked to improved service delivery and customer satisfaction.

The survey results, illustrated in Figure 22, also shows that most respondents agree on the fact that GBFIs impacts positively on their flexibility and productivity. The majority agreed to the statement, which means that there is indeed an impact on flexibility and productivity but not necessarily a significant impact.

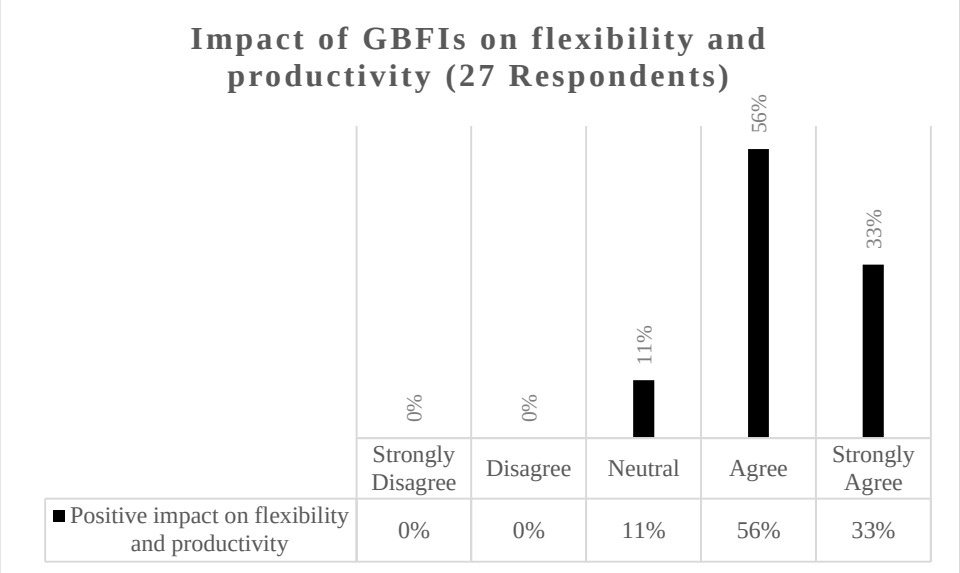


Figure 22. Perception of the impact of GBFIs on flexibility and productivity in CS2

Revenue growth (Asset value, innovation)

The fully glazed façade of the building maximises natural lighting and offers a 360-degree view and this is seen as a major innovation from an outsider point of view according to CS2B. There have been many requests from outside businesses to use the conference space and the demand is so high that not everybody can be accommodated. This eventually leads to more business and to new relationships:

> **CS2B:** *People that aren't our clients that use the facility, speak about it and hear about it, they are very happy to come in.*

The staff survey also shows strong agreement on the positive impact of GBFIs have on innovation as 48% of the tenants strongly agree that GBFIs impact positively on innovation and 37% agree to this. The remaining 15% are neutral. The survey results are illustrated in Figure 23.

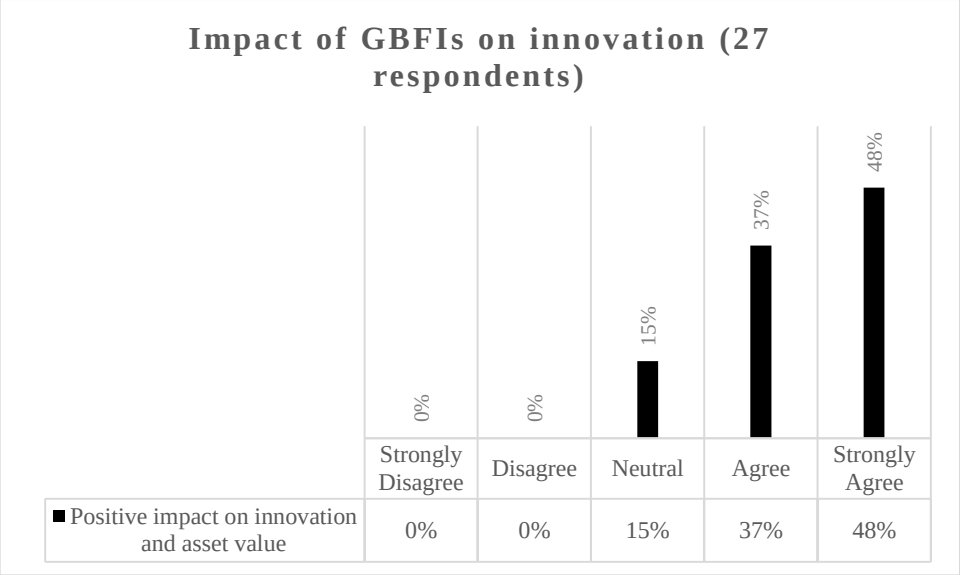


Figure 23. Perception of the impact of GBFIs on innovation in CS2

The building charges above market rental to factor in the premium of going green and this is seen through green leases. Furthermore, being a green building, the value of the asset comes with a premium which is primarily linked to the green rating rather than the various GBFIs. However, the building does attract a lot of interest through the various GBFIs which provides for future proofing whilst attracting tenants. The GBFIs effectively provide for stronger and safer cash flows and therefore lead to increase asset value of the facility.

However, CS2B explained that one of the challenges was to find smaller tenants that are willing to pay a green premium to occupy the space. This leads to above-average vacancy rates. As high vacancies equate to lower income, this can have a negative impact on asset value.

Shareholders

The GBFIs have a positive impact on shareholders as they depict that vision of the organisation. This perception, or branding, is vital and it does create comfort within the shareholders' minds that they are investing in a company that does actually consider the environment and its long term preservation:

> **CS2B:** […] *it does create comfort within shareholders minds that they are investing in a company that does actually look at the consequences of not living green.*

Summary

Despite the fact that the implementation of GBFIs results in a bigger capital outlay, it eventually pays off in the long run in terms of the return on investment. Economic value added was not a main consideration in the decision to develop a sustainable building but the GBFIs are nonetheless seen to contribute to cost cutting, flexibility, and productivity. However, it is the green star rating that plays a vital role in terms of asset value and innovation. The building occupants also perceive GBFIs to have a positive impact on economic value as seen through the survey results.

4.4.5. Environmental Value

Energy efficiency and carbon footprint

CS2B explained that the intensive use of LED lights (99% of the artificial lighting) combined with the fully glazed façade and the open floor plans lead to decreased energy consumption and hence improves efficiency and reduced carbon footprint. Similarly, a light harvesting system, using sensors to ensure that the lighting levels are optimal throughout the building areas, has been implemented in the building. This means that the artificial light is mostly used to complement the natural lighting in most cases and that the lights are only on when needed.

The double glazed façade reduces heating and cooling loads due to the vacuum in between the panes. Hence, less energy is required to heat or cool the building due to the insulating properties of the façade. The VAV HVAC system provide better temperature control and lower energy usage.

The information campaigns provided by the FM department make sure that the tenants are made aware of the various implications that GBFIs have on the environment. This was seen through staff surveys which revealed that 70% of the tenants agree strongly to the fact that GBFIs certainly improve energy efficiency and reduce the carbon footing of the building. The remaining tenants acknowledge and agree that there is a positive impact on energy efficiency and a reduced carbon footprint. The survey results are depicted in Figure 24.

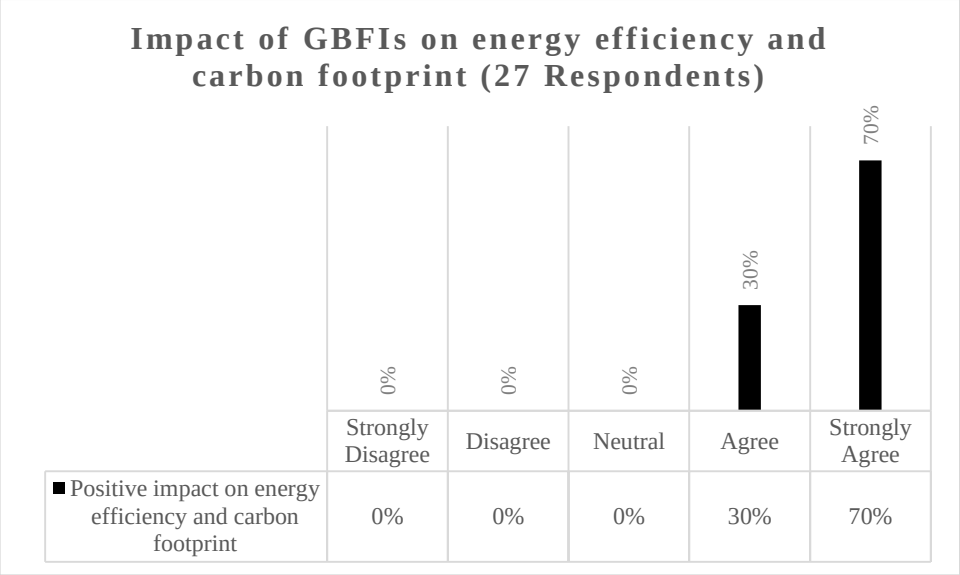


Figure 24. Perception of the impact of GBFIs on energy efficiency and carbon footprint

Waste management and resource conservation

The recycling programme in the facility ensures that all waste products are sorted at the source and sent for recycling where applicable. Food waste from the canteen is converted into compost in compost tumblers. This compost is then used for the various plants in the building and the surplus is sent back to companies involved in sustainable gardening and who also supply the organisation's canteen with vegetables. This ensures that what is taken from the earth goes back to the earth.

The tenants play a significant role in the recycling programme and they are kept informed by the FM team in that regard:

> **CS2B:** *Waste management is the way you choose to operate your building* […] *it is a big thing with us, we are continuously thriving on waste management because it is an area we environmentally cannot afford anymore to send stacks of items and waste to landfill* […].

According to the FM team, keeping the tenants informed and making sure they understand the various implications of those GBFIs is the only way to get the staff to participate in the programme. To back this statement, the staff survey revealed that 63% of the respondents strongly agreed that the GBFIs have a strong and positive impact on waste management and the rest agreed that there was a positive impact. None disagreed to the proposition about GBFIs having a positive impact on waste management. The results are depicted in Figure 25.

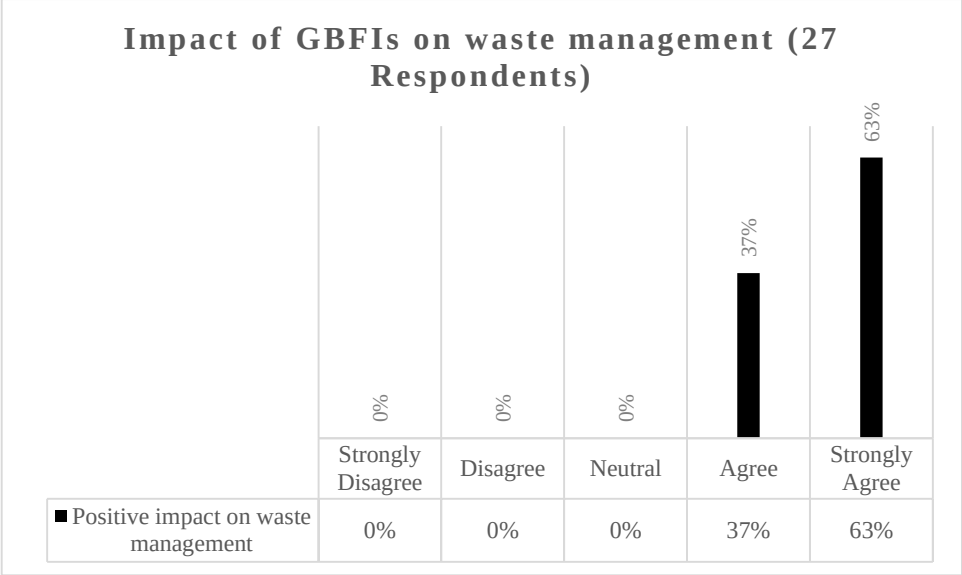


Figure 25. Perception of the impact of GBFIs on waste management in CS2

In terms of natural resource conservation, through the grey water system and efficient sanitary fittings, the facility uses about 80% less than a conventional building of this size would use. Similar to the waste management criteria, the staff survey revealed that 70% of the respondents strongly agreed that the GBFIs have a strong and positive impact on resource conservation and the rest agreed that there was a positive impact. None disagreed to the proposition about GBFIs have a positive impact on resource conservation. The survey results are depicted in Figure 26.

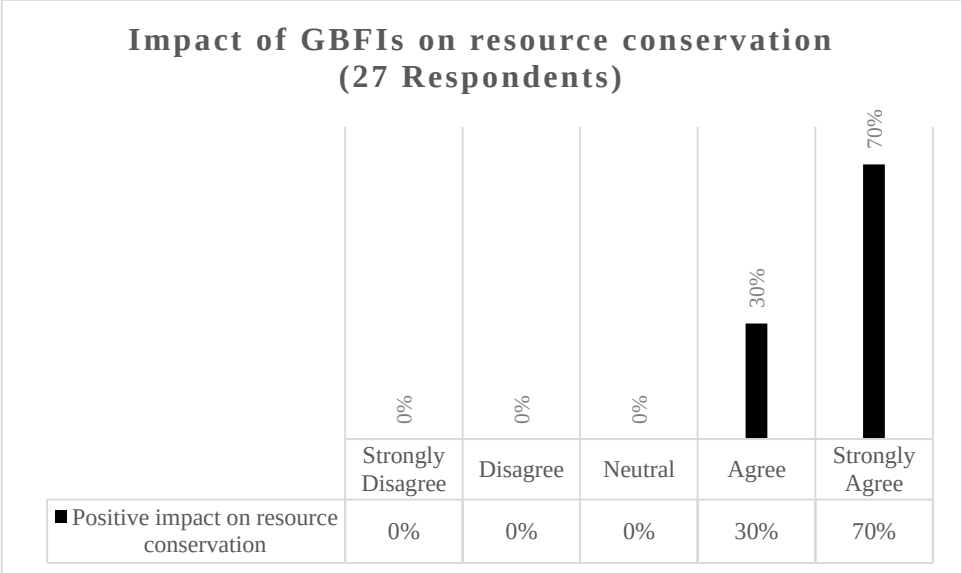


Figure 26. Perception of the impact of GBFIs on resource conservation in CS2

Sustainable travel

The provisions for bicycle racks and shower facilities encourage people to use sustainable transport such as cycling or running to come to the facility. However, a big challenge to this is that Cape Town is not structured in a way whereby living areas are close to the city and this makes it difficult for people to stop using their cars to come to work.

> **CS2B:** *Here living areas are far from the city, not in a city-living culture. But there are people who do come in with their bicycles* […].

Similarly, the provisions for electric cars is a good initiative but they are currently not being used a lot due to the high cost of electric cars. However, it provides for future proofing as the price of electric cars is expected to come down in the future.

Summary

Environmental value was the closest aspect of value considered in the implementation of GBFIs in the facility. The right mix of GBFIs were implemented to meet the primary goal of environmental preservation through energy efficiency, reduced carbon footprint, recycling, resource conservation, provisions for sustainable travel and future proofing. The survey respondents were also of the same opinion.

4.4.6. Social Value

Workplace attractiveness, staff retention and staff satisfaction

The GBFIs sends an image of environmental responsibility to both outsiders and insiders (staff). A growing portion of the staff are becoming environmentally conscious and would not consider working for organisations which do not care about the environment. They are pleased that their organisation demonstrates commitment to the environmental preservation. Furthermore, working in a sustainable building raises awareness about environmental issues and sustainable behaviours:

> **CS2B:** *There are certain companies that might not care too much about protecting the environment but it is really important that we do that because you also house in those buildings people that are your staff, the users of the buildings that are environmentally conscious and if they see the company is doing it then obviously it lends itself to better behaviour inside the building as well so that's the one aspect in terms of social consciousness* […].

People (staff) from twenty-two various satellite offices were relocated to the facility in 2014. Most of them were used to their particular building and it took some time for them to leave their comfort zone and adapt to this building that was very different to what they were used to. One of the main challenges was the open plan of the offices as this led to reduced privacy and less flexibility for the staff. However, most of the occupants have adapted to the new facility over time.

The staff surveys revealed fairly mixed but positive feedback with regards to the impact of GBFIs on staff satisfaction and workplace attractiveness. Despite 67% agreeing to the positive impact of GBFIs on staff satisfaction, 33% do not feel the same. This result ties back to the point raised by the FM team about the challenge in keeping every occupant happy. However, the perception of GBFIs on workplace attractiveness is more positive than staff satisfaction with 85% agreeing to a positive impact and the rest being neutral. The survey results are illustrated in Figure 27.

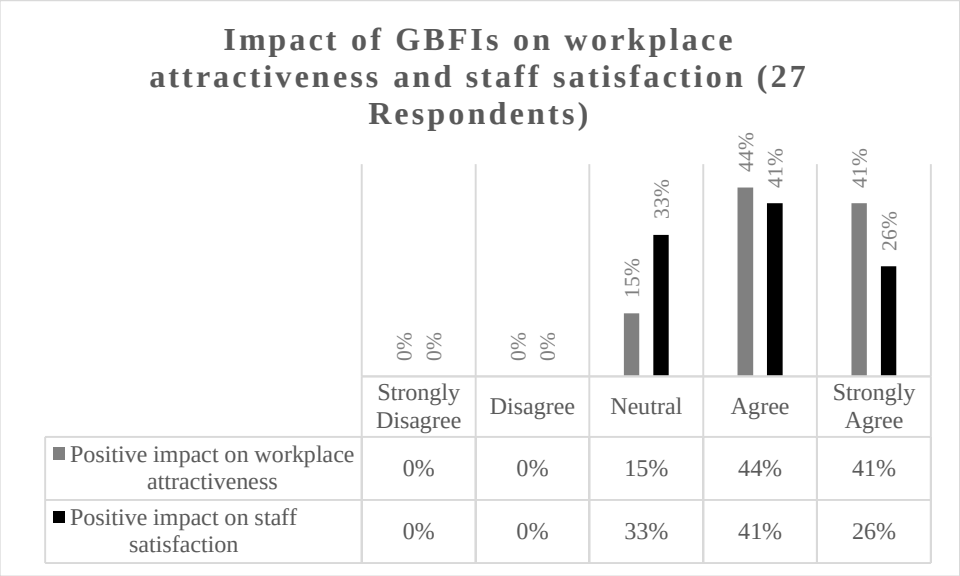


Figure 27. Perception of the impact of GBFIs on workplace attractiveness and staff satisfaction

Work environment and comfort

The staff and clients are very happy with the building and the 360-degree view provided by the façade and this makes the building quite unique in that aspect. This feature is seen to contribute to a better work environment. Furthermore, the lighting and temperature are always kept at an optimal level through the various GBFIs (LED light, sensors, VAV HVAC) in order to satisfy the staff by providing a better and more productive work environment. However, it is always a complicated task to satisfy everybody when it comes to lighting and temperature in an open plan office.

The open floor plan also provides for increased collaboration and communication between the various employees. However, one of the major challenges is the lack of privacy and the noise levels associated with open floor offices. This is reflected in the survey results for this area that displays the largest range of answers in the survey. Despite the majority of respondents agreeing to a positive impact of GBFIs on the workplace environment and comfort levels, 18% of the respondents did not support this argument. This is line with the statements from the FM departments about complaints regarding lighting levels, temperature and noise level in an open plan office. The survey results are illustrated in Figure 28.

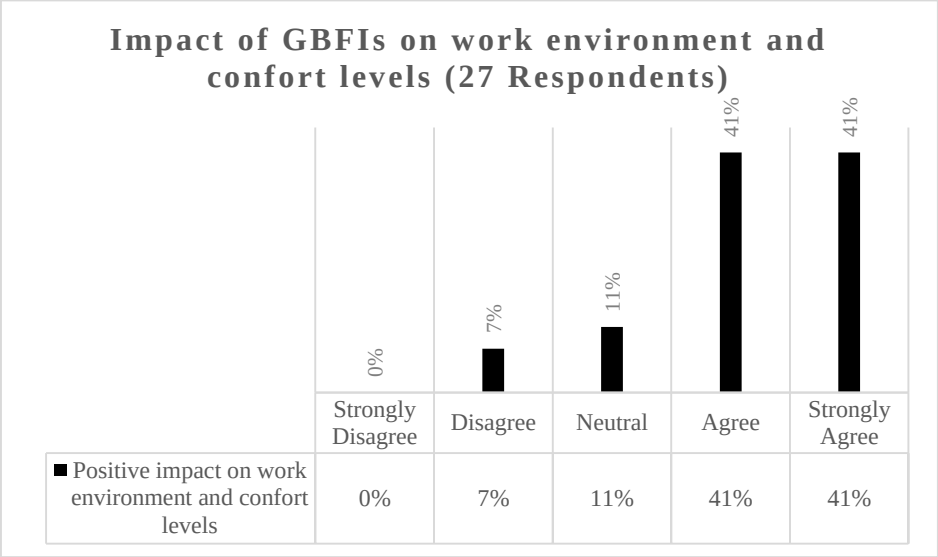


Figure 28. Perception of the impact of GBFIs on work environment

Health and safety

The VAV system only pumps air into areas of the building where it is needed and uses outside air as far as possible to cool the building. The HVAC system provides 150% more fresh air than stipulated standards with the potential to provide 100% fresh air for 60% of the year. The air gets renewed rather than recycled and this does not promote the likelihood of the sick building syndrome.

The majority of the survey respondents also share this feeling as none disagreed to the positive impact of GBFIs on health and safety. However, 15% of the respondents were neutral and did not agree nor disagree to the positive impact on health and safety. The results are illustrated in Figure 29.

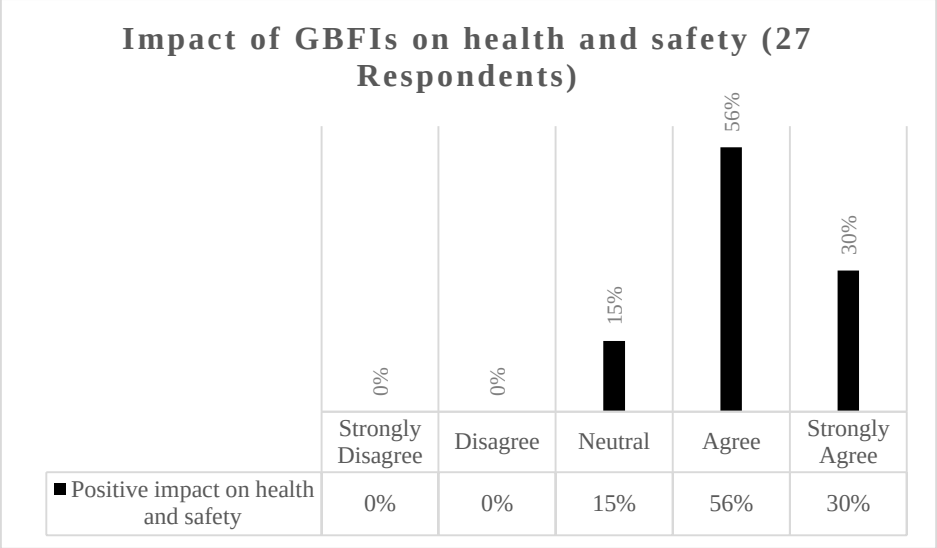


Figure 29. Perception of the impact of GBFIs on health and safety

Summary

GBFIs require many adjustments and changes in behaviour from the end users and this can be very difficult. It is very important to keep the staff informed with regards to the various GBFIs and how they work. The adjustment from the staff happens very slowly and but once it happens benefits in terms of staff satisfaction, improved perception of the environment and workplaces attractiveness. Comfort levels remain the most challenging aspect of social value when it comes to GBFIs and it is difficult to keep everyone happy as noted by the FM team and by the staff surveys.

4.4.7. Conclusion

The pro-active FM strategy adopted ensured that the staff are always informed with regards to the various GBFIs implemented. This is because the "green" operation of the building was found to be heavily reliant on the end-users. Hence, to optimise the value added by the GBFIs it was crucial to get the tenants on board and to get them to change their behaviours and adapt to the building. From an FM perspective it was seen that the GBFIs contribute to environmental and economic value with environmental value being higher.

The social value added is not as clear and remains a challenge due to the change in behaviours required. However, the overall perception from both the management and the tenants is that GBFIs add value to the organisation. The results from the surveys showed that 85% of the staff agree (strongly agree and agree) that GBFIs add value to the facility whilst the remain 15% were neutral on this topic.

4.5. Case Study 3 (CS3)

4.5.1. Case Description

CS3 is a 5 star GSSA office park of more than 174,000m^2, comprising numerous buildings. The office park is fully owned and partly occupied by a national organisation operating in the financial services sector. The park is multi-tenanted by numerous organisations operating in various sectors of the economy. The office park is home to over 9,000 occupants and with visitors and contractors included, the occupancy could go up to 11,000 people in a day.

One of the goals of the organisation is to be a responsible towards clients, employees, communities and in terms of their investments. In accordance to these pillars, the organisation is going "green" in all their branches over South Africa. For example, a 5-star GSSA head office in Johannesburg will be in operation by the end of 2017. This movement has also been applied to the facilities in Cape Town. However, all buildings in the office park are more than 10 years old (with the oldest building being built in 1954). Hence, all the GBFIs were retrofitted as they were never part of the initial designs. This made the implementation of GBFIs substantially challenging from a FM perspective.

4.5.2. GBFIs

The GBFIs incorporated in the facility are listed below:

1. Energy efficient lighting: LED lights used in all common areas and T5 Fluorescent fittings in the office space with motion sensing and daylight harvesting.
2. Environmentally friendly HVAC system and new efficient chiller units: Space temperature is controlled by a chilled water system that uses R134a refrigerant, improving its Ozone Depletion Potential (ODP) and Global Warming Potential (GWP) when compared to conventional systems. Replacement of inefficient mechanical units to localised and efficient electronically controlled units.
3. Recycling: Conventional recycling and non-conventional recycling of organic waste used for fly farming.
4. Solar electricity: Installation of photo voltaic (PV) panels to generate electricity
5. Water recycling: Treated effluent water from the municipality used for irrigation and external usage and water recycling plant for car wash
6. Travel hub and video conferencing facilities: To eliminate unnecessary travelling.

4.5.3. FM Strategy

According to CS3C, the FM strategy considers sustainability in terms of energy, water and waste rather than a joint consideration of economic, environmental, and social aspects. Hence, the strategy is environmentally oriented but each GBFI is assessed differently and there is no one-size fits all approach. However, GBFIs are always implemented if they are financially viable, that is, if it does not end up costing more to the company. As all the buildings in the office park were built many years before the green movement, the FM team made use of benchmarking to look at the major users or contributors with regards to energy, water and waste:

> **CS3C:** […] *to manage your sustainability as a facilities manager you need to look at those three: energy, water, and waste* […] *we've benchmarked. We've looked at what we have. And then we looked at what our major users are in terms of those three categories and then we started green initiatives in place to reduce that*.

Based on this exercise, GBFIs were implemented accordingly to reduce consumption in the targeted areas such as lighting, HVAC and waste management. However, implementing GBFIs to existing facilities was a substantial challenge compared to designing and building green. The FM goal is to be 'net–zero' in terms of waste, water and energy and a systematic strategy has been adopted to advance towards those goals. The FM professionals constantly re-assess the buildings and look at new ways of improving the performance of the building in term of energy, water or waste.

For example, after the implementation of efficient lighting and HVAC, the energy consumption dropped by 42% and the next step for the FM team was to implement a solar electricity project to further reduce the energy consumption from the grid:

> **CS3C:** *From a sort of business continuity and resilience perspective we were already at the point where we had reduced our energy consumption by up to forty two percent so what we then did was looked at said our plant is already on site its already running efficiently what can we do to make our building much more resilient.*

A life-cycle costing exercise showed that the return on investment would justify the installation of the PV panels. Other issues being considered by the FM team currently relate to land use ecology, e.g., whether alien plants are being introduced to the natural environment or whether the natural flora is being preserved to support the existing ecosystem.

In the same vein, considering the severe drought in Cape Town, in order to reduce the water consumption of the facility the FM team is looking at a black water system project to treat sewerage water to potable standards. Despite this not being an economic decision, the purpose of this project is to future proof the building against a possible worsening of the drought situation in Cape Town that would require the facilities to close due to the lack of potable water.

However, the FM team notes that independent of the various GBFIs implemented the benefits reaped are highly dependent on the management process around the GBFIs:

> **CS3C:** […] *if you talking about green buildings there's a large component of green buildings that is not related to the direct initiative or equipment that will make the building sustainable, it is the management process around it.*

Taking HVAC as an example, no matter how efficient the system is, the set points will have to be checked seasonally and adjusted accordingly in summer and winter. Maintenance or operational processes must be in place to ensure that plants and equipment are running optimally. The implementations of the various GBFIs has resulted in the generation of numerous internal policies developed to ensure the optimal operations of the installations from an FM perspective.

Furthermore, considering all the various GBFIs which require end-user input or change in behaviours (such as recycling and the black water system for example), the FM team believe that there is some education, marketing and communication required to inform the end-users. The FM team is of the opinion that meaningful change can only be attained once people change their behaviours as the biggest benefit, in terms of sustainability and GBFIs, comes from behaviour change:

> **CS3C:** *Every initiative has education that is required* […] *education and marketing, communication regarding whatever you trying to achieve because between the three energy, water and waste - energy is probably the only one that you can influence largely without the requirements for the staff to be involved per say. You can take a lot of control away from them and actually manage the profile, energy profile quite well. But water and waste depends almost completely on your tenant* […].

As a result, change management ended up being one of the critical FM tasks for the optimal operations of the various GBFIs. This is important because in the operations phase, the end-users become the 'champions' leading to the success of any strategy being implemented.

Hence, it is vital to effectively communicate the difference from operating in a conventional building versus a green building. This is because one of the FM challenges to the implementation or operations of non-conventional/aggressive GBFIs is the immaturity of the end-users and their reluctance to accept the system. GBFIs relating to energy efficiency are described as being easier to manage as they generally do not require much input from the end user. However, GBFIs relating to water and waste rely heavily on the tenants. Taking the integrated waste management plan as an example, the staff had to be educated and informed over a period of about 18 months.

4.5.4. Economic Value

Profitability growth (Cost cutting, flexibility and adaptability)

CS3C agrees that the GBFIs result in cost cutting in various ways. For example, the LED lights and the light harvesting lead to reduced electricity consumption. However, as the lighting only makes up about 20% of the electricity bill, the biggest cost reduction comes from the improved HVAC system and new chillers. Furthermore, the installation of the PV panels also lead to cost cutting. For example, a saving of about 2.6 million rands on electricity was recorded for the period December 2016 to May 2017.

Another operational cost reduction is waste management. The waste management plan ensures that all waste is not just dumped to land fill sites but rather reused or recycled. Considering the case of wet waste, which is a fixed cost in most buildings, the waste management plan ensured that wet waste disposal came at no cost and produced an income rather. This is because all the wet waste is sold off to a fly farming company rather instead of being transported to landfill sites. However, this required sizeable investments for the re-engineering of waste areas.

In terms of flexibility, it was found that GBFIs provide for variability and adaptability for various environment and building usage. The options provided by GBFIs means that there could be various possible for different challenges in different buildings:

> **CS3C:** […] *a large portion of putting in green initiatives is looking at firstly sustainable options and anytime variable options, there's different type of options that suites different types of environments.*

Moreover, considering the number of organisations and tenants occupying the office park, it is clear that the GBFIs do provide for flexibility favouring multiple uses of the facilities. In terms of productivity, one of the goals of the GBFIs implementation was to provide for the operability

of the facilities in an environment facing electrical and water shortages. This strategy was in place to ensure that productivity is not affected by those difficult conditions.

Revenue growth (Asset value, innovation)

The various GBFIs are seen to improve the asset value of the facilities considering the increase in net operating income resulting from the reduced operational costs. Furthermore, being a 5-star green rated building, there is a potential to charge a premium rental to tenants through green leases for example. The premium is not charged due to the high investment cost of the GBFIs, which is recovered from the reduced operating costs, but rather because the green rating and the sustainability of the facilities' operations.

In terms of innovation, it was noted that the new generation (representing a new client base) are concerned about how a company contributes back to the environment and the greater society from their business operations. Hence, there is a growing need for companies to prove that they are adopting new and innovative solutions to make a positive contribution towards sustainability in order to attract employees and customers. GBFIs effectively provide for innovative ways of operating facilities sustainably and this in turns impacts on the perception of the younger generation/client base by encouraging them to do business with the organisation.

Green recognition

The implementation of GBFIs leads to numerous certifications, awards or accolades. For example, the organisation received a provincial award for energy efficiency in 2016. Those accolades make the facilities more marketable and attractive to other companies who want to join this green movement. Through the various certifications or awards, the GBFIs effectively indirectly attract more business or tenants in the office park:

> **CS3C:** *So once you start received those types of accolades, your building and your site becomes an attraction for other companies on the market to be in.*

Summary

The various GBFIs contribute positively to economic value through cost cutting, improved flexibility, adaptability, asset value and innovation. The green recognition that comes with the implementation of some GBFIs also leads to more marketability and improves the attractiveness of the facility and the organisation hence attracting more business.

4.5.5. Environmental Value

Energy efficiency and carbon footprint

CS3C explained that the LED lights, T5 fluorescent lights, light harvesting and HVAC system all lead to improved energy efficiency, reduced energy use and reduced carbon footprint. The LED lights and the T5 fluorescent lights use less energy than conventional lights and the light harvesting system ensures that there is the right amount of light where needed so that energy is not wasted in lighting the building.

Twenty-two inefficient chiller units running on the R22 refrigerant gas have been replaced with five more efficient units using R134a refrigerants that improve the ODP and the GWP. In the same vein, inefficient diffusers have been replaced by localised energy efficient electronic units. The various initiatives led to a reduction of about 42% of energy usage, which also translates to a reduction of 29 tonnes of CO_2 per year.

Furthermore, the solar electricity allows for less electricity consumption from the grid (coal-generated electricity) and hence reduces the carbon footprint of the facility. The solar plant (PV panels) will lead to reduction of the carbon footprint of the facility by more than one tonne per year.

Waste management and resource conservation

Waste management was an important target of the FM team. Before implementing any strategy, feature or initiative, a waste audit was done to assess and identify the various types of wastes from the office park. After this exercise, strategies were devised to separate waste streams such as paper, plastic, metals, construction waste and even food waste. The education campaign carried out by the FM team was key to the success of this operation as it was essential to separate the waste at source.

As a result, all the waste from the facilities is either recycled or treated in a sustainable manner. Wet waste is usually sent to landfills – even in the case of green buildings. However, the waste management plan allowed for more than 10 tonnes of wet waste to be diverted from landfill sites. Furthermore, the waste management plan along with the education campaigns have changed the lifestyles of the tenants who now also implement these sustainable behaviours at home. For example, staff would collect their wet waste from home and discard it at work where it goes to fly farming sites to produce high protein insects for animal fodder. This also decreases the need for fish farming as a high protein animal fodder are mostly from farmed fish:

> **CS3C:** […] *we are helping the environment in that instance indirectly but directly for us as we then diverted a large portion of our wet waste to an initiative that then has this natural off spin of feed, protein feed, into the industry.*

In terms of resource conservation, treated water from effluent plants are used for external uses (irrigation, cleaning etc.) and a water recycling plant has been seen up for the car wash facility. The FM team noted that this is not enough and are busy implementing a black water system to treat sewer water to potable standards.

Reduced travel

In order to reduce travel requirements, provisions have been made for teleconferencing facilities to facilitate meetings without having to be physically in the same room as the other participants. Furthermore, all on-site trips across the park must be booked through a travel hub to reduce unnecessary travel or minimise the number of cars going to one place.

Summary

The FM goals of reducing energy, water and waste are all met through the various GBFIs implemented. Those GBFIs lead to energy efficiency, reduced carbon footprint, water conservation, travel reduction, waste management and reduction. The environmental value added by those GBFIs is very high. Furthermore, the organisation is considering ways of improving the facilities performance in relation to their immediate environment through hard surfaces management. They are busy assessing the storm water system to find ways of capturing the water to ensure that the storm water run-offs from the hard surfaces do not run off to the informal settlements nearby.

4.5.6. Social Value

Workplace attractiveness, staff retention and staff satisfaction

The impact of GBFIs on staff satisfaction is difficult to assess according to the CS3C as it depends on the specific individual. In such a big office park, there is a big generation gap and the younger generation tend to accept and appreciate the GBFIs more than the older generation who are used to the conventional buildings:

> **CS3C:** *Employee satisfaction is an interesting one, so depending on the organisation you work for you actually have to take this back to psychology* […].

Those GBFIs also plays a role in attracting new, younger and often environmentally conscious employees. The change that comes from the GBFIs sometimes has a negative impact on the staff satisfaction of the older generation (of end-users). However, it was noted that a large portion of staff satisfaction is derived from the employee understanding that he or she is a making a positive contribution to the environment. It was observed that this gave rise to a sense of gratification or achievement through their contribution to a greater cause. This was seen in the comments in the survey conducted in 2016. Similarly, in terms of staff retention, as many tenants are fascinated by the various GBFIs implemented, this further encourages them to work in a facility operating sustainably:

> **CS3C:** *The industry data shows that staff retention is positively impacted in that there's more retention.*

The FM department also noted that once the waste management programme was accepted by the staff, some tenants started bringing their waste from home to be discarded in the office. This allowed the staff to get rid of their waste more often rather than doing it once a week.

Work environment and comfort

According to CS3C, the lighting and temperature is kept at an optimal level through the light harvesting mechanism and HVAC system respectively. The current strategy is not only to have open floor plans to maximise use of natural lighting and decrease the energy loads but to also have breakaway areas to allow people get together in a different setting in order to mix ideas and improve creativity.

The survey results, illustrated in figure 30 and 31, reflect a relatively neutral sentiment with regards to temperature, noise, and IAQ. This means that the staff are not particular satisfied with the outcome of the various GBFIs in those particular areas. The only area with which the staff are markedly satisfied is the indoor lighting of the facility. Further comments in the survey included issues relating to the facilities being either too hot or too cold and how challenging it was to find a temperature that suited everyone. The noise levels of the open plan office was also a very common issue raised in the survey. The survey results are depicted in Figure 30.

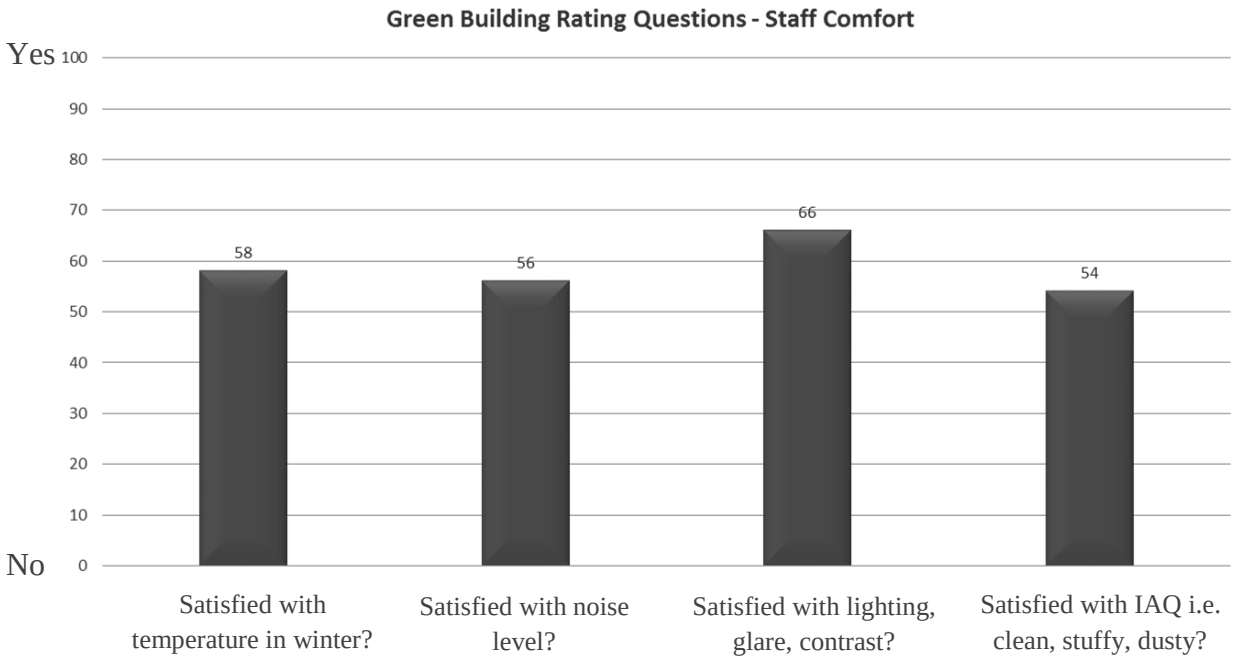


Figure 30. Perception of GBFISs and staff comfort in CS3

Furthermore, the survey also recorded 167 complaints regarding the work environment. Amongst these complaints, 141 related to temperature issues, 21 to IAQ issues, 4 to noise issues and 1 was about lighting issues. This is illustrated in Figure 31. However, out of the 2541 response, the 167 complaints only represent about 6.6% of the survey respondents. Nonetheless, as temperature and IAQ form the biggest challenge as 6.4% of survey respondents complained about these two. This means that the HVAC system has a negative impact of social value added.

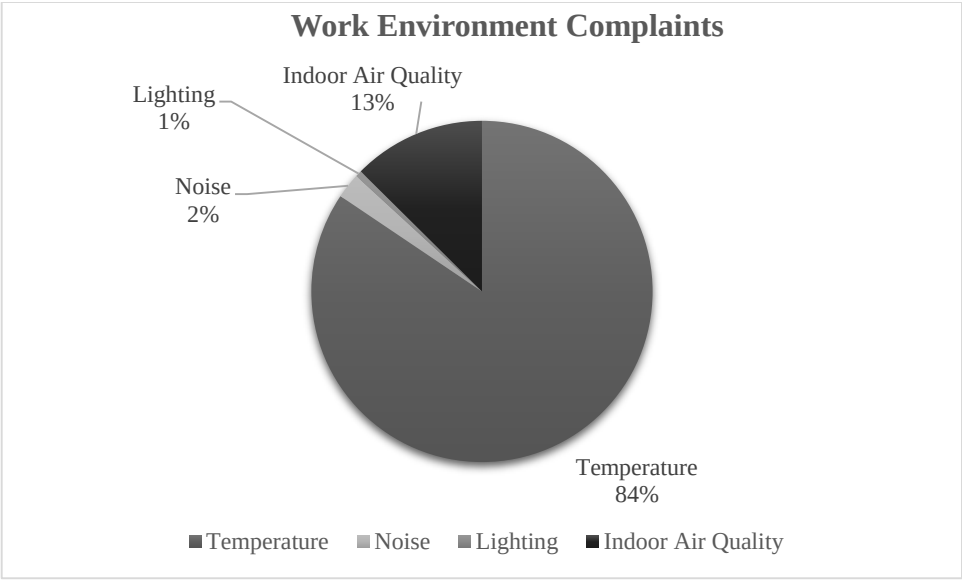


Figure 31. Work Environment Complaints in CS3

Health and safety

Despite the staff neutral perception of the staff on IAQ, the HVAC system is operated and maintained to provide for IAQ. As part of the FM strategy, every year tests are carried to assess the levels of carbon monoxide, carbon dioxide or formaldehyde from furniture as well as legionella testing for water contamination. These measures ensure that there is minimal exposure to germs and toxins in the various facilities. However, the staff comments in the survey pointed out the lack of ventilation, in some areas of the facility, which lead to proliferation of germs once somebody gets sick.

Summary

CS3C describes one of the goals of the organisation as changing the behaviour of the employees to create a ripple effect and encouraging tenants to implement the sustainable principles at home. This was seen through the waste management programme. However, one of the main challenges of the GBFIs relate to the IEQ. Despite the various initiatives and efforts made by the FM department, the staff experience is not as positive as depicted by CS3C. For example, 6.4% of survey respondents complained about temperature levels and IAQ. This means that the HVAC system has a negative impact of social value added.

However, one of the challenges of open plan offices is to about keeping every occupant happy. The FM team is aware of this and are making continuous efforts to optimise the social value of the HVAC systems. CS3C explained that they would soon implement an interior rating of sustainability, so that staff can rate how sustainable the interiors are and to identify weaknesses in the system. This would consider paints, HVAC, lighting and noise levels.

4.5.7. Conclusion

The value added by the various GBFIs in CS3 is highly dependent on the FM strategy and on the management of those GBFIs. Environmental value added stands out as the most evident result of the various GBFIs followed by economic value added. Social value added remains a long term challenge for the FM team who will have to optimise the services in order to satisfy the end users as well.

4.6. Case Study 4 (CS4)

4.6.1. Case Description

CS4 is a non-green star SA rated facility of about 9500m^2 and comprises 20 levels. The facility has recently been purchased by the (current) proprietor and is tenanted by numerous organisations with eight floors occupied by a major tenant operating in the legal sector. The concept of added value was not a driver in the implementation of GBFIs and the inclusion of the various GBFIs was only an effort to be more sustainable. The GBFIs included in the facility are seen as being the norm presently according to CS4D.

4.6.2. GBFIs

The GBFIs incorporated in the facility are as follows:

1. Water efficient sanitary fittings: Full flush (11 litre cistern) and half flush (6 litre cistern) cisterns for toilets and sensors for taps, urinals etc.
2. Recycling: Recycling systems for paper, glass, carton, and metals.
3. Cyclist facilities: Showers and bicycle racks to increase the use of sustainable travel.

4.6.3. FM Strategy

The facilities manager (CS4D) explained that the GBFIs incorporated in the building were chosen due to the ease and low cost of installation. The goal of the developer was not to operate in the green market by targeting an elite 'green' tenant base. They rather targeted average organisations looking for A-grade office space at market rentals, that is, with no green premium charged. CS4D describes the office sector to be a tough one and it was a priority to charge competitive rentals because of the perceived over supply of office space in Cape Town currently:

> **CS4D:** *The market we are in, it is tough. We were not looking at green buildings as those usually mean higher rent. The smaller businesses, like our tenants here, would not be prepared to pay a premium on the rent. When you look at other green buildings around, you will see that there is a lot of vacancies.*

The FM strategy adopted appears to be mostly about operational FM. The FM service is outsourced by the landlord and CS4D is in charge of numerous other buildings and only attends to CS4 once a week. Furthermore, as pointed out by CS4D, the GBFIs implemented do not require much FM input. Hence, the FM professional adopts a reactive approach rather than a pro-active approach.

In terms of the GBFIs management, CS4D explained that the recycling programme is strongly supported by the main tenant. This is because they obtain certificates from the recycling initiative. The main tenant separates their waste strictly – paper, metal, glass, wet waste, etc. However, the other smaller tenants do not sort their waste despite the sorting bins provided in each office:

> **CS4D:** *We do provide sorting bins for recycling in all offices. You know those bins for glass, tin, paper, etc. but it is not used correctly and we struggle with that.*

Consequently, the waste needs to be sorted in the basement prior to collection from the recycling company. Similarly, most tenants do not make use of the half-flush system and mostly use the full 11-litre flush. This is backed by the survey results, depicted in Figure 32, which show that despite the low level of GBFIs implementation, 54% of the tenants are unaware of all the various GBFIs implemented.

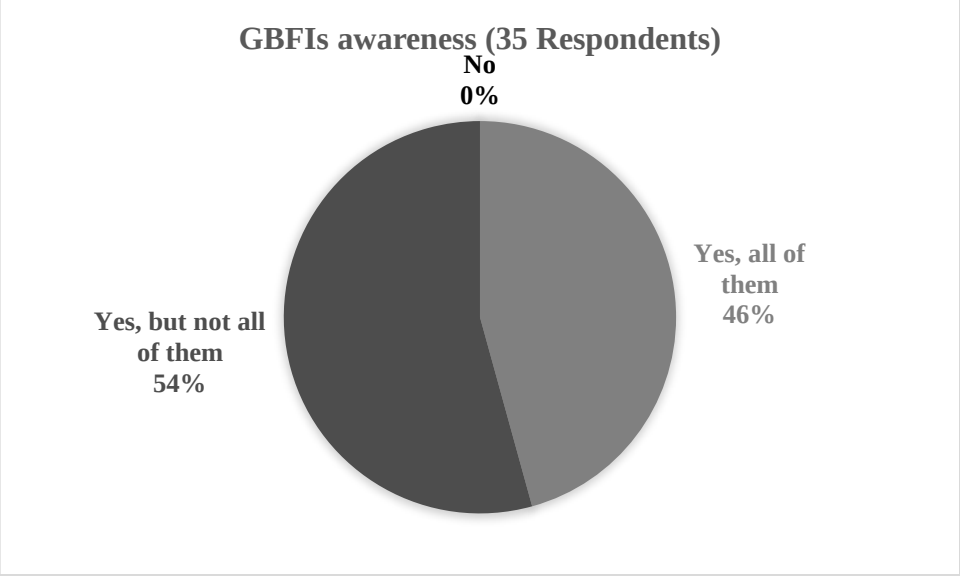


Figure 32. GBFIs awareness in CS4

CS4D agreed that GBFIs are becoming more and more important considering the electricity and water shortages. There have been mentions of retrofitting the building with more energy efficient fittings to improve energy efficiency. However, sizeable capital investment will be required to provide reduce water consumption. CS4D regrets that this was not considered in the design stage as they will soon be facing a problem should the situation worsen:

> **CS4D:** *With the drought, the price of water is likely to keep going up and this will hit the operating cost hard. Both tenants and landlord will feel it in that case, not*

necessarily shareholders only but I don't know what the plan is, it is a very pricy exercise to now come and implement all that greywater and rain water harvesting stuff.

4.6.4. Economic Value

Profitability growth (Cost cutting, flexibility and productivity)

The water efficient fittings lead to a reduced water bill and rebates/cash backs are received from the recycling programme. The GBFIs have no impact of flexibility or productivity. The survey also revealed that the majority of the end users believe that these GBFIs have no impact of profitability growth as they mostly disagreed to the statement about GBFIs having a positive impact on cost cutting, flexibility and productivity. 71% of the survey respondents did not agree that the GBFIs contribute positively to cost cutting whilst 91% did not agree that the GBFIs impact positively on flexibility and productivity. The survey results are illustrated in Figure 33.

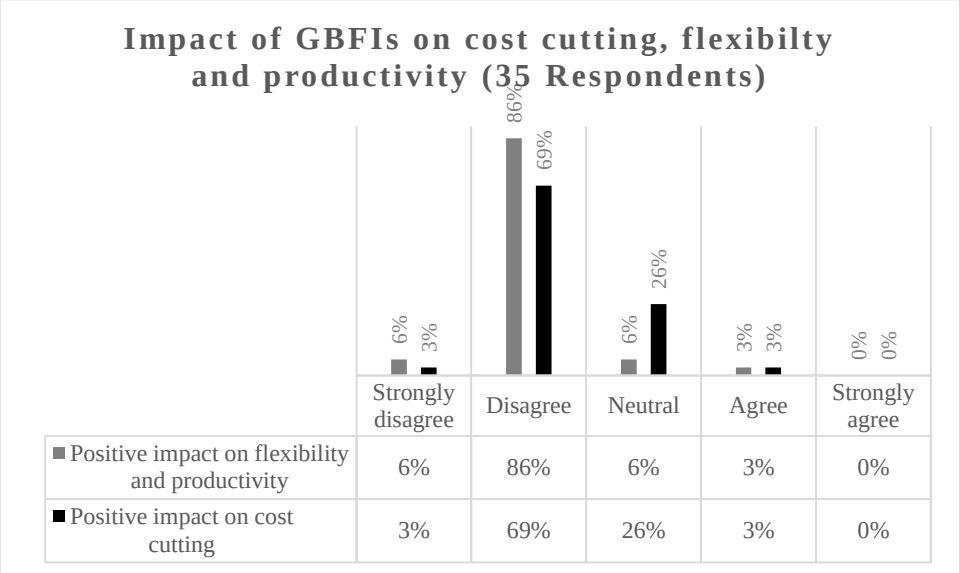


Figure 33. Perception of the impact of GBFIs on profitability growth in CS4

Revenue growth (Asset value, innovation)

CS4D noted that the GBFIs had no impact on asset value or innovation in his opinion. The survey results support this argument as 86% of building occupants either disagreed (80%) or strongly disagreed (6%) to the statement that the implemented GBFIs impact positively on innovation as illustrated in Figure 34.

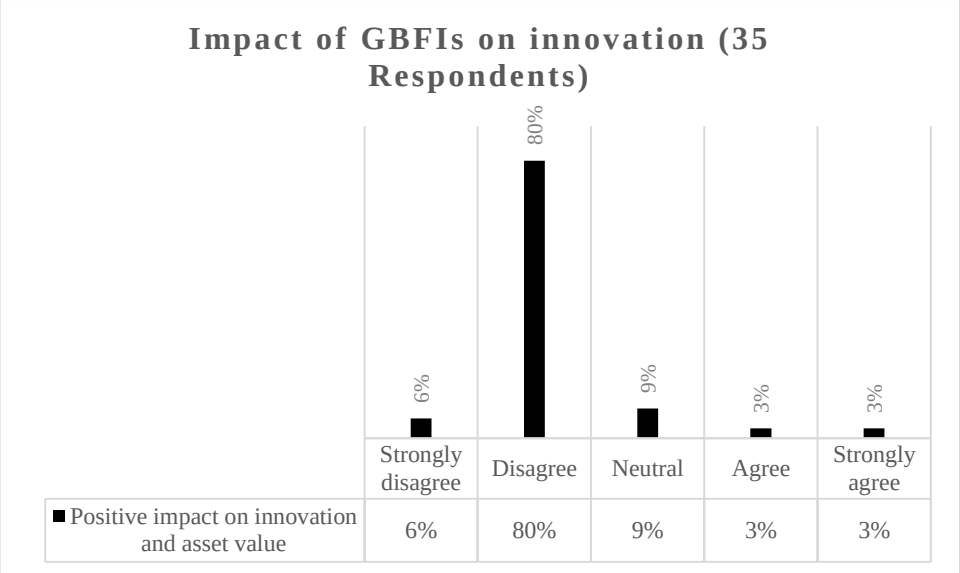


Figure 34. Perception of the impact of GBFIs on innovation in CS4

Summary

Considering the scale and types of GBFIs implemented, it can be seen that the economic value added was not significant. Both the FM professional and the occupants share the similar opinions about the impact of GBFIs on economic value:

> **CS4D: […]** *in buildings where it is done extensively then sure it adds value but here it is low scale so the value added is minimal.*

4.6.5. Environmental Value

Energy efficiency and carbon footprint

The GBFIs implemented in the facility do not contribute directly energy efficiency or carbon footprint reduction according to CS4D. Similarly, the survey results depicted in Figure 35 also point out that 77% of the respondents do not agree that the GBFIs contribute positively to energy efficiency and the carbon footprint reduction and 11% strongly disagree to the proposition. However, CS4D noted that the provisions for sustainable travel does lead (indirectly) to a reduced carbon footprint of the facility.

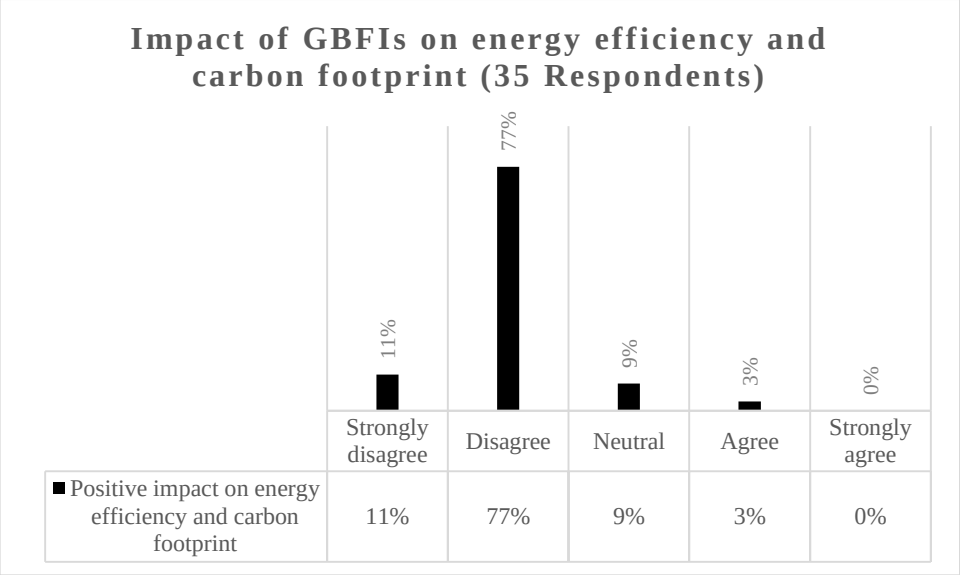


Figure 35. Perception of the impact of GBFIs on energy efficiency and carbon footprint in CS4

Waste management and resource conservation

The recycling programme ensures that the waste is treated in a sustainable way. The sensor taps and the dual flush system also allows for the reduced consumption of water. The survey respondents had a better perception of the GBFIs when looking at resource conservation and waste management. 86% were of the opinion that the GBFIs contributed positively to waste management and 69% were if the opinion that the GBFIs had a positive impact on resource management. Despite some respondents being neutral on the issue, it can be noted that the overwhelming majority perceive GBFIs as having a positive impact on both waste management and resource conservation but waste management was perceived as being the area which is most positively by the GBFIs. This is illustrated in Figure 36.

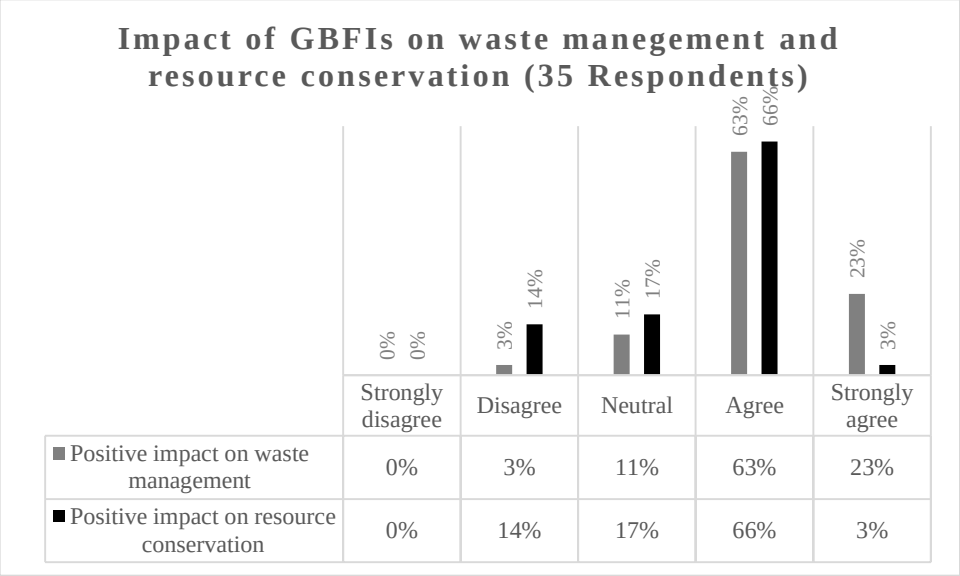


Figure 36. Perception of the impact of GBFIs on waste management and resource conservation in CS4

Sustainable travel

Provisions for cyclist facilities in the facility encourage staff to opt for sustainable travel options. However, one of the points raise by CS4D was that the bike racks are not fully used. Despite the provision for sustainable travel, the desired outcome of having less cars coming in the buildings is not achieved.

Summary

Despite the low scale of the GBFIs implementation in CS4, they were seen to add environmental value by addressing specific areas, namely: resource conservation, waste management and sustainable travel.

4.6.6. Social Value

Workplace attractiveness, staff retention and staff satisfaction

CS4D agrees that GBFIs have the potential to impact on staff satisfaction or workplace attractiveness especially when they are implemented at a large scale. However, in this case the GBFIs are not seen as having a significant impact on the workplace attractiveness or staff satisfaction. CS4D believes that only the employees using the cyclist facilities (not many) would experience improved staff satisfaction. The end-users also share the same opinion as the majority of the survey respondents did not agree to the proposition that the GBFIs have a positive impact on the workplace attractiveness (77%) and staff satisfaction (80%). This is illustrated in Figure 37. With regards to workplace attractiveness, 57% disagreed to the proposition whilst 23% strongly disagreed. Similarly, for case of staff satisfaction, 51% disagreed to the proposition whilst 26% strongly disagreed. This reflects a strong sentiment about the GBFIs not affecting workplace attractiveness or staff satisfaction.

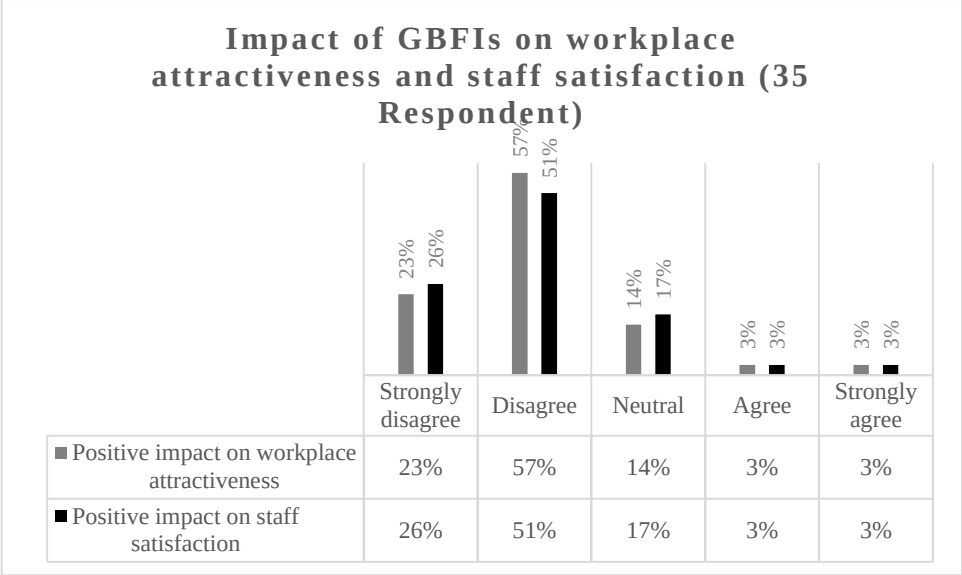


Figure 37. Perception of the impact of GBFIs on workplace attractiveness and staff satisfaction in CS4

Work environment and comfort

The GBFIs have no impact on the work environment and comfort according to CS4D. The survey results, depicted in Figure 38, also support this statement. 83% of the staff do not perceive the GBFIs as having a positive impact on the work environment and comfort levels. There was a strong level of disagreement on the proposition with 29% strongly disagreeing and 54% disagreeing.

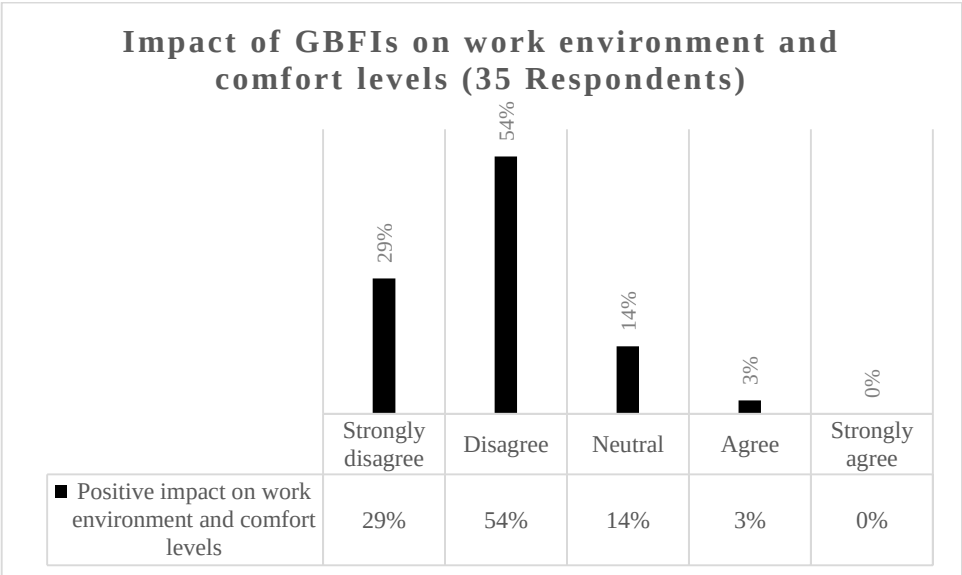


Figure 38. Perception of the impact of GBFIs on work environment and comfort levels in CS4

Health and safety

The GBFIs have no impact on health and safety according to CS4D. In the same vein, the survey results, illustrated in Figure 39, revealed that the majority of respondents (82%) did not

perceive GBFIs as having a positive impact of health and safety in the facility. 51% disagreed to the proposition whilst 31% strongly disagreed.

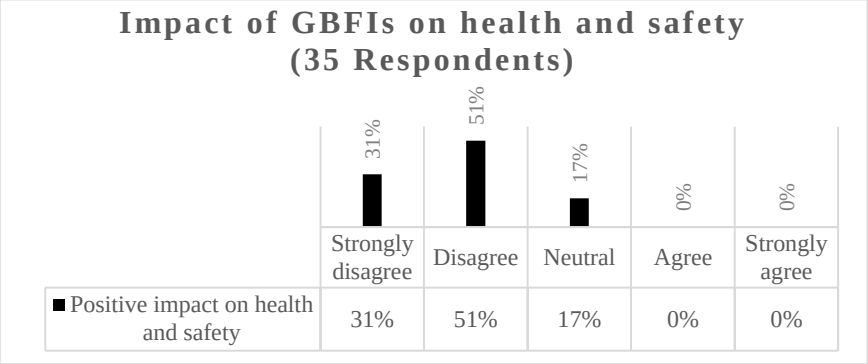


Figure 39. Perception of the impact of GBFIs on health and safety in CS4

Summary

It was found that the GBFIs do not contribute to any proxies for social value as no positive impacts were noted on workplace attractiveness, staff retention, staff satisfaction, work environment, comfort level or health and safety.

4.6.7. Conclusion

Environmental value stands out as being the one aspect of value on which the GBFIs have a positive impact. Almost no impact was noted with regards to economic value with the exception of some cost reductions relating to the recycling programme. However, the GBFIs had no impact on social value as revealed by the interviewee and the survey results. Overall, the building occupants have slightly positive perception of the value added by GBFIs. Furthermore, considering that the FM function has been outsourced to CS4D, it can be seen that the outsourcing of the FM services appears to have a negative impact on the pro-active operations of the building and leaves way to a reactive approach.

4.7. Cross Case Analysis

4.7.1. General

The individual case analyses revealed that CS4 was the only case where the GBFIs did not contribute significantly to economic and social value. This was not the case for CS1, CS2 and CS3, which are green rated facilities where GBFIs were perceived to add value in all the three aspects of value. The cross case analysis draws attention to the similarities and differences between the cases in terms of themes, such as the FM strategy, the tenant role, the GBFIs mix and the green star rating, identified in the individual case analyses.

Table 17 below summarises the keys aspects about the four cases analysed highlighting the similarities and differences in the operations and tenancy of the facilities.

Table 17. Cross case analysis

	CS1	**CS2**	**CS3**	**CS4**
Green Rating	Level 4	Level 5	Level 5-Retrofitted	No green rating
GBFIs	- Stormwater harvesting - Efficient HVAC - DALI lighting systems - Double glazed façade - Recycling - Cyclist facilities	- Water efficient sanitary fittings - Recycling and composting - Water recycling - Motion sensors for lighting - Full glazing maximing use on natural light - Double glazed reducing heating and cooling loads - Cyclist facilities - Electric car charging points	- Recycling - Food recycling - LED lights - Light harvesting - Efficient HVAC - Travel hub - Use of treated effluent water - Photovoltaic panels for electricity	- Recycling - Cyclist facilities - Water efficient sanitary fittings
FM	Pro-active / Strategic	Pro-active / Strategic	Pro-active / Strategic	Reactive/ Operational
Economic value added	Profitability and revenue growth	Profitability and revenue growth	Profitability and revenue growth	Profitability growth
Environmental value added	Energy efficiency, water savings, waste management, sustainable travel	Energy efficiency, water savings, waste management, sustainable travel	Energy efficiency, water savings, waste management, reduced travel	Waste management, water savings
Social value added	IAQ, Workplace attractiveness*, staff satisfaction* **subjective*	Staff satisfaction*, IAQ, comfort*,work environment* **subjective*	Staff satisfaction*, IAQ*, workplace attractiveness* **subjective*	
Challenge	Comfort, behaviours	Comfort, behaviours	Comfort, behaviours	Behaviours
Occupancy	Owner-occupier	Developer-occupier and multi tenanted	Owner-occupier and multi-tenanted	Multi-tenanted
Sector	Mining, coal, natural resources etc.	Finance and business services	Various: Finance and business services (core tenant)	Various: Legal (Core tenant), construction, marketing etc.
No. of occupants	Not disclosed	900	9000	220

4.7.2. FM Strategy

Green operations

The value added by GBFIs is linked to the FM strategy. CS1, CS2, and CS3 adopted a pro-active and "green" oriented FM strategy as opposed to CS4. The FM professionals for those three cases place significant emphasis on the "green" operations of the facilities in terms of the various GBFIs implemented. The FM strategy is in line with the vision of the main tenant or owner occupier in those three cases. In all those three cases it was found that having a main organisation (tenant or owner) driving the sustainability move ensures that the facility is "green" operated. This drive was missing in CS4.

Implementing GBFIs in a facility to make it sustainable is only the first step as the FM department needs to ensure that the GBFIs are operated optimally to ensure that the facility is run sustainably. This is because the performance of GBFIs is highly dependent of the management process. CS3C explained that specific maintenance or operational processes must be in place to ensure that the GBFIs run optimally. Furthermore, in CS1 and CS4, the respective FM departments have set up internal policies or documentations to ensure the optimal operations of the GBFIs from an FM perspective. The reactive/operational approach employed in CS4 does not pay particular attention to GBFIs but rather responds to operations requirements of the building.

Pro-active approach

The pro-active approach adopted by FM professionals from CS1, CS2 and CS3 also provides for on-going development of the sustainable FM strategy by constantly looking for improvement opportunities. New biodigestors will be implemented in CS1, alternative uses are being considered for small pockets of spaces in CS2 and a black water recycling system is being commissioned in CS3. Furthermore, the FM team in CS3 continually re-assess the performance of the facility to find new ways to improve the buildings performance in terms of energy, water and waste.

LCC and benchmarking

To support the on-going development of GBFIs in the different facilities, the FM teams make use of various tools such as LCC and benchmarking. LCC exercises were performed in CS1 and CS3 when considering the additions of new GBFIs. This demonstrates the importance of financial sustainability in the FM strategies. However, despite being financially sustainable, in several instances the GBFIs add more environmental value that economic value. To justify the

implementation of GBFIs that do not necessarily add economic value, the environmental considerations are also factored in LCC as was the case in CS3. Furthermore, in CS3, which was a retrofitted facility, benchmarking played an important role by assisting the organisation in assessing the best options, trends or best practices in terms of sustainability in order to implement the best options in the facilities.

Retrofitting GBFIs

Benchmarking and LCC are essential tools when retrofitting GBFIs to an existing facility. They allow for the assessment and curtailing of the GBFIs to the facilities and its operations. CS3 adopted a systematic approach to improve the facilities through the implementation of GBFIs to the current facilities. CS3D explained that it was critical to implement the various GBFIs in steps when dealing with existing facilities as it takes time for the end-users of a facility to adapt to changes in the work environment. This also means that with retrofitting, the FM department needs to deal with change management, which is a big requirement when GBFIs are implemented to existing buildings. Considering the existing stock of buildings with no GBFIs, there is a lot of scope for major development in the field of GBFIs implementation to existing buildings.

Future proofing

All the FM professionals agreed that most GBFIs were effective solutions to future-proof facilities. This is particularly important in the current context considering the severe drought in Cape Town along with the electricity shortages. Strict laws and restrictions are expected and this could have a potential impact on the operationality of facilities. In the same vein, these shortages can lead to increased utility rates that will impact on operating costs. GBFIs such as greywater systems, rainwater harvesting or solar electricity installation effectively provide for future proofing of facilities by ensuring their usability even in a changing environment (in terms of natural environment or rules and regulations). CS4D noted that due to the lack of water related GBFIs, it will be challenging to manage the facility should the drought situation get worse in Cape Town.

Some GBFIs also provide for variability and adaptability by offering long-term solutions to current and future requirements. An example would be electric cars, despite not being popular currently, there is a growing interest around the subject and their popularity is increasing in South Africa. Hence, provisions for electricity cars accommodate the expected change in behaviours in the near future.

4.7.3. Tenant Role

End user input

Many GBFIs, such as LED lights or solar electricity, can be implemented without requiring input or behaviour change from the end-users. However, as explained by CS3D, the biggest benefits come from those GBFIs that require input from the end-users. For example, for a recycling programme to work, the building occupants need to sort their waste or for a black water recycling programme to work, end users must be open to the idea of using treated sewer water. Hence, the end-user has the potential to impact on the value added by GBFIs.

Change management

Staff behaviour was one of the major challenges noted in all the cases studied. The implementation and operations of aggressive or non-conventional GBFIs can be hindered by the immaturity of the end-users and their reluctance to accept the system. It can be difficult for staff to adapt to new systems and change management is often required. This can be challenging and it can take a lot of time to get tenants to change their behaviour to adopt more sustainable ones in line with the FM strategy. However, in CS1, CS2 and CS3 the FM teams addressed the issue in numerous ways.

Information and communication

Various information and communication initiatives have been set up in CS1, CS2 and CS3 to inform the end-users about the work being done by the FM teams and how their own contribution is important. This is because it is crucial to get the staff on board for the success of the FM strategy. These initiatives would include information campaigns to keep tenants informed about the various GBFIs, education programmes to integrate sustainability practices and information screens to inform the tenants about the facility's performance (in terms of energy or water). Once the tenants are informed and when they see what is being done by the FM team, they become more environmentally conscious. There are no such initiatives in place in CS4 and this reflects of the unsustainable behaviours of the building occupants as noted by CS4D.

Tenant base

The size of the tenant base also plays a significant role in change management. Based on CS3, the bigger the employee base, the bigger the generation gap. Hence, it becomes challenging for the FM professionals to devise strategies to reach all the different 'generations'. However, it

was seen that the younger generations are more accepting of the GBFIs as opposed to the older generations who do not really like the change brought by GBFIs.

Tenant as a driver of green movement

It was also seen that it is important to have an organisation driving the sustainability agenda to ensure that the facilities are being operated sustainably. In CS1 and CS3, the owner-occupier drove this process and in CS2 the developer and main tenant drove the process. This was missing from CS4 and there was no substantial driving force to push for the sustainable operations of the building.

By looking at the four cases, it was also found that the sector of operation of the main tenant/organisation also appears to play a role in the green operations of facilities. For example, organisation from the financial services sector appeared to be more driven towards sustainability and the strategic management of GBFIs.

4.7.4. Value Added by GBFIs

Overview

Even though none of the cases considered the value added by GBFIs as a primary driver to their implementation, it was found that GBFIs do add value to the facilities. In all cases considered in this study it was found that all GBFIs contribute to added environmental value of facilities. This is because the primary goal of GBFIs is to reduce the environmental impact of the operations of facilities. Economic value added came in second place whilst social value added came in last.

Challenges

Despite a relatively positive overall outlook, social value in terms the building occupants was a challenging aspect of facilities incorporating GBFIs. This is because GBFIs bring about change and this is not easily accepted by the building occupants. Furthermore, there were reported cases of dissatisfaction surrounding the building services (lights, temperature, IAQ) in CS1, CS2 and CS3 and this was also seen in the survey results for CS3. The main sources of complaints were the services and the open office plan which was noisy or not at the ideal temperature or not at the right lighting level. However, CS1A noted an improvement in interactions and collaboration from the open floor plan in combination with the glazed façade.

The FM professionals are aware of this but this remains one of their biggest challenge, as it is extremely difficult to keep every single occupant happy when it comes to GBFIs

implementation. Despite the efforts made by the FM team in CS3, the survey results showed and average sentiment in relation to the work environment, comfort levels and IAQ. CS2B believes that awareness of the GBFIs and the reasons behind their implementation is key in to improve social value as GBFIs send and image of social responsibility. In CS2 about 67% of the survey respondents were aware of all the GBFIs implemented and the responses in relation to social value were also seen to be fairly positive.

CS2B also explained that the management of GBFIs in a high-rise building is a very meticulous exercise. This is because the higher the building is the harder it is to manage the services in the buildings and different floors have different requirements. With high-rise, there are limitations with regards to what can be done externally and most GBFIs need to focus on the internal aspect of the building. For example, it is extremely difficult to integrate green walls or natural ventilation to a high-rise building.

Another point raised by CS1A was the difficulty experienced with procurement management in relation to GBFIs. CS1A explained that they find it hard to find a contractor for the maintenance of the existing GBFIs or for the installations of new ones.

Green Star Rating

The green star rating of CS1, CS2 and CS3 was found to play a significant role in economic and social value added. The green star rating was found to impact on perceptions and branding which in turn impact on share prices (in the case of public listed companies) or on the attraction of new tenants who want to occupy green star accredited facilities at a premium rental. Hence, this influences the income earning potential and the asset value of the facility. Furthermore, working in a green star accredited building was found to improve staff satisfaction and workplace attractiveness.

GBFI mix and level of implementation

GBFIs add value to facilities in numerous ways and all GBFIs contribute to improved environmental value but not necessarily economic or social value. It was found that the value added by any GBFI is reliant on the FM strategy.

Table 18 breaks down the perceived value added by the various GBFIs considered in this research based on the interviews and staff surveys. It is important to note that the social value added is very subjective and depends on the end user's mindset, behaviour and attitude.

Table 18. Value added by GBFIs

	Economic value	**Environmental value**	**Social value**
Rainwater harvesting	+ Cost cutting + Flexibility* + Asset value *Future proofing	+ Resource conservation	+ Staff satisfaction (linked to sustainable behaviours)
Grey water system	+ Cost cutting + Flexibility* + Asset value *Future proofing	+ Resource conservation	- Negative staff perception when used in instances other than WCs
Water efficient sanitary fittings	+ Cost cutting	+ Resource conservation	- Staff dissatisfaction in some cases
Double glazed façade to reduce heating/cooling loads	+ Cost cutting + Asset value	+ Energy efficiency + Reduced carbon footprint	+ Work environment and comfort levels
Efficient HVAC maximising use of external air	+ Cost cutting + Productivity + Asset value	+ Energy efficiency + Reduced carbon footprint	- Staff dissatisfaction in some cases + Health and safety contribution (IAQ)
Glazed façade and open floor plans	+ Cost cutting + Asset value + Innovation	+ Energy efficiency + Reduced carbon footprint	- Staff dissatisfaction
Conventional recycling	+ Cost cutting	+ Waste management	+ Staff satisfaction
Recycling of wet wastes	+ Cost cutting + Asset value + Flexibility + Innovation	+ Waste management	+ Workplace attractiveness + Staff satisfaction
LED lights and light harvesting	+ Cost cutting + Flexibility* + Productivity + Asset value + Innovation *Future proofing	+ Energy efficiency + Reduced carbon footprint	+ Work environment and comfort levels
Cyclist facilities		+ Sustainable travel/reduce carbon footprint	+ Workplace attractiveness + Staff satisfaction
Electric car points	+ Asset value + Flexibility* *Future proofing	+ Sustainable travel/reduced carbon footprint	+ Workplace attractiveness
Solar electricity	+ Cost cutting + Flexibility* + Asset value *Future proofing	+ Energy efficiency + Reduced carbon footprint	+ Staff satisfaction + Workplace attractiveness
Video conferencing infrastructure		+ Reduced carbon footprint	+ Workplace attractiveness + Staff satisfaction

4.8. Chapter Summary

The data gathered from the interviews and surveys were presented in this chapter. The analysis of each case was done with respect to themes identified in the data relating to the FM requirements surrounding GBFIs as well as the proxies for value added. Lastly, a cross case analysis was conducted to highlight the similarities and differences between the various cases. These findings are further discussed in terms of the literature in chapter 5.

Chapter 5: Conclusion

5.1. Introduction

The previous chapter analysed the data gathered from the interviews and survey and three cases were seen as successful in terms of value added. This chapter will further examine the themes identified in Chapter 4 and relate them back to the literature reviewed in Chapter 2. The research questions, objectives and proposition will also be re-examined in order to assess the value added by GBFIs implemented in a facility and to further understand the role of FM in this process. The reliability and validity of the research will also be discussed towards the end of the chapter. The recommendations for future research concludes this chapter.

5.2. Linking Emerging Themes to Literature

5.2.1. Drivers of Sustainability

According to authors such as Gladwin *et al.* (1995), Starik and Rands (1995), Carter and Rogers (2008) and Pullman *et al.* (2009), an increasing number of organisations and researchers have expanded sustainability objectives to address more carefully the social, environmental, and long-term economic stability considerations. However, it was found that the GBFIs were implemented in the different facilities studied as part of the vision of the companies and to reflect the responsible behaviour of the organisations. This was clearly seen in cases where the owner was the occupier of the facility. Shah (2007) argued that sustainable development has evolved to a more holistic approach merging with CSR in the 2000s. It was found that responsible behaviour was indeed a major driver of the sustainable agenda and the value added by GBFIs was not a main consideration but the environmental benefits were considered over profit maximisation in some instance.

International literature suggested that the main drivers to the implementation of sustainable practices relate to: (1) Legislations; (2) Corporate image; (3) Organisation vision; (4) Senior management; (5) Pressure from clients; (6) Life cycle cost reduction; (7) Pressure from employees; and, (8) Pressure from shareholders (Elmualim *et al.*, 2012). This ranking is illustrated in Figure 6 (See Chapter 2, p.30). The ranking appears to be applicable to South Africa with the exception of legislations, which are not seen as major driver to sustainable practice and GBFIs. The main drivers are corporate image and organisations ethics whilst current legislations would be last in the list. As argued by Robins (2006), socially and environmentally responsible organisations accept a higher level of responsibility and moral obligation than what is required by law.

5.2.2. FM Strategy and Sustainable FM

In the three successful cases, which experienced positive impact of value, FM is seen a technique applied to achieve the business objectives as described by IFMA (2009) and Alexander (2013). It was found that in order to meet business objective, FM professionals have an in-depth understanding of the business objectives, so as to align the FM goals accordingly. This is in line with the literature from Langston and Lauge-Kristensen (2013), and IFMA and RICS (2017). Furthermore, the FM teams understood the importance of linking facilities to the core business of an organisation which according to IFMA (2007) and Shah (2007) has a considerable impact on productivity, innovation, efficiency, employee satisfaction and the public perception of the organisation (IFMA, 2007; Shah, 2007).

In the cases which experienced positive impact of value, it was found that the FM strategy is in line with the vision of the main tenant or owner. In all those three cases it was found that having a main organisation (tenant or owner) driving the strategic management of the facility to ensure that their goals are met. In the unsuccessful case, which was multi-tenanted, it was found that there was no drive or pressure from the tenants in terms of sustainability. Implementing GBFIs in a facility to make it sustainable is only the first step as the FM department needs to ensure that the GBFIs are operated optimally to ensure that the facility is run sustainably and that the desired targets are met. As discussed by Barrett and Baldry (2009) and IFMA (2016), an integrated approach is key to modern FM.

This integrated and pro-active approach adopted with regards to the "green" operations of the facilities ensures proper support to the building users, provides for competitive advantages, improves the organisations culture and image, and integrates people, place, process, technology and sustainability. These are in line with the identified FM goals based on the literature from Becker (1990b), Then (1994), Then (1999), Best *et al.* (2003), Hodges (2005), Shah (2007), Cotts *et al.* (2009), Hauptfleisch (2012), Alexander (2013), Probst-Wallace (2015), IFMA (2016) and IFMA and RICS (2017).

As noted by McGregor (2000), the efficient management of facilities to support stakeholders' expectations requires an appropriate plan. Hence, management initiatives also play an important role in sustainable buildings. Each FM team in the successful cases employed a unique strategy to suit the different requirements of both the organisations and the facility itself as there is no 'one size fits all' solution as explained by Alexander (2013). This is because the performance of GBFIs is highly dependent on the management process and therefore the value

added by GBFIs is dependent of the "green" operations and management of the facility. In some cases, specific maintenance or operational processes are in place to ensure that the GBFIs run optimally. In other case, the respective FM departments have set up internal policies or documentations to ensure the optimal operations of the GBFIs from an FM perspective.

5.2.3. Future Proofing

The integration of sustainable practices is seen as one of the function of FM according to Hodges (2005), Shah (2007) and Cotts *et al.* (2009). The pro-active approach adopted by FM professionals provides for on-going development and integrations of the sustainable practices by constantly looking for improvement opportunities. In some cases the facilities are constantly reassessed to identify areas of improvements to further align the facilities with the vision of the organisations. This supports the argument by IFMA (2009) and Rondeau *et al.* (2012) about the ongoing progress of FM to offer management services meeting planned long-term and short-term requirements and goals of organisations (IFMA, 2009; Rondeau *et al.*, 2012).

One of the numerous functions of FM is to provide for future-proofing and adaptability of work spaces (Melvin, 1992; McGregor, 2000; Hauptfleisch, 2012). Considering the severe drought and electricity shortages in Cape Town, all the FM professionals agreed that most GBFIs were effective solutions to future proof facilities. Moreover, these shortages will most likely lead to stricter laws and restrictions which could affect the operationality of various facilities.

Furthermore, these shortages will lead to increased utility rates which will impact on operating costs. GBFIs such as greywater systems, rainwater harvesting or solar electricity installation effectively provide for future proofing of facilities by ensuring their usability even in a changing environment. Hence, the integration of sustainable practices is crucial.

Taking the provisions made for electric cars as an example, it can be seen that some GBFIs can also provide for variability and adaptability by offering long-term solutions to current and future requirements. Through the integration of sustainable practices, FM provides for the future proofing of the workspace.

5.2.4. LCC, Benchmarking and Retrofitting

LCC was identified as an essential tool to FM as it assists the facility manager in meeting not only the organisation's economic goals but also the social and environmental ones (Hodges, 2005). To support the on-going development of GBFIs in the different facilities, the FM teams (in the successful cases) make use of various tools such as LCC and benchmarking. LCC was found to be relevant when designing and building green or when retrofitting GBFIs. LCC exercises were performed in the cases where the addition of GBFIs was being considered in the operations stage (i.e. post construction).

The use of LCC reflects the importance for GBFIs to be financially sustainable. However, LCC also considers social and environmental benefits. The value chain and its impact on the environment makes LCC critical in the modern economy (Hellweg and i Canals, 2014) as LCC can also measure the environmental impact of resources use. In the FM context, LCC can be used to demonstrate the environmental and cost benefits of recycling (Shah, 2007). In several instances the GBFIs add more environmental value that economic value. To justify the implementation of GBFIs which do not necessarily add overwhelming economic value, it was vital to consider the environmental and social benefits.

It was found that, along with LCC, benchmarking played an important role by assisting the organisation in assessing the best options, trends or best practices in terms of sustainability in order to implement the best options in the facilities. Hence, as argued by Lynch (2002b), FM professionals should remain well-informed with regards to further developments in this domain in order to add value to businesses. Furthermore, benchmarking and LCC are essential tools when retrofitting GBFIs to an existing facility as they allow for the assessment and curtailing of the GBFIs to the facilities and its operations. Surveys were also employed to understand the needs and perceptions of the building occupants in order to identify weaknesses and areas of improvement in the facilities. Wauters (2005) found that user satisfaction surveys and service level analyses help benchmarking quality in the appraisal of value added.

According to CIDB (2009) a shift from building new green facilities to greening existing ones is expected. Considering the existing stock of buildings with no GBFIs in South Africa, there is a lot of scope for major development in the field of GBFIs implementation to existing buildings. When implementing GBFIs to existing facilities, it was found that a systematic approach works best as it is critical to implement the various GBFIs in steps when dealing with existing facilities as it takes time for the end-users of a facility to adapt to changes in the work

environment. This also means that with retrofitting, the FM department needs to deal with change management, which is a large requirement when GBFIs are implemented into existing buildings.

5.2.5. Change Management

Tay and Ooi (2001) and Rondeau *et al.* (2012) described FM as requiring multiple skills and in this study, it was found that change management is a critical skill set that was required by the FM teams with regards to sustainable FM. However, the FM professionals did not consider change management as a natural FM skill but rather considered it as one which they had to adopt compellingly. Elmualim *et al.* (2008) believe that the rapid diversification of FM resulted in a lack of time available to address sustainability issues and adapt accordingly.

In order to overcome this lack of skills and knowledge in the FM context, a more collaborative approach is required between people management and change management (Brand and de Bruijn, 1999; Carpenter and Meehan, 2002). Change management and people management are vital as staff behaviour was one of the major challenges noted in all the cases studied. The implementation and operations of 'aggressive' or non-conventional GBFIs can be hindered by the immaturity of the end-users and their reluctance to accept the system. It can be very difficult for staff to adapt to new systems and change management is often required. It is very challenging and time consuming to get the tenants/end users to change their behaviours to adopt more sustainable ones in line with the FM strategy.

5.2.6. End User's Role

Levy and De Francesco (2009) explained that on top of the owners, developers and managers of the facilities, the end users also have an important role to play to ensure sustainability. Numerous GBFIs can be implemented without requiring any effort or behaviour change from the end users. However, it was found that the biggest benefits are reaped from GBFIs requiring effort and adjustment from the end-users. For example, in the numerous cases studied it was found that for a recycling programme to work, the buildings occupants need to sort their waste. Similarly, for a black water recycling programme to work, end users must be open to the idea of using treated sewer water. If the end users do not accept the GBFIs then there will be limited or no value added from those GBFIs. Hence, the end users play a significant role in the value added by GBFIs.

It was also found that the size of the tenant base also plays a significant role in change management. With large facilities, there is a high number of building occupants or end users

of the facilities. This also means that there is a greater generation gap. Hence, it becomes challenging for the FM teams to devise strategies to influence all occupants. However, it was seen that the younger generations are more accepting of the GBFIs as opposed to the older generations who do not really like the change brought by GBFIs.

5.2.7. Information, Communication and Education

The accelerating pace of change in the business is increasing the pressure on facilities performance (Lynch, 2002a). To deal with change management and people management, various education, information and communication initiatives have been set up in the successful cases to inform the end-users about the work being done by the FM teams and how their own contribution is important. In those cases, the FM team recognised the role played the building occupants and understood that is crucial to get the staff on board for the success of the FM strategy.

These initiatives were in the form of information campaigns to keep tenants informed about the various GBFIs, education programmes to integrate sustainability practices and information screens to inform the tenants about the facility's performance (in terms of energy or water). It was found that tenants become more environmentally conscious and accepting of the GBFIs once they are informed and when they see what is being done by the FM team. This is in line with the change management approach supported by Grimshaw (1999) to develop relationships between the business, facility and the employees.

Furthermore, considering the cyclical nature of SFP, it can be seen that change management is captured by in the implementation of a strategic facilities plan (IFMA, 2009). Amaratunga and Baldry (2002) recognise change management as a key area where FM contributes to the performance of organisations. In cases where change management was not considered and the tenants were not informed or educated about the GBFIs it was found that the GBFIs were not operated optimally.

5.2.8. Role of Main Tenant

According to Pinkston and Carroll (1994) and McWilliams (2000), end users and investors developed strong inclinations for socially responsible firms. Consequently big organisations mostly reacted positively, making responsible practices a significant element of strategic management. This study revealed the importance of having an organisation driving the sustainability agenda to ensure that the facilities are operated sustainably. It is also critical that it is either the owner or the main occupier driving this process to ensure its success.

McKinsey (2008) noted that there is a lack of involvement, with regards to sustainable FM, from senior managers in bigger organisations as opposed to smaller one which are more likely to understand the benefit of sustainable FM. The findings from this study suggest otherwise as bigger organisations understood and applied sustainable FM practices. However, even though an organisation is big, sustainable behaviour is not guaranteed. The sector of operations of the main organisation also appears to play a role in the green operations of facilities. For example, tenants from the financial sector displayed a greater interest in sustainability and in the strategic management of GBFIs.

5.2.9. Outsourcing

According to Probst-Wallace (2015), traditionally FM services were provided by an in-house facility manager. However, presently numerous organisations consider the benefits of outsourcing support services such as FM. In one of the cases analysed, it was seen that outsourcing the FM services resulted in a reactive approach to the management of the facilities. This reactive/operational approach does not pay particular attention to GBFIs but rather responds to operational requirements of the building. As GBFIs have specific requirements and require active management along with pro-active strategies, it is crucial that their management is done in-house.

5.2.10. Sustainable FM Value Added

Organisations create value in several ways for various targets and new value is created when organisations adopt new ways of doing things (Porter, 1985; Post *et al.*, 2002). In most cases the value created by the organisation is shared with other stakeholders such as employees or society (Coff, 1999; Makadok *et al.*, 2002). Those arguments are supported by the findings of this study which is focused on perception value relating to experiences.

The value added the FM strategy and GBFIs is subjective and difficult to quantify. FM value is multidimensional and results from linking input and amounts to output (Jensen *et al.*, 2012a). The implementation of GBFIs in the FM strategy leads to the effective management of facilities and has a positive impact on aspects such as profitability growth, revenue growth, waste management, resource conservation, energy efficiency, workplace attractiveness, staff well-being and public opinion. Those finding support the arguments raised by Pitt (2005), Ayres *et al.* (2007), Smith (2007) and Ortiz *et al.* (2009).

Numerous models, from authors such as Lindholm (2008), de Vries *et al.* (2008), Smit (2008) and Jensen *et al.* (2008), were identified in Chapter 2 relating to the value added by FM. Those models can be compared to findings from this research as per Table 19.

Table 19. Comparison of FM models

	Lindholm (2008)	**de Vries *et al.* (2008)**	**Smit (2008)**	**Jensen *et al.* (2008)**	**Research Findings**
People	-Increase employee satisfaction	-Image -Culture -Satisfaction	-Perceived success of FM	-Satisfaction -Culture	-Increase workplace attractiveness -Increase staff satisfaction -Increase comfort -Better perception
Process	-Increase innovation -Increase productivity -Increase flexibility	-Production -Flexibility -Innovation -Risk control	-Increase in productivity -Advantages and savings	-Productivity -Reliability -Adaptability	-Cost cutting -Productivity -Flexibility -Increase asset value -Innovation -Perception -Share price
Economy	-Increase value of assets -Promote marketing -Reduce cost	-Cost -Possibility to finance	-One time savings -Yearly savings	-Cost	
Surroundings				-Economical -Social -Spatial -Environmental	-Waste management -Resource conservation -Energy efficiency -Reduced carbon footprint

5.2.11. Green Rating Value Added

The green star rating of the facilities was found to play an important role in economic and social value added. From an economic value perspective, a green star rating impacts of perceptions and branding which in turn reflect on share prices (in the case of public listed

companies) or on the attraction of new tenants who want to occupy green star accredited facilities at a premium rental. Hence, this impacts of the income earning potential as well as the asset value of the facility. Furthermore, from a social aspect, working in a green star accredited building was found to improve staff satisfaction and workplace attractiveness.

5.2.12. GBFIs Value Added

GBFIs add value to facilities in numerous ways and all GBFIs contribute to improved environmental value but not necessarily economic or social value. However, even though significant added environmental value was noted, it was found that in most cases the immediate environment was not considered and there was a more global view of environment adopted by the various organisations. Nonetheless, the value added by any GBFI is reliant on the FM strategy. Furthermore, considering the fact that various GBFIs have different impacts of value, it is important to get the right mix and level of implementation to experience holistic value added.

Table 20 illustrates the perceived value added by the various GBFIs considered in this research based on the interviews and staff surveys. The assessment of added value depends on the context as it is subjective, dynamic and relational and the evaluation of the innovation of a new feature or initiative cannot be performed independently of its social or cultural context (Zeithaml, 1988; Amabile, 1996; Lindgreen and Wynstra, 2005; Jensen, van der Voordt, Coenen, *et al.*, 2012). It is also important that users have full understanding of the innovations whilst being of the existing alternatives for a relevant assessment on value creation or addition (Amabile, 1996). The survey revealed that the majority of respondents, particularly in the successful cases, were aware of the various GBFIs implemented in the facilities. However, the perception of social value added remains subjective as there are instances where the perception of the FM team is not identical to the general perception from the building occupants. Social value depends on the end user's mind-set, behaviour, expectations and attitude.

Table 20. Summary of value added by GBFIs

GBFIs	Economic Value		Environmental Value			Social Value		
	Profitability	Revenue	Waste management/ Resource conservation	Energy & carbon footprint	Sustainable travel	Staff perception	Comfort	Health & safety
Rainwater harvesting	✓	✓	✓			✓		
Grey water system	✓	✓	✓			X		
Water efficient sanitary fittings	✓		✓			X		
Double glazed façade to reduce heating/cooling loads	✓	✓		✓		✓	✓	
Efficient HVAC maximising use of external air	✓	✓		✓		X	X	✓
Glazed façade and open floor plans	✓	✓		✓		X	X	
Conventional recycling	✓		✓			✓		
Recycling of wet wastes	✓	✓	✓			✓		
LED lights and light harvesting	✓	✓		✓			✓	
Cyclist facilities					✓	✓		
Electric car points	✓	✓			✓	✓		
Solar electricity	✓	✓		✓		✓		
Video conferencing infrastructure					✓	✓		

5.2.13. Challenges

Over time, the value added by FM has not been balanced between the three sustainability pillars as it has been focused on economic and environmental value gains (Elmualim *et al.*, 2012). The various cases studied revealed that GBFIs had a stronger impact of environmental value and economic value respectively. Social value, in terms the building occupants, was a challenging aspect of facilities incorporating GBFIs despite a relatively positive overall outlook portrayed in the various cases analysed.

The change brought by GBFIs is not always easily accepted by the building occupants. There were numerous cases of staff dissatisfaction with regards to some GBFIs which impact directly on the occupants in terms on comfort levels or the work environment. Despite the noted cases of improved interactions resulting from open floor plans, there seem to be major dissatisfaction regarding this feature. With regards to GBFIs, staff satisfaction remains the biggest challenge as it is difficult to keep every occupant happy especially regarding the building services.

5.3. Emerging themes interplay

Figure 40 depicts the emerging themes of this research, in a format similar to the summary done at the end of the literature review, showing the interplay between the various themes.

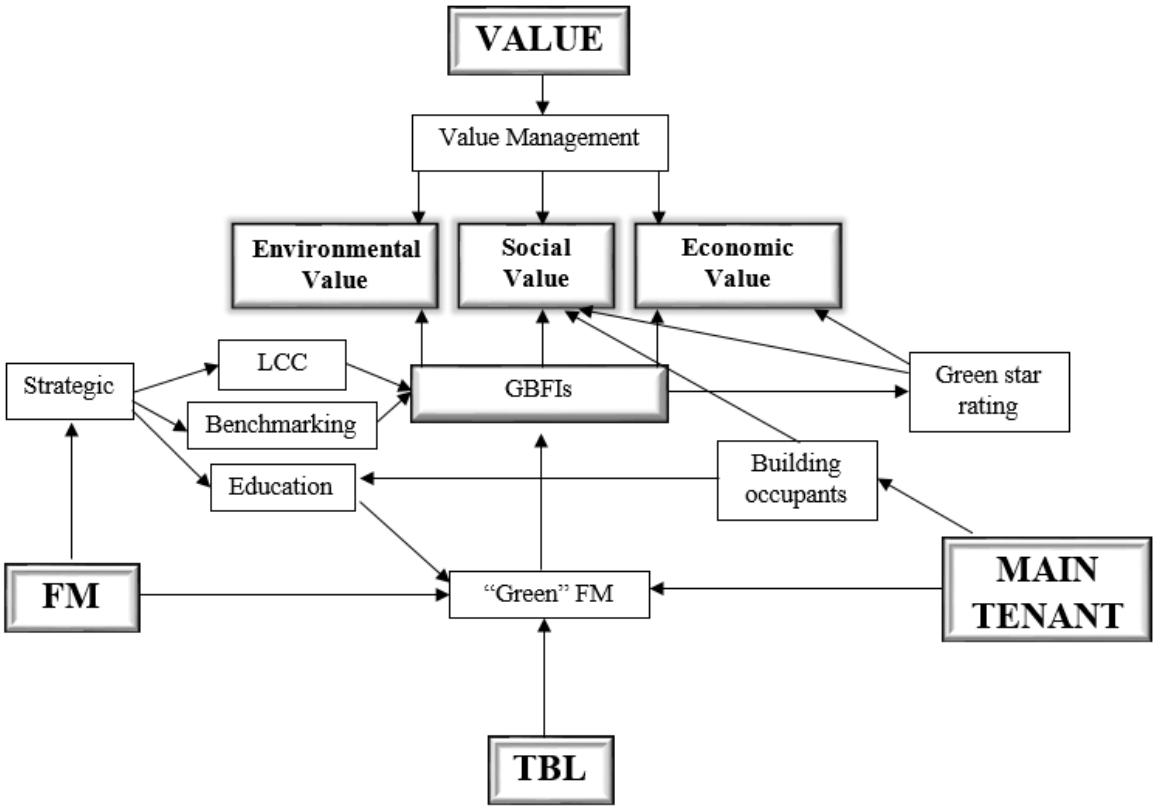


Figure 40. Summary of Research

5.4. Finding on the Research Questions

The research questions posed at the beginning were:

1. *How does the integration of GBFIs into a FM strategy influence the perceived social, economic and environmental value of a facility?*

The literature did not lay much emphasis on the value-adding potential of GBFIs in a FM strategy. Whilst the relationship between FM and value management has been discussed by numerous authors, it was not broken down into the three strands explored in this research namely: economic, environmental and social value.

It was found that GBFIs add value to facilities in numerous ways both directly and indirectly. They impact on future proofing, revenue growth, profitability growth, waste management, resource conservation, energy efficiency, reduced carbon footprint, sustainable or reduced travel, workplace attractiveness, staff perceptions, work environment, comfort levels, health and safety.

However, as various GBFIs have different impacts on value, it is important to get the right mix and level of implementation to experience holistic value added. It was also found that the accolades, such as a green star rating, which comes from the implementation of GBFIs can lead to further added economic and social value as such accolades impact directly on the perception of the facility.

2. *What are the FM requirements to optimise the influence of GBFIs on the value of a facility?*

As the performance of GBFIs is directly linked to the operations of the building, it is vital to adopt a pro-active and strategic approach to FM in order to optimise the impact of GBFIs on the value of a facility. The adoption of GBFIs is only a step and to ensure the success of those GBFIs the FM strategy must provide for the green operations of the facility and must be in line with the vision of the main tenant.

Hence, the tenant also plays a significant role in the value adding process in that they must also be sustainability-driven. The FM team must have different initiatives in place to ensure the proper functioning of the GBFIs and to deal with the people management and change management requirements that usually accompany the implementation of GBFIs.

Lastly, the FM team must constantly re-assess the facility to ensure that it is operating optimally and to identify areas of improvements. Through LCC and benchmarking, the FM strategy also needs to provide for the on-going development of the facility and its GBFIs.

5.5. Revisiting the Research Proposition

The research proposition tested in this study was:

The integration of GBFIs into a FM strategy improves the perception of the social, economic and environmental value of the facility.

It was established that the integration of GBFIs in a FM strategy can improve the perception of economic, environmental and social value of a facility. Hence, the proposition is supported. However, the FM strategy along with the GBFI mix play a crucial role in this process as the implementation of GBFIs is only the first step of the value-adding process.

5.6. Achievement of Research Objectives

The following research objectives have been met:

i. *Determine the impact of the integration of GBFIs into a FM strategy on the perception of social, economic and environmental value of the facility.*

Through the semi-structured interviews and online surveys it was found that GBFIs are perceived as value adding in various ways and the value added by any GBFI is reliant on the FM strategy. All GBFIs were found to contribute to improved environmental value of the facility but they do not always contribute to improved economic or social value. The perceived added value of GBFIs is illustrated in Table 18 and Table 20. Considering the fact that various GBFIs have different impacts of value, it is important to get the right mix and level of implementation to experience holistic value added.

Furthermore, all the FM professionals agreed that most GBFIs are effective solutions to future-proof facilities considering the water shortage in Cape Town along with the power shortage over the whole of South Africa. Considering the critical situation in Cape Town, strict laws and restrictions are expected in the near future and this could have a potential impact on the operationality of facilities. For example, these water and electricity shortages can lead to increased utility rates that will impact negatively on operating costs. GBFIs such as greywater systems, rainwater harvesting, or solar electricity installation effectively provide for future proofing of facilities by ensuring their usability even in a changing environment.

In the same vein, some GBFIs also provide for variability and adaptability by offering lasting solutions to current and future needs. For example, the provision of electric car charging points will accommodate the expected change in behaviours in the near future. Despite not being popular currently, there is a growing interest around electric cars and their popularity is increasing in South Africa.

The green star ratings associated with facilities implementing GBFIs were found to impact on the value of the facilities. Green star ratings were found to influence perceptions and branding which in turn influences tenant attraction and share prices, in the case of public listed companies. Hence, this influences the income earning potential of a facility as well as the resulting asset value. Furthermore, working in a green star accredited building was found to improve staff satisfaction and workplace attractiveness.

ii. Determine the FM requirements for GBFIs to influence the value of a facility positively.

This research revealed that management initiatives play an important role in the context of sustainable buildings. For most GBFIs to impact positively on the value of a facility, a strategic and pro-active FM strategy must be adopted. In the successful cases analysed, each FM professional employed a distinct strategy to respond to the different requirements of both the organisations and the facility. As the FM strategy needs to line up with the business goals and objectives, it is also very important for the tenant to drive the strategic management of the facility in order to meet their sustainability goals. The value added by GBFIs is much more when there is a single tenant or a main tenant driving the FM strategy. It is also important that the FM services are not outsourced to a third party who does not share the same vision as the tenanting organisation and often adopts a reactive approach to FM.

Incorporating GBFIs in a facility to make it sustainable is only a step in the process as the FM professional needs to ensure that the various GBFIs are managed and operated optimally to ensure that the facility is run sustainably and that the desired targets are met. The sustainable operation of the facilities guarantee appropriate support to the building users, provides for competitive advantages, enhances the organisation's brand and image, and integrates people, workplace, and sustainability.

Furthermore, it was found that LCC and benchmarking were common tools used in the successful cases. LCC most commonly assists the facility manager in the financial decisions relating to the implementation of GBFIs even though it can also consider social and

environmental impacts and benefits. Similarly, benchmarking helps the FM professionals to decide on the most suitable sustainable practices, features or initiatives to be implemented at the facility. As there are many GBFIs that can be incorporated in a FM strategy, these tools are useful in the optimal selection of GBFIs for the sustainable design of new buildings or for the sustainable retrofitting of existing buildings.

The majority of GBFIs can be implemented without requiring any effort or adjustment from the end-users. However, it was found that the biggest benefits are reaped from GBFIs, such a recycling, requiring effort and change from the end-users. Change and people management were found to be important FM skills for the successful management of sustainable buildings. This is because the end user plays a significant role in the proper operations of GBFIs and it can often be very challenging for staff to adapt to new systems. Hence, people management and change management are important functions that were required from the FM professionals. In the successful cases the FM teams devised various strategies to inform and educate the tenants with regards to the various GBFIs to contribute to the sustainable operations of the facilities.

5.7. Reliability and Validity of Research

Whilst agreeing that reliability in research is important, Lincoln and Guba (1985) and Chandler and Lyon (2001) argue that measures can be reliable without being valid but cannot be valid without being reliable. Hence, the proving the validity of the research is enough to prove its reliability or dependability according to Lincoln and Guba (1985). Even though numerous researchers argue that validity is irrelevant to qualitative studies, most researchers acknowledge the need for some sort of quality check for qualitative research (Golafshani, 2003). Table 21 shows the research tactics employed to ensure both the reliability and validity of this study.

Table 21. Research tactics employed for validity and reliability

Tests	**Case Study Tactic**	**Phase of occurrence**
Internal Validity	Explanation building	Data analysis
Construct Validity	Use of multiple sources of evidence	Data collection
External Validity	Multiple case studies	Research design
Reliability	Use case study control	Data collection
	Develop case study database	Data collection

5.8. Conclusion

The research has shown the value adding potential of the inclusion of GBFIs in a FM strategy. However, the implementation of GBFIs alone does not lead to added value and a number of systems and strategies must be in place to ensure that the facilities are operated sustainably. Furthermore, the tenant and the building users have a big role to play in this process. This places a lot of importance on the FM strategy that also needs to provide for people and management.

5.9. Recommendations for Future Research

The following recommendations can be made based on the conclusions drawn from the findings:

1) Research about retrofitted GBFIs

Considering the stock of existing buildings that do not include any GBFIs, the retrofitting of GBFIs to existing building is likely to become more important in the future. Hence, it will be important to understand the specific challenges, FM roles, and value considerations with regards to the greening of existing facilities.

2) Research focused on tenants based on their sectors of operations

This research revealed that tenants operating in some sectors are more concerned with the sustainability of facilities. Further research needs to be done to understand the tenants' motives and the role of their sector of operations in order to be able to influence other tenants in joining the "green movement".

3) Expanding the research to a nationwide study

This research related to Cape Town only and a number of respondents were biased about the current drought situation in the region. Further research will be needed to further understand the interrelationships between value, FM and GBFIs in South Africa.

4) Research about non-green rated buildings

Three out of the four facilities analysed were green rated buildings. These buildings tend to attract sustainability-oriented tenant who are concerned about the green operations of the facilities. Considering other non-green rated facilities, which nonetheless include GBFIs, will help understand the value added by GBFIs.

References

Alexander, K. (1994) A strategy for facilities management. *Facilities*, **12**(11), 6-10.

Alexander, K. (1996) *Facilities Management: Theory and Practice*. London: E&FN Spon.

Alexander, K. (1999) *Facilities Management*. London: E&FN Spon.

Alexander, K. (2006) New economics. *Facilities*, **24**(7/8), 248-249.

Alexander, K. (2013) *Facilities management: theory and practice*. Routledge.

Alexander, K. and Brown, M. (2006) Community-based facilities management. *Facilities*, **24**(7/8), 250-268.

Allen, I.E. and Seaman, C.A. (2007) Likert scales and data analyses. *Quality progress*, **40**(7), 64.

Amabile, T. (1996) *Creativity in context*. Westview press.

Amaratunga, D. and Baldry, D. (2001) Case study methodology as a means of theory building: performance measurement in facilities management organisations. *Work study*, **50**(3), 95-105.

Amaratunga, D. and Baldry, D. (2002) Moving from performance measurement to performance management. *Facilities*, **20**(5/6), 217-223.

Amaratunga, D., Baldry, D., Sarshar, M. and Newton, R. (2002) Quantitative and qualitative research in the built environment: application of "mixed" research approach. *Work study*, **51**(1), 17-31.

Appleton, J.V. and King, L. (1997) Constructivism: A naturalistic methodology for nursing inquiry. *Advances in Nursing Science*, **20**(2), 13-22.

Armstrong, J.S. and Overton, T.S. (1977) Estimating nonresponse bias in mail surveys. *Journal of marketing research*, 396-402.

Aronson, J. (1995) A pragmatic view of thematic analysis. *The qualitative report*, **2**(1), 1-3.

Atkin, B. and Brooks, A. (2009) *Total facilities management*. John Wiley & Sons.

Attride-Stirling, J. (2001) Thematic networks: an analytic tool for qualitative research. *Qualitative research*, **1**(3), 385-405.

Ayres, R.U., Turton, H. and Casten, T. (2007) Energy efficiency, sustainability and economic growth. *Energy*, **32**(5), 634-648.

Barbour, R.S. (1998) Mixing qualitative methods: quality assurance or qualitative quagmire? *Qualitative health research*, **8**(3), 352-361.

Barney, J. (1991) Firm resources and sustained competitive advantage. *Journal of management*, **17**(1), 99-120.

Barrett, P. (2000) Achieving strategic facilities management through strong relationships. *Facilities*, **18**(10/11/12), 421-426.

Barrett, P. and Baldry, D. (2009) *Facilities management: Towards best practice*. John Wiley & Sons.

Barrett, P.S. (1992) Measuring the ability gap for construction professionals, *Construction Management and Economics*, Vol. 10, pp. 321-342.

Barton, R., Jones, D. and Gilbert, D. (2002) Strategic asset management incorporating ecologically sustainable development. *Journal of Facilities Management*, **1**(1), 70-84.

Beaupré, S., Boudreault, P.L.T. and Leclerc, M. (2010) Solar‐Energy Production and Energy‐Efficient Lighting: Photovoltaic Devices and White‐Light‐Emitting Diodes Using Poly (2, 7‐fluorene), Poly (2, 7‐carbazole), and Poly (2, 7‐dibenzosilole) Derivatives. *Advanced Materials*, **22**(8).

Becker, F. (1990a) Facilities Management: A cutting - edge field. *In:* Pennington, M. (Ed.), *Property Management*, Vol. 8, pp. 108-116: MCB UP Ltd.

Becker, F. (1990b) *The Total Workplace: FM and the Elastic Organisation*. New York: Van Nostrand Reinhold.

Becker, F. and Steele, F. (1990) The total workplace. *Facilities*, **8**(3), 9-14.

Benbasat, I., Goldstein, D.K. and Mead, M. (1987) The case research strategy in studies of information systems. *MIS quarterly*, 369-386.

Benn, S., Dunphy, D. and Griffiths, A. (2014) *Organizational change for corporate sustainability*. Routledge.

Bennett, A. (2004) Case study methods: Design, use, and comparative advantages. *Models, numbers, and cases: Methods for studying international relations*, 19-55.

Best, R., Langston, C.A. and De Valence, G. (2003) *Workplace strategies and facilities management*. Routledge.

Bhattacharya, C.B. and Sen, S. (2004) Doing better at doing good: When, why, and how consumers respond to corporate social initiatives. *California management review*, **47**(1), 9-24.

BIFM (2014) The BIFM Examination Syllabus: Part 1. In, Essex, United Kingdom: The British Institute of Facilities Management.

Bosnjak, M. and Tuten, T.L. (2001) Classifying response behaviors in web‐based surveys. *Journal of Computer‐Mediated Communication*, **6**(3).

Bottom, C. (2003) Facilities management, the role of performance measurement and benchmarking. *YCS Times*, **10**.

Bowman, C. and Ambrosini, V. (2000) Value creation versus value capture: towards a coherent definition of value in strategy. *British Journal of Management*, **11**(1), 1-15.

Boyatzis, R.E. (1998) *Transforming qualitative information: Thematic analysis and code development*. sage.

Brand, E. and de Bruijn, T. (1999) Shared responsibility at the regional level: the building of sustainable industrial estates. *European Environment*, **9**(6), 221-231.

Braun, V. and Clarke, V. (2006) Using thematic analysis in psychology. *Qualitative research in psychology*, **3**(2), 77-101.

Braun, V., Clarke, V. and Terry, G. (2014) Thematic analysis. *In:* Rohleder, P. and Lyons, A. (Eds.), *Qualitative Research in Clinical and Health Psychology*. Basingstoke: Palgrave MacMillan.

Bristow, G., McClure, J.D. and Fisher, D. (2006) Waterless urinals: Features, benefits, and applications. *Journal of Green Building*, **1**(1), 55-62.

Bröchner, J. (2001) Facilities Management 2000 Years Ago. *In*, *World Workplace Europe 11-13 June*, Glasgow.

Bronzwaer, S. (2008) Verlichting tegen de dip. *NRC*, **23**, 14.

Brundtland, G.H. (1987) *Report of the World Commission on environment and development:" our common future."*. United Nations.

Bryden, A. (2005) International Standards And the Triple Bottom Line: The Contribution of ISO. *In*, *18th World Petroleum Congress, 25-29 September*, Johannesburg, South Africa. World Petroleum Congress.

Burke, J.R. (1997) Examining the validity structure of qualitative research. *Education*, **118**(2), 282-293.

Burton, L. (2007) Survey Research: Choice of Instrument, Sample. In, USA: Johns Hopkins University School of Public Health.

Campbell, D.T. (1975) III."Degrees of freedom" and the case study. *Comparative political studies*, **8**(2), 178-193.

Campbell, T. (1997) Technology, multimedia, and qualitative research in education. *Journal of Research on Computing in Education*, **30**(2), 122-132.

Carpenter, D. and Meehan, B. (2002) Mainstreaming environmental management: case studies from Australasian universities. *International Journal of Sustainability in Higher Education*, **3**(1), 19-37.

Carter, C.R. and Rogers, D.S. (2008) A framework of sustainable supply chain management: moving toward new theory. *International journal of physical distribution & logistics management*, **38**(5), 360-387.

Casals, X.G. (2006) Analysis of building energy regulation and certification in Europe: Their role, limitations and differences. *Energy and Buildings*, **38**(5), 381-392.

Castillo, J. (2009) Convenience Sampling. In.

Cavaye, A.L. (1996) Case study research: a multi‐faceted research approach for IS. *Information systems journal*, **6**(3), 227-242.

CBRE (2009) *Who pays for green? The economics of sustainable building*. CB Richard Ellis.

Chandler, G.N. and Lyon, D.W. (2001) Issues of research design and construct measurement in entrepreneurship research: The past decade. *Entrepreneurship: Theory and Practice*, **25**(4), 101-114.

Chau, K., Wong, S., Leung, A. and Yiu, C. (2003) Estimating the value enhancement effects of refurbishment. *Facilities*, **21**(1/2), 13-19.

Cheung, H. and Chung, T. (2005) Calculation of the vertical daylight factor on window facades in a dense urban environment. *Architectural Science Review*, **48**(1), 81-91.

Christova-Boal, D., Eden, R.E. and McFarlane, S. (1996) An investigation into greywater reuse for urban residential properties. *Desalination*, **106**(1-3), 391-397.

CIDB (2009) *Greenhouse gas emission reduction: Potentials from buildings*. Construction Industry Development Board.

CIOB (2004) *Sustainability and Construction*. Ascot: Chartered Institute of Building.

Clift, R. and Wright, L. (2000) Relationships between environmental impacts and added value along the supply chain. *Technological Forecasting and Social Change*, **65**(3), 281-295.

Clonts, J.G. (1992) The Concept of Reliability as It Pertains to Data from Qualitative Studies.

Coff, R.W. (1999) When competitive advantage doesn't lead to performance: The resource-based view and stakeholder bargaining power. *Organization science*, **10**(2), 119-133.

Cogley, T. and Sargent, T.J. (2001) Evolving post-world war II US inflation dynamics. *NBER macroeconomics annual*, **16**, 331-373.

Cook, T.D., Campbell, D.T. and Day, A. (1979) *Quasi-experimentation: Design & analysis issues for field settings*. Vol. 351, Houghton Mifflin Boston.

Cooper, I. (2008) *Roofs Gardens for Greening the Environment* [Online]. Available: http://www.harmoniousliving.co.za/Environment/Home-Office/Roofs-Gardens-for-Greening-the-Environment/ [Accessed 17 April, 2017].

Cotts, D.G. (1999) *The Facility Management Handbook*. 2 ed. United States: American Management Association.

Cotts, D.G., ROPER, K.O. and PAYANT, R.P. (2009) *The facility management handbook*. Third ed. AMACOM American Management Associationn.

Cousins, J.T. (2009) *Green Building Rating Tools and Energy Efficiency*. TLC Engineering Solutions Pty (Ltd).

Creswell, J.W. (2013) *Research design: Qualitative, quantitative, and mixed methods approaches*. Sage publications.

Creswell, J.W. and Miller, D.L. (2000) Determining validity in qualitative inquiry. *Theory into practice*, **39**(3), 124-130.

Crotty, M. (1998) *The foundations of social research: Meaning and perspective in the research process*. Sage.

Damanpour, F. (1995) Is your creative organization innovative. *Creative action in organizations*, 125-131.

David, F. (1989) *Strategic Management*. Columbus, OH: Merrill Publishing Company.

Davies, D. and Dodd, J. (2002) Qualitative research and the question of rigor. *Qualitative health research*, **12**(2), 279-289.

de Vries, J.C., de Jonge, H. and van der Voordt, T.J. (2008) Impact of real estate interventions on organisational performance. *Journal of Corporate Real Estate*, **10**(3), 208-223.

Deetz, S. (1996) Crossroads-describing differences in approaches to organization science: Rethinking Burrell and Morgan and their legacy. *Organization science*, **7**(2), 191-207.

Denzin, N.K. (1989) *The research act: A theoretical introduction to sociological methods*. 3rd ed. New York: McGraw-Holl.

Denzin, N.K. and Lincoln, Y.S. (1994) *Handbook of qualitative research*. Sage publications, inc.

Denzin, N.K. and Lincoln, Y.S. (2005) Paradigms and perspectives in contention. *The Sage handbook of qualitative research*, 183-190.

Devers, K.J. and Frankel, R.M. (2000) Study design in qualitative research--2: Sampling and data collection strategies. *Education for Health*, **13**(2), 263.

Dhillon, B. (2013) *Life cycle costing: techniques, models and applications*. Routledge.

Dunn, K. (2005) Interviewing. *In:* Hay, I. (Ed.), *Qualitative research methods in human geography*, 2nd edn., pp. 79-105. Melbourne: Oxford University Press.

Easterby-Smith, M.T. and Thorpe, R. (2002) R. and Lowe, A.(2002). *Management research: An introduction*, **2**, 342.

Eichholtz, P., Kok, N. and Quigley, J.M. (2010) Doing well by doing good? Green office buildings. *The American Economic Review*, **100**(5), 2492-2509.

Eisenhardt, K.M. (1989) Building theories from case study research. *Academy of management Review*, **14**(4), 532-550.

Eisner, E.W. (2017) *The enlightened eye: Qualitative inquiry and the enhancement of educational practice*. Teachers College Press.

Elkington, J. (2004) Enter the triple bottom line. *The triple bottom line: Does it all add up*, **11**(12), 1-16.

Elmualim, A., Valle, R. and Kwawu, W. (2012) Discerning policy and drivers for sustainable facilities management practice. *International journal of sustainable built environment*, **1**(1), 16-25.

Elmualim, A., Czwakiel, A., Valle, C., Ludlow, G. and Shah, S. (2008) Barriers for implementing sustainable facilities management. *In, World sustainable building conference*, 21-25.

Elmualim, A., Shockley, D., Valle, R., Ludlow, G. and Shah, S. (2010) Barriers and commitment of facilities management profession to the sustainability agenda. *Building and Environment*, **45**(1), 58-64.

Farooq, U. (2011) *What is Society: Meaning and Definition of Society* [Online]. Study Lecture Notes. Available: http://www.studylecturenotes.com/social-sciences/sociology/133-what-is-society [Accessed 20 March, 2017].

Feagin, J.R., Orum, A.M. and Sjoberg, G. (1991) *A case for the case study*. UNC Press Books.

Finch, E. (1992) Facilities management at the crossroads. *Property Management*, **10**(3), 196-205.

Flynn, B.B., Schroeder, R.G. and Sakakibara, S. (1994) A framework for quality management research and an associated measurement instrument. *Journal of Operations Management*, **11**(4), 339-366.

Foster, J.J. (2000) Motivation in the workplace. *Introduction to Work and Organizational Psychology. Oxford: Blackwell*, 302-326.

Fowler, F.J. (1995) *Improving survey questions: Design and evaluation*. Vol. 38, Sage.

Fowler Jr, F.J. (2013) *Survey research methods*. Sage publications.

Frankel, R.M. and Devers, K. (2000a) Qualitative research: A consumer's guide. *Education for Health*, **13**(1), 113.

Frankel, R.M. and Devers, K.J. (2000b) Study design in qualitative research--1: Developing questions and assessing resource needs. *Education for Health*, **13**(2), 251.

Frederick, W.C. (2008) Corporate social responsibility, *The Oxford handbook of corporate social responsibility*.

Gall, M.D., Gall, J.P. and Borg, W.R. (2003) *Educational research: An introduction*. 7th ed. Boston,MA:: A & B Publications.

GBCA (2013) *Introducing Green Star. Inspiring innovation, Encouraign environmental leadership, Building a sustainable future*. Australia: Green Building Council of Australia.

GBCSA (2008) The Inside Guide to Green Star SA. In, South Africa: Green Building Council of South Africa.

GBCSA (2012) *First local government building in Western Cape to achieve green building status*. Green Building Council South Africa.

GBCSA (2013) *Material fact sheet for product manufactures and suppliers*. South Africa: Green Building Council of South Africa.

GBCSA (2015) *Green Star SA - Office v1* South Africa: Green Building Council South Africa.

GBCSA (2017a) About Green Building. In, South Africa: Green Building Council South Africa.

GBCSA (2017b) *Green Star SA Rating System* [Online]. Green Building Council South Africa. Available: https://www.gbcsa.org.za/green-star-sa-rating-system/ [Accessed 16 April, 2017].

Gerring, J. (2004) What is a case study and what is it good for? *American political science review*, **98**(02), 341-354.

Gersick, C.J. (1988) Time and transition in work teams: Toward a new model of group development. *Academy of Management journal*, **31**(1), 9-41.

Ghisi, E. and Tinker, J.A. (2005) An ideal window area concept for energy efficient integration of daylight and artificial light in buildings. *Building and Environment*, **40**(1), 51-61.

Gibberd, J. (2008) Sustainable building assessment tool: integrating sustainability into current design and building processes.

Gibbert, M. and Ruigrok, W. (2010) The ‘‘what’’and ‘‘how’’of case study rigor: Three strategies based on published work. *Organizational research methods*, **13**(4), 710-737.

Gladwin, T.N., Kennelly, J.J. and Krause, T.-S. (1995) Shifting paradigms for sustainable development: Implications for management theory and research. *Academy of management Review*, **20**(4), 874-907.

Golafshani, N. (2003) Understanding reliability and validity in qualitative research. *The qualitative report*, **8**(4), 597-606.

Gorden, R.L. (1975) *Interviewing: Strategy, techniques, and tactics*. Dorsey press Homewood, IL.

Goyal, S. and Pitt, M. (2007) Determining the role of innovation management in facilities management. *Facilities*, **25**(1/2), 48-60.

Graeber, D. (2001) *Toward an anthropological theory of value: The false coin of our own dreams*. Springer.

Gray, D.E. (2013) *Doing research in the real world*. Sage.

Green, A.N. and Jack, A. (2004) Creating stakeholder value by consistently aligning the support environment with stakeholder needs. *Facilities*, **22**(13/14), 359-363.

Griffitt, W. (1970) Environmental effects on interpersonal affective behavior: Ambient effective temperature and attraction. *Journal of Personality and Social Psychology*, **15**(3), 240.

Grimshaw, B. (1999) Facilities management: the wider implications of managing change. *Facilities*, **17**(1/2), 24-30.

Gunnell, K., Du Plessis, C. and Gibberd, J. (2009) *Green Building in South Africa: Emerging Trends* South Africa: Republic of South Africa.

Hammond, A. (1995) *Environmental indicators: a systematic approach to measuring and reporting on environmental policy performance in the context of sustainable development*. World Resources Institute Washington, DC.

Han, D.-M. and Lim, J.-H. (2010) Smart home energy management system using IEEE 802.15. 4 and zigbee. *IEEE Transactions on Consumer Electronics*, **56**(3).

Harris, S.G. and Sutton, R.I. (1986) Functions of parting ceremonies in dying organizations. *Academy of Management journal*, **29**(1), 5-30.

Hartley, J.F. (1994) Case studies in organisation research. *In:* Cassell, C. and Symon, G. (Eds.), *Essential guide to qualitative methods in organizational research*. London: Sage Publications.

Hatch, M.J. and Cunliffe, A.L. (2013) *Organization theory: modern, symbolic and postmodern perspectives*. Oxford university press.

Hauptfleisch, D. (2012) Facilities Management and Training for South Africa. *In, SAFMA Conference*. The South African Facilities Management Association.

Haynes, B.P., Smith, A. and Pitt, M. (2009) Sustainable workplaces: improving staff health and well-being using plants. *Journal of Corporate Real Estate*, **11**(1), 52-63.

Healy, M. and Perry, C. (2000) Comprehensive criteria to judge validity and reliability of qualitative research within the realism paradigm. *Qualitative market research: An international journal*, **3**(3), 118-126.

Heerwagen, J. (2000) Green buildings, organizational success and occupant productivity. *Building Research & Information*, **28**(5-6), 353-367.

Hellweg, S. and Milà i Canals, L. (2014) Emerging approaches, challenges and opportunities in life cycle assessment. *Science*, **344**(6188), 1109-1113.

Herzberg, F., Mausner, B. and Snyderman, B.B. (2011) *The motivation to work*. Vol. 1, Transaction publishers.

Hilliard, J. (1999) What deserves to be published? Toward an EfH policy statement. *Education for Health*, **12**(2), 141.

Hinks, J. and McNay, P. (1999) The creation of a management-by-variance tool for facilities management performance assessment. *Facilities*, **17**(1/2), 31-53.

Hodges, C.P. (2005) A facility manager's approach to sustainability. *Journal of Facilities Management*, **3**(4), 312-324.

Holme, R. and Watts, P. (1999) Corporate social responsibility. *Geneva: World Business Council for Sustainable Development*.

Horton, D. (2006) Environmentalism and the bicycle. *Environmental Politics*, **15**(1), 41-58.

Hui, E.C., Wong, J.T. and Wan, J.K. (2008) The evidence of value enhancement resulting from rehabilitation. *Facilities*, **26**(1/2), 16-32.

Hutchinson, L. (2003) Educational environment. *BMJ: British Medical Journal*, **326**(7393), 810.

IFMA (2007) *Exploring the Current Trends and Future Outlook for Facility Management Professionals*. Houston, USA: International Facility Management Association.

IFMA (2009) *Strategic Facility Planning: A White Paper*.

IFMA (2014) Discover The Complete Study Resource For The CFM Exam: The IFMA Facility Management Learning System. In: *Webinar*: Internation Facility Management Association.

IFMA (2016) *What is Facility Management?* [Online]. International Facility Management Association. Available: https://www.ifma.org/about/what-is-facility-management [Accessed 20 December 2016].

IFMA and RICS (2017) *Raising the Bar: From Operational Excellence to Strategic Impact in FM*. International Facility Management Association and the Royal Institute of Chartered Surveyors.

Inalhan, G. and Appel-Meulenbroek, R. (2010) Knowledge sharing through co-presence: added value of facilities. *Facilities*, **28**(3/4), 189-205.

IoDSA (2009) *King Code of Governance Principles for South Africa*. Institute of Directors in Southern Africa.

IoDSA (2016) *King IV Report on Code of Governance for South Africa 2016*. Institute of Directors in Southern Africa.

Jensen, P.A. (2005) Value concepts and value based collaboration in building projects. *Designing Value*, 3-10.

Jensen, P.A. (2009) Theoretical Model Demonstrating the Value Adding Contribution of Facilities. *In, European Facilities Management Conference 2009: Research Symposium*, 1-12.

Jensen, P.A. (2010) The facilities management value map: a conceptual framework. *Facilities*, **28**(3/4), 175-188.

Jensen, P.A., Nielsen, K. and Nielsen, S.B. (2008) Facilities Management Best Practice in the Nordic Countries.

Jensen, P.A., Coenen, C. and van der Voordt, T. (2012a) *The added value of facilities management: concepts, findings and perspectives*. Polyteknisk Forlag Lyngby.

Jensen, P.A., Sarasoja, A.-L., Van der Voordt, D. and Coenen, C. (2013) How can Facilities Management add value to organisations as well as to society? *In, Proceedings of the 19th CIB World Building Congress 2013" Construction and Society", Brisbane, Australia, 5-9 May 2013*. International Council for Building (CIB).

Jensen, P.A., Voordt, T.v.d., Coenen, C., Felten, D.v., Lindholm, A.L., Nielsen, S.B., Riratanaphong, C. and Pfenninger, M. (2012b) In search for the added value of FM: what we know and what we need to learn. *Facilities*, **30**(5/6), 199-217.

Jick, T.D. (1979) Mixing qualitative and quantitative methods: Triangulation in action. *Administrative science quarterly*, **24**(4), 602-611.

Joffe, H. (2004) Content and thematic analysis. Research Methods for Clinical and Health Psychology. Edited by: Marks D, Yardley L. 2004. In: London: Sage.

Johnson, R.B. and Onwuegbuzie, A.J. (2004) Mixed methods research: A research paradigm whose time has come. *Educational researcher*, **33**(7), 14-26.

Jones, I. (1997) Mixing qualitative and quantitative methods in sports fan research. *The qualitative report*, **3**(4), 1-8.

Jones, O. (2000) Facility management: future opportunities, scope and impact. *Facilities*, **18**(3/4), 133-137.

Joroff, M.L., Lambert, S. and Louargand, M. (1993) *Strategic management of the fifth resource: corporate real estate*. International Development Research Council.

Kaplan, R.S. and Norton, D.P. (2000) Having trouble with your strategy? Then map it. *Focusing Your Organization on Strategy—with the Balanced Scorecard*, **49**.

Kats, G. (2003) *Green building costs and financial benefits*. Massachusetts Technology Collaborative Boston, MA.

Khan, S. and VanWynsberghe, R. (2008) Cultivating the under-mined: Cross-case analysis as knowledge mobilization. *In, Forum Qualitative Sozialforschung/Forum: Qualitative Social Research*, Vol. 9.

Kibert, C.J. (2004) Green buildings: an overview of progress. *Journal of Land Use & Environmental Law*, **19**(2), 491-502.

Kibert, C.J. (2016) *Sustainable construction: green building design and delivery*. John Wiley & Sons.

Kim, J.T. and Kim, G. (2010) Overview and new developments in optical daylighting systems for building a healthy indoor environment. *Building and Environment*, **45**(2), 256-269.

King, N., Cassell, C. and Symon, G. (1994) Qualitative methods in organizational research: A practical guide. *The Qualitative Research Interview*, **17**.

Klein Hesselink, J., van Duijn, B., van Bergen, S., van Hoof, M. and Cornelissen, E. (2007) Planten verhogen de productiviteit bij creatief werk. *TNO Arbeid, Leiden*.

Klein, H.K. and Myers, M.D. (1999) A set of principles for conducting and evaluating interpretive field studies in information systems. *MIS quarterly*, 67-93.

Klein, R.A. (2003) Strategic facilities planning: Keeping an eye on the long view. *Journal of Facilities Management*, **2**(4), 338-350.

Knez, I. and Kers, C. (2000) Effects of indoor lighting, gender, and age on mood and cognitive performance. *Environment and Behavior*, **32**(6), 817-831.

Kok, H.B., Mobach, M.P. and Omta, O.S. (2011) The added value of facility management in the educational environment. *Journal of Facilities Management*, **9**(4), 249-265.

KPMG (2008) KPMG International survey of corporate responsibility reporting 2008. *Amsterdam, The Netherlands: KPMG*.

Kraemer, K. (1991) Introduction. Paper presented at the Information Systems Research Challenge: Survey Research Methods.

Kreiss, K. (1990) The sick building syndrome: where is the epidemiologic basis? *American Journal of Public Health*, **80**(10), 1172-1173.

Krumm, P.J., Dewulf, G. and De Jonge, H. (1998) Managing key resources and capabilities: pinpointing the added value of corporate real estate management. *Facilities*, **16**(12/13), 372-379.

Kvale, S. (1996) Interviews: An introduction to qualitative research interviewing. *Sage, Thousand Oaks, CA*.

Kvale, S. (2007) *Doing interviews*. Thousand Oaks, CA: Sage Publications.

Langston, C. and Lauge-Kristensen, R. (2013) *Strategic management of built facilities*. Routledge.

Leonard-Barton, D. (1988) Synergistic design for case studies: Longitudinal single-site and replicated multiple-site. *In, National Science Foundation Conference on Longitudinal Research Methods in Organizations, Austin*.

Lepak, D.P., Smith, K.G. and Taylor, M.S. (2007) Value creation and value capture: a multilevel perspective. *Academy of management Review*, **32**(1), 180-194.

Levy, D.S. and De Francesco, A. (2009) A Comparative Study Into the Effect of Sustainability on Corporate Property Investment Drivers in the UK, Australia and New Zealand. *In, 14th Annual European Real Estate Society Conference*, London, UK. The University of Oakland Business School.

Lincoln, Y.S. and Guba, E.G. (1985) *Naturalistic inquiry*. Vol. 75, Sage.

Lindgreen, A. and Wynstra, F. (2005) Value in business markets: What do we know? Where are we going? *Industrial Marketing Management*, **34**(7), 732-748.

Lindgreen, A., Swaen, V., Maon, F., Eltantawy, R.A., Fox, G.L. and Giunipero, L. (2009) Supply management ethical responsibility: reputation and performance impacts. *Supply Chain Management: An International Journal*, **14**(2), 99-108.

Lindgreen, A.S., Valérie; Johnston, Wesley J (2009) Corporate social responsibility: An empirical investigation of US organizations. *Journal of business ethics*, **85**, 303-323.

Lindholm, A.-L. (2005) Public Facilities Management Services in Local Government. In.

Lindholm, A.-L. and Leväinen, K.I. (2006) A framework for identifying and measuring value added by corporate real estate. *Journal of Corporate Real Estate*, **8**(1), 38-46.

Lindholm, A.-L., Gibler, K.M. and Levainen, K.I. (2006) Modelling the value adding attributes of real estate to the wealth maximization of the firm. *Journal of Real Estate Research*.

Lindholm, A. (2008) *Identifying and measuring the success of corporate real estate*. PhD thesis.

Loevinger, J. (1957) Objective tests as instruments of psychological theory. *Psychological reports*, **3**(3), 635-694.

Longhurst, R. (2003) Semi-structured interviews and focus groups. *Key methods in geography*, 117-132.

Loosemore, M. and Phua, F. (2010) *Responsible corporate strategy in construction and engineering: doing the right thing?* Taylor & Francis.

Luthans, F. and Martinko, M. (1987) Behavioral approaches to organizations. *International review of industrial and organizational psychology. Chichester: Wiley*.

Lynch, B. (2002a) Maximising FM's contribution to shareholder value Part I: Can the capital expenditure process for fixed assets be improved? *Journal of Facilities Management*, **1**(1), 48-55.

Lynch, B. (2002b) Maximising FM's contribution to shareholder value Part 2: Tactics for improving the capital budgeting process‐and producing results. *Journal of Facilities Management*, **1**(3), 222-226.

Makadok, R., Piga, C., McWilliams, A. and Siegel, D. (2002) Dialogue. *Academy of management Review*, **27**(1), 10-16.

Manning, C. (2009) Managing Environmental Risk and Investment Opportunities to Maximize Shareholder Wealth. *Journal of Real Estate Research*.

Manning, C., Rodriguez, M. and Ghosh, C. (1999) Devising a corporate facility location strategy to maximize shareholder wealth. *Journal of Real Estate Research*, **17**(3), 321-340.

Mao, X., Lu, H. and Li, Q. (2009) A comparison study of mainstream sustainable/green building rating tools in the world. *In, Management and Service Science, 2009. MASS'09. International Conference on*. IEEE, 1-5.

Mathison, S. (1988) Why triangulate? *Educational researcher*, **17**(2), 13-17.

McGraw-Hill (2013) *World Green Building Trends: Smart Market Report 2013* [Online]. McGraw-Hill Construction. Available:

http://www.worldgbc.org/files/8613/6295/6420/World_Green_Building_Trends_SmartMarket_Report_2013.pdf [Accessed 23 December, 2016].

McGregor, W. (2000) Preparing for an uncertain future. *Facilities*, **18**(10/11/12), 402-410.

McIntyre, L. (2013) *The practical skeptic: Core concepts in sociology*. McGraw-Hill Higher Education.

McKinsey (2008) *Creating organisational transformations: McKinsey Gloval Survey Results* [Online]. Available: http://gsme.sharif.edu/~change/McKinsey%20Global%20Survey%20Results.pdf [Accessed 05 March, 2017].

McNamara, C. (1999) General Guidelines for Conducting Interviews. Free Management Library. In.

McWilliams, A. (2000) Corporate social responsibility. *Wiley Encyclopedia of Management*.

Mehta, R. and Zhu, R.J. (2009) Blue or red? Exploring the effect of color on cognitive task performances. *Science*, **323**(5918), 1226-1229.

Melnyk, S.A., Sroufe, R.P. and Calantone, R. (2003) Assessing the impact of environmental management systems on corporate and environmental performance. *Journal of Operations Management*, **21**(3), 329-351.

Melvin, J. (1992) Creating Places. *Facilities*, **10**(2), 14-18.

Mertens, D.M. (1998) *Research methods in education and psychology: Integrating diversity with quantitative & qualitative approaches*. Sage publications.

Messick, S. (1987) Validity. *ETS Research Report Series*, **1987**(2).

Michell, K. and Nurick, S. (2014) The role of facilities management and green buildings features and initiatives on tenant attraction and retention. In Proceedings of *SAFMA Conference 2014*, GSB, Cape Town.

Michell, K.A. (2010) *A grounded theory approach to community-based facilities management: the context of Cape Town, South Africa*. School of the Built Environment, University of Salford.

Miles, M.B. and Huberman, A.M. (1994) Qualitative data analysis: A sourcebook. *Beverly Hills: Sage Publications*.

Milne, N. (2012) The Rands and Sense of Green Building, Building the Business Case for Green Commercial Buildings in South Africa. In, Cape Town: Green Building Council South Africa.

Mirkovich, D. (1993) Assessment of beam lighting systems for interior core illumination in multi-story commercial buildings. *TRANSACTIONS-AMERICAN SOCIETY OF*

HEATING REFRIGERATING AND AIR CONDITIONING ENGINEERS, **99**, 1106-1106.

Mohd Noor, M.N. and Pitt, M. (2009) A critical review on innovation in facilities management service delivery. *Facilities*, **27**(5/6), 211-228.

Moline, A. (2001) Conflicts in the workplace. *Plants, Sites and Parks*, **28**(1), 50-52.

Møllebjerg, L. (2009) Facility management value add. *In*, *Presentation at Business Conference*.

Morrissey, A.J. and Browne, J. (2004) Waste management models and their application to sustainable waste management. *Waste management*, **24**(3), 297-308.

Munther, M. (1997) Life Cycle Costing.

Myers, G., Reed, R. and Robinson, J. (2008) Investor perception of the business case for sustainable office buildings: evidence from New Zealand. *In*, *PRRES 2008: Investing in Sustainable Real Estate Environment: Proceedings of the 14th Annual Conference of the Pacific Rim Real Estate Society*. Pacific Rim Real Estate Society, 1-18.

Nau, D.S. (1995) Mixing methodologies: can bimodal research be a viable post-positivist tool? *The qualitative report*, **2**(3), 1-6.

Nelson, J. (2008) Globalization and Global Trends in Green Real Estate Investment. In: RREEF Research.

Nemcsics, A. (1993) *Colour Dynamics*. Hong Kong Polytech. Univ.

Nicolow, J. (2004) Getting the green light from the sun-The benefits of daylight harvesting. *Construction Specifier*, **57**, 58-65.

Nor, N.A.M., Mohammed, A.H. and Alias, B. (2014) Facility Management History and Evolution. *International Journal of Facility Management*, **Vol. 5**((1)).

Norman, G. (1990) Life cycle costing. *Property Management*, **8**(4), 344-356.

Nourse, H. and Roulac, S. (2009) Linking real estate decisions to corporate strategy. *Journal of Real Estate Research*.

Nourse, H.O. (1990) *Managerial real estate: corporate real estate asset management*. Prentice Hall.

Nurick, S., Le Jeune, K., Dawber, E., Flowers, R. and Wilkinson, J. (2013) Incorporating GBFIs into Commercial Property Valuation. *In*, *European Real Estate Society 20th Annual Conference*.

Nutt, B. (2000) Four competing futures for facility management. *Facilities*, **18**(3/4), 124-132.

Olve, N.-G., Roy, J. and Wetter, M. (1999) Performance drivers: A practical guide to using the balanced scorecard. *J. Wiley*.

Ortiz, O., Castells, F. and Sonnemann, G. (2009) Sustainability in the construction industry: A review of recent developments based on LCA. *Construction and Building Materials*, **23**(1), 28-39.

Parker, P.D. and Martin, A.J. (2009) Coping and buoyancy in the workplace: Understanding their effects on teachers' work-related well-being and engagement. *Teaching and Teacher Education*, **25**(1), 68-75.

Pathirage, C., Haigh, R., Amaratunga, D. and Baldry, D. (2008) Knowledge management practices in facilities organisations: a case study. *Journal of Facilities Management*, **6**(1), 5-22.

Patton, M.Q. (2002) *Qualitative evaluation and research methods*. 2nd ed. SAGE Publications, inc.

Patton, M.Q. (2005) *Qualitative research*. Wiley Online Library.

Payne, T. (2000) *Facilities management: A strategy for success*. Chartridge Books Oxford.

Peteraf, M.A. (1993) The cornerstones of competitive advantage: a resource‐based view. *Strategic management journal*, **14**(3), 179-191.

Pettipas, E.E. (2012) Grey water system. In: Google Patents.

Pimputkar, S., Speck, J.S., DenBaars, S.P. and Nakamura, S. (2009) Prospects for LED lighting. *Nature Photonics*, **3**(4), 180-182.

Pine, B.J. and Gilmore, J.H. (1999) *The experience economy: work is theatre & every business a stage*. Harvard Business Press.

Pinkston, T.S. and Carroll, A.B. (1994) Corporate citizenship perspectives and foreign direct investment in the US. *Journal of business ethics*, **13**(3), 157-169.

Pinsonneault, A. and Kraemer, K. (1993) Survey research methodology in management information systems: an assessment. *Journal of management information systems*, **10**(2), 75-105.

Pitt, M. (2005) Trends in shopping centre waste management. *Facilities*, **23**(11/12), 522-533.

Pitt, M. and Hinks, J. (2001) Barriers to the operation of the facilities management: property management interface. *Facilities*, **19**(7/8), 304-308.

Pivo, G. (2008) Responsible property investment criteria developed using the Delphi Method. *Building Research & Information*, **36**(1), 20-36.

Porter, M.E. (1985) Competitive advantage: creating and sustaining superior performance. 1985. *New York: FreePress*.

Post, J.E., Preston, L.E. and Sauter-Sachs, S. (2002) *Redefining the corporation: Stakeholder management and organizational wealth*. Stanford University Press.

Prasad, D.K. and Hall, M. (2005) *The construction challenge: sustainability in developing countries*. RICS.

Price, I. (2002) Can FM evolve? If not, what future? *Journal of Facilities Management*, **1**(1), 56-69.

Price, I. (2003) The Development of Facility Management. *In:* Best, R., Langston, C. and Valence, G.D. (Eds.), *Strategies and Facilities Management: Building in Value*, pp. 30-66. Oxford, United Kingdom: Butterworth-Heinemann.

Primiceri, G.E. (2006) Why inflation rose and fell: policy-makers' beliefs and US postwar stabilization policy. *The Quarterly Journal of Economics*, **121**(3), 867-901.

Probst-Wallace, D. (2015) *What is Facility Management?* [Online]. International Facility Management Association. Available: http://www.ifma.org.hk/download/what_is_facility_management.pdf [Accessed 19 February, 2017].

Pullman, M.E., Maloni, M.J. and Carter, C.R. (2009) Food for thought: social versus environmental sustainability practices and performance outcomes. *Journal of Supply Chain Management*, **45**(4), 38-54.

Punch, K.F. (2013) *Introduction to social research: Quantitative and qualitative approaches*. Sage.

Ragin, C.C. (1997) Turning the tables: How case-oriented research challenges variable-oriented research. *Comparative social research*, **16**, 27-42.

Reason, P. and Bradbury, H. (2001) *Handbook of action research: Participative inquiry and practice*. Sage.

Reed, R.G. and Wilkinson, S.J. (2005) The increasing importance of sustainability for building ownership. *Journal of Corporate Real Estate*, **7**(4), 339-350.

Richardson, L. (1990) Narrative and sociology. *Journal of contemporary ethnography*, **19**(1), 116-135.

Robins, F. (2006) The challenge of TBL: a responsibility to whom? *Business and Society Review*, **111**(1), 1-14.

Rondeau, E.P., Brown, R.K. and Lapides, P.D. (2012) *Facility management*. John Wiley & Sons.

Rowlands, B.H. (2005) Grounded in practice: Using interpretive research to build theory. *The Electronic Journal of Business Research Methodology*, **3**(1), 81-92.

Rutherford, R. and Nourse, H. (1988) The impact of corporate real estate unit formation on the parent firm's value. *Journal of Real Estate Research*, **3**(3), 73-84.

SAFMA (2014) What is Facilities Management? In: 22 April 2014 edn. (South African Facilites Management Association.

SAFMA (2016) *Who we are* [Online]. South African Facilities Management Association. Available: http://www.safma.co.za/ [Accessed 20 December, 2016].

Saks, A.M. (2006) Antecedents and consequences of employee engagement. *Journal of managerial psychology*, **21**(7), 600-619.

Salant, P. and Dillman, D.A. (1994) *How to conduct your own survey*. Wiley.

Sarshar, M. and Pitt, M. (2009) Adding value to clients: learning from four case-studies. *Facilities*, **27**(9/10), 399-412.

Schaltegger, S. and Synnestvedt, T. (2002) The link between 'green'and economic success: environmental management as the crucial trigger between environmental and economic performance. *Journal of environmental management*, **65**(4), 339-346.

Schell, C. (1992) The value of the case study as a research strategy. *Manchester Business School*, **2**.

Schostak, J. and Schostak, J. (2007) *Radical research: Designing, developing and writing research to make a difference*. Routledge.

Seale, C. (1999) Quality in qualitative research. *Qualitative inquiry*, **5**(4), 465-478.

Seawright, J. and Gerring, J. (2008) Case selection techniques in case study research: A menu of qualitative and quantitative options. *Political Research Quarterly*, **61**(2), 294-308.

Shah, M. and Dwyer, C. (2010) *Facilities Management: Strategies to Reduce Operating Costs*. Boston: Aberdeen Group.

Shah, S. (2007) *Sustainable practice for the facilities manager*. John Wiley & Sons.

Sharholy, M., Ahmad, K., Mahmood, G. and Trivedi, R. (2008) Municipal solid waste management in Indian cities–A review. *Waste management*, **28**(2), 459-467.

Shiers, D., Lavers, A. and Keeping, M. (2007) Indicators of the impact of environmental factors on UK construction law: developments in the new millennium. *Construction Management and Economics*, **25**(7), 821-829.

Simons, H. (2009) *Case study research in practice*. SAGE publications.

Singhvi, V., Krause, A., Guestrin, C., Garrett Jr, J.H. and Matthews, H.S. (2005) Intelligent light control using sensor networks. *In, Proceedings of the 3rd international conference on Embedded networked sensor systems*. ACM, 218-229.

Small, M.L. (2009) How many cases do I need?'On science and the logic of case selection in field-based research. *Ethnography*, **10**(1), 5-38.

Smallbone, T. and Quinton, S. (2004) Increasing business students' confidence in questioning the validity and reliability of their research. *Electronic Journal of Business Research Methods*, **2**(2), 153-162.

Smit, I. (2008) A study on the added value of facility management. *Wageningen Universiteit*.

Smith, P.F. (2007) *Sustainability at the cutting edge: emerging technologies for low energy buildings*. Routledge.

Stake, R.E. (1995) *The art of case study research*. Sage.

Stake, R.E. (2013) *Multiple case study analysis*. Guilford Press.

Starik, M. and Rands, G.P. (1995) Weaving an integrated web: Multilevel and multisystem perspectives of ecologically sustainable organizations. *Academy of management Review*, **20**(4), 908-935.

Stenbacka, C. (2001) Qualitative research requires quality concepts of its own. *Management decision*, **39**(7), 551-556.

Strauss, A. and Corbin, J.M. (1997) *Grounded theory in practice*. Sage.

Strauss, A. and Corbin, J. (1998) Basics of qualitative research: Procedures and techniques for developing grounded theory. In: Thousand Oaks, CA: Sage.

Stretton, H. (1969) *The political sciences: General principles of selection in social science and history*. Routledge & Kegan Paul London.

Szigeti, F. and Davis, G. (2000) The value chain for corporate real estate. *an unpublished white paper prepared by the International Centre for Facilities for the Corporate Real Estate Portfolio Alliance*.

Tay, L. and Ooi, J.T. (2001) Facilities management: a "Jack of all trades"? *Facilities*, **19**(10), 357-363.

Teddlie, C. and Tashakkori, A. (2009) *Foundations of mixed methods research: Integrating quantitative and qualitative approaches in the social and behavioral sciences*. Sage.

Tennant, T., BELSOM, X. and Thomas, C. (1997) Creating a standard for a corporate global warming indicator. *NPI Global Care Investments*.

Tesch, R. (2013) *Qualitative research: Analysis types and software*. Routledge.

Then, D. (1994) Facilities Management-Managing the Interface between People, Property and Technology. *Facilities Management. October*.

Then, D.S.S. (1999) An integrated resource management view of facilities management. *Facilities*, **17**(12/13), 462-469.

Tibúrcio, T. and Finch, E.F. (2005) The impact of an intelligent classroom on pupils' interactive behaviour. *Facilities*, **23**(5/6), 262-278.

Treacy, M. and Wiersema, F. (1997) The Discipline of Market Leaders, Addision-Wesley. *Reading, MA*.

Treece, E.W. and Treece, J.W. (1986) *Elements of Research in Nursing*. 4th ed. St Louis: Mosby.

Turner III, D.W. (2010) Qualitative interview design: A practical guide for novice investigators. *The qualitative report*, **15**(3), 754.

Urmson, J.O. and Rée, J. (1991) *The concise encyclopedia of western philosophy and philosophers*. Psychology Press.

Vallance, S., Perkins, H.C. and Dixon, J.E. (2011) What is social sustainability? A clarification of concepts. *Geoforum*, **42**(3), 342-348.

Van Wyk, L. (2008) Do green building assessment criteria meet sustainability imperatives: a critical analysis.

Varcoe, B. (2000) Implications for facility management of the changing business climate. *Facilities*, **18**(10/11/12), 383-391.

Vogel, D.J. (2005) Is there a market for virtue? The business case for corporate social responsibility. *California management review*, **47**(4), 19-45.

Von Paumgartten, P. (2003) The business case for high performance green buildings: Sustainability and its financial impact. *Journal of Facilities Management*, **2**(1), 26-34.

Walker, D., Pitt, M. and Jha Thakur, U. (2007) Environmental management systems: Information management and corporate responsibility. *Journal of Facilities Management*, **5**(1), 49-61.

Walsham, G. (1995) Interpretive case studies in IS research: nature and method. *European Journal of information systems*, **4**(2), 74.

Wauters, B. (2005) The added value of facilities management: benchmarking work processes. *Facilities*, **23**(3/4), 142-151.

Wernerfelt, B. (1984) A resource‐based view of the firm. *Strategic management journal*, **5**(2), 171-180.

Wieviorka, M. (1992) Case studies: History or sociology. *What is a Case*, 159-172.

Williams, B. (1999) Foreword. *In:* Alexander, K. (Ed.), *Facilities Management*. London: E&FN Spon.

Williams, B. (2000) *An Introduction to Benchmarking Facilities and Justifying the Investment in Facilities*. London: Building Economics Bureau.

Willis, P. and Trondman, M. (2000) Manifesto for ethnography. *Ethnography*, **1**(1), 5-16.

Wilson, S. (1987) Making offices work. *Management Today*, **21**(10), 91-92.

Winter, G. (2000) A comparative discussion of the notion of'validity'in qualitative and quantitative research. *The qualitative report*, **4**(3), 1-14.

Yim Yiu, C. (2008) A conceptual link among facilities management, strategic management and project management. *Facilities*, **26**(13/14), 501-511.

Yin, R. (1994) *Case Study Research: Design and Methods.* . California: Sage Publications.

Yin, R. (2002) Case study evaluations: a decade of progress? *Evaluation models*, 185-193.

Yin, R.K. (1984) Case study research: Design and methods. Beverley Hills. In: Ca: Sage.

Yin, R.K. (2009) Case study research: Design and methods. 4 uppl. *Thousand Oaks, CA*.

Yin, R.K. (2013) *Case study research: Design and methods*. Sage publications.

Zeithaml, V.A. (1988) Consumer perceptions of price, quality, and value: a means-end model and synthesis of evidence. *The Journal of marketing*, 2-22.

Appendix A: Interview Design

Topic: General

Question 1: What are the various GBFIs included in the FM strategy for this building, what were the main drivers for their implementation and what are the FM requirements?

Justification: To understand the level and extent of GBFIs implementation in the FM strategy as well as to determine whether the concept of value was considered for the implementation of GBFIs as part of the FM strategy.

Question 2: Was the value adding potential of GBFIs in the FM strategy a main consideration for their implementation?

Justification: Follow up to question 1 if the interviewee did not make any comments on the concept of value. It points the interviewee towards the concepts of value and to determine its weight in the FM strategy.

Question 3: (If yes to above) Was there a particularly important aspect of value that was considered or was it a holistic approach. Why (why was a holistic approach considered v/s why was this particular aspect of value considered?)

Justification: To determine if there is a particular aspect of value which stands out from the interviewee's perspective and, if so, identify this aspect. It also helps understand the reasoning behind the approach to value.

Topic: Economic Value

Question 4: How much is economic value considered in the implementation of a value adding strategy (implementation of GBFIs)?

Justification: To assess the importance of economic value in the implementation of GBFIs as part of a FM strategy.

Question 5: How do the implementation of GBFIs impact on profitability growth?

Justification: To determine the influence of GBFIs on profitability growth which is one of the factors contributing to increased economic value as identified in the conceptual framework at the end of chapter 2.

Question 6: How does the implementation of GBFIs impact on revenue growth?

Justification: To determine the influence of GBFIs on revenue growth which is one of the factors contributing to increased economic value as identified in the conceptual framework at the end of chapter 2.

Question 7: In what other ways (if any) can the implementation of GBFIs in a FM strategy contribute to improved shareholder wealth?

Justification: To identify possible alternative ways in which GBFIs can contribute to improved economic value.

Question 8: What is your general perception of the impact of GBFIs on economic value of the organisation? (Do they add value?)

Justification: Concluding remarks on the concept of economic value in relation to GBFIs. To capture the overall perception of the interviewee on the topic.

Topic: Environmental Value

Question 9: How much is environmental value considered in the implementation of a value adding FM strategy (implementation of GBFIs)?

Justification: To assess the importance of environmental value in the implementation of GBFIs as part of a FM strategy.

Question 10: How do GBFIs contribute to energy efficiency and the reduction of carbon footprint for this facility?

Justification: To determine the influence of GBFIs on energy efficiency and carbon footprint which are amongst the factors contributing to increased environmental value as identified in the conceptual framework at the end of chapter 2.

Question 11: How important are GBFIs for the resource conservation and waste management for this facility?

Justification: To determine the influence of GBFIs on resource conservation and waste management which is amongst the factors contributing to increased environmental value as identified in the conceptual framework at the end of chapter 2.

Question 12: Is there any provision for sustainable travel? If yes, is it considered to improve the environmental value of the facility/organisation and how?

Justification: To determine the influence of GBFIs on sustainable travel which is amongst the factors contributing to increased environmental value as identified in the conceptual framework at the end of chapter 2.

Question 13: In what other ways (if any) can the implementation of GBFIs in a FM strategy contribute to improved environmental value (Bio-diversity, etc.)?

Justification: To identify possible alternative ways in which GBFIs can contribute to improved environmental value.

Question 14: What is your general perception of the impact of GBFIs on environmental value? (Do they add value?)

Justification: Concluding remarks on the concept of environmental value in relation to GBFIs. To capture the overall perception of the interviewee on the topic.

Social Value

Question 15: How much is social value considered in the implementation of a value adding FM strategy (implementation of GBFIs)?

Justification: To assess the importance of social value in the implementation of GBFIs as part of a FM strategy.

Question 16: What is your perception of the impact of the implementation of GBFIs on workplace attractiveness, staff retention and staff satisfaction?

Justification: To determine the influence of GBFIs on the workplace attractiveness, staff satisfaction and staff retention which are amongst the factors contributing to increased social value as identified in the conceptual framework at the end of chapter 2.

Question 17: What is your perception of the impact of the implementation of GBFIs on the work environment (lighting, noise), comfort (leading to improved moods, interactions, and creativity)?

Justification: To determine the influence of GBFIs on the work environment quality and comfort which are amongst the factors contributing to increased social value as identified in the conceptual framework at the end of chapter 2.

Question 18: What is your perception of the impact of the implementation of GBFIs on health risks management (indoor environment quality)?

Justification: To determine the influence of GBFIs on staff health and safety which is amongst the factors contributing to increased social value as identified in the conceptual framework at the end of chapter 2.

Question 19: In what other ways (if any) can the implementation of GBFIs in a FM strategy contribute to improved social value?

Justification: To identify possible alternative ways in which GBFIs can contribute to improved social value.

Question 20: What is your general perception of the impact of GBFIs on social value? (Do they add value?)

Justification: Concluding remarks on the concept of social value in relation to GBFIs. To capture the overall perception of the interviewee on the topic.

Conclusion

Question 21: Any other comments on the value adding potential of GBFIs to facilities?

Justification: To capture any comments on the (holistic) aspect of the perceived impact of GBFIs on value.

Question 22: What is the importance of the perception of the value added by the inclusion of GBFIs in a FM strategy?

Justification: To understand the role perception in the formulation of a FM strategy

Appendix B: Survey Design

Topic: General

Question 1: Were you aware of the various GBFIs implemented in the facility? (yes/yes but not all of them/no)

Justification: To determine whether the respondent is aware of the inclusion of GBFIs in the FM strategy of the facility.

Question 2: These GBFIs add value to the facility and hence the organisation (1-5 likert scale: Strongly disagree to strongly agree)

Justification: To understand the overall perception of the respondent before assessing the value-add indicators identified at the end of chapter 2.

Topic: Economic Value

Question 3: These GBFIs contribute to cost cutting (1-5 likert scale)

Justification: To understand the perceived impact of GBFIs on profitability growth

Question 4: These GBFIs impact positively on flexibility and productivity (1-5 likert scale)

Justification: To understand the perceived impact of GBFIs on profitability growth

Question 5: These GBFIs contribute to improved innovation (1-5 likert scale)

Justification: To understand the perceived impact of GBFIs on revenue growth

Topic: Environmental Value

Question 6: These GBFIs contribute to resource conservation (1-5 likert scale)

Justification: To understand the perceived impact of GBFIs on revenue growth

Question 7: These GBFIs contribute to energy efficiency and the reduction of carbon footprint (1-5 likert scale)

Justification: To understand the perceived impact of GBFIs on energy efficiency

Question 8: These GBFIs contribute to improved resource conservation and waste management (recycling) (1-5 likert scale)

Justification: To understand the perceived impact of GBFIs on waste management

Topic: Social Value

Question 9: These GBFIs influence workplace attractiveness positively (1-5 likert scale)

Justification: To understand the perceived impact of GBFIs on the workplace

Question 10: These GBFIs contribute to improved staff satisfaction and retention (1-5 likert scale)

Justification: To understand the perceived impact of GBFIs on staff

Question 11: These GBFIs provide for improved work environments (lighting conditions, noise level, comfort) (1-5 likert scale)

Justification: To understand the perceived impact of GBFIs on the work environment

Question 12: These GBFIs contribute to reduced health and safety risks (1-5 likert scale)

Justification: To understand the perceived impact of GBFIs on health matters.

Appendix C: Interview Transcripts (CS1)

INTERVIEWER: What are the various GBFIs including in this building and its FM strategy? What were the main drivers behind them and their FM requirements?

INTERVIEWEE: We have a double glazed façade, the DALI system, the mechanically ventilated office areas…

INTERVIEWER: No AC?

INTERVIEWEE: No there is AC.

INTERVIEWER: Okay.

INTERVIEWEE: However, the way we configure it we use the outside temperature wherever.

INTERVIEWER: Okay.

INTERVIEWEE: I mean the outside air, we normally draw in the outside air to compliment so that we don't use too much energy in the AC.

INTERVIEWEE: The building also seeks to be water positive.

INTERVIEWER: Water positive?

INTERVIEWEE: I think that's a big one for us given you know Cape Town is now in a water crisis situation. I can tell you now we actually with my team, I'm actually trying to validate how come we paying so little water for this building, because for me it doesn't make sense, to give you an idea a normal South African household uses about thirty seven thousand litres of water per month, we using less than that for this whole building that's now, something is telling me, but I've got comfort because the council is billing us for that. So which shows me they cannot make a mistake for two years you understand. And apart from that we got the meters, if you... have you seen our screen at the reception which shows how much water we using.

INTERVIEWER: No.

INTERVIEWEE: When you got out just check at reception there's, it shows a screen that shows how much water we using. Basically the concept of water is we do rain water harvesting so all the rainwater harvesting you know around the gutters and everything goes down, we got a Olympic size swimming pool in the basement.

INTERVIEWER: So it keeps that water.

INTERVIEWEE: So we got a basement underneath the parking there's a swimming pool like wow.

INTERVIEWER: A tank.

INTERVIEWEE: Ya a tank, but it is quite huge, so all the water goes in there and what actually happens is all that water is pumped in the ablution facilities, used for flushing only, so they don't go to their sinks, its only for flushing.

INTERVIEWER: Okay.

INTERVIEWEE: Another thing is we got water efficient fittings so it is a sensor.

INTERVIEWER: Ya taps.

INTERVIEWEE: So basically a tap, so those are the taps that we got, and our tank, a normal tank uses eleven litres I think of water, ours uses six. So those are all the things that we've done on the water side of things.

INTERVIEWER: it is heavily water efficient

INTERVIEWEE: Yes efficient ya.

INTERVIEWER: What were the drivers to the implementation of those GBFIs? Was the value adding potential considered?

INTERVIEWEE: I hadn't joined the company by then ya but I've got the details so.

INTERVIEWER: Okay that's fine so I can ask you. So do you know if the value adding potential of this green features was actually considered before the implementation?

INTERVIEWEE: Sorry the question again...

INTERVIEWER: If the value adding potential of the green building features were considered before the implementation?

INTERVIEWEE: It was actually very important that **[Company Name]** build this building so I don't know that you are aware **[Company Name]** as many as other many oil companies, petrochemical companies we bug when it comes to the environment. Okay because everything

its translated, any instance that we got with the environment I'm sure you've heard about oil spills, its related to the market share of the company so safety, and when I say safety I'm talking about safety to people safety to the environment its number one priority for **[Company Name]**.

INTERVIEWER: Okay.

INTERVIEWEE: The prof... the monetary stuff comes second since it was formed, **[Company Name]** safety or responsible behaviour is always number one because it lends itself to the share price of the company, having said that, a green building fits in perfectly with the strategy of the company because we want to make sure that we are responsible, we operate in a responsible manner, so that decision came from actually quite high up in the corporation and it wasn't difficult to sell it to the business because it fell in line with the vision and the strategy of cape town so that was already looked into energy, we knew that, we need to look at something energy, water, transport materials. Materials was a big thing on construction for example, make sure that for example the timber that you see is from the forestry stewardship.

INTERVIEWER: So it is just through the vision of the company, yes the vision of the company… Was there a particular aspect of value which was focused on?

INTERVIEWEE: For the company's value, so it doesn't mean monetary value but...

INTERVIEWER: But it eventually translates to value because of the market shares, so that might actually be, well the driver. So here again so if you look at value would mostly focus on economic value.

INTERVIEWEE: Yes.

INTERVIEWER: Okay so the next one, so it is probably back again to the previous point, how much was the economic value of the implementation of the value adding strategy?

INTERVIEWEE: Okay which number.

INTERVIEWER: On number four.

INTERVIEWEE: Okay.

INTERVIEWER: I mean is economic value considered when you looking at the FM strategy?

INTERVIEWEE: Yes so in terms of cost, I've just given you an example of how little we pay for water but then at the end of the day water is not really that expensive but the difference is

that we are almost not using tap water. Do you understand, it is still making a big difference. Like I was just telling you earlier I was busy with budgets. For example energy and electricity we spending way less than your normal conventional building, you understand so in terms of value we seeing it more, economic value we seeing it more now that the building is in operation rather than when you understand because from an operations point of view we realising the economic benefits of having green features so I'm spending less on energy and I'm sure you've heard about Eskom going to ask for twenty percent increase next year. I've just done my budget now, I've compared with other buildings we way less than what other people pay, so in terms of economic value yes now in operation we can see that.

INTERVIEWER: So basically because of that cost cutting there will be profitability growth as well. And productivity?

INTERVIEWEE: Productivity. We have good ablutions, HVAC, lighting etc. so the people working here can work properly without being interrupted. You see sometimes when there's not water or AC people can stop working.

INTERVIEWER: Okay. Do you see these green buildings features impacting in the revenue growth in terms of asset value and staff satisfaction, innovation do these green features attract more business, more clients.

INTERVIEWEE: Ya so there quite a few, for us because we own the building and from employee satisfaction is both ways, I mean I just sent communication earlier but we've got what we call a building manual which I think I should give you before you go, a building manual which tells you how does this building operate, so we had to give that to the employees so they do understand so I'm going to give you an example. Initially, now they don't complain anymore, they go to the toilet because the tank because maybe when they flush they not happy they didn't you understand because it is only half of what they are use to at their homes and they will come running to us and say your toilet is not working.

INTERVIEWER: Yeah, I understand.

INTERVIEWEE: So it is things like that but once you educate them, you say no it is a feature of a green building we don't want to waste water and likely most of the people work for **[Company Name]** understand the value. They don't have patience to wait for the tank to fill again and then flush again, so education plays a role, so initially in terms of employee

satisfaction they will say the green building is not working because people don't understand what it means. We had issues of sun glare, that another issue as well of sun glare.

INTERVIEWER: Especially here at Century city.

INTERVIEWEE: Yes, exactly because of the glass facade, we have to resort, we have to... we bought what do you call them, block out blinds, which they can adjust to whatever they need, so initially yes customer satisfaction takes a dip but once you the important thing is to educate them, yes so once you educate them then they do understand.

INTERVIEWER: Yeah it makes sense.

INTERVIEWEE: And they adjust their behaviours, because it is all about behaviours, so that's from employee satisfaction point of view. Asset value, there's pros and cons as well, I'll give you two examples, there we got some aircon pipes on the roof now because we can only use for example, we can only paint, we can only use low VOC paint.

INTERVIEWER: Yes ya

INTERVIEWEE: Sometimes it doesn't last that long as your other paint so as I'm speaking to you now this building is about less than three years old, that paint for the chillers pipes and everything is peeling off that whole thing is peeling...

INTERVIEWER: So it has to be painted

INTERVIEWEE: Yes so it has to be repainted and make sure you use the right thing and maybe sometimes it loses its integrity. For example again so its two fold on that, so again that's the impact on asset value, innovation definitely yes, I've just told you about the screen that we've got where you can see how much energy we are using. Every month we got a system that automatically emails us this is how much we are using energy, this is how much we using water and we compare that with what the council are telling us and then y...

INTERVIEWER: And it drives clients as well when they see your resource and energy efficiency, hence they would want to be doing business with **[Company Name].** And then in general in what other ways can these green features lead to improve shareholders for the owners basically.

INTERVIEWEE: For the owners of the business.

INTERVIEWEE: So again I've told you about how most oil company's value safety to the environment and the people okay

INTERVIEWEE: Now if a company is associated to be responsible in the community where it is operating.

INTERVIEWER: So it is back to that point.

INTERVIEWEE: Ya that for and its quite a big thing in **[Company Name]** and other you know oil companies, we've got a department called PGPA which only deals with, it is like public relations

INTERVIEWER: Okay.

INTERVIEWEE: And we normally deal with, I've done a lot of articles on this building on other, you know certain publications and it shows that you know the company, the perception of how the company operates

INTERVIEWER: it is very important ya.

INTERVIEWEE: It's very important I mean you don't want to be known you know, to be someone, who produces high carbon footprint for example, so you make sure your carbon footprint and in fact having talked about carbon footprint we do all those calculations on a monthly basis, we combine the whole **[Company Name]** corporation around the world. So every month we load how much energy we've used, how much water we've used and there's a calculation which says okay this is how much carbon footprint we have got so that is very important to the shareholders because if I want to invest in my, my money in a company that is irresponsible I'm not going to invest in a company I know they don't care about the environment and stuff cause I will lose my investment you understand in terms of shareholders so that's where the value comes in.

INTERVIEWER: Interesting, is it possible for me to get that footprint of the building, the carbon footprint if...

INTERVIEWEE: Yes I will check but... the thing is it is combined, it is combined so information, the guys that calculate there in **[Company Name]** USA.

INTERVIEWER: Okay

INTERVIEWEE: So we just send them out information to say this is how much, this is how much electricity we have used, this is how much and then do the calculations, so we won't have that we just going to have. In fact I can show you here we got data how much electricity we've used and water.

INTERVIEWER: Okay so just as a summing up point and what would your general perception be of GBFIs and economic value, basically do they do to add value?

INTERVIEWEE: Yes so in your economic value, again there are quite so is this the perception from us as the operator of the building or the users.

INTERVIEWER: Both.

INTERVIEWEE: Okay, economic value.

INTERVIEWER: Yes.

INTERVIEWEE: Okay so economic value from my facility as management team is again two fold, again so the general perception is first of all very difficult and I think it is because of maybe the company they are using, I'm not sure. It is very difficult sometimes to find vendors

INTERVIEWER: Who are green?

INTERVIEWEE: Who understand that if I say I want you to quote me to paint here they should already know to say this is a green building, I can only use this paint. Sometimes because there's so little of them they can be very expensive too.

INTERVIEWER: Yeah.

INTERVIEWEE: You understand, I should only be using, again so from building operating view maybe because it's still a new concept, there are now a lot of green buildings out there, but those are the kinds of things that we come across.

INTERVIEWER: So mostly relating to procuring management.

INTERVIEWEE: Yes, procurement management, there's now to having said there's now a lot of green buildings in south Africa so it is no longer a new thing but I think from procurement and other after services you know, I think that's where they are lacking. Vendors for example HVAC contractor needs to start selling themselves as specialist in green building you

understand but if you walk around, I'm sure you going to see no one is claiming that from a vendor point of view. No, none of them so that's a challenge.

INTERVIEWER: it is a long run challenge. It makes sense. Then just moving to environmental value, and I think we already talked about this, but how much was environmental value considered in the implementation of GBFIs?

INTERVIEWEE: Yes… ya that's a big one in fact for us the environmental value is a big one, we've got a very good recycling programme here I can show you, we also have a recycling policy that we've got, it is a document. We've got a very good recycling programmed, we know how much we discard, every day we sign off how much things are going to recycling in weight, bottles, plastics you name them so segregate them, even if you go here, you make coffee you going to see the beans are segregated so we have a sorting area in the back so there's a guy he sorts it into different.

INTERVIEWER: So that's his job.

INTERVIEWEE: Yes, yes and then have a compactor, he compacts whatever cardboard he compacts that stuff, he records it and we make sure that the landfill that we use is registered on our website we don't just take it to any landfill and then we get a receipt again once you have dumped out stuff there you get a receipt on the next trip to say this is what we throw away on your behalf **[Company Name]** so that we know no-one can claim to say hey you have high waste generated for example. It operates fluently so we've got that process. So green building, just to close on that question on environmental value is the biggest value for us considering green environment because again it falls in line with the corporate strategy

INTERVIEWER: How do the GBFIs here contribute to the energy efficiency and the reduction of the carbon footprint of this facility?

INTERVIEWEE: Yes and so we've got the HVAC...

INTERVIEWEE: Yes so that's that obviously we got, we've got motion sensor, I don't know if you've noticed when we got here it was dark, when we walked in here the lights went on, our HVAC is on an economic cycle, they call it economic cycle. SO it mixes, I just told you earlier on, its takes like in the morning it takes like five, it is cool outside for example, it takes all that air, brings it in and all those kind of stuff. So yes in terms of energy there's... obviously we got that, what that thing is called now, park correction factor.

INTERVIEWER: Okay.

INTERVIEWEE: We've got that in place and ya there's quite a few things that we've done in constructing this building on electrical side that I'm confident that we paying and we using way much less electricity than any other company or any other conventional building.

INTERVIEWER: Next one is to waste management, but we already talked about recycling. Resource conservation? GBFIs for that? Do you have any grey water system?

INTERVIEWEE: Grey water, we do not have a grey water plant.

INTERVIEWER: You just have storm water.

INTERVIEWEE: Storm water, but what we have in terms, you talking about waste management which we see still it was supposed to be in operation but it's taking us long because maybe none of us have dealt with it, we've got what we call a biodigestor, I don't know that you familiar with it, so a biodigestor is like a macerator where this where we throw, we got a canteen so all the things the food that you need to throw away, you throw in there. Okay and it converts that into gas which you can use to cook. Okay you can use that to cook and once the by-product goes into the sewer but it is not operational at the moment.

INTERVIEWER: And then here, do you have any provision of sustainable travel? Bicycle racks, shower facilities for bikers - bike riders? Does this add value to the facility?

INTERVIEWEE: Yes, so we got shower facilities downstairs, we got our parking in the basement and most of the parking is the basement is not for individual cars. it is based on if you got an electric car you know you get close to the door, we got a bicycle racks, we got a lot of disable parking, so in fact that's one of the points, one of our points was given to us based on that aspect.

INTERVIEWER: Sustainable travel, oh okay.

INTERVIEWEE: Obviously that was considered early on it wasn't added afterwards.

INTERVIEWER: And then what other ways do you think we can be using GBFIs to improve the environmental value of facility and there's lots of green features here, what else do you think of.

INTERVIEWEE: Is that question thirteen, in what other ways if any can implementation add value interesting, ya I never really thought of that actually, I'll come back to that

INTERVIEWER: Okay that's fine and then just overall perception of the impact of GBFIs on environmental value.

INTERVIEWEE: Ya so that, I think for me it is more than a perception, it is a knowledge maybe as I'm a FM professional but having worked for and still working for a company which is so much, puts so much emphasis on safety to the environment and people. I mean just look behind you before I answer, you see that, if you look we got called tenets of operation. Those at the bottom and there are ten tenets of operation, always operate within design and environmental limits, can you see the first one, so tenants of operation is like a... what do you call it in bible terms is your commandments.

INTERVIEWER: Oh okay.

INTERVIEWEE: So those are the commandments for **[Company Name]** so whatever you do here make sure you follow that and what is the first one, always operate within design and environmental limits, that shows you how much emphasis the company pays so yes to answer your question, the perception that I've got on these features, on environmental value is actually big, I mean look at the climate change which is happening in the world, it is said that if things go the way they are your and my kids will never be in a different world where already the weather patterns have changed, so we need as people and as companies to play our part in making sure we don't escalate.

INTERVIEWER: Make it worse ya.

INTERVIEWEE: To make it worse ya and one of the things to do that is to make sure you implement green building staff in your design if you doing and you can see yourself, the rate of construction, if you drive just ten meters everywhere people are constructing and building

INTERVIEWER: Building the construction is one of the least green...

INTERVIEWEE: Exactly so make sure you behave in a sustainable way that's why my belief, my perception of green building to the environment is quite positive.

INTERVIEWER: And the last one is social value, and then how much was social value considered of implementation of value added strategy especially for the GBFIs cause we talk

about economic value, the vision of the company and obviously then we talk about environmental values how the company is concerned for the environment and how that environment reflects on the shares which is basically linked, the two are linked, so then was social value actually considered or was it more focus on environment, environment leading to economic value.

INTERVIEWEE: I believe these two things are interlinked, environmental and social, especially for our company **[Company Name]**.

INTERVIEWER: Social value here mostly related to the staff and the building users.

INTERVIEWEE: Ah the building users.

INTERVIEWER: Because the society was captured by the environmental value.

INTERVIEWEE: Okay, okay.

INTERVIEWER: it is because any benefit to the environment is translated to a broader society.

INTERVIEWEE: Okay.

INTERVIEWER: So this one literally looks at that building, okay social value

INTERVIEWEE: So yes it is considered, I can tell you now I wasn't there but at the last building where **[Company Name]** was, one of the, I don't even know the building. One of the things that I know was that the company wanted people to collaborate because and most companies want people to communicate to each other, but that office everybody had an office.

INTERWIEWER: Oh okay it is not open plan.

INTERVIEWEE: You understand, and when I say an office, not a dry wall office, brick office you understand, proper rooms you can lock the door, and snooze and nobody will know. And that you know, that doesn't encourage collaboration, doesn't encourage you working communication of your fellow employees and stuff like that you understand.

INTERVIEWER: Yes.

INTERVIEWEE: Now the green building design for example, and I'm saying green building design cause let's say for example one of the things that we target was light, you know to make

sure we use as natural light as possible, now if you got too many offices you not going to get that point.

INTERVIEWER: Yes natural lighting.

INTERVIEWEE: So you need to have open plan and you need to plan your office in a certain way.

INTERVIEWER: Yes building orientation for natural lighting.

INTERVIEWEE: And at the same time you using natural lighting at the same time you encouraging because it is open plan and you encouraging collaboration between the people so that's the social value.

INTERVIEWER: Okay so...

INTERVIEWEE: That the green building brought yes ya

INTERVIEWER: And then what's your perception of the impact of the implementation of the GBFIs on work place attractiveness, or are the staff more attracted to work here

INTERVIEWEE: Okay I think this is what I chatted earlier, it is very important that you educate the staff, educate them first before you put them in a green building otherwise they will be frustrated

INTERVIEWER: Educate them first?

INTERVIEWEE: I saw it even with myself, it can be a frustration but if you explain to staff to say, guys you know this a building and this is what we trying to achieve. Once you do that staff will understand and would raise on it, if they are resonating with a company that they are working for, then we know **[Company Name]** is all about environment and also once you in line with a company, it is very easy for them to be aligned.

INTERVIEWER: To accept it.

INTERVIEWEE: To accept the building, in fact what we have done, when I spoke to you, we've got a building manual for this building you name it I'm sure before they gave you a flyer at reception, they didn't give you.

INTERVIEWER: No.

INTERVIEWEE: Oh maybe they finished. We got all type of things that explain to you where the fire escape is, where the ablution facility is, we got even the map of how you can get to second floor, all those kind of things, now can you imagine how important that is, cause now if you walk around here, people they also got that displayed on there and you don't know where the meeting room is, let's say for example David meeting room, you just look at that pamphlet I'm talking about, you know it is on the second floor.

INTERVIEWER: Okay.

INTERVIEWEE: So once you, you know you educate them so once they know the value of having a green building because remember a green building is also to make sure you got manuals for certain things and that's also where the staff satisfaction comes in, they become satisfied.

INTERVIEWER: Okay and then once the staff are educated does that also lead to staff retention?

INTERVIEWEE: For the retention part I wouldn't talk on the rest of the staff, that for me, it is a very difficult thing to quantify at the moment ya, so that unfortunately I can't answer you on that.

INTERVIEWER: That's totally fine and then GBFIs do they impact to work on the environment in terms of lighting, noise levels, temperatures are those conditions optimal through the GBFIs?

INTERVIEWEE: So that was what was the biggest issue and maybe still biggest issue for us so where are we lighting.

INTERVIEWER: Ya

INTERVIEWEE: So lighting is perfect, we've never had complaints because we use mostly natural lighting but with that comes the sun glare I was talking about but again we resolved that issue we now got block out blinds, in fact some of the people have got two blinds, they adjust whatever they want. But initially we wanted to get as much natural light as possible that we didn't do the necessary things outside like I think we suppose to install sun…

INTERVIEWER: Screens ya.

INTERVIEWEE: Ya we didn't do that because of budget constraints so we had a problem with the sun glare.

INTERVIEWER: Okay.

INTERVIEWEE: We didn't do that so that's with comfort levels, we don't have comfort levels at the moment so initially again it was a big problem, when I started two years ago, it was a big problem but it took a lot of tuning on the system and everything and then it came right. The biggest issue we have not resolved because it is too expensive to resolve and in fact people again just now education is very important but it was a big thing was soundproofing.

INTERVIEWER: Oh!

INTERVIEWEE: Yes soundproofing is something that we missed when we were doing construction I think maybe I do not know what the reason was but we missed but now we chatting, we get complaints lie someone is next door, but hey we heard your whole conversation with that guy.

INTERVIEWER: Okay. This is also linked to the open floor plan linked to maximise the use of natural lighting….

INTERVIEWEE: Yes, it was costed in the initial stuff but I think something went wrong

INTERVIEWER: And then what is your perception of the GBFIs of risk management on the indoor environmental air quality.

INTERVIEWEE: Okay, no that is definitely good, as I said we mix a lot of outside air because there's other people who, I've worked at different companies and a lot of people just the fact that recycling HVAC you know air, the same air.

INTERVIEWER: One person in the office gets sick, everyone gets sick.

INTERVIEWEE: Exactly, here as far as we know because we can check everything on the PC we got what we call the DALI system.

INTERVIEWER: Ya.

INTERVIEWEE: And then we got the BMS as well its quite good in terms of making sure we don't have those kind of things. Sick building syndrome and all those kind of things that comes with an office building.

INTERVIEWER: And then, in what other ways do you think that the green building features could improve social value.

INTERVIEWEE: Okay that is the same question as the other one.

INTERVIEWER: That one is environmental, this one probably sound, so here sound and everything would lead to better environment through green features, that's one way we talked about earlier.

INTERVIEWEE: Ya those two I should answer some time, let me think about those two.

INTERVIEWER: Okay, and then what's your general perception. Do you have any other comments on contribution of GBFIs of the value of the facility?

INTERVIEWEE: There's a lot and I know our friend in Australia, US and I think Canada they quite advanced with their green buildings stuff, but I've seen here there's so much ground the south African guys have covered, for example when I did my certification there was only one two but now there is retail, a building operation like this you can go for certification and stuff like that so coming back to your question there is a lot that green building can do to facilities so like in our case we did transport, we got points on transport, we got points on energy, we got points on water. I'm sure I'm just trying to think what other areas can it add value but there's definitely quite a lot of ways, you know there's still ways for one to add value on green building which I may not off the cuff now remember what they are.

INTERVIEWER: And then just the last question, what is the perception of value added by the GBFIs. We did chat about the perception of environmental value leading to economic and shareholders value and all of that CSR but just in terms of the holistic aspect of value

INTERVIEWEE: Ya so it is important from where I see it, it is important let me not just speak FM, let me speak real estate. From real estate point of view it is very important so I don't know that you are aware but I'm sure you are because of the field in which you are. There are companies out there, the companies out there who want to lease a place, but they can only lease from green building.

INTERVIEWER: Ya.

INTERVIEWEE: You understand, I don't know if you are aware of that, yes so there's a green building lease for example which is out there, so companies who don't want to build a

building like say oh okay we don't want to build a building but we are a responsible company so we don't want to go in any other building that you know David or Tom can offer us, we want to go into a green building so you need to prove to us that this a green building so you see how important that is, a perception in green building.

INTERVIEWER: Ya okay that does add value.

INTERVIEWEE: And I just remembered a point in two or three years' time I read, I saw something tracking some stuff and I'm involved in all sorts of things, it is going to be compulsory for buildings to perform on energy side or water side, along certain with restrictions. It is not in the far future it is in the near future, they going to say okay **[Company Name]** you got that building, three hundred people, you can only use this maximum energy and this maximum water. Soon we going to have that so again...

INTERVIEWER: it is a bit of future proofing in a way.

INTERVIEWEE: Yes exact.

INTERVIEWER: GBFIs provide for future.

INTERVIEWEE: So again maybe that will be, to answer your question so say that's where the added value for green building features, so they can be proactive and look at hey the government is trying and in five years' time the government might introduce these restrictions so what green building features can we improve to make sure you know you understand so that's where the gap is I think, the gaps ya.

INTERVIEWER: I think we've covered pretty much everything

INTERVIEWEE: Ya it is just then the question number thirteen what other ways can the implementation of GBFIs, so its number thirteen, which is similar to number twenty.

INTERVIEWER: Ya.

INTERVIEWER: Would you guys consider green roofs, green walls because it actually the green walls cool, all green walls and roof cools down the buildings, provide shading.

INTERVIEWEE: Yes things like that, definitely would because before I don't know you aware actually **[Company Name]** is actually the main shareholder of the company has sold his shares holding so we no longer going to be called **[Company Name]** we busy with that process

we going to do **[Company Name]** now, all I wanted to say was that I forgot now. Anyway I forgot what I wanted to say

INTERVIEWER: Number twenty, you did touch on it.

INTERVIEWEE: I did ya.

INTERVIEWER: Education and then added value.

INTERVIEWEE: Yes I did.

INTERVIEWER: I think I got all of it. Thanks.

Appendix D: Interview Transcripts (CS2)

INTERVIEWER: Just as the background, I'm looking at various buildings that have green features and initiatives. I'm looking at the value added but not only in the economic sense but also the value added to environment and the employee's as well. So this is a series of questions relating to this. You have the questions so you know what we'll be talking about. Let's get started.

INTERVIEWER: Do you know what the various green features are in this building and what where the drivers them to implementation?

INTERVIEWEE: Okay well the building was designed as a project between **[Company Group Name 1]** which is another company from **[Company Name 1]** and **[Company Name 2]** properties so it was joint owned building and joint development of the site and so in the initial discussions it was a vision to have a green star building in Cape town and then it ended up being the tallest building in Cape town and the tallest green star building in South Africa in fact. So in the design of the building various features were incorporated in the design already, for instance it focused on energy, air conditioning, lighting, electrical, and water reticulation etc. There were there value add as well, so for instance technology for having car chargers in the building especially for people with electric cars they can park in the building and charge. The cycling facilities, showers both inside and outside of the building. We can on that later. The building is completely a glass facade and in the glass facade itself there's sort of a double glazing with an air vacuum so that's not too much of external heating coming in structure the building inside if its anything more specific you would want then...

INTERVIEWER: So was the goal just as to be the tallest green building in South Africa or was it to add value?

INTERVIEWEE: It was a value add cause as corporations and big companies you do tend to use a lot of, in terms of your development for example **[Company Name 2]** has property development and property section in their business and I think the new thing would be more sustainable to be more environmentally conscious and socially aware and so with these features in the design there would be an implement of energy saving which means lower carbon footprint, could be water saving and other elements like recycling that would lend itself to be more effective than conventional buildings.

INTERVIEWER: Then it is also to the image of the company.

INTERVIEWEE: Absolutely ya the brand. Branding is very important for both companies.

INTERVIEWER: And then let's just talk about value add, was any particular aspect of value, is it social value, economical value, environmental value or all three of them?

INTERVIEWEE: Look all three of them will apply because like you said what does the world out there see in various big companies. There are certain companies that might not care too much about protecting the environment but it is really important that we do that because you also house in those buildings people that are your staff, the users of the buildings that are environmentally

conscious and if they see the company is doing it then obviously it lends itself to better behaviour inside the building as well so that's the one aspect in terms of social consciousness and the other one would be obviously on to reduce your costs because if you spending less on energy and less on water than you would effectively

INTERVIEWER: In that same line, let's at economic value, I think we did touch at that, question four is, how much is economic value considered in the implementation of GBFIs?

INTERVIEWEE: yes look it does cost more there's no question about it. If you do go for green design you have to spend a little but more on your installation, so for instance in the building we do have reticulations that are difficult to other buildings where we can capture water which gets recycled and reuse it, we can capture water that gets recycled you know which other buildings don't have

INTERVIEWER: So it is a bigger investment.

INTERVIEWEE: Your investment is bigger but it pays off in terms of your return on investment.

INTERVIEWER: And then how do these green features affect profitability growth in terms of cost cutting, flexibility or productivity

INTERVIEWEE: You're spending in the long term would end up to be less, for instance we would use about thirty two percent less energy in the building after design..

INTERVIEWER: Okay.

INTERVIEWEE: After occupying the building, we do have approximately eighty percent less water usage in the building more than a conventional building and because we got all these features built we say your capital out initially we but eventually as time goes by we look at five years and beyond

INTERVIEWER: You're saying your life cycle costs

INTERVIEWEE: Okay that study was done and obviously works out cheaper in the long run.

INTERVIEWER: Okay, and then in terms of revenue growth, looking at asset value and innovation and then employee satisfaction, do those green buildings factors on the revenue growth?

INTERVIEWEE: On the?

INTERVIEWER: Revenue growth, I mean is the asset value higher? Innovation drive more business as well? More clients?

INTERVIEWEE: Ya it would, what we have discovered in the buildings that because of its height and because of its. It lends itself to the glass facade they will be able to see, have a three sixty view degree of the city, as you know we have Robben Island on that side, we got signal hill, table mountain on that side, we got the cape town stadium you can see that. So what we discovered is we created on the top floor a sort of events conference facility and we've had many, many requests from outside businesses that are not quite linked to our business that have heard about it. People that aren't our clients that use the facility, speak about it and hear about it, they are very happy to come in. People have come to know and ask request if we can't accommodate all of them. We had the city of Cape Town, the provincial government, the national government so you know we do accommodate and it does lend itself to getting a more profile. **INTERVIEWER:** And it builds relationships I suppose.

INTERVIEWEE: It does ya.

INTERVIEWER: And your clients?

INTERVIEWEE: Our clients are also very happy to come in but it is a head office so not many clients actually come here.

INTERVIEWER: In what other ways can those GBFIs improve shareholder wealth, because we looked at revenue, we looked at costing. Is there another way that you could think of the green buildings features back to the shareholders profits?

INTERVIEWEE: Well if shareholders do see ourselves as **[Company Name 1]** and is looking at putting back to the environment and weighing the consequences of not living green. That does have a positive impact and it does create comfort within shareholders minds that they are investing in a company that does actually look at the consequences of not living green and we looking at not only this building but also future developments also that we occupy would be green ya.

INTERVIEWER: And then you overall perception of the GBFIs and economic value, do they add value?

INTERVIEWEE: For green initiatives, it does definitely add value, you see the difference here is we start occupying a building that is green designed but the other aspect of green is that you have to operate it as green as well. We were rated five star, for green design of green so in other words all the features that you know of were incorporated in the design, so that some aspect of being rated as green building but the other aspect is how you operate building. So you will find there are some other initiatives that we did come up with that lends itself to getting us to a green rated building operated as green.

INTERVIEWER: Okay and then just looking at the environmental value now. How much was the environmental value considered in the implementation of the FM strategy.

INTERVIEWEE: Well the building is a feature building so it would have been the obvious choice to go green in the design of the building and say well this is a five star green building so it gives itself to that statue. People look at this building and say: so this green building, who owns the building? What we also doing which is not well known is we are looking at other buildings that we already have and turning them into green operated buildings as well. And that's a process that's going to be ongoing throughout our strategies in terms of **[Company Group Name 1]** and **[Company Name 1]** and going forward.

INTERVIEWER: So was that based on **[Building Name]** being a success so is that why you wanted to.

INTERVIEWEE: Not necessarily no.

INTERVIEWER: It was always part of the vision.

INTERVIEWEE: Was part of the visions of the company to go green and socially conscious, to have a social impact.

INTERVIEWER: Okay and then how do the GBFIs continue to be energy efficiency and production of carbon footprint, you talked about lighting and all of that.

INTERVIEWEE: Yes look about ninety nine percent, maybe more than ninety nice percent of lighting in this building is LED lighting which is more energy efficient and it lasts longer, we also have natural lighting coming in and we have harvesting of lighting as well, so when the lighting comes in the sensors will detect and there's enough lighting by itself, okay and like I said in the beginning this is a cost initially cause its unconventional and new technology and we also have if you noticed in some of our areas, most of the areas we got sensors so that on occupied areas and unoccupied if its left on overnight you could make a thousand cups of tea with that energy that you burning so does it have economic value so you know that we saving money, we did obviously spend a lot more, it is again the need to save energy is very important.

INTERVIEWER: Okay. How does the implementation of GBFIs impact of waste management and resource conservation?

INTERVIEWEE: Waste management is the way you choose to operate your building, so some conventional thinking will be there's a waste paper bin basket just dump the waste in there, what we have done and you will see is we have got receptacles around you, we've got a waste bin that's for general waste, another one that's for recycle so if you don't need something anymore that can be recycled, it goes into the recycling bin, we then collect that with a cleaning company that we have and it gets collected and taken down into two separate wheelie bin containers, separates, in other words it separates at source. It goes down into a waste management area and what can be recycled gets recycled. We also have a two hundred seater staff restaurant dining area, we make our own food here so obviously food wastes, off cuts and plate waste that we recycle, we do not throw this away, we do not send it off to dump sites we recycle this ourselves, if you go down the corner you will see where are there are recycle bins and the vessels that turn food into compost, you see the bags are over there.

INTERVIEWER: Oh okay.

INTERVIEWEE: So it is a big thing with us, we are continuously thriving on waste management because it is an area we environmentally cannot afford anymore to send stacks of items and waste to landfill, it costs about two fifty rand per trip kilogram, sorry a ton, to drop the waste there, so we are minimizing the costs as well as for the future. It is not the way to go anymore.

INTERVIEWER: And do you use the compost yourself.

INTERVIEWEE: In the gardening that we have around us.

INTERVIEWEE: Oh and there are companies that do sustainable gardening, they supply us with our veggies and they take out, so what we take from the earth we put back to the earth.

INTERVIEWER: We've talked about sustainable travel. Is that actually a success in the sustainable travel and the racks, and showers and the...

INTERVIEWEE: Look you know, the way the city has been designed, it is not like overseas where people you know. Here living areas are far from the city, not in a city-living culture. But there are people who do come in with their bicycles, we've got around two twenty three around there bicycle racks people can actually lock their bicycles up inside the building space and we've got twenty one showers and twenty nine lockers that people use so it does get used, people also run

INTERVIEWER: Showers promote this...

INTERVIEWEE: At the moment we not using the showers because of our drought situation, so people have to find alternative, so yes it does get used, yes we also have cyclist lock up facilities around the building where people can park bicycle lock it up and go to their meeting and do that

INTERVIEWER: You also mentioned the points for electric cars.

INTERVIEWEE: Ya.

INTERVIEWER: Are these ones used a lot?

INTERVIEWEE: We've got sixteen at the moment, it is got one percent of the total parking allocation in the building and they are used although not fully but as you know the electric cars

are not inexpensive, it is a new technology and it is a pity because it does prove to be quite sustainable.

INTERVIEWER: So it is a bit of future proofing as well.

INTERVIEWEE: It is future proofing, we also have some ports that are not connected yet so in case it does improve in the future, we've got provisions

INTERVIEWER: Provision for more ya.

INTERVIEWEE: For the future.

INTERVIEWER: That's good, can you think of any other ways the implementation of GBI's in FM strategy could contribute to environmental benefits.

INTERVIEWEE: Ya well I take it like this, there are two wings of green. You can design green like we've done in this building the other one is staff grade green. Other buildings are not designed as green but they do operate it as green, okay so there are many other strategies, our food composting is one of them. How else can we? We can green wall you know we can plant vegetables, we can do lots of other things. In a nature of a building like this, in a tall building it's very difficult because you don't have the space around you know you've got to use packets and spaces and to travel between these two spaces is very difficult because it's a corporate building.

INTERVIEWER: Ya, for sure.

INTERVIEWEE: There are clients coming in here that are coming to bank and want advice and that sort of thing, so you have to be quite strategic about how you do it. It is part of our strategy and its ongoing work in progress for a building like this

INTERVIEWER: And then what's your general perception of the GBFIs environmental value...

INTERVIEWEE: Environmental value of anything that you do that would go towards, initiated towards saving for future, for instance water usage, if you can cut back on that. You are doing a lot in terms of. I mean I don't need to explain it and highlight the situation now, we are in a very, very dire situation. Level four B restrictions give us about eighty seven litres of water per person per day and that's very, very drastic. So I'm thinking that, what we've done for instance and now we talk about operating green is that with that in mind, like I said we've

got the showers, so we not allowing people to showers in the building and some people don't like it but it is just when what it is, you've got to change your habits. We've also reduced already sensor taps so we don't have any taps that open up except in the kitchen so it is just the use so they will go on and use it but even that we've reduced the flow.

INTERVIEWER: Oh okay.

INTERVIEWEE: So it doesn't flow at six litres per minute it now flows at say three litres per minute. And these are the initiatives we do to at least contribute to the environment.

INTERVIEWER: I was just talking about environment, benefits to the environment but also to society indirectly, but then, so now we talk about social value, but social value here is going to be about the staff, the people actually using the building, the direct occupants. Was the social value to staff considered in the implementation of the green building features as well or is it about image and environment mostly.

INTERVIEWEE: With the fit out around the building and here I'm speaking for **[Company Name 1]** because we managing the entire building but it is the area that we manage internally for our staff, for our clients. Is that we've designed it in such a way that people are able to use this building, attractive view that they in, comfort and maximum ability. So you will find that all of our areas are Wi-Fi, so for staff who are in the building, they can actually come and sit here you know, they want to break away from their work area, they can come and sit in this space, they can come and sit in the balcony, they can come an sit in the meeting room somewhere else and we, just to get out of your comfort zone or the noisiness or the business of your area. You can take a group of people and say come lets go and sit at this table and have some coffee, you still working but you having a different feel with a different vibe and a different view. It does lend itself to a lot of attractiveness and comfort for people coming from conventional buildings

INTERVIEWER: That goes to the next point, what is your perception of those GBFIs and workplace, staff retention and staff satisfaction.

INTERVIEWEE: Ya as you go out of the building I might take you to some areas so you can just have a look and look at some of the area but it does talk to the second point as well

INTERVIEWER: Okay and does it impact on staff retention, I mean are employees more keen to stay here cause of the building and work space.

INTERVIEWEE: Ya we had about twenty two various satellite locations before this building was completed and where people were housed, so naturally if you in your own home environment where you are housed as a certain business unity you would have your own comforts, you would probably have your own locked up office so here it was different so sometimes it comes a little but more difficult for people to adjust because we also did an open plan area, you are mobile. You can you know use spaces more frequently as before you were more structured and comfortable where you were in terms of your own rules and housekeeping. When you get to a bigger space it is a little bit more difficult to adjust cause everybody has to abide by the same rules and that still a challenge and I think people got used to it they've got great food they are offered here, more open spaces, fresh air if you want to go out on the balcony for some fresh air, it is not often found in a high rise building

INTERVIEWER: Ya that's true.

INTERVIEWEE: So I think it did lead to greater attractiveness.

INTERVIEWER: Okay so in terms of staff retention, staff satisfaction just took a bit of time for it to be seen I suppose.

INTERVIEWEE: yes the fact that you do have a gym on site as well does help, it does help ya.

INTERVIEWER: And then...

INTERVIEWEE: An obviously the view... you not going to find this anywhere else.

INTERVIEWER: it is a big plus.

INTERVIEWEE: You not going to find this anywhere else, it doesn't matter where you come from and particularly you've got the ocean.

INTERVIEWER: On one side.

INTERVIEWEE: And the mountains on the other side and both give you a different contrasting views and they both serene.

INTERVIEWER: What's your perception of the green features in the environment in terms of lighting and noise, comfort? Previous research shows that comfortable work space leads to improve the moods, better interaction and creativity. Have you seen that here with the GBFIs?

INTERVIEWEE: Comforts you know we go for the best in design in terms of our final fit out furniture so it is very important that we people no matter where they are where they sit they are comfortable in their work station so we have given them economically designed comforts, chairs, desks and those sort of things and we continually looking at being improved in the future, how we looking at sort of five years of stages so then at the moment then I think in the break of areas as well might be to your advantage to have a look at those to see how people are given a view with comfort in their work space as well as the breakaway cause areas as well.

INTERVIEWER: In terms of noise levels, do you have any issues in the building?

INTERVIEWEE: Look in an open plan area people have, they don't have the comfort of a closed area when you doing a telephone call but people get used to that and it is the culture within, to have, not to have any closed areas.

INTERVIEWER: Also it encourages people to talk to each other and to work together.

INTERVIEWEE: Correct.

INTERVIEWER: And what's your perception of those green features in the health management. Sometimes you have the HVAC system that leads to the sick building syndrome, so do you have these problems here?

INTERVIEWEE: So the design, like I said the design even considers the glass which it doesn't have to consider the glass, I'm thinking warm air when the glass itself reflects some of the heat, the glass traps some of the heat inside through the panes and that would sort of emit itself into the work space, that the first thing, the second thing variable air volume design which means it will pump environment air as it is needed so the amount that needs to be provided in that area is provided as needed. So you will notice that some of these diffusers have actually got sensors so that when it occupies it will send through what is required and if not it doesn't because you know it is going to be a waste of energy and heating. And the other one would be if outside the air is the cool air its cool enough for fresh air to be come from the outside, it does that directly, so it is a way of what we call economy cycle so that the air and the unit doesn't have to work through all of this energy to get you cool air you know, cool it down and then bring air into it, it will take from the outside, it senses that the temperature I want so let's bring that air in and pump it through into the building, see cause also bit of ventilation.

INTERVIEWER: So also a bit of natural ventilation that happens. In what other ways do you think there's been green building features improve the social value for the occupants of any ways we discussed.

INTERVIEWEE: Well you see its human nature and I think the more you get people involved …it's all about that at the end of the day, it is all about environment cause we cannot live in a unclean environment, an environment like where we got the water shortage at the moment so we got to get involved in terms of how do we, what do we do about this and how can we help. So I think if you can get your occupants sort of you know we have campaigns, water wise campaigns and cleaning and saving energy if you can get people together involved in that that's already a great step. When they know what we're doing and what they need to do.

INTERVIEWER: And do you think that working in a building having all these features actually have them by default more environmentally conscious without necessarily having campaigns or anything.

INTERVIEWEE: It will only work if they see what you doing.

INTERVIEWER: Okay.

INTERVIEWEE: You've got to be active, you've got to post messages, you've got to send emails So what we've got is screens all over and sometimes we just for example level four B water restrictions at the moment, we just post the messages on there the people can actually see it so it depends on how you manage it. As the facility manager you've got to be.

INTERVIEWER: Proactive.

INTERVIEWEE: Very proactive and conscious of the people that when they see something they might just ignore it or somebody else will actually go and see it and then they speak amongst each other and then you find it grows. The consciousness grows when people see others doing it.

INTERVIEWER: Just wrapping up, any other comments on the contribution of green building features facilities that I haven't touched on?

INTERVIEWEE: I think I've already maybe covered that point by saying that the users play a key role, so facility management strategy could be one thing but the users play a huge role in it so you might find that some people have a problem, they want to have bright light on the

desks and that's just the way they are, their comfort level from where they are from home or somewhere else, whereas the next person says I'm okay, this is fine. So now that adjustment is very, very difficult. So what do we do with this person and how do you manage that person and I'm not the persons manager but one needs to make people aware and that's different but maybe there's something really wrong with his eyes you can't blame the person for not seeing you know, lighting just matters if it is really not going to be comfortable for him or for other people we will have to up the lighting again and so that's the difficult part of it.

INTERVIEWER: To make everyone happy.

INTERVIEWEE: To make everybody happy is a very difficult thing. You find in a tall building air conditioning is always a big issue because you cannot open windows and some people get cold in the same environment in the next person will be getting hot. So you've got to be aware of that and we've got a rule that if it is in within the parameter of what the object determines ass room temperature anywhere between twenty two, twenty three, twenty four degrees we should be happy but in fact you find these sensors can be adjusted by the people in the area and they could say looks it twenty three, I want it twenty four and they can actually adjust it to automatically do it for them, so it gives them a little bit of control as well

INTERVIEWER: Okay what's the importance of the perception of the value added by the inclusion of GBFIs in a FM strategy?

INTERVIEWEE: Perception of the...

INTERVIEWER: Of the GBFIs before including any GBFIs in the strategy, is that perceived value add of GBFIs important?

INTERVIEWEE: It depends there are many initiatives that you could look at, we feel in this building water management is one that's going to be ongoing, it is never going to go away, you will always have waste. So it is a very, very important one. Our resources are important, which is water, we've got to do water saving, even if our dams are full. We don't know what's going to happen correct ya, we don't know what's going to happen in this, it is a very, very dire situation at the moment. Johannesburg is in the same situation when they didn't have any rain, they were in a very same situation for months they had full dams because it was just a lot of flash floods and destructive rain and stuff. So we don't know what's going to happen here, but we would stress that even in the future we will have to look at water saving mechanisms and

energy as well. So those three are important as well for us to work on immediately other things will come as people get.

INTERVIEWER: It's a lot in future proofing building in terms of strategy for pro-active FM. Okay I think I've got everything I need.

INTERVIEWER: Thanks a lot for your help.

INTERVIEWEE: You sure you don't want a cup of coffee.

INTERVIEWER: No thanks I just had some the before coming here.

Appendix E: Interview Transcripts (CS3)

INTERVIEWER: We can actually get started in the questions, let me give you a set of questions as well. Just to know more about the building, **[Building Name]** what are the general green buildings features and initiatives implemented here?

INTERVIEWEE: So **[Building Name]** is a very difficult building to describe, so maybe I must show this to you now.

INTERVIEWEE: [Points towards the map] I just wanted to show you what the building looks like. So same building but just opposite view looking at it from the other side over there but you can see the different initiatives over time as well. So basically you've actually got one building the 1989 building just this one here, the 1991 building and the 1994 building, west campus, parking, storage. We got a sports field on the side, a gold course the sports fields over here; we got the sports club over here. We got the biggest crèche in the Western Cape which is just past that as well. The reason of those numbers is when the building was built in 1981, 1994, 1954, this was in 1991 predominately that's west campus in 2000. This is all operated in one common space.

INTERVIEWER: Okay, so in terms of FM requirements…

INTERVIEWEE: So the problem with that now is how do you manage that site, that's almost a hundred and seventy four square thousand meters with almost twelve thousand people here so what do you do?

INTERVIEWER: That's a lot hey

INTERVIEWEE: We got forty transformers. So you asked me what green initiatives we do have, so it is very difficult to explain because sustainability is broken up in the three main sections.

INTERVIEWER: Economical, environment and social.

INTERVIEWEE: No...

INTERVIEWER: Okay what are your sections?

INTERVIEWEE: Energy, water and waste.

INTERVIEWER: Okay...

INTERVIEWEE: Okay, so if you want to manage your sustainability as a facilities manager you need to look at those three, energy, water and waste. What are you doing in terms of your energy, and what are you doing with your waste and what are you doing in your...

INTERVIEWER: Ya we actually cover that in the interview questions.

INTERVIEWEE: So in that perspective you first need to start and then ask what am I using more? So obviously like I said the amount of years we've been here, we've benchmarked. We've looked at what we have. And then we looked at what our major users are in terms of those three categories and then we started green initiatives in place to reduce that. We've looked a trends, what is being done elsewhere. Now you look at energy and people say well are you using energy efficient lighting. Lighting is like in everybody's face, use LED's but lighting makes up maybe twenty percent of your bill anyway. Air conditioning is where we focus most our work on and we still busy with it now, we placing our entire air conditioning system over time with much more efficient systems, or newer technology or changing the way it works completely. For example as I told you now this site is made up of so many buildings and each of those buildings were built its own infrastructure, its own transformers, its own chillers.

INTERVIEWER: Okay.

INTERVIEWEE: Its own everything, services. But they all operating in a private space so now I'm actually busy now as we speak with a phase two of a dis-commissioning project. So previously, this entire site had about twenty-seven chillers on site.

INTERVIEWER: Okay.

INTERVIEWEE: In all the various different buildings. What we then did was actually replaced those, well as the buildings came to end in life phase one couple of buildings, now phase two, 1991 - 1994 the bigger buildings we then decided to create a central cooling plant where we actually stripped out the chillers that was then at this stage been end of life and we replaced those, much more efficient chillers central location. So what it is resulted now in phase two we've actually now at the end of this process which will be around November where we would of stripped out in the process of twenty chillers where we only have five in its place. That's much more efficient.

INTERVIEWER: Way more efficient ya.

INTERVIEWEE: And it is also configured electronically in such a way that they operate at a much more optimal level because they can sort of cross pollinate so from a sustainability we looking at probably reducing our energy consumption in terms of air conditioning now for the site probably by another 10% or so by the end of this year. On top of that because you using less machine we using less refrigerant. So in terms of our R22 gas the old stuff you talking about green stuff, refrigerant is one of them so the R22 gas that was used for the re-fridge for those twenty odd chillers has now all been replaced with a much more efficient gas which is the newer machine running on R134A and not is it much more efficient we using less cause its only five machines versus the other machines, okay its bigger machines but still so that's on the air conditioning side. We then supplementing all our lightings been replaced running with LED lights we now string to introduce LED in our work areas as well. But in our work areas we've gone through the entire Eskom DSM projects where we done the retrofits from T8 to T5 etc...

INTERVIEWER: So basically all the green building was retrofit here was never designed at work ya.

INTERVIEWEE: Existing building, this building. The oldest building here is 1954 where installation used on the building was asbestos so that even needed to be stripped out as well. So which made it much more challenging for us as it needed to be a long term approach. Our head office has been built and is actually being occupied within the next couple of months up in Jo'burg that is a five star new building.

INTERVIEWER: Design ya.

INTERVIEWEE: Much more easier design from scratch, but a lot of the green initiatives, I mean I can go on, I can tell you about the water stuff and waste initiatives we could replace as well but if you talking about green buildings there's a large component of green buildings that is not related to the direct initiative.

INTERVIEWER: Ya.

INTERVIEWEE: Or equipment that will make the building sustainable, it is the management process around it.

INTERVIEWER: Ya it is a lot of... management initiative.

INTERVIEWEE: So if for example on air conditioning there's stuff like you want to make your building run much more efficient if it is already automated as an example but still seasonally you need to go check and change your set points of your temperatures because those set points are different from summer to winter. So you need to run that as a maintenance or operational process to keep your plant running optimally depending on what the environmental conditions are. Consequently to that we've responded to, when we looked at load shedding last year as well. Businesses in the country were shut down. From a sort of business continuity and resilience perspective we were already at the point where we had reduced our energy consumption by up to forty two percent so what we then did was looked at said our plant is already on site its already running efficiently what can we do to make our building much more resilient. We opted for solar, so we put sustainable energy on site so I showed you in that picture there that the car park we use as a pilot project where we build car ports structure and we wrapped it with solar, that's the biggest solar installation in the Western Cape. It is a one megawatt plant sitting there and I mean where we now, it is been running since middle December, so from January to we in July now. January to June, I must actually do the numbers now from June, up until May we have already saved in terms of energy, production from the plant about two point six million rand so that's the financial turn of investment so now you take that two point six million rand, okay that's rand value of it, now you look at it in terms of your kilowatts or KVA energy that was produced from a sustainable source and you look at that and you translate that into carbon footprint reduction. I think that plant alone will reduce our carbon footprint by over a ton per year if I'm not mistaken and the energy reduction that I mentioned earlier with the other initiatives like air conditioning and lighting and so one where we reduce our energy consumption by up to forty two percent that reduction is reduction of something like 29 tonnes of CO_2 per year versus your previous condition if I can call it that. Water, only potable water is being used inside the building we got a treated effluence supply from the municipality that we using recycling water for our irrigation and plant purposes. Our air conditioning is not a priority so if they are not, you know what I mean running, the trip out then that's fine. We just installed water recycling plant in the car park area, because there's a car wash facility so they only operating on the recycled water as per the level four B restriction anyway or level four. Potable water only being used inside the building for potable reasons for peoples drinking and flushing at this point, unfortunately flushing of toilets. All our water features have been stopped and filled up. We looking at capturing I've actually commissioned a site, a project now we busy signing a contract for we putting. All our sewerage water runs down one pipe if I can call it that.

INTERVIEWER: I understand.

INTERVIEWEE: Which eventually, all merges into one line and runs out and then obviously joins the sewerage line and to the municipality. What we are going to do is we putting up a filtration plant where we catching all our sewerage water and we will be recycling that to potable standards and pumping it back into the grid so obviously that is a major initiative that we are embarking on. Requires sign off from department of health.

INTERVIEWER: For that kind of initiative surely there's a bit of education that needs to be done for the staff for them to accept it.

INTERVIEWEE: Every initiative has education that is required so the immediate thing is am I going to drink my toilet water.

INTERVIEWER: Exactly.

INTERVIEWEE: But it's not toilet water, its potable water and if people think the water they are drinking has not been recycled in one way or the other then that shows you the immaturity of our people still today, Now some people are very forward thinking about sustainability and they actually take it forward with you but on the most part it requires a training thing and the other initiative I was going to speak about was a waste initiative, its exactly that its education and marketing, communication regarding whatever you trying to achieve because between the three energy, water and waste - energy is probably the only one that you can influence largely without the requirements for the staff to be involved per say. You can take a lot of control away from them and actually manage the profile, energy profile quite well. But water and waste depends almost completely on your tenant and it depends on what they will do, just putting up a bin for wet and dry waste is not good enough cause the people won't separate it anyway and that's the learning's we have sort of come across over the last eighteen months with our integrated waste management plan that we've got on site. So from that perspective exactly the same thing for water as well where once its commissioned we busy with a sort of the viability and feasibility studies now but once we put the plan together and we start the implementation and construction of this sort of recycling plant we also obviously kick of marketing and education campaigns for our staff just to tell them what we actually are doing. Oh that's an exciting one we going to be busy with this particular year. Looking to having a plant up and running before the end of the year, probably commissioned and used to its full extent in the first quarter of next year. So that's very quick considering we sitting in July already.

INTERVIEWER: July already, we half way through the year.

INTERVIEWEE: So yup.

INTERVIEWER: I think you've already answered a lot of questions in the list. I'm just going to go through the questions anyway. Was the value adding potential of GBFIs in a FM strategy a main consideration for their implementation?

INTERVIEWEE: What do you mean by value?

INTERVIEWER: Value adding in terms of economic value, environmental, social …

INTERVIEWEE: Yes and no. I think your question is very much based perhaps still on the old concept of going green is more expensive so your net needs to add value.

INTERVIEWER: No, it is often heavily focused on cost cutting, green building but they also add value in terms social and environmental aspects.

INTERVIEWEE: There's, those are the side benefits and those add all the softer stuff that perhaps at this point in time is more difficult to measure. So yes of course when you put a business case together and you look at the numbers in terms of the solar project for an example that we did I had to present it in terms of firstly financial viability. So you look at return of investment and say well if I'm spending twenty three million on a solar plant then yes what am I getting out of this direct impact would be a reduced burden on your grid so that's savings that you are receiving from your energy production, you have to calculate it and then obviously present a financial model and that was done. So then you look at it and you look at your financial institution obviously the accountant and say well what's your internal rate or return of investments and all of these things that obviously make sense in terms of financial model.

INTERVIEWER: Financial point of view.

INTERVIEWEE: And we try and do that for bigger projects like I said solar project and for the most part it does hold true it can be seen as an investment now you look at the water project as an example now also a multiple million rand project that we would need to invest in. The consideration there is now if you look at the environmental situation that we sitting with in the western cape it is being reported by professionals and industry experts, even with... it will take us probably three to five years to get us out of this state out of this water crisis we are in now, this drought that we in. If we had massive storms like we had a couple of years back. The

reports are saying that you need about thirty of those storms just to get us to forty fifty percent of our water level which means we still not out it.

INTERVIEWER: Ya we very deep in it.

INTERVIEWEE: So is it a financial decision, no because if we don't do anything now the next year this time we will have to shut the business down cause by law you are obligated.

INTERVIEWER: So it is a bit of future proofing that you guys are doing?

INTERVIEWEE: Correct, so it depends on what project you looking at, it is a very difficult question to answer and it depends, then there's the other facet of it and saying well I've got almost ten thousand florescent light fittings on site and I need to replace these light fittings because the globes or tubes are fusing. Do I just walk into this blindly and just replace them with fluorescent tubes all over again or do I actually look at this and say well if you know if do a bulk replacement the energy, the cost of LED alternative that is almost the same as a fluorescent now your light expectancy is a bit longer, your efficiencies are that much higher, do we use our maintenance money actually now and then which is actually an operational expense anyway and actually invest that operational money that you would have done anyway into something more sustainable, so an extra investment but those things you don't really necessarily require to prove a financial model but in the same instance you using an operational money and you increasing the value like you said of your property. Because you adding all these green initiatives, but there is a (Indistinct 18:29) to be had because efficient and in terms of energy use means the electricity bill comes down so I spending less on my building anyway. And if you look at it from a business perspective your rand per square meter that you charge your tenants a large portion of that I think these days is made up of your utility, water and energy. So the less I pay for water and energy and make this building much more efficient then the better my profitability of my square meter of my rate is for my tenants anyway.

INTERVIEWER: Definitely.

INTERVIEWEE: So not a simple question to answer, it depends on what you are looking at and how you would actually model it in terms of efficiency or sustainability.

INTERVIEWER: Question three, so like we've talked a bit about economic value and we also talked about environmental considerations is this a holistic approach or would you consider economic and environmental more than social benefits in terms of benefit to staff.

INTERVIEWEE: Its holistic, you have to run the numbers if we **[Company Name 3]** are specifically running or one of our how can I say our values are made pillars, we've got these five pillars or goals that we are trying to achieve and I've actually got it in this book here. So if you look at it to be a responsible business there's five pillars for us to achieve that goal of being a responsible business and those five pillars are looking at responsible to our customers, responsible investments, so we take our customers money and we invest it responsibly. Responsible to our employees, we have got thousands of people working for [Company Name 3] so are there descend pay lines, HR policies, practices, reward recognition schemes etc. So responsible to our employees, responsible to our communities. We are such a huge business that is we make up a footprint within this country, region or province or whatever so buy occupying this pace and being a part of the community what are we doing in terms of our responsibility to communities, whether its schools, whether it is non-profit organizations or whatever it might be. There's initiative in that line and then the fifth one where what we are talking about basically responsible environmental management. So holistic approach that is always there, responsible (Indistinct 20:52) vision to the company.

INTERVIEWER: The vision of the company.

INTERVIEWEE: That's the vision of what it is anyway, but you can't just say we are doing environmental and then we go and put in project that cost fifty million rand but you don't really need it because your turn over and benefit of it is very minimal so you need to consider those things when you running a business you can't just throw money away however if you are looking at, if we finding ourselves in a position with this particular site that when we do consider projects we do check if it align our strategies, what are we are trying to achieve strategically, environmental responsibility or whatever that might be and if that is a yes and you run the numbers on that and you find that there is a sight variance towards environmental benefit versus financial then you still have to consider it. A classic example of that is our waste management. So the waste management, you look at the waste management and you say how does a normal building manage their waste? What do you see waste as in a normal building, its expense.

INTERVIEWER: Ya.

INTERVIEWEE: Because your building produces wastes and what must you do with it.

INTERVIEWER: You have to get rid of it.

INTERVIEWEE: You have to get rid of it. So when your municipality comes and collects your waste or whoever you got that collects your waste you see that cost, as a bottom line cost so that you basically just need to spend now. How many people actually looks at that and say it is an investment opportunity or what's the income opportunity here not many I would assume. What we did was we appointed a specific company that does various specialities but we ask them to do proper waste management or waste audit on our side to check exactly what our waste streams are cause understand what we could do with our waste, we need to understand what our waste was in the first place. So then we did a waste audit where we identified exactly what our waste streams were paper, plastic there's food waste that's a huge portion of it. There's E waste which is our electronic waste component and there's a large portion of construction type waste as well. In those categories we then broke it down further and we looked at it and said okay construction waste we need to deal with it two ways, there's the bricks and mortar type construction waste and then there's your aluminium and metals that sit with that so how do you deal with that as well. So even within that we developed a strategy and a policy and a plan that looked at separating our waste streams so we can isolate exactly those value chains if I can call it that. So our plastics were separated, our paper were separated even amongst paper was separated further our food was then targeted to strongly separate when you get rid of your waste from food and your waste from source. Separate the actual stuff considered as waste food to the container or whatever. The reason why we did that was when we parted with specific companies where we could actually get a rebate from giving them our waste so for example all the food waste that we then generated on site. We then parted with a company eventually called **[Company name 2]** that does fly farming.

INTERVIEWER: Oh!

INTERVIEWEE: So what they do is, they farm a specific type of fly, not a house fly it is a very specific fly that's rich in protein, so then what they do is use the food waste, the wet waste that we generate on site for these flies that then produce hundreds of thousands of lava as they break it down as they then reproduce within your waste. Eighty percent of that fly lava is dried as a protein feed for your chickens and your poultry and you're agricultural industry.

INTERVIEWER: It goes back to the food chain.

INTERVIEWEE: Twenty percent of that which is left is used again to reproduce again for the next cycle but what the exciting process is in terms of livestock feed if I can call it that is fish meal, so what's actually happening is you have these massive sea food companies [Seafood

company 1], [Seafood company 2] whoever they might be that go out there as massive companies that go out fishing and a large component of the fish that is being harvested from our seas and oceans is not being used for us in terms of food for the people it is being used as fish meal or a protein meal and being sold back into farming industry being used for chickens, livestock and ducks and whatever high protein feed so then that can be generated and be sold off as... because that kind of lifestyle requires high protein feed. Now fish is not a natural food of chickens, chicken don't eat fish, chickens eat insects or grains. Now obviously when investing in this particular initiative we did two things, we firstly then are reducing the need for fish farming if I can call it that and pushing that protein food through to a non-organic type say chicken farm if I can call it that. So we are helping the environment in that instance indirectly but directly for us as we then diverted a large portion of our wet waste to an initiative that then has this natural off spin of feed, protein feed, into the industry. So now the question was is it environmental or economical? How much did it cost us, we spent probably a million rand on the project last year to re-engineer our waste area to receive this different waste streams to how they should be putting processes and systems in place and corporately deal with the different type of waste that comes in there and was it worth it. So you look financially and say well okay the wet waste for an example we have last year in about eight months' time, we managed to get about I think it was just over sixty, between sixty and ninety thousand rand from **[Fly farm company 1]** that paid us for out wet waste. Now what is ninety thousand rand even in our eyes, is that a lot of money for an industry like this, no it is not because our waste bill is probably sitting in the millions for the year anyway. So what is the financial decision... park it off, consider the other fact of that exact same initiative, the wet waste that we got paid for, that's sixty, seventy eighty thousand rand. Over ten tons of wet waste that we diverted from landfill for that period so now you consider the environmental impact that we have diverted by actually looking from another initiative, and now looking from a flip side and saying okay seventy thousand rand is not a lot of money but its seventy or eighty thousand rand I didn't make before, because before I was just signing it off anyway cause if you look at it from a financial perspective and say well investment of seventy thousand rand per year it was a year for a million rand spend is going to be the next fifteen twenty years, but it is not a financial decision. It is an environmental decision. So again it is not a one type approach where you look at every initiative we use one sort of broad brush you need to consider each initiative and see what am I trying to achieve here.

INTERVIEWER: Okay.

INTERVIEWEE: So our goal here, the ultimate goal would be to net zero you know, zero waste, zero carbon, zero water, zero energy, zero everything I mean that's the ultimate goal. That's the dream, whether you get there it is actually irrelevant, it is the journey that important and how you...

INTERVIEWER: step by step approach of just how you get there. Okay that's very clear, okay then just looking at economic value. I think we did talk, we talked a lot about how value is considered...

INTERVIEWER: How does implementation of GBFIs impact on probability growth of cost cutting, flexibility and productivity?

INTERVIEWEE: So flexibility and productivity I think is an increase as a positive effect from the initiatives that we put in place because a large portion of putting in green initiatives is looking at firstly sustainable options and anytime variable options, there's different type of options that suites different types of environments. So you don't just have one source of an intervention service you have various options which means that then your flexibility increases so you got options to choose from. Cost cutting definitely in some instances people might say that to go green is more expensive cause a LED costs more than a florescent or a green technology there's a premium to be paid. Research shows and proves that now out of various initiatives that was done over a number of years. The green building council actually released this information two years ago I think at their conference, could have been last year? That the premium to be paid on going green versus going normal is less than five percent. So from a financial perspective it is not going to cost you to go green but your building is operating more sustainably, it is using less water, using less energy, creating less waste. So obviously cost wise is a benefit.

INTERVIEWER: How does the implementation of GBFIs impact on revenue growth asset valve innovation and employee satisfaction?

INTERVIEWEE: The generation we coming into now, so asset value and innovation, it is an increase, it is a no brainer. I spoke about all the stuff that we did now. Employee satisfaction is an interesting one, so depending on the organisation you work for you actually have to take this back to psychology, so if you look at the makeup of our group, we're a large organization with ten thousand plus people at **[Company Name 3]** whether they employees visitors or contractors. The fact of the matter is we got a wide generation gap that sits here, we got people

from baby boomers all together to millennials and even further. So gen X gen Y so all across so hopefully you know what I'm speaking about cause that's something that's in the market these days and if you look at your millennial and your generation just before that which is probably my generation or so. A large portion of employee satisfaction is derived from that employee understanding whether the employee is making a positive contribution to the environment and to be much more sustainable not just from a financial economic business prospective but from an entire point of view of how they impacting you know, the entire environment with the existence there to communities, people to customers and so on, so it is very interesting to be in this situation now and you find that is a very strong need from companies to actually prove that they are making sort of positive contributions towards sustainability to attract not just employees of the new generation but the new generation is the customers. So you find a **[Company Name 3]** road show going out to the various sort of groups all over the country and sitting there trying to sell policies and the people they say you say you're responsible business what have you done for my environment and the sale person which is the financial adviser sitting there thinking shucks I don't know. I know this policy, I know this insurance thing I've got nothing, I've got no information with regards to sustainability, and so that's a very interesting mind shift for the organization to actually have to shift towards those things now as well so employee satisfaction by green initiatives is definitely an increase.

INTERVIEWER: Question seven, in what other ways if any can the implementation of GBFIs in a FM strategy contribute to shareholder wealth.

INTERVIEWEE: I don't know what you mean by in any other ways.

INTERVIEWER: We discussed previously the cost cutting, the innovation, the productivity, I mean is there anything not captured by...

INTERVIEWEE: Look, the other thing that you get from shareholder wealth I would say if you looking at it from an investment perspective. The fact that your building is actually as it could potentially receive certain accolades, certification if you go in a green building room. You could get certification in terms of your building being three star, four star, fie star or whatever star building. We received last year the energy efficiency award from the city of Cape Town for the initiatives we've done. Our particular project is a solar project is the largest solar installation on a single ERF within the Western Cape definitely and perhaps also other corporate, perhaps one of the biggest in terms of organization for the country etcetera. So once you start received those type of accolades, your building and your site becomes an attraction

for other companies on the market to be in. You can start inviting or becoming attractive to businesses that now want to take up occupation within your premises because to them sitting and operating out of a more sustainable building. They can report and say that there bottom line and they paying, you can charge them as premiums in terms of their rental so got to do with shareholder wealth, the value of your premises goes up. But in the same instance although you charging perhaps premium and running this green building and it is not that the premium is charged because it costs your building more, remember your building is actually costing less cause its running much more sustainable. You doing that because there's a demand from these premises to be occupied by tenants and why would there be a demand because they then in their business can report that their carbon footprint has been reduced because their occupancy is more efficient and sustainable by the initiatives that you've done as a property owner or investor or whatever.

INTERVIEWER: Based on this you've also answered question eight, which is about the general perception of the impact of GBFIs on economic value. Question nine, how much is environmental value considered in the implementation of a value adding FM strategy.

INTERVIEWEE: Extremely high, it is the bible of what we do. The entire implementation of this building has resulted in the generation of numerous amounts of policies or procedures that have been developed to ensure we operating certain things within the business now from a FM perspective in sustainable way or a compliant way. So how do these contribute, so sorry question nine environmental value considered value adding FM strategy it becomes the basis of your FM strategy.

INTERVIEWER: How does these contribute to energy efficient reduction carbon footprint facility?

INTERVIEWEE: I've mentioned that already. Forty two percent more, this actually more than forty two percent, cause forty two percent more efficient without the solar plant we actually doing a hell of a lot.

INTERVIEWER: Way better now.

INTERVIEWEE: I can track it and I can see exactly what's happening, so it will be interesting to see at the end of this particular year you know what our numbers come up as.

INTERVIEWER: How important are GBFIs for the waste management, resource conservation and recycling strategy of this facility (Recycling)?

INTERVIEWEE: Very important, as discussed already.

INTERVIEWER: Is there any provision for sustainable travel, if yes is it considered to improve the environmental value of the facility and how?

INTERVIEWEE: yes we do, in terms of our travel and all travel on site must be booked through our travel hub and then when we're doing it that way and centralising it you can now start asking questions with regard to: is this a requirement?. So **[Company Name 3]** is maybe not the world leader or perhaps not one of the company leaders in terms of technology but with the advance of technology in the sense of sort of your skyping and your video conferencing facility etc. The requirement for travelling has reduced quite significantly and that is always given consideration now as well you know can things be done remotely and the technology with cloud based applications, internet of things. I can show you now even applications on my phone where I can tap into my energy consumption site, I can see what my water consumption is. I won't need to travel anymore to various sites to do various things so it all ties in even if you look here transport we got full points for, we got a green travel policy in place as well.

INTERVIEWER: In what other ways if any can the implementation of GBFIs in a FM strategy contribute to improved environmental value? So travel, recycling and waste management…

INTERVIEWEE: So the other areas that we've looked at if you look at the publication. Management talks about your systems that you put in place to manage like I said if you got processes to change set points and certain things across seasons or environments

INTERVIEWER: Okay.

INTERVIEWEE: To ensure you're running sustainably. Indoor environment quality is an interesting thing, you look at one, just lighting, not light efficient it is got to do with lux levels or the light level or the lux level within your area controlled to such an extent that firstly it drives down your energy consumption, but the fact that you got atriums and open windows and natural light coming in why are all your light burning at maximum, so we got sensors on all our lights, reduces our light intensity to maintain a light level and if there no motion they also switch the light off. Indoor air quality, we ensure our air quality on an annual basis and we

have a test, we look at the level of carbon monoxide, carbon dioxide, formaldehyde for furniture plus also legionella testing as well and the supply of fresh air into area and making sure we have a good quality of air going into buildings, keeping germs and toxins out of the building. Like I said vision testing, emission controls, we look at emission controls at in terms of dosing systems for our diesels systems if we running generators as an example. Emission control is also legionalla referred to all, or your refrigerators you are using, air conditioning system making sure that your refrigerators that you are using are environmentally friendly in terms of your GWP and GDP which is your global warming properties and global depleting properties of their refrigerant. So if that system springs a leak and the gas leaks into the environment, is it harmful to the environment and what would it take to either detect it, to negate that risk or are you using environmentally friendly products. And then there's various other things, land use ecology is an interesting one, are you introducing alien plants into your landscaping areas which then become a problem for your area ecology you using or it now requires which side you want to put up a palm tree where a plant requires lots of water and humidity but now you need to use so much water on your irrigation system, to make sure your system is being maintained, or your plants are being maintained. Or are you hurting natural ecology, or on top of that are you actually not even disturbing your ecology because you have little eco systems that are growing within your environment anyway, One of the other stuff is hard surface management which looks at you building this building, you now just building a massive concrete slab or paved area or path roads all over the place what are you then doing with all the water that gets eliminated in terms of storm water run offs etc. Because all that water needs to be caught somewhere or else your storm water will die, it washes downstream and it just washes away the informal settlement that's living a couple kilometres down and then you are negatively impacting the environment, have you considered permeable surfaces to actually allow that water to go back into your eco system so those are lots of areas that need to be focused on.

INTERVIEWER: Okay.

INTERVIEWER: How much is social value considered in the implementation of a value adding FM strategy? Social value in that aspect is mostly relating to staff because environmental value would relate to the greater society is already covered so.

INTERVIEWEE: Social in terms of internal staff what we try and do especially when you look at the waste and water side of things you actually trying to change people's behaviour

that's the only way you going to make a meaningful change. So we've got nine thousand people, call it close to ten thousand people that work here it is a bit more. We trying to change your behaviour of ten thousand people on site by introducing systems that will allow them to separate ways that will allow them to be more water conscious and consider slow flow taps, not flushing at every flush. Whatever the initiatives are, what we then doing then is changing or introducing changes within people who have impact to an average family at home and in the communities as well and then so social value is definitely a consideration for us like the foot print we have at old **[Building Name]**, we do recognise and understand that just by introducing changes in a small organization of ten thousand people you can actually influence a large community of up to forty, fifty, sixty thousand people considering each of one of those person.

INTERVIEWER: Ripple effect of that, okay.

INTERVIEWEE: Some of the things are more direct, like change a light bulb you know but definitely on the bigger scope we focus on, and even if you look at the waste initiative now we started at internal and I started doing certain things you start jumping onto it and more so on. So you got a bin here where you separate wet waste and dry waste. What is the principal, the principal is anything that can be considered as food and we give guidance on that, even your teabags, coffee granules what not. Egg shells, fruit peals whatever separate that completely it goes into one bin and anything else that is paper, your container and stuff. What a few people have started doing now is exactly the same thing at home.

INTERVIEWER: Oh!

INTERVIEWEE: And then they bring their wet waste to work, because now they got a place where they can recycle this waste, now all of a sudden at home your bin doesn't stink, you don't have to take your bin out every week because it is not even full. You start to realise how much of your waste you generate at home is actually wet waste, food waste so you've got a very small component you actually introducing systems that cater for social problems but you actually work place.

INTERVIEWER: It actually works for the company as well, if your waste increases, then the money that you get from the waste is also more.

INTERVIEWEE: Yes, exactly.

INTERVIEWER: It does work both ways.

INTERVIEWER: What is the perception of the impact of the implementation of GBFIs on workplace attractiveness, staff retention and staff satisfaction.

INTERVIEWEE: Definitely a positive impact, we run annual surveys and the response we get from our tenants in terms of the buildings. Also, being in a green certified buildings also helps in that aspect.

INTERVIEWER: I wanted to ask you, is it possible for me to have, to do a survey or get your surveys.

INTERVIEWEE: We've done a survey. I can give you the result of the survey, I think its fine.

INTERVIEWER: But are the surveys green features oriented or general?

INTERVIEWEE: Both.

INTERVIEWER: Okay good.

INTERVIEWEE: So it looks at our surveys as say corporate management but there are specific green buildings questions in there that ask them questions on how they travel to work

INTERVIEWER: Okay.

INTERVIEWEE: Do they know, talk about indoor air quality, quality of the air conditioning, the quality of the lighting. The waste management and those types of things, so there are certain type of questions that got to do with that.

INTERVIEWER: Okay I can try use this. It is going to be tricky for me to actually send a survey out hey?

INTERVIEWEE: Very tricky.

INTERVIEWER: it is the public relations that comes into play.

INTERVIEWEE: it is going to be very tricky to get that, so I've got some data there already, you've got my email. So just chat to me so I'll just ask the questions in terms of sharing the information, I don't think it is an issue.

INTERVIEWER: it is all going to be confidential anyway.

INTERVIEWEE: It will be confidential anyway ya and you can just see if it adds value to your studies anyway.

INTERVIEWER: Okay. What is your perception of the impact of the implementation of GBFIs on the work environment in terms of light, noise, comfort etc.

INTERVIEWEE: Have I not answered that already? I'm sure.

INTERVIEWER: Ya. Did you see improvement on interactions or creativity?

INTERVIEWEE: Yes.

INTERVIEWER: From that, do you have open floor plan, for maximise lighting.

INTERVIEWEE: Definitely.

INTERVIEWER: Okay.

INTERVIEWEE: One of my other areas of report to me work space management busy implementing now, new blue prints that we want to start rolling out in terms of furniture layout so I mean all the services get considered from lighting to air conditioning everything is considered within the layout but what we are moving towards is obviously looking towards two things so looking at industry standards of how people are operating these days, there's much lesser requirements cause people are more open plan but what there is a requirement for is breakaway areas and rooms and get together type spaces for creativity and sort of mixing of ideas and capturing so you will see.

INTERVIEWER: Interaction.

INTERVIEWEE: So you will see writable paint so you need to be able to write down you pay awards and write it off.

INTERVIEWER: Wipe it off**.**

INTERVIEWEE: those type of things, so those are the things we are rolling out because that's what the industry is looking for or what the work space wants to introduce but on top of that other thing is also because the target for this year and next year is trying to push towards an interior rating of sustainability, so rating of how sustainable our interiors are. So that's also looking at furniture, your paints that you use and all of those things, whereas if your buildings green, existing building air conditioning, lighting.

INTERVIEWER: Services, a lot of services.

INTERVIEWEE: Services, the structures itself, the interiors ratings start looking at softer interior decorating type stuff, your glazing and what are you doing with recycling, office turn and etcetera. Your chairs, your office furniture, your carpets and all of those things**.**

INTERVIEWER: What is your perception of the impact of GBFIs on health risk management?

INTERVIEWEE: Health management and indoor quality, it is in here as you can see it is a complete in here and I mentioned it and those things need to be looked at, we got programmes in place for that.

INTERVIEWER: In what other way if any can implementation of GBFIs in a FM strategy contribute to social value?

INTERVIEWEE: I've touched a hell of a lot of those things. In terms of changing behaviour of your people and then increasing value in your social environments as well.

INTERVIEWER: Do you see it impact on staff retention? Are people more interested in staff retention and attraction?

INTERVIEWEE: it is an interesting one, look you would obviously have to investigate the other HR numbers to look at. The industry data shows that staff retention is positively impacted in that there's more retention. From a building that is much more sustainable, if people enjoy working in a building that has fresh air that has less germs that is more environmentally friendly. So the science proves that if you ask me for specific numbers I haven't done that yet but what is very interesting we've had recently they call it a CAPRI programme but we've had six graduates, post grads, that came through the, that was employed but then spent a couple of weeks in various sections of the buildings just to get exposure, like an induction programme.

INTERVIEWER: Okay.

INTERVIEWEE: Now corporate management business, my business is not a core business of **[Company Name 3],** they not in a property environment, it is more policies etc. What was very interesting was when each of these students spent time in my space they were blown away by the initiatives that we are actually trying to do, what we are trying to achieve within an environmental space and it was received extremely positively in that they never thought

[Company Name 3] would of been involved to that degree. And in that perspective they were much more encouraged and motivate to work in a space like this, so that proves the fact you know. Especially for generation like that we referred to earlier. Out of all six of them all six of them were...

INTERVIEWER: Were happy, very happy about it.

INTERVIEWER: Conclusion, any other comments on the value adding potential to facilities?

INTERVIEWEE: I think I talked too much.

INTERVIEWER: We talked a lot, yes.

INTERVIEWER: What is the importance of perception of value added by the inclusion of GBFIs in a FM strategy?

INTERVIEWEE: The importance is big, I mean perception of value added, you need to be able to communicate and make sure that people understand what you are trying to do does actually add value that the challenge though is what people also need to understand and what comes from us as a facility managers and building manager is that we need to effectively communicate the change of operating within a normal building versus a green building. A simple thing like waste on the waste management side is so ultimate goal would perhaps be no more bins on the floor. You have a central location where you now have a set of bins for paper and etc. and whatever you doing in terms of your waste separation. So that immediately means people will not have the comfort of just chucking waste on the side of their bin, their desk they now need to get up and walk. Now is that a bad thing? Some might say yes some might say no. it is a comfort thing so it will take them out of their comfort zone and more effort applied from them the employee side to achieve this goal that you are trying to achieve but that serves two purposes, it forces firstly your employee to create change by separating their waste by doing that and the second thing now the big problem with have now with corporate is people don't move the circulation in your blood, your body, they sit all day so from a health perspective you are now encouraging and forcing people to walk. But it is a mind shift change, because people are not use to that, they expect to have certain facilities around them.

INTERVIEWER: it is a tough start but if you stick to it, you will have to abide.

INTERVIEWEE: Yes, but you need to communicate it.

INTERVIEWER: Yes communicate properly

INTERVIEWEE: Cause people don't like change, cause if you just move one bin and take all the bins way and just put something else and people will come into work the next day, that product will fail.

INTERVIEWER: And then all the changes need to be step by step so then you need look at everything.

INTERVIEWEE: Yes you look at one small step at a time but before you implement the physical change make sure you communicate, do you know why we doing this and once you do report back and say we've done this, this is the benefits we've received, look these are the numbers we've now managed to reduce this amount of waste, we've received this amount of money, we have now reduced this amount of carbon or whatever it is you are trying to measure it and report on it and make sure you can tell the people. What people get is the sense of gratification, achievement you know of people contributing towards a bigger thing is huge within amongst employees. They will sit and I know in my space they will know I made the effort to separate my waste, but once they see that shucks we've actually diverted ten tons from landfill waste. I've contributed so I feel good about doing it so I do more, and if I see my colleague not doing it I'm going to speak up and say.

INTERVIEWER: Put pressure on him to do it.

INTERVIEWEE: Listen guy you need to do this now case this is what everyone is doing and it is the right thing. So your people and employees become your champions.

INTERVIEWER: Then it is actually a good thing all the features were implemented after, so you can do it step by step

INTERVIEWEE: Yes and no

INTERVIEWER: Cost wise, it would be more challenging.

INTERVIEWEE: it is more challenging ya and also you can't necessarily do what you want to do because there's certain initiatives that you might want to have done which is much better in terms of performers and cheaper but the fact is your building is built a particular way so you can't adjust.

INTERVIEWER: So some staff…

INTERVIEWEE: So it is not one being better than the other, existing buildings are much more challenging than new buildings because new buildings you can scope it from the beginning and the fact of the matter is if you building a new building you have a budget for it and as I mentioned previously the premium of going green is very low once you design it appropriately from the start, so it wouldn't cost you anything extra if you got a billion rand and you building a new head office then build it green anyway cause you got that money and it won't cost you that much more anyway.

INTERVIEWER: Yeah I'm also working on that project **[Company Name 3]**, they were going for four stars, but then they got a five star rating by adding a few extras costing two to three hundred thousand.

INTERVIEWEE: What size.

INTERVIEWER: Three hundred million overall.

INTERVIEWEE: So it is nothing, that money laying in the bank for couple of months gets to anyway, you get what I'm saying.

INTERVIEWER: And also now because of that, the tenant, they're also like okay we getting five star, I definitely want to be here.

INTERVIEWEE: You see, they can obviously now we won't charge a hundred rand per square meter might be able to charge hundred and ten rand a square meter so you can get your money back, few thousand rand made back in a couple of weeks.

INTERVIEWER: If its design, it is easier...

INTERVIEWEE: Its easier, it could be cheaper but having said that now you consider that more than ninety five percent of four existing building stock is existence building, the opportunity of new building is only less than five percent perhaps of your build environment, so where should your efforts lay? In the existing buildings.

INTERVIEWER: It has to be yes. Okay but then for the existing buildings what is easier is the one that qualify the input from the staff and that is easier to implement cause there so much natural change to be done.

INTERVIEWEE: No.

INTERVIEWER: Because you can do it step by step, not the design...

INTERVIEWEE: If I understand you correctly I will challenge you on that from my experience. Any initiative that requires people to make a change in behaviour is the most difficult thing to do, but the challenge is and here's the irony of the situation is that your biggest benefit in terms of sustainability of making a change of becoming more sustainable comes from behaviour change so what I'm saying is if behaviour change is that easy and you could influence everybody to change what they are doing and just recycle their waste and use less water and do whatever, it doesn't cost you anything, it just costs you communication perhaps and people changing behaviour. You will get the biggest reward in terms of sustainability in terms of reducing your waste, reducing your energy, reducing your water, but it is the most difficult thing to do. it is easier for you to spend money and implement a more efficient light and reduce energy from cause you not waiting for anybody it is given you were given a sixty watt light out and you but a five watt light in and that's the savings and its giving and no one can control it and that's what I'm getting. But as soon as you depend on people, it becomes a challenge.

INTERVIEWER: It becomes the challenge especially it is such a big employee base.

INTERVIEWEE: Yes the bigger the organization the bigger the challenge, but I think and because of that also we haven't shied away from it, we take on the challenge and try change behaviour but the only frustration for you or me now is obviously to make change or change in behaviour takes time so you can't just influence big change and have it happen overnight, it is all a step by step. So ya change management wasn't considered as part of our expertise but it has been...

INTERVIEWER: Forced.

INTERVIEWEE: forced on us to make sure that we drive the efficiently, get our product and be successful and you never there, it is always something, like I said. The goal for us to be net zero but it is not about the goal. That's the wish list, you know the end of this tunnel the end of this journey we hopefully going to be there in like a hundred years' time probably, the point is the journey to do it.

INTERVIEWEE: Just to do it, to get there.

INTERVIEWER: Just do the small thing, step by step you will be there.

INTERVIEWEE: Thanks a lot.

INTERVIEWER: Okay.

INTERVIEWEE: Very helpful.

Appendix F: Interview Transcripts (CS4)

INTERVIEWER: Basically, what I am doing is to look at the value added of green building features and initiatives in various building having various levels of GBFIs implementation. What are the various GBFIs included in the FM strategy for this building and what were the main drivers for their implementation?

INTERVIEWEE: Well we have the recycling that is a big one. All the waste get sorted in the basement. We also have bike racks and these are used a lot.

INTERVIEWER: Okay.

INTERVIEWEE: We also use water efficient toilets with the half and full flush. We also have sensors for urinals flushing. These are the only ones we have I think

INTERVIEWER: Noted. Was the value adding potential of GBFIs in the FM strategy a main consideration for their implementation?

INTERVIEWEE: All I can think of is that they tried to go green so I'm not sure if value was really considered or not. But I doubt it. The market we are in, it is tough. We were not looking at green buildings as those usually mean higher rent. The smaller businesses, like our tenants here, would not be prepared to pay a premium on the rent. When you look at other green buildings around, you will see that there is a lot of vacancies. Here we have some good leases in place. You can see, the property has recently been sold to **[REIT Name 1]** one of the biggest property companies around.

INTERVIEWER: Oh! In terms of FM it is also easier to manage then?

INTERVIEWEE: You see, when you look at these features, they were easy features to integrate in the building. It is not like we went out of our way or anything and the goal was not to achieve a green star at any stage as far as I know. I also do not work on this building only, I manage this building on behalf of the landlord but I also manage a number of other buildings. I'm only here on Mondays full day to attend to the various issues for this building. The rest of the week I'm off to different buildings but the original developer, that is the previous landlord, they were not into the green building market. The new ones are a bit more into it.

INTERVIEWER: Makes sense.

INTERVIEWER: How much is economic value considered in the implementation of GBFIs?

INTERVIEWEE: In this case, as I said, we did not really look at value added implications. The half and full tank flushing system and the sensors to urinals are becoming the norm now. The recycling did not requiring anything in the construction. It is just something we do on the operations side.

INTERVIEWER: Okay, next, how does the implementation of GBFIs impact on cost cutting, flexibility, and productivity.

INTERVIEWEE: Cost cutting. Yes. There is a bit of savings on the recycling and we get some cashback from that. So yes, the cost is less. Water consumption is also less so we pay less for our water bill.

INTERVIEWER: Productivity and flexibility?

INTERVIEWEE: Productivity. I don't think so. These are very… soft green stuff. They are not core part of the building I mean. They're not out there.

INTERVIEWER: How does the implementation of GBFIs impact on asset value, innovation, employee satisfaction?

INTERVIEWEE: Not really in my opinion. Those features are mostly the norm nowadays.

INTERVIEWER: In what other ways (if any) can the implementation of GBFIs in a FM strategy contribute to improved shareholder wealth?

INTERVIEWEE: You see in the other green buildings you would probably see a huge impact on shareholder wealth as you say but here the impact is quite small. I mean, it is not like we went big on the green stuff anyway. I think also…it's a tricky one though, about water savings, maybe. I don't know how we going to do it. With the drought, the price of water is likely to keep going up and this will hit the operating cost hard. Both tenants and landlord will feel it in that case, not necessarily shareholders only but I don't know what the plan is, it is a very pricy exercise to now come and implement all that greywater and rain water harvesting stuff. The new landlord is trying to find ways to reduce the water consumption for this building because this will be a big cost to come. The easiest option they are considering is to change the fittings, like having waterless urinals but that will be costly too. Should have been done right from the start.

INTERVIEWER: What is your general perception of the impact of GBFIs on economic value?

INTERVIEWEE: Look, in buildings where it is done extensively then sure it adds value but here it is low scale so the value added is minimal. I'm not saying it does not add value. Just not as much as for other buildings. If you look at the price of electricity for example, of course some green features can help reduce the consumption of power and hence reduce costs but that's only in a few green buildings. Here we made provision for the electricity shortages with the two back up generators but no provision were made for the possible rise in cost of electricity.

INTERVIEWER: How much is environmental value considered in the implementation of a value adding FM strategy?

INTERVIEWEE: That's similar to your previous question. I think it was considered more that the economic value because those features do impact more on the environment than on the cost in my opinion.

INTERVIEWER: How do GBFIs contribute to energy efficiency and the reduction of carbon footprint for this facility?

INTERVIEWEE: In this building we unfortunately do not have energy efficient installation. Everything is conventional. HVAC, lighting etc. No natural ventilation, fluorescent lights. The usual.

INTERVIEWER: How important are GBFIs for the waste management, resource conservation and recycling strategy of this facility (Recycling)?

INTERVIEWEE: That's actually a big one in this building. As you know **[Tenant Name]** is the main tenant in this building. They really push for recycling. They have a canteen up there and they sort out their waste from there too. They separate their wet waste from their paper waste for example. They probably talked to their staff to get them to adopt the recycling initiative. It is obviously good for them as well because they get certificates for that.

INTERVIEWER: Do the other tenants also sort their waste?

INTERVIEWEE: Not really unfortunately. We do provide sorting bins for recycling in all offices. You know those bins for glass, tin, paper, etc. but it is not used correctly and we

struggle with that. Random stuff are thrown in the bins. So we have a guy from the service provider who sorts all the waste down in the basement before the recycling company takes it away. Also for resource conservation, most people use the full flush every time unfortunately. They don't really know or they really want to use the half flush. Recently that's changed though with the drought. There is growing awareness from the tenants and there has been request from tenants to look in to the water issue. The new landlord is also looking at ways to save water and reduce the water consumption. But even now, in all buildings in which I'm involved, even if the dams are full, we will operate in a water efficient way and maintain whatever water saving feature or programme we implemented.

INTERVIEWER: There are provisions for sustainable travel through the bike racks. Is it considered to improve the environmental value of the facility and how?

INTERVIEWEE: Yes in some instances. We have cyclist facilities, the bikes racks used, you can see when you go in the parking that there are many bikes but there are still make empty racks. We have less cars coming in due to people driving their bikes and those choosing the myciti bus. A lot of that comes from the work done by the City of Cape Town. All these bike lanes make it quite convenient to use your bicycle and come to work, specially here on Bree street. That does answer your question before though? About the footprint?

INTERVIEWER: Yes, you're right. It actually does answer that question too.

INTERVIEWER: In what other ways (if any) can the implementation of GBFIs in a FM strategy contribute to improved environmental value?

INTERVIEWER: What is your general perception of the impact of GBFIs on environmental value? (Do they add value?)

INTERVIEWER: How much is social value considered in the implementation of GBFIs?

INTERVIEWEE: Social value in terms of?

INTERVIEWER: In terms of the staff or the end users of the building.

INTERVIEWEE: Oh okay, no I don't think this was really considered.

INTERVIEWER: What is your perception of the impact of the implementation of GBFIs on workplace attractiveness, staff retention and staff satisfaction?

INTERVIEWEE: In this building, not much impact I would think. The guys using the bike racks are quite happy about what we have here. That's the only thing I can think of but in your other green building I'm sure they would. I mean who would not like working in the Silo building at the waterfront.

INTERVIEWER: I would not mind that too actually. What is your perception of the impact of the implementation of GBFIs on the work environment, comfort?

INTERVIEWEE: Not much here. But like I said, in other buildings I'm sure you would have a different response from the occupants.

INTERVIEWER: What is your perception of the impact of the implementation of GBFIs on health risks management, indoor air quality?

INTERVIEWEE: Those features don't impact on it health risks. Indoor air quality, we have the standard HVAC.

INTERVIEWER: Natural ventilation?

INTERVIEWEE: No, only the standard ACs etc.

INTERVIEWER: Any issues reported from tenants regarding the lack of natural ventilation?

INTERVIEWEE: Not that I know of.

INTERVIEWER: In what other ways can the implementation of GBFIs in a FM strategy contribute to improved social value?

INTERVIEWEE: There are many different ways to do that. Let me think, staff are generally happy with innovative stuff. It kind of makes them feel like they're working in a special environment. So stuff like you see at the waterfront, green walls etc. These are easy ways to improve the social aspect of the building. Green roofs and so on.

INTERVIEWER: What is your general perception of the impact of GBFIs on social value?

INTERVIEWEE: They do yes. Here not really. But in other instances yes. I will keep referring back to the Silo in the waterfront – there it definitely has an impact. People would love to work there.

INTERVIEWER: Any other comments on the value adding potential of GBFIs to facilities?

INTERVIEWEE: Well, if you look at Eskom and the price of water, if we had more water efficient features or energy efficient features installed in the building then we would be prepared to deal with all of these shortages and price increase. But that's not the case here.

INTERVIEWER: Future proofing?

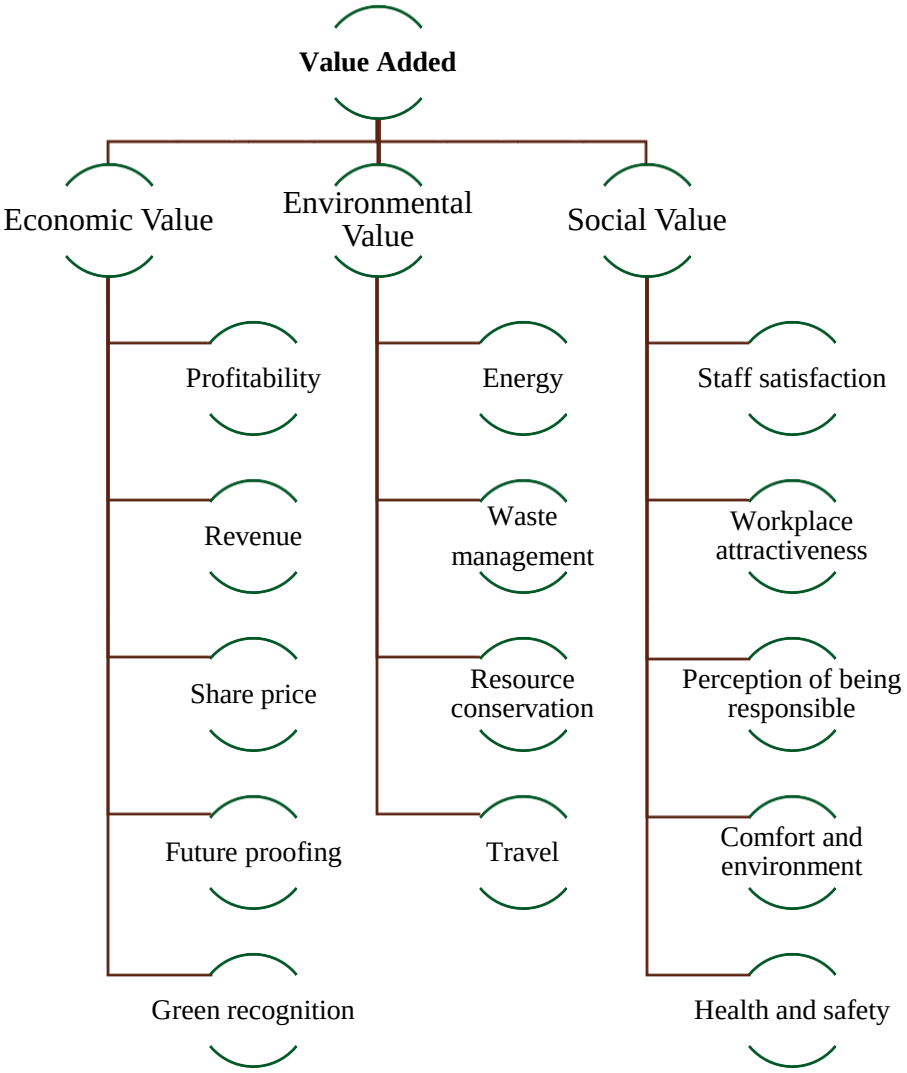
INTERVIEWEE: Yes! They provide for future proofing. I don't think the situation will get better anytime soon. Electricity or water-wise I mean.

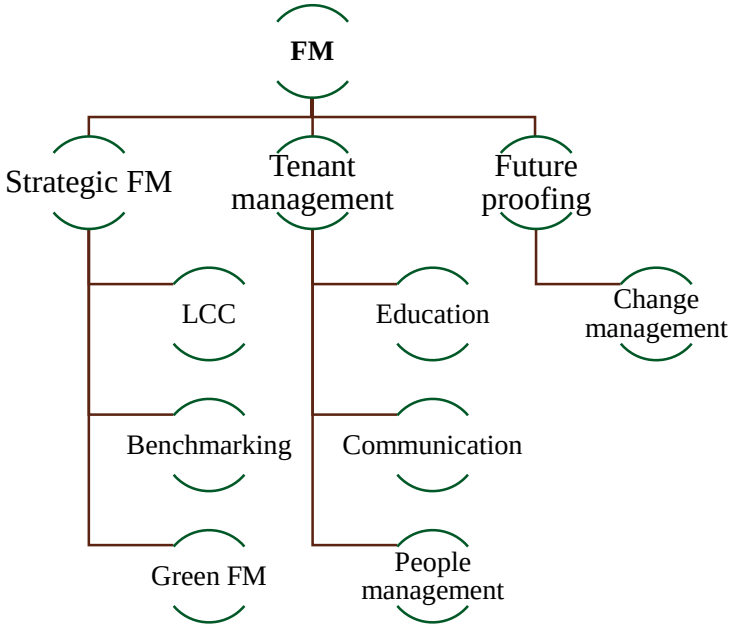
INTERVIEWER: What is the importance of the perception of the value added by the inclusion of GBFIs in a FM strategy?

INTERVIEWEE: The perception is what drives the implementation in my opinion. So yes, it is quite importance but it has not really been considered in projects I worked on.

INTERVIEWER: You should! I think that's it for me. Thanks a lot for your help.

Appendix G: Tree Node Structure





Appendix H: Consent forms

University of Cape Town

This Informed Consent Form is for

Name and e-mail of Principle Investigator:
Kursen Valaydon: vlykur001@myuct.ac.za

Name of Organisation: University of Cape Town

Name of Research Project: Impact of the integration of green building features and initiatives (GBFIs) into a FM strategy on the perceived social, economic and environmental value of the facility.

This Informed Consent Form has two parts:

- Information Sheet (to share information about the study with you)
- Certificate of Consent (for signatures if you choose to participate)

You will be given a copy of the full Informed Consent Form

Part I: Information Sheet

Introduction

I am a masters student from the University of Cape Town (UCT) doing a research about the impact of the integration of GBFIs into a FM strategy on the perceived social, economic and environmental value of the facility. The research is supervised by Associate Professor Kathy Michell of the University of Cape Town and the results of the study will be presented to the Department of Construction Economics and Management in fulfillment of the requirements for the Masters degree in Property Studies.

I would be extremely grateful if you could be part of our research and provide some assistance with our data collection process. Do not hesitate to ask me any questions about any uncertainties you might have with regards to this consent form.

Purpose of the research

The facility manager can generate long-term value to an organization by developing, applying and maintaining sustainable facility practices. However, little is known about the perceived added social, economic and environmental value of the integration of GBFIs into a FM strategy. The research aims at developing an understanding of how the integration of GBFIs into a FM strategy influences the perception of social, economic and environmental value of the facility.

Type of Research Intervention

This research will involve your participation in a discussion that will take about 30- 45 minutes.

Participant Selection

You are being invited to take part in this research because we believe that you can significantly contribute to this research by offering us your perceptions of the topic at hand.

Voluntary Participation

Your participation in this research is completely voluntary. You may choose to withdraw from this study at any time of your wish. You may also refuse to answer any question that you do not want to answer. You may withdraw your consent at any time and discontinue participation without any penalty. This study has been reviewed and received ethics clearance through the University of Cape Town Research Ethics Board.

Procedures

A. We are asking your help assess the impact of GBFIs on the perceived value of facilities.

B. The interview questions to be asked will relate to economic, environmental and social aspect of facilities.

Benefits

It is likely that there will be no direct benefit to you but your participation will help us with our research.

Reimbursements
There will be no remuneration to the participants of this research.

Risks

There is a possibility that you could share some confidential information, or that you may feel uncomfortable discussing some of the above mentioned topics. As we do not want this to occur, you may feel free to refuse to answer any question which you feel uncomfortable to discuss.

Confidentiality

From time to time, you may disclose Confidential Information to us. We will limit disclosure of any Confidential Information to our research group who has a need to know such Confidential Information in connection with our current research. "Confidential Information" means any data or information that is proprietary to the Disclosing Party (you) and not generally known to the public, whether in tangible or intangible form, whenever and however disclosed, including, but not limited to: (i) performance results relating to the past or present, its affiliates, subsidiaries and affiliated companies; customer or supplier lists. We agree to use the Confidential Information solely in connection with the current research.

Companies and interviewees' names shall also be kept private and anonymous and will not be disclosed under any circumstances. Any information about you or your firms will not be available to anyone outside of the research team.

Sharing the Results

Data gathered in this interview will not be shared with anyone outside the research team. The findings that we obtain from this research might be made available to you and your community. This research will, however, not be published to the general public.

Who to Contact

If there is any question you might want to ask, you may ask them now or later by contacting any of the principle investigators listed below.
Name: Kursen Valaydon
Email: vlykur001@myuct.ac.za
Cellphone: 082 549 3977/ 084 993 3042

This proposal has been reviewed and approved by *The University of Cape Town Ethics Review Committee*, which makes sure that research participants are protected from harm.

Part II: Certificate of Consent

I have been invited to participate in research about the perceived value added of the inclusion of GBFIs into a FM strategy.

I have read the foregoing information, or it has been read to me. I have had the opportunity to ask questions about it and any questions I have been asked have been answered to my satisfaction. I consent voluntarily to be a participant in this study

Print Name of Participant: _____

Signature of Participant: _____

Date: _____

Day/month/year

Statement by the researcher/person taking consent

I confirm that the participant was given an opportunity to ask questions about the study, and all the questions asked by the participant have been answered correctly and to the best of my ability. I confirm that the individual has not been coerced into giving consent, and the consent has been given freely and voluntarily.

A copy of this ICF has been provided to the participant.

Name of Researcher/person taking the consent: *Kursen Valaydon*

Signature of Researcher /person taking the consent: _____

Date: _____

Day/month/year

Appendix I: Ethics Clearance