

**RECYCLING INITIATIVES IN UK SHOPPING CENTRES,
FACTORS CRITICAL TO SUCCESS**



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Abstract

Waste management of UK shopping centres must contend with operational performance, variable levels of landlord or corporate financial support, escalating costs of recycling programs and disposal charges for landfill. Recurrent critics challenge the economic prudence and environmental benefit of recycling, which has made it a central component in their businesses. This means that facilities management (FM) plays an imperative role to ensure that shopping centres manage the environmental aspect of their solid waste streams in a comprehensive, cost-effective and responsible manner. Considering the importance of FM success in business, this research introduces the relevance of Critical Success Factors (CSFs) in shopping centre recycling operations research that combined both recycling and critical success factors theory and research.

This thesis explicated the FM position inherent in the shopping centre business operation and offers an improved understanding of the environmental aspect of solid waste recycling focused on the UK shopping centre population. By introducing a recycling implementation success framework, the study also demonstrates the use of the appropriate management skills of the current recycling variables have an impact for the success of shopping centre recycling.

As previous research relating to this subject has largely been based on case studies, hence the main aim of this research is to investigate the critical factors related to the implementation success of solid waste recycling between the UK shopping centres. An empirical investigation through mixed-methods research was selected as the appropriate research technique. The assessment of practices using the recycling implementation success (performance) framework was carried out through series of interviews and a macro level survey as key methods for generation of research data. Based on this framework, the research concentrates on the cause-effect relationship between critical factors and self-reported of recycling implementation success. Correlation analysis reveals the extent of the critical success factors implemented by these organisations.

Further analysis demonstrates the differences between the critical factors which have the effect on over recycling implementation success. In essence, adhering to the various levels of implementation presented will ensure that shopping centre organisations can derive the maximum benefit from recycling initiatives and that the decision-making process as well as the actions regarded as critical are taken into consideration. Finally, this research provides recommendations from both a theoretical and practical point of view.

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List of Abbreviations

| | |
|----------------|---|
| AD | anaerobic digestion |
| ANOVA | analysis of variance |
| BCSC | British Council of Shopping Centres |
| C&D | construction and demolition |
| CSF | critical success factor(s) |
| CSR | corporate social responsibility |
| DEFRA | Department of Food, Environment and Agriculture |
| EA | Environment Agency |
| EC | European Commission |
| EMS | Environmental Management System |
| EU | European Union |
| EWC | European Waste Catalogue |
| EPR | extended producer responsibility |
| FM | facilities management |
| HMSO | Her Majesty Stationary Office |
| ICSC | International Council of Shopping Centre |
| MANOVA | Multivariate Analysis of Variance |
| MLR | Multiple Linear Regressions |
| MRF | Material recycling/recovery/reprocessing facility |
| O.C.C. | old corrugated cardboard |
| OECD | Organisation for Economic Co-operation and Development |
| UK EPA | UK Environment Protection Act |
| UN | United Nations |
| UNEP | United Nations Environment Programme |
| US EPA | US Environment Protection Agency |
| SLA | Service Level Agreement |
| WARP | Waste & Resources Action Programme |
| WEEE | Waste Electrical and Electronic Equipment |

Chapter One: Introduction

1.1 Background of study

There is growing pressure on regional and community retail shopping centre business to act responsibly and comprehensively to manage their solid waste in a sustainable way. In addition, the practical importance of meeting waste directives and environmental credentials has made most businesses value facilities management (FM) service delivery highly. Despite the existing situation; financial-economic constraints; regulation; environment; organisational and technical issues, retail shopping centre management need to consider appropriate options for organising and managing waste cost-effectively. In order to succeed, the effort requires a creative act and dedication to turn retail shopping centre waste streams into meaningful resources.

Previous research on waste minimisation through recycling mostly relates to municipalities, commercial office buildings, hotels, educational institutions and industrial buildings, and little attempt has been made to investigate the existing solid waste recycling from the UK shopping centre sector. Some key studies from Fuller (1994), Pitt (2005) and Triantafyllou and Cherrett (2009) concerning shopping centre waste management and recycling trends have developed some critical factors concerning recycling which can be further investigated from the perspective of UK shopping centre business.

In regard to shopping centre solid waste recycling, the Critical Success Factors (CSFs) of such activity can be considered as those few key variables or recycling activities that affect the centre manager in achieving his goals for his current or future recycling initiatives. As this thesis is aimed at defining the critical issues of shopping centre recycling, identifying support needs and outlining possible directions of future development, it is therefore important to outline the set of critical success factors and

develop a recycling implementation success framework for UK shopping centre solid waste. This will allow for waste administrators, centre managers, facilities managers as well as researchers to evaluate recycling programs from this particular sector in terms of their implementation success. The research establishes how these factors can be determined and validated in accordance with current perspectives.

1.2 Research impetus

In the past 30 years, sustainability has become a topic mostly of great importance to academics, practitioners and businesses. There is nothing new about recycling as an objective, but there are new and growing pressures on UK businesses to manage their waste effectively. In England, businesses generate approximately one quarter of all waste, however, waste is a drag on the economy and business productivity (DEFRA 2011). By making products with fewer natural resources and reduce the costs of waste treatment and disposal, businesses can sustain its economic competitiveness. Improving the productivity with which natural resources are used can generate new opportunities and jobs. In order to strike a balance between the economic, social and environmental aspects of sustainability shopping centres must act responsibly and comprehensively to manage their waste streams in the most cost-effective ways possible (Envirowise, 2008).

Earlier studies on waste management and recycling programs mainly relate to the municipalities, medical and educational institution, as well as the manufacturing sectors. Very little attempt has been made to investigate recycling factors at shopping centres, particularly relating to how they operate and deal with this challenging situation. Lacking a comprehensive list of success factors makes it difficult not only for managers but also for researchers to evaluate recycling programs from the sector in terms of their success. Given that the existing landfill directives prohibiting the commissioning of new landfill sites and with the increasing operational cost of waste management, it is apparent that shopping centres have begun to set themselves some tough targets. Several sources or

references have been found for recycling, however, few sources (if any) highlighted any conclusive definition of success with regard to recycling. The lack of conclusive focus on the critical success factors (CSFs) and implementation success for shopping centre recycling used for the sector may create future difficulties in identifying adequate sources of data.

1.3 Key questions

This research attempts to shed light on “how shopping centre recycling success in the UK can be defined? and “what are these success factors?”. To investigate these issues, this research poses several questions which are pertinent to the overall scope of the research:-

- Q1. Are there any significant factors which could be considered of critical importance to the successful of shopping centres recycling implementation and how can they be selected?
- Q2. What is the current implementation trend or performance of UK shopping centre recycling in terms of the given factors?
- Q3. What type of assessment framework should be considered to identify the impact of these factors by the adoption of a robust and replicable methodology?

1.4 Research aim

This research was therefore motivated by the need to fill the above gaps in knowledge by generating empirically tested data focused on the shopping centre recycling implementation success framework that could underpin decision making. This would also enable the researcher to grasp the performance level of UK shopping centres recycling and to what extent the relevant factors are currently implemented.

Based on the aforementioned issues, this study therefore aimed to **investigate critical factors associated with the shopping centres recycling implementation success in the UK.**

1.5 Research objectives

The aforementioned research aims lead to the following objectives:

1. To develop a theoretical framework on the principle factors affecting the implementation success of UK shopping centre recycling;
2. To identify and validate the key success factors for shopping centre recycling initiatives by carrying out an interview survey within the industry; and
3. To establish the extent to which these critical success factors have an impact on the recycling implementation success of UK shopping centre organisations.

1.6 Significance of study

The conceptualisation of this research is guided by an extensive review of literature within a relevant theoretical construct. Earlier studies on waste disposal and recycling mainly relate to the municipal, medical and educational institutions and manufacturing sectors. It appears that this research has the potential to bridge the current gap in existing research and also contribute to FM knowledge on the theoretical development of solid waste management and recycling in the shopping centre sector. Thus, the study introduces the relevance of the critical success factors approach in shopping centre recycling operations research, attempting to combine both shopping centre recycling and critical success factor theory and research. By providing a set of recycling factors along with performance measurement framework for shopping centres recycling, this thesis could assist practitioners and researchers in their recycling strategy for the future.

1.7 Organisation of thesis

- **Chapter 1- Introduction;** provides an overview of the thesis structure and details the focus of study carried out.
- **Chapter 2 – Shopping centres position in material resource recovery;** provides definitions of the principle concepts of shopping centre waste management operation at the business level. This is followed by the strategic aspects of shopping centre recycling with a need to meet recycling and recovery objectives for all waste streams through waste packaging regulations, which are based on the principle of the Duty of Care and other affecting policies. The chapter closes with a brief outline of the strategic context which FM can offer to this business sector.
- **Chapter 3 – Critical elements of shopping centres recycling success;** begins with the central concepts of critical success factors related to shopping centre recycling and how recycling implementation success can be defined and measured. The scope of shopping centre recycling initiatives based on prior literature in the recycling domain is then described. The chapter closes with an overview of the theoretical framework for shopping centre recycling success envisioned for the development of research strategies.
- **Chapter 4 – Research design and methodology;** presents the methodology employed based on the conceptual framework study derived from the previous chapter. The chapter initially involves an analysis of the types of methodology available. Qualitative, quantitative and critical success factors methodologies are described followed by a discussion on the selected methodology and the grounds for its adoption. The use of triangulation is then presented in order to outline its purpose in improving the quality of the resultant data throughout the findings of the research.

This Chapter concludes with a brief consideration of the limitations of the adopted methodology.

- **Chapter 5 – Qualitative data analysis: Interview results;** describes the carrying out of a series of interviews held with the key informants in the industry used to validate findings from the literature review in Chapter 3. The second phase of the research seeks detailed information on how shopping centres are implementing their recycling program, and identification of the key success factors. This is performed via semi-structured interviews. The processes involved with the selection of interviewees are described along with a brief explanation of the interview process adopted and a summary of the outcomes at this stage in the research. This chapter also includes the development of deductive hypotheses to be tested in the confirmatory phase of the research.
- **Chapter 6 – Quantitative data analysis: Questionnaire results;** describes the a large scale questionnaire which was conducted within a specific population of shopping centres throughout UK. Several objectives of the study were developed in order to explore the extent of recycling experience and the perceptions with regard to key factors associated with successful implementation. Statistical procedures and analyses are presented along with research questions and hypotheses findings obtained.
- **Chapter 7 – Findings and discussions;** discusses the results from relevant research methods employed in accordance with the theoretical framework established for shopping centre recycling implementations success. Relevant findings from both exploratory and confirmatory phases are presented based around the aims and objectives undertaken for this research.

- **Chapter 8 – Conclusions, contributions and direction for future research;** further conclusions of study are outlined in this final chapter. The chapter also provides a range of limitations of study and targeted recommendations from the identified results.

Chapter Two: Shopping Centre Position in Solid Waste Management

2.1 Introduction

In order to allow a clear grasp of the research context, the relevance of FM in shopping centre recycling requires an in-depth understanding of the waste framework that currently affects businesses in the UK. With this in mind, this chapter starts with a discussion pertaining to the integrated resource recovery system of solid waste management and business implications towards the economics of sustainable development. The unique position of commercial retail business within materials cycle networks and the effects of relevant policies and the associated waste trends impacting on waste packaging from the retail sector is also highlighted. The second part of this chapter relates the characteristic and classifications of shopping centre business and how recycling is implemented. Finally, the chapter highlights the relevance of strategic FM intervention in managing business waste and recycling from shopping centre sector.

2.2 Sustainable development on solid waste management

The over-reliance on landfill in the previous decade has caused many countries to face shortages of landfill sites. Experience also suggests that sustainability derives its greatest power and affects organisations when it is deeply embraced as a set of core values that genuinely integrate economic prosperity, environmental stewardship and social responsibility: profit, planet and people. From several declarations ranging from the Montreal Convention (1987), Rio Declarations of Rio Earth Summit (1992), Kyoto Protocol (1997), Sustainable Development Announcements of Johannesburg World Summit (2002), and EU2004/35/EC Environmental Liability Directive, reveal growing environmental concerns in all public and private sectors. In light of the environmental

agenda, government, individuals, and companies play a major role in protecting our common environment.

Furthermore, the gravity of this problem is perhaps best reflected in the level of attention given to it in the United Nations Millennium Declaration (UN, 2000). One of the eight goals underlined in the declaration has waste or resource efficiency implications (UN, 2007) to ensure environmental sustainability by integrating the principles of sustainable development into country policies and programmes, and reverse the loss of environmental resources. The EU sustainability agenda (The European Sustainable Development Strategy 2001; 2009) also reflects this to the EU member states, and therefore sustainable waste management and effective waste minimisation have become the basic principles of the UK Environmental Legislation and Strategy. As a part of the overall waste management strategy, several specific waste streams have been defined to receive priority attention, the aim being to reduce the overall environmental impact of each waste stream (Directive 2008/98/EC)

To date, the business environment is changing at an ever-increasing pace and technological advances, globalisation and corporate responsibility (CR), are at the forefront of this change. The degree for such commercial business embraces environmental management through effective waste minimisation and makes a clear statement about its business culture, and how seriously it takes this responsibility to society. Also, the increasing pressures for waste disposal reporting and for organisations to demonstrate their environmental credentials present a good opportunity for organisations to attain a competitive advantage while differentiating themselves in the marketplace (Walker *et al.*, 2007; Baharum and Pitt, 2009). As result, proper waste management becomes a central component for business, and is valued for the cost-savings associated with some programs as well as its general environment-friendly aspects.

2.2.1 Materials recycling: closing the loop

Waste is described as an unavoidable by-product of the resource conversion process within our economic system (Turner and Powell, 1991; Phillips *et al.*, 2001). The measures to prevent waste generation and to reincorporate waste in the economic cycle or 'closing the materials loop', that is, recycling is an important element of a comprehensive approach to resource management (Fuller and Allen, 1995). From this point of view, the insight into the nature of recycling is gained by examining the definition of the term 'recycle', is the re-introduction of residual materials into production processes so that they may be re-formulated into new products' (United Nations, 2003; United Nations Environment Programme, 2007). Technically, recycling is the process of systematically collecting, sorting, decontaminating and returning waste materials to commerce as commodities for use or exchange. The traditional approach to product disposition can be described as a linear flow in which waste materials are sent to landfill or indiscriminately dumped (Neace, 1991; Phillips *et al.*, 2006). Hence, for recycling to be sustainable, there needs to be accessible markets for recycled materials at the end of the cycle (Fuller and Allen, 1995). Baharum and Pitt (2010) further illustrate the circular flow that applies to waste generated at different levels in a hypothetical production – consumption cycle over time (see Figure 2.1). Recycling has not been without its problems however, which have been a result of the rapid growth in recycling programmes and the logistical costs of processing the material through the circular reintegration channel (Pohlen and Farris, 1992).

Figure 2.1: Materials system life-cycle.

(Source: Baharum and Pitt, 2010)

Figure 2.2: Waste hierarchy

(Adapted from: (UN, 2003; UNEP, 2007; HSMO, 2011; and DEFRA 2011c)

Marketing intermediaries also produce waste that follows this same routing. The overall effect of the diversion of materials through resource recovery is not only to conserve resources but also to eliminate additional on-going pollution from unfettered use of landfill. Material recycling as a sub-system creates a marketable physical product that is essentially a substitute for raw materials in the primary production processes. At this point, the material is essentially refined back to its raw material specification; it may subsequently be used for any purpose appropriate to that material. Alternatively, the reuse and incineration sub-systems have as their respective objectives in the development of returnable systems (Korzum *et al.*, 1990), composting and the reduction of waste by energy recovery. These, used together, represent the major elements of an integrated solid waste management program following the waste hierarchy (shown in Figure 2.2) (UN, 2003; UNEP, 2007; HSMO, 2011; and DEFRA 2011c). Therefore, it is important for every business to grasp the holistic network of the materials they consume and how they

should be dealt with from the beginning to ensure sustainability and efficient resource use is reflected in their business.

2.3 Managing business waste: scenario in the UK

Over the past decade, recycling has often been viewed politicians and academics as an important aspect of an efficient and effective solid waste and resource management system. The business etiquette of sustainable solid waste management has been highlighted in Agenda 21 which requires recycling to become a necessary part of every business (UN, 1992; DETR, 1999; DETR, 2000; DEFRA, 2008). Most importantly from business perspective, it must enable the realisation of financial saving and competitiveness (Envirowise, 1998; Phillips *et al.*, 2006).

In principle, the UK solid waste policy reflects the EU Waste Framework Directives for regulating the European solid waste management system. This policy emphasises the importance of waste prevention, recovery and recycling as the top of its waste hierarchy options to promote more sustainable and be proactive in her waste management system. The government objective is therefore to move beyond this throwaway society towards a zero waste economy, by emphasising waste prevention, then reuse, recycle and recover what cannot be prevented – and throw away only as a last resort. Although businesses in England now recycle more than 50 % of their waste, they still produce over 45 million tonnes of waste every year (DEFRA 2011b). In term of cost, by reducing waste by 20 % can cut a business's waste disposal costs by 40 % and waste to landfill by 60 % (Waste & Resources Action Programme (WARP), 2011). With annual landfill tax rises recently confirmed until 2013, there is clearly good reason for UK businesses to take prompt action in managing their waste effectively.

2.3.1 Waste policies and targets impacting on commercial retailing

The realisation of UK waste policies set out aimed to create incentives that reflect the waste hierarchy and to create opportunities for the reduction, re-use, and recycling of waste, and recovery of energy from waste. Apparently commercial retail waste is bound by several parts of European legislation transposed into national laws and regulations. The legislation imposes a 'Duty of Care' on commercial premises to make satisfactory arrangements for their waste management and places a 'Producer's Responsibility' on retailers based on the 'Polluter Pays' principle, requiring the set-up and management of recyclables and material take-back schemes.

The UK government acknowledge the critical importance for waste minimisation to counter the trend of 3 % per annum waste growth, with emphasis on "breaking the link that exists between economic growth and increased waste production" (Read, 2000). Today, reducing waste generation in retail activities has become a key issue in business due to pressures exerted by the government to fulfil European Union (EU) targets on the Waste Framework Directive (2008/98/EC) and the Waste (England and Wales) Regulations 2011 that given high priority on re-use, recycling and waste-to-energy recovery in conjunction with the waste hierarchy. They also promote the "producer responsibility" policy which underlies the approach taken in implementing the EC (European Commission) directives (DEFRA, 2006). Based on the 'Producer's Responsibility' policy which impose a 'Duty of Care' on anyone that imports, treats or disposes of waste, a series of European directives have been transposed into the national regulatory framework aiming to reduce the amount of waste ending up in landfill. All these producer responsibility directives were identified in the European Union's Fifth Environment Action Programme as "priority waste streams" because of growing concern about their impact on the environment. In these directives, responsibility is clearly placed on producers to bear the costs of collection, sorting or treatment and recycling or recovery. With this, Pohlen and Farris (1992) and Bettac *et al.* (1999) showed that these legislative actions can drive companies to utilise reverse logistics to recover products and

certain types of waste from downstream supply chain stakeholders, and ensure the compliance with existing and future legislation.

Despite the above-mentioned legislative actions, most importantly is the EC directive on Packaging and Packaging Waste (94/62/EC) that seeks to reduce the impact on the environment by introducing recovery and recycling targets for packaging waste, and by encouraging minimisation and reuse of packaging. The EC directive on packaging and packaging waste has set the EU member states mandatory recovery and recycling targets, the first of which were to be met in 2001. In effect, the EC directive on packaging and packaging waste (94/62/EC) has been imposed into UK law under the Environment Act (1995) as follows:

- Producer responsibility obligations (packaging waste) regulations (1997)
- Packaging (essential requirements) regulations (1998)

In February 2004, a revised packaging directive (2004/12/EC) was published, which set recovery and recycling targets (i.e. 60 % for glass, paper and board; 50 % for metals; 22.5 % for plastics; and 15 % wood), as a percentage of all packaging waste arising in the UK, to be met by 31 December 2008. These regulations have an effect on any business which handles more than 50 tonnes of packaging per annum and has a turnover of more than 2 pounds million per annum, if it is involved in one or more of the following activities:

- manufacturing raw materials for packaging;
- converting raw materials into packaging;
- filling packaging (i.e. putting goods or products into packaging);
- selling packaged goods to the final user (which can be other businesses or the public);
- performs a “service provision”;
- importing packaging / packaging materials / packaged goods into the UK for any of the above activities.

Table 2.1: Business targets for packaging waste from 2006 to 2010.

(Source: National and Business specific recycling targets under the Producer Responsibility Obligation (Packaging Waste) Regulations 2007)

With such commercial activities involved these regulations positively encourage the minimisation of packaging and packaging waste, but also provide incentives for reuse and increase the recovery and recycling of packaging waste. Hence, each year recovery and recycling targets are set for UK businesses to meet (see Table 2.1). These are designed to enable the UK to meet the recovery and recycling targets in the Packaging and Packaging Waste directive by 31 December 2008. Therefore DEFRA (2006) set a business recovery target of 68 % in 2008 to meet the directive target of 60 %. The business targets are higher than the EC directive targets because “not all businesses that handle packaging in the UK are bound under the Regulations (smaller businesses which do not satisfy the threshold tests are not obligated)”. This further suggests that the retail sector has an important role in reference with the strict legislative requirements on waste disposal.

While the retail sector is a major contributor to the UK economy, with sales of 225 billion pounds in 2001, it also produced large amounts of waste – an estimated 12 million tonnes per annum at a cost of over 360 million pounds per annum (Envirowise, 2002).

Under this sector, UK shopping centres for instance currently spend about 15 million pounds per annum on waste disposal, and this cost was expected to rise to 18 million pounds per annum by 2004 (Envirowise, 2002). Although this is an estimate, it indicates that there are opportunities to save significant sums of money to shopping centre business. This clearly implies that there is a strong business case for taking action to prevent and reduce waste from this business sector.

2.3.2 Commercial sector waste trends

An overview of commercial waste arising in England reported that an estimated 35.3 million tonnes of waste were produced in 2009 compared to the results of the last national survey of business waste in 2002/03 (DEFRA, 2010b). Indeed the increasing trend of commercial waste production in England probably reflects trends in business demography and the move towards more a service based economy (DEFRA, 2011b).

Figure 2.3: Total C&I waste by sector (million tonnes), waste type and management method, England, 2009.

(Source: DEFRA, 2011b)

Apparently the amount of commercial waste was decreased to 23.8 million tonnes (DEFRA, 2011b) (see Figure 2.3). These interim results indicate that commercial waste has increased, both in tonnage terms and as a proportion of total waste. For retail and wholesale sector, including regional and community shopping centres, department stores, out-of-town developments and retail parks produces an estimated 10.7 million tonnes of waste annually (DEFRA 2010b). The Environmental Agency (2004) added that 48 % of commercial waste ends up in landfills with the main commercial waste stream consisting of waste packaging and solids (Envirowise, 2007). Pitt (2005) claimed that the commercial sector has been slow to initiate waste minimisation programs, which also contributed to poor waste segregation from the sector. He added that lack of leadership, commitment from top management, awareness and waste management skills are some of the reasons why commercial sectors are slow to respond. Pitt (2005) reasoned problem however cannot be deflected away from poor contract management skills and a failure by the FM discipline to effectively manage outsourced waste management solutions in the sector.

Table 2.2: Commercial and Industrial waste by broad sector in England, 2009.

(Source: DEFRA, 2011b)

Despite the importance of FM intervention on business waste, the recent solid waste statistic (shown in Table 2.2) on retail and wholesale revealed some waste amount of 9,212,000 tonnes produced from this sub business sector (i.e. 38.6% of total waste from commercial sector) with 59.6% recycling and reuse rates. Although the figure reflects some significant improvement, however this sub business sector is a major waste contributor from the UK commercial waste sector which in need of further attention.

Figure 2.4: Management method as percentage of total Commercial and Industrial (C&I) waste in England, 1998/9, 2002/3 and 2009.

(Source: DEFRA, 2011b)

Furthermore, a reduction in the amount of landfill disposal (see Figure 2.4) also supports that awareness of recycling issues has become increasingly relevant. The management statistics of commercial and industrial waste in England reported that a recycling rate near to 50%, in 2009 compared with 30 % more in 2002/03, was coupled with a marked decrease in waste sent to landfill (DEFRA 2011b). The increased recycling and decreased

in landfill trends may reflect the appropriate management of waste has become more important to UK businesses. Apparently a reduction in the amount of mixed waste has been recorded due to the business sector being affected by the rising landfill tariff. Thus at this point, recycling and reuse remains a key strategy for managing business waste. As revealed in Figure 2.4, the waste management methods for UK commercial and industrial businesses reflect the purpose of existing waste strategy which has been to determine the direction over the medium and long term for national waste management.

The rising tariff for landfill above inflation it is a 'no brainer' for any business in the UK if their waste is not effectively managed and implemented. This highlights some key issues that businesses should consider when embracing business plans for waste management.

2.4 UK shopping centres: as business, property and investment

Given the main focus of this study is to look at shopping centre recycling in the UK, thus understanding key issues related to shopping centre business is paramount in order to grasp precise characteristic, its definition and existing classifications behind this unique commercial retail hub.

Apparently shopping centres have steadily grown in significance for the UK economy through the service they provide to consumers, the employment they generate both in the centres themselves and also the vast number of companies and industries that service the shopping centres. For the past 50 years it can be seen that shopping centres have become firmly established as an important component of the UK retail environment. Shopping centres premise is also seen as a good platform for retailer growth, especially in new markets.

Shopping-centre development indeed is a catalyst for retail regeneration in many towns and cities across UK. A market research published by the International Council of Shopping Centres (ICSC) (2008) has recognised that shopping centres frequently act as a catalyst to the regeneration of surrounding areas by providing positive economic benefits to the community, including employment, income and tax revenue, as well as physical improvements to the environment in terms of better buildings and infrastructure. According to British Council of Shopping Centres (BCSC) (2009b) the UK retail property industry currently employs over seven million people across the UK, with 2.8 million people employed within retail functions and 4.5 million people employed in property services. Indirectly, through the “multiplier” and “accelerator” economic effects on the economy, shopping-centre development (including redevelopment and renovation) lifts the broader economy. For example in notable retail-led regeneration schemes include the Bullring centre in Birmingham, and the new Paradise Street scheme in Liverpool. Therefore this sector is identified as a major contributor to the UK economy. The reason behind is because almost all of the UK’s major towns have at least one shopping centre scheme. There are currently a total of 819 shopping centres in the UK, with 21% located in the South East and 12% located in the North West (BCSC 2009b).

Also it was contended that the roles of shopping centres can be seen from different perspectives, that are, as a place of business, as a property and as an investment (Pitt and Musa, 2008). As investor increasingly favours large size shopping centres development because they see an opportunity to dominate the location and to create or maintain prime pitch adds. They find the attractiveness of shopping centres schemes as an investment asset (The National Retail Planning Forum (NRPF), 2000). There is also evidence that the UK has ranks the first in shopping centre development throughout EU between 2004 and 2006, with an average of 8 666 million Euros of capital investment (Cushman & Wakefield (2005); ESCT and ICSC, 2008).

Pitt and Musa (2009) portrayed that retailing is not the business of shopping centres: this is a retailer's core business. Shopping centres more likely provide a business place that includes retail space / units, facilities and services to the potential retailers. The core business of shopping centres is leasing retail space for profit. Thus the success or failure of shopping centres is depending on many factors; but the operation and management is one of the factors are vital to its success (Musa and Pitt 2009).

From the above arguments, shopping centre managers need to understand these perspectives before developing their own objectives and policies in managing their shopping centres. Thus, the challenges remained to identify, understand and meet the on-going needs of consumers, retailers and investors.

2.4.1 Characteristic of shopping centre: consumers, retailers and investors need

In order to meet the on-going demands of consumers, retailers and investors, it is of importance to recognise their repercussion for the business of shopping centre. Predominantly the consumer is the cornerstone of the retail real estate industry and, for that matter, the economy itself. Hence, understanding consumers buying decisions at a given point in history helps build the picture of likely consumer behaviour in the future. For instance in Europe, with consumption accounting for approximately 60% of the Gross Domestic Product (GDP), commercial retailing sector is the backbone and catalyst for the European economic growth (EC, 2007).

From retailers' perspective, shopping centres provide a clustering of goods and services that benefit both. Retailers benefit from the concentration of shoppers (footfall) and consumers benefit from the choice of shops, wide-selection of goods and services offerings and retailer competition. For the community, shopping centres provide economic benefit, including jobs and tax revenues through new or expanded hubs of commerce or regeneration of areas. For the investor, shopping centres are a unique real-

estate asset on par, as an asset class, with office, industrial and residential properties. Shopping centres as an investment show the ability of the property to generate a future income stream that may attract investors.

In consequences, Musa and Pitt (2008) argued it does not make sense to spend a huge amount of money designing and building shopping centres only to hand them over to inadequate management. Therefore, the quality of management in the shopping centre is, however, an important factor that can affect the success or failure of the centre operations (Morgan and Walker, 1988). This explains the significant role of shopping centre operations and management in securing a future stream of income as a return from the owner's capital investment.

Moreover shopping centre developers and investors must be mindful in regard to sustainability considerations; shopping centre business is a large consumer of energy, water and producers of waste (BCSC 2011). For sustainability reason, centre management need to demonstrate their commitment to Carbon Reduction Commitment, Zero waste to landfill by 2020, Energy Performance of Buildings Directive (Directive 2002/91/EC) II, revisions to Part L of Building Regulations 2010 and the proposals for new commercial buildings to be zero carbon by 2019. This indeed links between sustainability and its business strategy due to the explosion of corporate sustainability transparency and accountability through corporate social reporting (CSR) (Kolk, 2003; Perrini and Tencati, 2006; Nousiainen and Junnila, 2008). Yet there is little market evidence to show that market sustainability issues are influencing market pricing or the ability of a scheme to attract retailers. Although however this likely to change in near future.

2.4.2 Shopping centres definition and classifications

A range of definitions have been developed for shopping centres, which often tend to reflect the fact that industry was evolving. In basic term, a shopping centre can be described as a building that contains many units of shops but is managed as a single property (Lambert, 2006). Since the 1960s, the shopping centre industry has grown and changed and more types of managed centres have been created and evolved. Such development and innovation, however, occurred in out of town locations where new formats have been created in the form of Regional Shopping Centres, retail warehouse or retail parks and outlet centres (NRPF, 2000). Today the subject of shopping centres is more complex than ever. Such complexities can be explained in terms of its size, type and characteristics, hence contributed to the misunderstanding as to shopping centre identities. As shopping centre industry experiencing considerable innovation, the formats of shopping centre have often been confused with their identities.

At the end of 2005, ICSC Research has published a study that reviewed national definitions currently used to describe shopping centres throughout Europe with the goal of refining the common centre types and their characteristics into a Pan-European International Standard for shopping centres. This standard was created after extracting common elements from centre types throughout Europe, and does not replace any existing national definitions. Characteristically the standard classifies shopping centres into 11 broad-based international types of centres which can be grouped into two broader categories—traditional and specialised, as shown in Table 2.3) (ICSC, 2005). The traditional format is an all-purpose centre that could be either enclosed or open-air and classified by size. The specialised format is a specific purpose-built retail scheme that is typically open-air and could be further classified by size. Specialised formats include the retail park, factory outlet centre and the theme-oriented centre.

Table 2.3: International standard for European shopping centre types against UK shopping centre population.

(Source: BCSC (2003); ICSC (2005))

Hence, as a working definition, the thesis defines a shopping centre as a retail property that is planned, built and managed as a single entity, comprising units and “communal” areas, with a minimum gross leasable area (GLA) of 5,000 square metres (m²). This characterisation concurs with Lambert (2006) and the ICSC’s pan-European definition of shopping centres standard which clarifies the precise types and formats of what shopping centre is. This working definition is of importance in order to grasp precise sampling parameter required for empirical observation in regard to shopping centre operations and management.

2.5 Shopping centre and materials recycling

Waste from shopping centres is varied, and is mostly produced by retail businesses. According Envirowise (2002) the waste generated from the retail sector is the consequence of the following commercial activities:

- damaged or obsolete stock;
- discarded packaging;

- the time and effort spent handling waste, for example, crushing and moving single-use packaging;
- the time and effort spent managing waste, for example, storing and processing damaged goods;
- excessive or inefficient use of water and energy.

Indeed, it is more difficult to quantify waste data from shopping centres. The reason behind this is that commercial waste in the UK is collected individually by businesses through waste contractors. Given that most of the research on waste is focused on the municipal sector, information on the precise waste trend in the commercial sector is limited. This can be explained by the fact that municipal waste is collected centrally by local authorities, enabling efficient monitoring of waste. Pitt (2005) pointed out the current focus is on the disposition routes themselves yet there is no emphasis on how effective the methods work under differing circumstances. This is important particularly when considering the nature of each industry or sector varies, meaning that the suitability of each disposition method varies accordingly. Clearly this portrays the efforts to minimise commercial waste depend on individual businesses' efforts, while municipal waste minimisation can be implemented through local authorities.

Although there is limited empirical evidence identifying the characteristics of shopping centre waste streams. Beck (1993, cited in Fuller 1994) gives estimates of typical shopping centre waste streams (see Table 2.4 and Figure 2.5). The estimates illustrated indicate that shopping centres typically produce much larger quantities of relatively homogeneous waste packaging that are by-products of retailing operations. Other investigations also reveal the largest amount of recyclable waste produced in shopping centres is old corrugated cardboard (OCC) (Fuller 1994; Pitt 2005; Triantafyllou and Cherrett, 2010).

Table 2.4: Average estimates of solid waste generation at shopping centres

Source: Adapted from Beck R.W. (1993) cited in Fuller (1994)

Figure 2.5: Typical proportions of solid waste generation from shopping centre.

Source: Adapted from Beck R.W. (1993) cited in Fuller (1994)

It has been discussed earlier in Section 2.2.1, recycling is one of the basic sub-systems of an integrated waste management strategy (or resource recovery), which collects, processes and returns former waste materials to productive use (Wiard and Sopko, 1989; United Nations, 2003). As a unique form of materials recycling, shopping centre recycling can be distinguished by the nature of the waste generated and the types of material sought by the centre management. The relevance of materials recycling to shopping centres is quite straight forward. Fuller (1994) argued how retailers at shopping centres occupy a unique position described as 'down-stream', in the product extended channel, which places it at the point where bulk breaking associated with product assortment takes place in shopping centres. The collection of this waste places the shopping centre at the head of forward retailer / wholesaler within the product materials

circular reintegration, and predictable solid waste streams composed of packaging materials are associated with the shopping centre operations. Thus shopping centres play an important role to close the loop, thus creating greater supply from the materials recovered throughout recycling initiatives instigated by centre management. Therefore, it is apparent that recycling is a logical waste management strategy through which shopping centre business can achieve their waste reduction and sustainability objectives. In accordance with the Duty of Care, shopping centres are directly responsible for what happens to waste they have channelled or discharged from the businesses. To illustrate this occurrence, the following section elaborates some waste disposition routes that have apparently been practised by the sector.

2.6 Shopping centre waste operations and disposition routes

In England, typical waste disposition routes include recycling, reuse, incineration and land filling. Triantafyllou and Cherrett (2009) carried out a case study investigation which identified, in Figure 2.6, common disposition routes for a typical regional shopping centre in the UK, the *WestQuay's*. As shown in the figure, any waste was diverted from landfill was largely a result of increased in recycling and recovery rates, i.e. waste-to-energy and MRF, between the January 2006 and August 2008. In 2006, only 19.7 % of the total waste produced by the retail complex was recycled / recovered, while in 2007 this figure had increased to 28 % and an additional 46 % was incinerated, while the total annual waste tonnage slightly decreased when compared to 2006 figures. Throughout the first 8 months of 2008, recycling/recovery rates had further increased with 47 % of the total waste produced being recycled/recovered, exceeding the overall 2007 figures (577 tonnes). Another 51 % was incinerated indicating a total decrease in the proportion of the waste (2.4 %) being landfilled. The study also revealed that the recyclable materials produced by the retailers in the shopping centre include cardboard, polythene, glass, paper, coat hangers, pallets, cages/scrap metal, fluorescent lighting tubes and wood. In addition, some of the stores produce used cooking oil and

biodegradable kitchen and canteen waste (yard waste). The waste statistics showed that the only waste material being recycled prior to 2006 was cardboard.

Figure 2.6: Typical shopping centre waste management disposition routes.

Source: Triantafyllou and Cherrett (2009)

In the summer of 2007, *WestQuay* initiated separate polythene and paper collections, while *WestQuay*'s anchor tenant introduced its own glass recycling scheme. In December 2008, *WestQuay* started coat hanger recycling. In 2006, 93.3 % of all waste materials being recycled/recovered consisted of cardboard, whilst the remaining 6.7 % consisted of pallets and cages/scrap metal collected for recycling/reuse. In 2007, cardboard recycling accounted for 69 %, while pallets collected by waste contractors for repair, reuse or recycling accounted for 11% (48 tonnes) of the overall recycling rate. Polythene recycling accounted for 8.2 %, while glass, paper and hanger recycling accounted for 9 % of overall recycling. The remaining 2.7 % was waste being transferred to a materials

reprocessing facility (MRF) where any remaining value was extracted. During the first 8 months of 2008, packaging recycling fell to 63 % of the overall recycling rate but yielded more recyclate tonnage compared to 2007. Polythene and hanger recycling rates had increased, reaching 16 % and 8 % of overall recycling/recovery rates respectively. Glass, paper, and pallets collectively account for 11 % of the overall recycling rate. At this juncture, despite several waste management methods available to reduce the amount of waste sent to landfill, both recycling and energy recovery apparently turn out to be the most sensible option opted by the centre management.

Recycling and recovery options in the UK are continually developing and a wide range of local, regional and national opportunities exist to manage waste affordably, that also meet the tough legislative requirements (Richards *et al.*, 2007) currently in place. McLeod *et al.* (2007) described commercial waste in the UK generally collected by contractors, local authorities or through other routes e.g. in-house management. They identified waste contractors, i.e. *Serco, Veolia, BIFFA, Onyx, Sita*, or some other local haulier, offering flexible services at competitive prices, with larger retailers occasionally using several different contractors to service their operational needs. Third party contractors on the other hand can operate in a number of different ways offering dedicated/exclusive, shared, specialised, occasional, transit only and/or multi-client services (Rushton *et al.*, 2001).

On the other hand, alternative disposition routes can often add to the overall transport burden associated with waste logistics which could be mitigated if back-loading (i.e. the filling of vehicles also on return trips) was more widely adopted, however only 40 % of trucks are full according to some industry estimates (Shore 2006). The 'WEEE Directive', enacted in the UK in 2007, is expected to create an additional 100,000 vehicle movements a year (Bernon, 2005) which can be translated into millions of additional running kilometres, considering the general lack of local markets and poorly coordinated collection systems currently employed. Triantafyllou and Cherrett (2010) noted a more co-ordinated approach to managing return waste flows to better make use of the existing

channels and maximise recyclables generation which could be successfully implemented through the promotion of synergistic liaisons between retailers and suppliers housed in the shopping centres. In this regard, centre managers are in an important position to encourage tenants to adopt best waste management and recycling practice. Pitt (2005) also noted that the waste management and recycling initiatives however must come from the FM at shopping centres to drive change within a sphere of waste management and recycling operation in this commercial sector.

2.7 FM significance dealing with shopping centre solid waste

The quality of management in a shopping centre is identified as the third most important factor that can affect the success or failure of shopping centre business (Morgan and Walker, 1988). From the perspective of shopping centres support services management, there is evidence that suggests the significant importance of FM.

Indeed, FM is a relatively young industry; however, since the late 1980s, it has gradually increased in momentum as a credible discipline within the property and construction industry (Tay and Ooi, 2001); as facilities managers being responsible for many of the buildings and services which support businesses and other types of organisation from operational to strategic level. It is a business tool that is fully understood within the shopping centre industry (Musa and Pitt 2009b). Evidently, much has been written on meeting these sector-based demands, but one area that has received relatively little attention is the retail sector (Willis, 2003). This is because the perceptions and expectations of many investors and retailers did not cascade fully into the FM provider market.

Willis (2003) reported that many investors in shopping centres were not getting the level of FM service anticipated, and at the costs originally sought. He described retailers as feeling that their service charges did not necessarily equate to the level and quality

expected. As a result, this concern has probably changed their perceptions and expectations towards the FM provider market. Musa and Pitt (2009b) also identified the retail sector has long been a happy hunting ground for FM services providers. In addition it has been subject to major change as the economy fluctuates according to financial health, spending patterns and many other influences.

2.7.1 Defining FM in shopping centres business

By definition, the meaning of FM was originates from the American Library of Congress 1982 (Mole and Taylor, 1992; Ilozor and Oluwoye, 1998) as, “[. . .] the development, co-ordination and control of the non-core specialist services necessary for an organisation to successfully achieve its principal objectives”. In practice, FM can cover a wide range of services, including real estate management, financial management, environmental management, change management, human resource management, health and safety and contract management, utilities suppliers and domestic services (i.e. cleaning and security) and building maintenance (Atkin and Brookes, 2005; Nousiainen and Junnila, 2008).

Pitt and Tucker (2008) suggest that the purpose of FM is to integrate and align the non-core services, including those relating to premises required to operate and maintain a business to fully support the core objectives of the organisation. Kincaid (1994) observes that the integration of FM as an effective function for an organisation can be achieved by recognising three key characteristics;

1. FM is a support role within an organisation, or a support service to an organisation.
2. FM must link strategically, tactically, and operationally to other support activities and primary activities to create value.
3. Within FM, facility managers must be equipped with knowledge of facilities and management to carry out their integrated support role.

There are many business tools available for organisations to aid efficiency in business sectors, but FM offers a holistic and evolutionary approach in achieving optimum business solutions (Barrett and Baldry, 2003). This encompasses business policies, procedures and services, alongside procurement procedures, human resources management, training and development, business relationships, and statutory considerations (Mohd Noor and Pitt, 2009). FM can be strategic in managing business support functions and operational, concentrating on the detailed operational activities of the organisation. Atkin and Brookes (2009) also portray that for FM to be effective, both the “hard” issues, such as financial regulation, and the “soft” issues, such as managing people, have to be considered. In summary, FM embraces every part of an organisations activities, and can be seen as a series of inter-related activities involving the co-ordination of all efforts relating to the planning, designing, and managing an organisation’s physical resources (Becker, 1990), that incorporates spatial, environmental, human, and financial resources (Nutt, 2000).

In relation to shopping centre business, Cant (2005) described the FM services in shopping centres that are seen as non-core services. These include mechanical and electrical engineering, cleaning, waste management, security, landscape, energy management etc.. Even though FM services are non-core services in nature, if managed correctly either through in-house or an outsourced set-up, they should have a strategic importance to adding value to the shopping centres core business delivery. Given the core business of shopping centres is retail property investment (Musa and Pitt, 2009b), shopping centres certainly require a wide range of FM services either in house or outsourced to fully support the operations of the shopping centre property with sensible operating costs and best value.

2.7.2 Sustainable business support at strategic level

As FM involved throughout the design, construction, and operation of the built environment, therefore it holds specific roles in providing knowledge and skills on effective management of facilities (Tay and Ooi, 2001; Nutt, 2004). Various FM literatures attest that the facility manager is in a unique position to impact on the sustainability of a building and its facilities (McLennan, 2000; Nutt, 2004; Hodges, 2005; Roper and Beard, 2006; Nousiainen and Junnila, 2008) and also possesses a direct influence of the overall business strategy (Nutt and McLennan, 2000; Atkin and Bjork, 2007; van Ree, 2007; Walker *et al.*, 2007). Pathirage *et al.* (2008) noted that the professional discipline of FM has progressed from being a narrowly defined set of functional tasks delivered in a mechanistic manner to meet a specific requirement to an integrated management approach which perceives its role as being a significant determinant of corporate goal achievement. Practically FM processes nowadays tends to link both its operational and strategic levels as important business tool.

As the need for environmental management to business, FM serves in the area of energy management, health and safety, hygiene services, pest control, recycling, and waste management for corporate companies. Nonetheless, Price *et al.* (2011) reveal that within the FM industry sustainable business practice is not yet embedded; but it is apparent that sustainability is beginning to play more of an influential role, especially amongst the larger companies. According Price *et al.* (2011), FM organisations deal with these wide-reaching environmental issues in their daily operations. The sustainability policies of FM companies are likely to have come about due to operational issues that affect the environment. Due to increasing legislative pressures on large companies, FM only companies would be in a position to develop a sustainability policy to cover the wider environmental agenda to meet this purpose.

Junnila (2004) also describes facilities-related activities are a highly relevant issue in the environmental strategy of companies from the service sector. Her study reveals that facilities-related activities are a significant factor to consider when establishing

environmental strategy. This implies that enhancing a company's FM to support its environmental work can provide great environmental management potential with a favourable cost-benefit ratio to companies.

Therefore, facility managers should internalise their role in pursuing better environmental performance (Nousiainen and Junnila, 2008). By doing so, facility managers able to demonstrate value by proactively addressing environmental issues and participating in formulating good green practices by implementing environmental policies for reducing the organisation's environmental impact (Hodges, 2005; Roper and Beard, 2006; Price *et al.*, 2011).

To date, the FM profession has increasingly become a significant proponent of sustainable practice in many business organisations (Hodges, 2005; Roper and Beard, 2006). Hence, by putting sustainable policies and strategy into facilities operations, FM will benefit greater financial returns, increased reputation, improved productivity, and reduce detrimental effects on the environment (Shah, 2007; Galbreath, 2009). In sum, it is fundamental to recognise that sustainable practice becomes the key reason for the facility manager to bring competitiveness to shopping centre business at strategic level.

2.7.3 Dealing with business waste

Business waste has become one of the major environmental concerns in the UK that take place in resources to create products and services (Pitt 2005; DEFRA 2011b). With regard to the existing waste policy in the UK, businesses can still make significant cost savings and dramatically reduce the amount of waste they send to landfill every year. In accordance with the government National Waste Strategy 2000, waste has to pass waste acceptance procedures, and some will need pre-treatment before it can be landfilled, again adding to disposal costs (Foreman, 2006).

As pointed out earlier in Section 2.3.1, the solid waste directives give recycling a prominent position in waste management. The landfill regulations and the Environmental Protection Act 1990 has also placed responsible management of a business's waste strategy as a 'Duty of Care' for facilities managers. This can be achieved by integrating waste minimisation, recycling, processing, transport, and final disposal activities. Pitt and Smith (2003) indicate that the facilities manager's role is to reduce every type of waste, which is a key approach to innovating successful waste management strategy. The waste management strategy also encompasses other pertinent directives which guide the safe management of waste including Waste Electrical and Electronic Equipment Directive 2002; Packaging Waste Directive (interpreted in the UK by the Packaging Waste Regulations 1997); End-of-life Vehicles Directive 2000; and Animal By-products Regulation 2003 (food and catering waste). The practical relevance towards meeting waste directives and environmental credentials is encouraging many companies to understand the value of FM services in business (Walker *et al.*, 2007). It is therefore important to focus on the environmental aspect of business waste management and disposal by investigating the underlying factors that drive recycling implementation success, particularly within the shopping centre sector. In effect, this could assist the shopping centre FM implementation at operational level to sensibly manage solid waste resources from waste streams in the most economic and strategic ways possible.

2.8 Summary

This chapter has explained the current scenario; relevant sustainable policies' impacting on commercial retails waste at shopping centres, the trends and the way waste is managed. The issues raised in this chapter highlight the importance of shopping centres environmental aspect of waste management, which is centred on recycling. It has also been shown that many shopping centres carry out some activities to reduce waste disposal to landfill, through cardboard recycling etc., but studies have found that by reducing waste at source much more could be achieved (Envirowise, 2002). Therefore

recovery of materials through recycling is indeed critical to ensure impacts of sustainable waste management from the sector can be fully understood. As far as shopping centres are concerned, it requires creative action and commitment by the centres management to maximise diversion of waste from landfill. Such efforts can enable a greater understanding of material use, utility consumption, waste generation, waste management procedures, waste disposal costs, greater control of what is happening and the associated costs involved. Pitt (2005) and Triantafyllou and Cherrett (2010) demonstrated that success depends on involving FM, shopping centre retailers/tenants, their distributors and suppliers, so that they can contribute directly to improving centralised opportunities for the re-use and recycling of waste produced by retail activities. In doing this, the aim is to achieve significant cost reductions and other benefits brought about by waste minimisation, while maintaining strategic levels of service.

On the whole, this chapter summarised the importance of shopping centres position in materials resource recovery and acknowledges the FM intervention at strategic level in shopping centres sustainability. Following on from this, Chapter Three attempts to identify the critical elements required to provide shopping centre recycling and how implementation success can be instigated by FM in shopping centres.

Chapter Three: Review of Shopping Centre Recycling Variables

3.1 Introduction

The aim of this chapter is to present a critical review of the existing body of knowledge on recycling variables, its critical success factors (CSFs), and how shopping centre organisations dealing with recycling programs. Given that the initial objective of the research is to establish critical success factors, this chapter conducts an extensive review of literature relating to the factors that influence shopping centre success in recycling.

The chapter will begin with a definition of the key terms that one must be familiar with in relation to management measures for recycling implementation success. This leads onto a discussion of the literature regarding current thoughts on the concept of critical success factors (CSFs). This will be followed by an introduction to the 17 factors influencing shopping centre recycling identified from the prior literature, with attention being drawn to the broadness and complexity of these factors. This will then lead to a detailed review of the identified constructs (recycling variables), and concludes with a conceptual framework for this research.

3.2 Concept of critical success factor (CSF) in shopping centres recycling

Research into shopping centre recycling is not yet well established, and implementation methodologies are still lacking but are developing with experience. Howard (1997) argues the most pressing needs for shopping centre research have changed from issues surrounding construction and development, to how the existing centres can be best managed. Little research has been carried out on the day-to-day organisation of the shopping centres and the FM operations within it. Thus, more empirical investigations

based on rigorous, thoughtful, and systematic research approaches need to be conducted to tackle the various aspects regarding this relatively vibrant phenomenon and its implementation. A broad range of factors influencing the success of shopping centre recycling is discussed in the literature (see Section 3.4). For example, much has been stated about recycling policy, awareness, waste separation, partnerships, and equipment technologies as important considerations for its accomplishment. A comprehensive set of CSFs will help shopping centre organisations to keep in mind the important issues that should be dealt with when designing and implementing recycling initiatives. So far, no integrated attempt exists on characterising a collective set of CSFs for shopping centre organisations to successfully implement recycling programs.

The relevance of CFSs in organisational objectives has been constructively discussed by many social scientists. The concept of “success factors” was first introduced by Daniel (1961) as normally several factors that determine action for success. CSFs can be defined as "areas in which results, if they are satisfactory, will ensure successful competitive performance for the organisation" (Rockart, 1979). Many researchers viewed them as those critical areas of managerial planning and action that must be practised in order to achieve effectiveness of organisational implementation (Boynton and Zmud 1984; Saraph *et al.* 1989; Kanji and Tambi 1999). Rockart (1979) explained CSFs are those limited number of areas in which results, if they are satisfactory, will ensure successful competitive performance for the organisation. They are the few key areas where things must go right for the business to flourish. If results in these areas are not adequate, the organisation's efforts for the period will be less than desired. It is these areas of activity that should receive constant and careful attention from management. The current status of performance in each area should be continually measured, and that information should be made available'.

For these reasons, CSFs are used by many organisations and social scientists to give focus on a number of factors that help define success and maintain high performance for

an organisation's current and future operating activities. CSFs are those actions that must be performed well in order for the goals or objectives established by an organisation to be met satisfactorily. Consequently, CSFs are those few key variables or activities that affect the manager in achieving his goals for his current or future areas of activity. These key variables can be used in the company's planning process, in helping to improve communication among the managers or as an aid in information system planning. CSFs are described as "being necessary and sufficient for success: each factor is necessary, and the set of factors are sufficient" (Williams and Ramaprasad, 1996). According to Williams and Ramaprasad (1996), an individual factor may be identified as critical because it is frequently associated or highly correlated with success. They represent those managerial areas that must be given special and continual attention to cause high performance.

The CSFs concept is also recognised in FM practice as Atkins and Brooks (2009) described the CSF concepts as the most vital for FM to the overall organisational objectives, mission and strategies. As FM is defined earlier in Section 2.7, Cooke-Davies (2002) also demonstrates the relevance of CSFs in facilities provision and planning, suggesting that it is a key element of successful projects in the planning, procurement and construction of new capital assets which can reduce time to market, increase return on investment, and reduce operating costs. Sometimes not all of these attributes may be present but instead some combination is likely. If the measurement of CSF success is possible then this helps contribute to the creation of additional corporate value: sustained long-term value-creation is the ultimate measure of organisational success. These perspectives clearly contextualise the CSFs concept in FM, and reinforce their importance in attaining organisational objectives from a facilities provision standpoint.

Technically, choosing appropriate techniques to determine the best CSFs is a key part of CSFs development. There are several methods and techniques for determining CSFs. Leidecker and Bruno (1984) proposed environment scanning, industry structure analysis,

opinions of experts in the industry, analysis of competitors, analysis of the industry's dominant firm, a specific assessment of the company, intuitive judgment of insiders and profit impact of market strategy data.

On the whole these definitions see CSFs as points, areas, or goals that have to be given extensive attention and support by the management to achieve the mission, quality and high performance. In terms of a shopping centre recycling program, they can be viewed as those activities and practices that should be addressed in order to ensure its successful implementation. These practices would either need to be nurtured if they already existed or be developed if appropriate activities were not in place. Consequently, awareness and understanding of such factors will help to avoid failures of recycling program in future implementation. As a result, organisations must take account of the CSFs in order to exploit recycling related advantages fully, as well as how people learn, how they implement, what they learn, and what makes them succeed.

Given the relevance of CSFs and their usefulness for organisations; in achieving their organisational strategy and objectives, it is clear and logical that they are applied to a large number of industries. One such field that may benefit from the application of the concept of CSFs is the recycling field. This is because recycling has a wide-ranging role and has no limits and for that reason, recycling goes from individuals to large communities; at the organisational specific level, the industry level, as well as the economic socio-political level. For these reasons, this research put forward the application of the critical success factors concept in order to effectively study recycling with regard to shopping centres in the UK.

3.3 'Success' and recycling program

Given the importance of the CSF concept, this gives confidence to the application of the CSF concept to the field of recycling research. To be able to review the critical success

factors identified in the literature independently, an analysis of 'success' in recycling implementation must be established in order to distinguish the significant value of measuring it.

To confront issues related to program success, Leitmann (1999) suggests the development of recycling measures needs to be focused on a set of management objectives. In this regard, we can only include the standard management measures of recycling implementation. This involves the series of activities by which discarded post-consumer materials are collected, sorted, processed, converted into raw materials, and used in the production of new products (DETR 1996; US EPA 1997). It is also imperative to note that selecting measures to respond to key significant factors is achieved through consideration of the rationales behind certain factors. Suttibak and Nitivattananon (2008) said that management measures must take into consideration the involvement of development partners, building solid waste management capacity related to waste recycling systems, improving recycling performance, and focusing on key significant influential factors. As a consequence, these management measures are expected to enhance the performance of an organisations recycling program. However, to date, no measures have incorporated into a comprehensive set of management measures in the shopping centre recycling domain.

The importance of understanding the necessary conditions for a successful recycling program is an issue that has been recognised in several recycling literatures (Folz and Hazlett 1991; Fuller 1994; Schultz *et al.* 1995; Suttibak and Nitivattananon 2008). Moreover, some have solely addressed recycling behaviour (Hamad *et al.* 1981; Hopper and Nielsen 1991; Gamba and Oskamp 1994; Heinen 1995; Schultz *et al.* 1995; Tonglet *et al.* 2004; Timlett and Williams 2008; Kelly *et al.* 2006; Kaplowitz *et al.* 2009; Hage *et al.* 2009; Mahmud and Osman 2010s), capturing both participant levels of recycling and the subsequent materials recovered. Other studies have focused on the importance of recycling success by exploiting appropriate facilities and technology (Gultinan and

Nwokoye 1975; Coolidge *et al.* 1993; Pohlen and Farris 1992; Guy 1998; Maran and Lee; Pitt 2005; Suttibak and Nitivattananon 2008; Baharum *et al.* 2010; Khoo 2010), capturing participant commitment that aims to ameliorate recycling programs. However, these literatures fail to arrive at a consensus for defining recycling success. This is because some measurement instruments differ in terms of their implicit and explicit assumptions regarding the components of the recycling factors. In addition, Wilson, (1996) implies, no single measure can achieve systematic waste reduction; therefore, an integrated set of management practices should be a combination of measures.

3.3.1 Performance measures for recycling implementation success

An attempt to establish a unified model of a measuring system is a challenging task as organisations will view their success depending on respective desired outcomes of their recycling program. Many studies reported performance measures for recycling success in terms of the degree of diversion and participation rates (Hamad *et al.* 1981; Hopper and Nielsen 1991; Folz and Hazlett 1991; Everett and Pierce 1992; Gamba and Oskamp 1994; Heinen 1995; Schultz *et al.* 1995; Jenkins *et al.* 2003; Tonglet *et al.* 2004; Timlett and Williams 2008; Kelly *et al.* 2006; Suttibak and Nitivattananon 2008; Kaplowitz *et al.* 2009; Hage *et al.* 2009; Mahmud and Osman 2010). As a consequence, the widespread use of these definitions over time has at least provided a consistent and comparable measurement method.

Besides the two measurement systems that are being widely used, Turner (1992) points out the primary goal of any established recycling program is a reduction in the net social cost of the overall waste management system. He described that the net social costs may be measured solely in economic terms or may include an evaluation of environmental values not easily measured monetarily. Benefits can include reductions in the total social costs associated with both primary material use and waste collection and disposal. Costs will include the total social cost of the recycling activity. The net social costs should be

evaluated over significant planning horizons. Hence, implementation of recycling programs will divert waste materials from currently operating less expensive disposal options, thus extending their life-span. Jacobs and Everett (1992) added, although short-term costs will add up if current disposal costs are lower than recycling costs, long-term costs may decrease due to the effect of pushing further into the future the date when expensive new disposal facilities are needed. Thereby, the implementation of recycling programs should take place only when a reduction in the net social cost of waste management, evaluated over a sufficiently long time period, is the result (Everett and Pierce, 1992).

In view of that, controlling the cost of managing solid waste is a dominant goal for most organisations. An important step in this process is to accurately determine cost data for the solid waste program and use that information to make sound decisions. One decision that faces many managers is how to improve the effectiveness of a recycling program. A few authors have argued that measuring program success through costs is becoming a serious management issue (Noehammer and Byer 1997; Folz 1999; Rondinelli and Vestage (2000). Folz (1999) says that recycling costs are likely to prove competitive compared to the costs of traditional solid waste collection and disposal, and are seldom used as a result of the current waste and recycling policies and practice. Despite the practical importance of intervention costs, no in-depth studies have successfully reported on cost performance between disposal and recycling. Dess and Robinson (1984) pointed out that managers may be reluctant to disclose actual performance data if they consider it commercially sensitive or confidential. Also, Dawes (1999) advocated performance measures such as profitability may not accurately indicate the underlying financial health of a company at present due to several reasons. Firstly, the level of investment made in certain activities might have longer term effects than in others; secondly, considerable variation in the extent to which companies track their expenditures may be present. In view of this issue, ascertaining the costs of recycling is a difficult but essential task for comparing success.

3.3.2 Self-reported measure of implementation success

On the substantive front, there is variation in the extent to which researchers incorporate different aspects of recycling activities when measuring program success. For example, some studies have focused on concern about organisational recycling performance (Folz and Halzett 1999; Suttibak and Nitivattananon 2008), while other studies have either aggregated items dealing with these various substantive issues into single proxy measures (Schlegelmilch *et al.* 1996; Hernandez *et al.*, 1999), or developed a number of measures, each covering specific issues. The latter approach would seem to provide a more comprehensive profile of measures. However, Van Liere and Dunlap (1981) criticised this approach on the basis that it is unclear whether these various substantive issues reflect equally the broader concept of concern with environmental quality.

Existing studies relating to managing recycling programs have been limited in terms of solving current recycling problems and the way overall recycling program success can be measured. Given the controversy and gaps that link recycling programs with the set of management objectives (Coolidge 1993), single analysis of each construct alone may not accurately predict actual success of a recycling program. Due to the variability inherent in measuring recycling program success, it is therefore more constructive to monitor a number of proxy variables to reflect the development of the existing program. Holistic measures of success corresponding with pertaining factors, maybe essential for organisations to understand the consequences of their overall recycling construct, and should be a part of any recycling program. Schultz *et al.* (1995) suggested that all the interventions designed by one organisation need to move beyond single-variable assessments of recycling to consider interactions with the environment in which the program is based, and the population within whom the interventions are managed. Despite the investment made, the success of such programs depends not only on involvement of people, but also on the technologies utilised in addition to the

development and maintenance of appropriate management measures. Hence, it may be necessary for recycling coordinators to treat recycling as a multifaceted pattern of initiatives. Based on the problem discussed in defining recycling success, the researcher believes that an integrated set of management measures to measure the overall success of recycling program implemented is imperative therefore must be taken into consideration.

After considering the complexities associated with the definition of success (as discussed above), for the purposes of this work, a self-reported measure of implementation success will be used to assess whether significant influential factors are perceived to have impact to shopping centre recycling success. Furthermore, there is support in the management literature for the use of *subjective* self-reported success measures (Dess and Robinson, 1984; Dawes 1999; Creswell and Plano Clark, 2007) and it is common practise in academic research (the detailed methodology adopted is discussed in Chapter 4). In this regard, the use of the 'implementation success' in this research is considered as a fair representation of shopping centre organisation perceptions of recycling success.

3.4 Shopping centre recycling factors

Shopping centre possesses a number of defining characteristics of its community, i.e. consumers, retailers and investors, as elaborated in Chapter 2, Section 2.4.1. Hence, it is of important to recognise the parties involves in centre recycling process. Instead of consumers, retailers and investors, in term of materials resource network, Fuller (1994) added a shopping centre represents a segment interconnected with suppliers, retailers and consumers' retailing operations. Thus, from marketing point of view, the entire supply chain that begins with production and ends in the waste or recycling of discarded materials essentially takes place in this business setting.

Compared with perhaps 30 years ago, modern recycling procedures have changed a great deal. There have been numerous attempts to conceptualise and operationalise the

construct of community recycling. Despite these changes, initial research on recycling offers a valuable insight to the relative effectiveness of recycling interventions from various recycling communities. In addition to a number of waste management and recycling literatures (as shown in Table 3.1), other studies have been conducted in a wide array of other disciplines, such as green marketing (Fuller 1994; Fuller *et al.* 1996), FM (Pitt 2005; Baharum *et al.* 2010) and business research (Parsons and Kriwoken 2009; DEFRA 2010b).

Table 3.1: Precedent studies on factors influencing recycling success

| Title of study | Source Year | Methodology | Recycling Factor(s) |
|---|------------------------------------|------------------------------------|--|
| Shopping Centre and the Environment: recycling strategies for the 1990's | Fuller (1994) | Interviews (11) | <ul style="list-style-type: none"> • Collection methods • Awareness • Voluntary • Source separation • Training |
| Trends in Shopping Centre Waste Management | Pitt (2005) | Interviews (28) | <ul style="list-style-type: none"> • Service provider contracts • Partnership • Monitoring and reporting • Alternative recovery methods |
| Who recycles and when? a review of personal and situational factors | Shultz <i>et al.</i> (1995) | Empirical review | <ul style="list-style-type: none"> • Collection methods • Source separation • Monetary incentives and rewards • Monitoring and reporting (feedback) • Pledge |
| Developing alternatives: energy, offices and the environment | Guy (1998) | Literature review | <ul style="list-style-type: none"> • Partnership |
| Waste Management and 'Take-Back' Processes in a Dedicated Shopping Centre | Triantafyllou and Cherrett (2010) | Case study and Questionnaires (92) | <ul style="list-style-type: none"> • Goal-setting policy • Collection methods • Awareness • Partnership |
| Effects of goal setting and commitment on increasing metal recycling | McCaul and Kopp (1982) | Questionnaires (120) | <ul style="list-style-type: none"> • Goal setting policy • Pledge |
| Assessment of factors influencing the performance of solid waste recycling programs | Suttibak and Nitivattananon (2008) | Interview and Questionnaires (120) | <ul style="list-style-type: none"> • Goal setting policy • Mandatory recycling • Partnership • Program champion • Training • Awareness • Proximity of recycling facilities • Environmental Management System |
| The determinants of recycling intention behavior among the Malaysian school students: an application of theory of planned behaviour | Mahmud and Osman (2010) | Questionnaires (400) | <ul style="list-style-type: none"> • Awareness |

| | | | |
|---|--|--|--|
| Sustainability in Municipal Solid Waste Management in Bamenda and Yaounde, Cameroon | Achankeng (2004) | Interview and Questionnaires | <ul style="list-style-type: none"> • Partnership |
| Multi-Stakeholder Partnerships for Sustainable Development: Rethinking Legitimacy | Backstrand (2006) | Literature review | <ul style="list-style-type: none"> • Partnership |
| Private sector participation in municipal solid waste service: Experiences in Latin America | Bartone, Leite, Triche and Schertenleib (1991) | Case studies (4) | <ul style="list-style-type: none"> • Partnership |
| Increasing recycling in academic buildings: a systematic replication | Ludwig <i>et al.</i> (1998) | Participant observations (2) | <ul style="list-style-type: none"> • Program champion • Proximity of recycling facilities |
| University community responses to on-campus resource recycling | Kelly <i>et al.</i> (2006) | Questionnaires (678) | <ul style="list-style-type: none"> • Awareness |
| Improving California's Beverage Container Recycling Rates: A Case for Structural Program Changes | Nelson (2002) | Case studies, Questionnaire (167) | <ul style="list-style-type: none"> • Monetary incentives and rewards • Proximity of recycling facilities • Collection methods |
| Garnering input for recycling communication strategies at a Big Ten University | Kaplowitz <i>et al.</i> (2008) | Interviews, Focus group, Questionnaires (3896) | <ul style="list-style-type: none"> • Awareness • Proximity of recycling facilities |
| Linking recycling behavior to waste management planning | Marans and Lee (1993) | Questionnaires (1788) | <ul style="list-style-type: none"> • Goal setting policy • Training • Monetary incentives and rewards |
| Reasons for non-participation in a kerbside recycling scheme | Mcdonald and Oates (2003) | Questionnaires (1690) | <ul style="list-style-type: none"> • Awareness |
| Recycling program design, management, and participation: a national survey of municipal experience. | Folz (1991) | Questionnaires (264) | <ul style="list-style-type: none"> • Goal setting policy • Program champion • Partnership • Awareness • Alternative recovery methods |
| Public Participation and Recycling Performance: Explaining Program Success | Folz and Hazlett (1991) | Questionnaires (264) | <ul style="list-style-type: none"> • Goal setting policy • Mandatory recycling • Contracts |
| Curbside recycling in the USA: Convenience and mandatory participation | Everett and Peirce (1993) | Questionnaires (357) | <ul style="list-style-type: none"> • Mandatory recycling • Monetary incentives and rewards • Training • Awareness • Collection methods • Proximity of recycling facilities |
| Public participation and recycling performance in England: A comparison of tools for behaviour change | Timmet and Williams (2008) | | <ul style="list-style-type: none"> • Goal setting policy • Monetary incentives • Reporting and monitoring - feedback |

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| A model recycling program for Alabama | Tilman and Sandhu (1998) | Case study | <ul style="list-style-type: none"> • Mandatory recycling • Awareness • Training |
| Defining the multi-dimensional aspects of household waste management: A study of reported behavior in Devon. | Barr, Gilg, and Ford (2005) | Questionnaires (1265) | <ul style="list-style-type: none"> • Awareness |
| Factors influencing the rate of recycling | Sidique, Joshi, V. and Lupi (2009) | Case study | <ul style="list-style-type: none"> • Mandatory recycling • Awareness • Training |
| Analyzing changes in waste reduction behaviour in a low-income urban community following a public outreach program | Margai (1997) | Focus group and survey data | <ul style="list-style-type: none"> • Awareness • Proximity of recycling facilities |
| Using the theory of planned behaviour to investigate the determinants of recycling behaviour | Tonglet, Phillips and Bates (2004) | Interviews and questionnaires | <ul style="list-style-type: none"> • Awareness |
| Maximising recycling participation to reduce waste to landfill: a study of small to medium-sized enterprises in Hobart, Tasmania, Australia. | Parsons and Kriwoken (2009) | Questionnaires (171) | <ul style="list-style-type: none"> • Program champion • Awareness • Collection methods • Proximity of recycling facilities |
| Reverse logistics in plastic recycling. | Pohlen, and Farris (1992) | Literature review and Interviews | <ul style="list-style-type: none"> • Partnerships • MRF |
| Waste separation at home: Are Japanese municipal curbside recycling policies efficient? | Matsumoto (2010) | Empirical analysis | <ul style="list-style-type: none"> • Partnerships • Source separation • Awareness • Collection methods • Incentives and rewards |
| Effect of design variables on participation in residential curbside recycling programs | Noehammer and Byer (1997) | Empirical analysis | <ul style="list-style-type: none"> • Goal setting policy • Mandatory recycling |
| A Guide to Waste Reduction at Shopping Centers | US Environmental Protection Agency (2004) | Case studies | <ul style="list-style-type: none"> • Goal setting policy • Training • Partnerships • Source separation • Service providers contracts • Recycling C&D waste during fit-out and refurbishment • Collection methods • Proximity of recycling facilities • Environmental Management System • Program champion • Monitoring and reporting (feedback) |
| What makes a recycler? A comparison of recyclers and non-recyclers | Vinig and Ebreo (1990) | Questionnaires (197) | <ul style="list-style-type: none"> • Awareness • Monetary incentives and rewards |
| Overcoming barriers to campus greening: a survey among higher educational institutions in London, UK | Dahle and Neumayer (2001) | Interviews (16) | <ul style="list-style-type: none"> • Awareness • Proximity of recycling facilities |
| Behaviour and Opinions Concerning a Mandatory Newspaper Recycling Programme: a Statistical Correlation Analysis | Mersky (1988) | Questionnaire (84015) 6 municipalities | <ul style="list-style-type: none"> • Mandatory recycling • Source separation |

| | | | |
|--|--|-------------------------------|--|
| Panacea common sense or just a label? The value of ISO 14001 environmental management systems | Rondinelli and Vestage (2000) | Case study | <ul style="list-style-type: none"> • Awareness • EMS |
| Design of recycling policy | Nestor (1994) | Empirical review | <ul style="list-style-type: none"> • Policy • Collection methods • Source separation |
| Recycling performance of firms before and after adoption of the ISO 14001 standard | Babakri, Bennett, Rao, and Franchetti (2004) | Questionnaires (177) | <ul style="list-style-type: none"> • EMS |
| The bottom line—how to build a business case for ISO 4001 | Parry (2000) | Interview and Case studies | <ul style="list-style-type: none"> • EMS |
| The ISO 14001 EMS implementation process and its implications: a case study of central Japan. | Mohammed (2000) | Questionnaires (106) | <ul style="list-style-type: none"> • EMS |
| Changing behavior with normative feedback interventions: A field experiment on curbside recycling | Schultz (1998). | Questionnaires (605) | <ul style="list-style-type: none"> • Awareness • Monitoring and reporting (feedback) |
| Effects of educational and feedback interventions on recycling knowledge, attitudes, beliefs and behavior | Goldenhar and Connell, (1992) | Questionnaires (1,619) | <ul style="list-style-type: none"> • Monitoring and reporting (feedback) • Training • Awareness |
| The impact of public feedback on three recycling-related behaviours in South Korea. | Kim, Oah, and Dickinson (2005) | ABA Design experiment | <ul style="list-style-type: none"> • Awareness • Monitoring and reporting (feedback) |
| The use of posted feedback to promote recycling | Katzev and Mishima, (1992) | ABA Design experiment | <ul style="list-style-type: none"> • Awareness • Monitoring and reporting (feedback) |
| Strategies for successful construction and demolition waste recycling operations. | Peng, Scorpio, and Kitbert (1997) | Literature review | <ul style="list-style-type: none"> • C&D waste recycling |
| Small and medium enterprises' solution to improve on-site waste management in office building retrofit projects. | Li, Yang, Jay and Li, Qiming (2010) | Empirical review | <ul style="list-style-type: none"> • C&D waste recycling |
| Greening Leases: the landlord tenant relationship as a driver for sustainability | Sayce, Smith, Sundberg, and Cowling (2009) | Interviews (26) | <ul style="list-style-type: none"> • Pledge - Green lease |
| Factors influencing community residents' participation in commingled curbside recycling programs. | Gamba and Oskamp (1994). | Questionnaires (458) | <ul style="list-style-type: none"> • Awareness |
| Increasing community recycling with persuasive communication and public commitment. | Burn and Oskamp (1986) | Participant Observation (210) | <ul style="list-style-type: none"> • Monitoring and reporting (feedback) • Pledge |
| Group commitment and resource conservation: two field experiments on promoting recycling | Wang and Katzev (1990) | ABA Design experiment | <ul style="list-style-type: none"> • Monetary incentives and rewards • Pledge • Monitoring and reporting (feedback) |

Indeed, there is no single, ideal design for such a recycling program and the characteristics and needs of the community should dictate the program's design (Noehammer and Byer, 1997; Williams and Kelly, 2003). Only one reported study has been made regarding shopping centre recycling. Fuller's (1994) work identified several interventions in recycling programs made when investigating of 11 shopping centres in the United States which included the policy measures, control of the recycling activity, the nature of contractual commitment, collection arrangements, and recycling promotion. However, to date, no reported study has assessed whether the relationship between these interventions have significant impact on shopping centre recycling success, and no attempt has been made to define success in response to shopping centre recycling.

Given the limited number of empirical works available regarding the sources of shopping centre recycling interventions, it is imperative to note that one must be cautious when utilising industry reports and generalising research findings from broad communities carried out 10 or more years ago, as to grasp the gap/missing elements that may affects future development of the focused area. Overall, results from the precedent works have revealed seventeen (17) factors that have significant influence to the success of shopping centre recycling programs. As a comprehensive set of management objectives, these factors are deliberately outlined, and are broken down into the 17 variables as follows.

- i. Goal-setting;
- ii. Making recycling mandatory;
- iii. Manage recycling program through partnerships;
- iv. Program champion from top management;
- v. Awareness-raising;
- vi. Training and re-training programs;
- vii. Prioritise source separation;
- viii. Proximity of recycling facilities;
- ix. Collection methods;

- x. Alternative recovery methods for residual waste;
- xi. Materials Recovery Facilities (MRF);
- xii. Green leases;
- xiii. Service provider(s) contract;
- xiv. Environmental Management System (EMS) certification;
- xv. Regular monitoring and reporting of recycling performance;
- xvi. Recycling C&D waste during fit-out works; and
- xvii. Monetary incentives

3.4.1 Goal-setting

The most powerful factor, in terms of actual participation in recycling programs is an established goal-setting policy for recycling. Essentially, goal-setting policy involves the specification of a set target of material to be recycled (Schultz *et al.* 1995). According to some studies policy has a positive impact on recycling programs (Folz and Hazlett 1991; Chilton, 1993; Nestor, 1994; Fullerton and Wu, 1998). Folz and Hazlett (1991) described that recycling success depends more on the policies chosen, how they are selected, and how they are implemented rather than on local community characteristics. Hence, it is not surprising that many organisations nowadays have an established environmental policy with goal setting as part of its recycling program. There are several reasons for having an environmentally friendly policy that takes account of legal requirements which the resource management act imposes for good environmental management practice. In addition, such a policy adds to the “environmentally responsible” image of a business and it can help attract consumers royalty in a very competitive market. Finally implementing such a policy can save money (Enz and Sigauw 1999; Goodman 2000; Schendler 2001).

Research into goal-setting policy for recycling has examined both general concerns for recycling and specific concerns regarding particular issues. This measure involves the

specification of a set target of material to be recycled. A study carried out by Heinen (1995) states that many environmental activities, including recycling, are most affected by policy setting that concerns financial costs and benefits to the individual. This is in agreement with Pieters (1991) who argues that to change consumers waste disposal patterns, financial incentives and legislation are vital components of any environmental policy.

Following Folz (1991) correlational study of community recycling programs, he found that cities which established a goal to recycle a specific portion of the waste stream reported significantly higher levels of citizen participation in municipal recycling programs than cities which did not establish a goal. Only two experimental studies have assessed the effect of goal-setting policy on academic institutional recycling. Both of these studies found significant effects in increasing volume of materials being recycled in special recycling programs at universities. (Hamad *et al.* 1981; McCaul and Kopp, 1982).

In general, goal-setting policy highlights clear recycling targets and guidelines which can be strongly reinforced by management. These are often an important step toward adopting more sustainable practices and form an important feature of every recycling community as part of their respective recycling strategies. In the UK for example, many shopping centres have implemented zero waste policy targets for recovery of materials under environmental policy (Meadowhall, 2006; St John 2010; Hammerson 2011a; Capital Shopping Centre; Landsecurities 2010). Clearly goal-setting policy plays a decisive role to increase participation rate. However, making goal salient and important to retail groups in shopping centre communities maybe more difficult task and require long term period of implementation.

3.4.2 Making recycling mandatory

Mandatory recycling policies are relatively new procedures in the UK which have not been tested yet and it may take some time before best practice becomes apparent. Section 46 of the Environmental Protection Act 1990 was set up to guarantee that local authorities carry out their waste collection duties, but not to enforce participation in recycling schemes. DEFRA (2007) emphasised that the introduction of a compulsory policy should not be perceived as an opportunity for an additional revenue stream, however the main aim should be to encourage the public to recycle and authorities could be successful by just using the threat of fining the non-recyclers if they do not participate in the recycling schemes.

Matsumoto (2010) highlights the drawback of mandatory recycling programs in Japan, whereby some residents do not perform their sorting duties and consequently dispose of mixed wastes which incurred high cost of waste treatment by the councils. However, it has been argued that (Everett and Peirce 1993; Mersky 1988; Tilman and Sandhu 1998) the increased effectiveness of mandatory recycling schemes can only be achieved if there is sufficient infrastructure in place to back-up the scheme. Changes need to occur in local governments, education systems, and the economy before a mandatory recycling program could realistically be implemented. This concurs with Suttibak and Nitivattananon (2008) research revealed the mandatory recycling as a key influential factor in recycling program perceived by school directors in Thailand. On the other hand, Folz and Hazlett (1991) reported a survey results of a 450 municipal recycling coordinators which indicated that mandatory recycling programs attained participation and diversion rates almost twice as high as their voluntary counterparts (74.3 % and 21.6 % versus 39.7 % and 12.2 %, respectively). This is in line with two other studies (Everett and Peirce, 1993; Noehammer and Byer, 1997) both works found that mandatory schemes achieve higher participation rates than voluntary schemes, though the provision of appropriate infrastructure and costs of enforcement are significant factors. They also stated that well-designed voluntary schemes can still achieve comparable results to mandatory ones. In a later study, Jenkins *et al.* (2003) however found no difference in the volume of

recyclables collected from mandatory and voluntary household recycling programs across 20 metropolitan statistical areas in the United States. They described making recycling mandatory has an insignificant effect on all five materials, i.e. glass bottles, plastic bottles, aluminium, newspaper, and yard waste.

In sum, these studies clearly indicate that mandatory recycling offers mainly short-term effectiveness, while voluntary recycling may continue to be the primary method of diverting waste from disposal. Nonetheless, it is difficult to generalise these findings into the shopping centre recycling community given the current lack of literature. One could ask the question of whether mandatory policy for recycling would have similar implications for shopping centre recycling, however the answer is not available in current literature and therefore requires further investigation.

3.4.3 Partnerships

Generally, any recycling program is only successful if people support and actively participate in it. Pohlen and Farris (1992) advocated the use of strategic alliances allowing industry to spread fixed expenses and risk across multiple partners. This approach can be developed through both internal and external partnerships to create opportunities for increased operational efficiencies; thus they could be used effectively to bridge industry and government efforts. The definition of partnership has evolved from a matter of simple coordination and coalition to more participatory terms such as mutual collaboration, common goals and shared responsibility (Haque, 2004). Pohlen and Farris (1992) point out that waste management and recycling partnerships between private industry, city, council, regional and the federal government would spread costs and risks across all partners, allow the pooling of expertise and the consolidation of volumes. Nkya (2004) indicates that managing recycling is considered to be flexible and dynamic holding the promise of possible compromise in the form of constructive collaboration.

Being partners, the relationships are more accessible to finance, knowledge of technologies, managerial efficiency and competitiveness (Heilman *et al.*, 1992).

- **Internal partnerships**

In regard to shopping centres their organisation can be seen as a number of internal partnerships embedded within a network of on-going business and non-business relationships, which both enable and constrain its operations and working environment. Internal partnerships between centre managers and tenants for implementing recycling programs are apparently critical, and perhaps the relationship which is most loaded with potential conflict. Cooperation refers to the way parties in a relationship are able to work together in such a program to achieve outcomes that benefit all. This can mean joint problem solving, the nurturing of innovations, and the ability to plan and coordinate tasks for the benefit of the relationship. Hakansson and Snehota (1995) indicate the ability to work towards constructive outcomes is one of the worthwhile benefits of being in a long-term relationship. This may be exhibited through involvement in meetings, consultations, and working together to introduce innovations. Management would be approachable and open to ideas from tenants. Likewise, tenants would also be more willing to try out different ideas suggested by management.

The development of internal partnerships is an important factor in overcoming potential conflicts in order to be able to work closely for the mutual benefit between parties. Guy (1998) advocated, "an active partnership...must be forged, a shift in social relations from adversaries to partners which recognises the mutual cultural and economic benefits of concern with the efficient use of resources in the built environment". Hence, successful implementation of a recycling program certainly requires high cooperation between parties, especially during the tenancy fit-out and waste collection procedures.

As the legislation imposes a 'Duty of Care' on shopping centre premises to make satisfactory arrangements for their waste management and places a 'Producer's Responsibility' on retailers based on the 'Polluter Pays' principle, this requires the set-up and management of recyclables take-back schemes. Taking back a consumer's product or package within the shopping centre premises certainly poses new marketing challenges and brings with it new opportunities. For example, this contributes to the volumes of waste requiring special handling by individual businesses or retailers from the shopping centre. Hitherto, Triantafyllou and Cherrett (2010) identifies that the take back approach is largely used in isolation by the various retailers and associated supply chains in a dedicated shopping centre. They advocated more collaborative approach is required by promoting retailers to adopt sustainable procurement codes through the adoption of customer "take back" scheme with suppliers for products and packaging, which may increase the collection of recyclables at shopping centres. This is in agreement with DEFRA, (2010) and Pitt (2005) as they believe that such liaison and partnership between with retail units and their suppliers would significantly help to reduce the amount of waste at source.

However, there is no empirical study which has reported on the effects of internal partnerships in regard to the shopping centre recycling program, but research into partnership in general between tenant and centre manager relations apparently exist. Perendergast *et al.* (1996) provide an explicit study into these relationships. They observed the tenants and centre manager's perceptions of performance on variables such as creativity, flexibility, promotions, professionalism, cooperation, friendliness, accessibility and trust. Fisher and Lentz (1990) demonstrate that there is essentially a partnership between the shopping centre owner, tenants, and the anchor stores, which seek to provide a profitable return to all parties. While all parties work towards this goal, nonetheless, it is the landlords' responsibility to enhance the business value, through the successful management of the tenant mix, leases, building maintenance and operations, and promotions (Fisher and Lentz, 1990). Roberts and Merrilees (2003) conducted a

survey on 15 shopping centres and also found similar results where cooperation does impact on centre management performance. Due to the lack of detailed studies into internal recycling partnership involved within the shopping centre community, it is difficult to generalise these findings. Investigation in this area is necessary to understand the degree of relationship between key parties involved in recycling program planning, control and decision making, and also the effects of their involvement.

- **External partnerships**

On the other hand, when shopping centre business is involved in waste management and recycling beyond its organisational level, or at industrial level, the government role is shifted from service provision to implementation of regulation. As in the private sector, the shopping centre must provide solid waste collection, transfer and disposal services. The service delivery is more efficient and at lower cost than the public sector (Cointreau – Levine, 1994). Cointreau – Levine (1994) described the essential conditions for successful private sector involvement including competitive bidding, technical and organisational capacity, regulatory instruments and monitoring and control systems. Also, with partnerships, public needs are combined with private capabilities and resources to create market opportunities. Bartone *et al.* (1991) and Rosenau (2000) argues that private sectors are better at performing economic tasks, innovating and replicating successful experiments, adapting to rapid change, abandoning unsuccessful or obsolete activities and performing complex or technical tasks. As consequences, partnerships have become the cooperative mechanism of choice for pooling capabilities and resources to address the waste management and recycling problem effectively.

Public Private Partnerships have emerged as a promising alternative to improve both commercial, industrial and municipal waste management and recycling service delivery. Steets (2004) distinguished the Public Private Partnerships as voluntary cooperative arrangements between actors from the public, business, and civil society that display a

minimal degree of institutionalisation to address public policy issues. Both Achankeng (2004) and Backstrand (2006) recognised the Public Private Partnerships as new mode of governance opposed to the traditional hierarchical top down management approach whereby government authorities monopolise waste management, ignoring other stakeholders, using command and rule strategies and ill-adapted imported technology. The approach allows learning, bargaining, arguing and provide positive incentives (Rosenau 2000).

Cointreau – Levine (1994) described that one of the forms of Public Private Partnerships in solid waste management can be identified to be through concession. Concession is a form of partnership whereby the government awards an agreement or license to a private firm to set up a facility that utilises the government owned refuse resource. This concession may enable the private companies to recycle materials (paper, plastic, metal, glass) from refuse to recover resources (compost, heat, electricity) from residual waste, or to transfer or dispose of such residuals. The concession is in the form of a long-term contractual agreement, whereby the private firm builds the facility. Once the company signs the agreement, is forced by law to complete this obligation.

It was argued that this type of partnership gives an opportunity mainly for monopoly positions (EGSSAA, 2006). In some cases, the private firm may maintain indefinitely the ownership and operation of the facility. In other cases, the private firm may transfer ownership of the facility to the government after a specified period of private ownership and operation. Concession systems consist of building, owning, operating and transferring practices. For this reason they are known as BOOT (Build, Own, Operate and Transfer). Henstock, (1983) identified the main conditions required for successful concession implementation in the recycling sector to be the availability of specialised recovery technology, adequate conditions of product disposal, effective collection systems, capabilities of consuming industry and design of the object providing the scrap source. For instance, Meadowhall shopping centre in UK has jointly invested at regional

level to procure its material recycling facility (MRF) to process recyclables materials thus mitigate the landfill cost (Meadowhall Shopping Centre 2006).

Other examples of such partnerships have been reported (US EPA, 2004) between Lakeforest Mall, Maryland and council recycling officials in the United States. When the council officials enforced mandatory recycling for all businesses, the management at Lakeforest worked closely with the county to develop a model recycling program for its 164 tenants to meet their recycling obligations, but it also The close partnerships between mall management and county recycling officials has saved the centre management costs in solid waste disposal fees, and has been key to the shopping centre success. The council has provided recycling bins for tenants and educated tenants about recycling regulations. The centre manager also personally visits tenants and writes periodic memos to remind them of their responsibilities and educates them about the mall's recycling procedures.

Overall, these types of partnerships are crucial to understand about the behaviour involved in terms of the resources consumed, the amount of waste disposed of, and how the efforts to recycle can help to develop a long-term strategy (i.e. by integrating environmental considerations into day-to-day operations). The challenge for shopping centres is to develop a networking ability that enables them to connect their resources to those of other actors. In order to achieve success in their recycling programm, they must find ways to enhance cooperative behaviour between both internal and external parties.

3.4.4 Program champion from top management level

As is true of performance management for any environmental strategies must be conceived and supported by top management, but deployed in every functional area of an organisation to be meaningful (Walton *et al.* 1998). Concur with what has been discussed in Section 2.7.1, to link FM waste management operation at strategic business level; facilities managers need recycling buy-in from the top management level to warrant

success of recycling programs. Handfield *et al.* (1997) research proved how cross-functional “buy-in” is necessary to integrate environmental strategies within supply chain management. The importance of a program champion to start initiatives, and raise the organisational expectations is essential. Several authors have highlighted the significance of top management commitment for successful environmental management (Quazi, 1999; Kitazawa and Sarkis, 2000; Strachan *et al.*, 2003; Wee and Quazi, 2005) mainly in waste reduction and recycling schemes (Folz, 1991 ; Maran and Lee, 1993; Enz and Siguaw 1999; Vicente and Reis, 2007; Parsons and Kriwoken 2009). Strachan (1997) argued that the systems of management for a companies environmental program, i.e., recommended by BS7750, EMAS and ISO 14001, must be revised and stress on mechanistic solutions should be replaced with more participatory forms of management. Mallak and Kurstedt (1996) demonstrate that when companies shift to more open forms of participative management, they begin the process of empowering their employees.

In essence cultural change is necessary to support the successful implementation of environmental source reduction (Kitazawa and Sarkis, 2000). Top management’s commitment could essentially help recycling implementation because it allows commitment of resources such as time, money and staff (Hersey, 1998; Zutshi and Sohal, 2004). Without the accessibility of adequate resources organisations may experience delays in implementation of waste reduction and recycling schemes. Furthermore, adequate resources are essential because they convey to every level of an organisation that management is committed to the success of implementing such initiatives (Daily *et al.*, 2007; Kirkland and Thompson, 1999). For companies, Parsons and Kriwoken (2009) noted that at corporate level, encouragement of the head offices to introduce positive waste management and recycling policies at the every level of an organisation could greatly improve levels of recycling participation.

The ability of a recycling coordinator to take the lead of position and serve as program champion for recycling has been highlighted. To date, only one none-experimental study

(Enz and Siguaw 1999) revealed the implementation of a program champion has yielded positive recycling outcomes on four commercial hotels in the US. They also found special positions were created to administer their environmental programs, by establishing a special committee or task force of employees involved in waste reduction and the recycling program. Fundamentally the task is to gain support and enthusiasm of senior management and communicate with all recycling participants at every level of organisation. Several scholars described the roles as including development of recycling policy, procurement, and provision of recycling facilities; availability of promotional material; feedback of recycling performance, and liaison with suppliers and waste contractors (Fuller 1994; Shultz *et al.* 1995; Envirowise 2002a, 2002b; Pitt 2005).

Despite earlier observation, one shopping centre reported (Queensgate Shopping Centre, 2010) a positive contribution of 10% increase in recycling rates with a 20% decrease in waste to landfill impacting from the creation of a program champion. This highlights the significant contribution of a program champion in commercial organisations to achieve higher recycling rates. However, further empirical work is essential in order to gauge the wide scale impact of appointing a program champion to assist in managing recycling initiatives.

3.4.5 Awareness-raising

Normally, the more information a person has about which materials are recyclable, or where recyclables are collected, the more likely that person is to recycle (Schultz *et al.*, 1995). The main reason behind the implementation of awareness-raising, however, is about the lack of recycling commitment, or apathy, and can sometimes act as a potential barrier that prevents everyone from taking part in a recycling program. In regard to the FM point of view, Featherstone and Baldry (2000) demonstrated that a lack of formal awareness of one organisational mission is a significant contributing factor towards a lack of co-ordination of different work functions within that organisation. This inevitably

leads to alienation of support facilities functions and the fulfilment of a secondary and purely reactive role.

Awareness is one of the critical aspects of many recycling schemes which inform participants about what is expected of them in recycling. We usually see municipalities' role in awareness-raising to public recycling and businesses can often use awareness-raising approaches as a positive influence to marketing. Awareness-raising initiatives are generally used convey information to associated parties (i.e. employees, suppliers, customers) about a recycling program. Included within this may be aspects such as people's behaviour and the severity of the problem at hand in order to encourage participation. Kaplowitz *et al.* (2009) recommend that effective publicity and promotion about recycling program characteristics should accompany implementation of any recycling scheme. Informing participants about what they should do as well as the value and benefits of recycling has been generally accepted as critical to sustaining recycling program participation (Folz, 1999, Dahle and Neumayer, 2001; Barr *et al.* 2005).

Waste Watch (2005) noted the most successful schemes were well designed and tailored to the location. According to one study, even when residential flats are provided with recycling services, participation has been found to be low (less than 50 % self-reported participation rate) (SNU, 2006). As result, WasteWatch (2005) described that better recycling performance in flats is more likely to occur when occupants are engaged with appropriate knowledge and have a good communication with housing management. The communication mode varies, however it may include newsletters, television advertisements, stickers on bins, radio commercials/public service announcements and personal contacts. Some of these modes have been employed in institutional settings such as a university campus. Dahle and Neumayer (2001) reported that one of the most important measures that needs to be taken into account is raising environmental awareness within campus communities. They highlighted two universities in the United Kingdom, i.e. Liverpool John Moores and the University of Bath, developed a guidance

booklet and website conveying information about environmental gains and areas that need improvement to the institution, with lay emphasis on disposal routes for waste materials and waste classifications for recycling purposes. In shopping centre sectors, Fuller (1994) found some promotional tie-ins with recycling campaigns limited to occasional events (such as during the Earth Hour, World Forestry Day, World Environment Day, Clean-up the World Weekend, and Recycling Week, etc.)

To date, much groundwork has already been done on raising participants awareness of recycling from various sectors. It has been noted that campaigns that emphasise the value and benefits of recycling and which explain specific program features should facilitate people participation (Folz 1991; Marans and Lee 1993; Timlet and Williams 2009). Three reported studies found similar results, first, Byrd, *et al.* (1989) identified that over one-fifth of respondents did not recycle because they did not know how or where to participate; conversely, over 60 % participated because they thought that recycling would protect the environment. Second, Parsons and Kriwoken (2009) founds the greatest barriers in recycling were due to the lack of information on recycling services among the participation of small medium enterprise (SME) communities in the UK. Third, at a South Korean university, Kim *et al.* (2005) reported that posting information on recycling receptacles about the percentage of materials correctly separated and weight of materials collected at recycling stations increased the percentage and number of correctly separated aluminium cans and paper.

The limitation of previous awareness campaigns has been highlighted (Tabanico and Schultz 2007) as tending to focus on the high percentage of people who do the wrong thing and very little percentage on those who recycle 'correctly'. As result of this, Tabanico and Schultz (2007) considered that awareness campaigns not only fail to motivate the desired recycling behaviour, but they can produce boomerang effects and work in this opposite way.

There has been little support for increased provision of general information about recycling per se. Inadequate understanding regarding effective participation has been argued in other studies. According to Kelly *et al.* (2006), a lack of scheme-specific information was inhibiting people from recycling more. Their survey responses indicated that recycling could be improved by providing information on the fate of recyclables following collection. Ideally, measures of the content and quality of specific awareness strategies would be most beneficial for purposes of replication by communities. In essence, Lyas *et al.* (2005) noted a bespoke promotional campaign is essential to address specific problem areas of recycling. A more informative leaflet, providing a schematic of the recycling process, appeared to improve recycling activity.

A few studies on recycling awareness campaigns provide suggestions on the format and content of such campaigns to make them effective (Warner *et al.*, 2002). For example, Iyer and Kashyap (2007) suggest the success of awareness campaigns not only depends on their content and format but also on their frequency and mode of communication (i.e. media used to convey information). They also described despite the varieties of media have been used, too often, the selected media have been chosen based on project budgets and preferences of program implementers instead of efficacy or the preferences of the target populations. According to Maran and Lee (1994) suggests that providing people with procedural information about environmentally appropriate behaviour may be more effective in encouraging behaviour than offering monetary rewards. Establishing information-rich recycling programs within an office setting enables a positive contribution to facilitate active recycling. For example, an organisation's commitment to recycling can be demonstrated, in part, by specifying conveniently located recycling stations when planning and designing office facilities.

Understanding recycling program stakeholders' preferences and the perceived effectiveness of potential publicity media should enable program implementers to design and tailor educational programming to be successful. Indeed, previous studies revealed

that awareness-raising in recycling campaigns exists to enhance behaviour in a permanent way by improving environmental culture and awareness. Such an awareness should set a leadership example and established a renewed commitment to take the role as a socially responsible community to the next level.

3.4.6 Training program

In the area of environmental education, training programs can be implemented to not only challenge pre-existing negative environmental attitudes but to encourage individual and organisational recycling. Educational efforts will lead to an increase in knowledge. Increasing knowledge will cause a change in behaviour (Vining and Ebreo 1990; Oskamp *et al.* 1991; Schultz 1995). Oskamp *et al.* (1991) noted that recycling behaviours may be less related to knowledge about global environmental issues than to knowledge about the specifics of recycling. Indeed, knowledge about the recycling program has found to correlate with recycling. Previous researchers report the vital role of training efforts in influencing knowledge about recycling, recycling attitudes, and recycling behaviour (De Yound 1989; Bagozzi and Dabholkar 1994; Mason *et al.* 2004; Iyer and Kashyap, 2007).

Appropriate training has been investigated as a possible predictor of recycling behaviour. Research findings on training are less uniform but suggest the possible existence of a relationship between greater training and recycling rates. De Young (1989) advocates that recycling education via training programs should communicate time and space needs for recycling, inform people about where to go for assistance, and explain what materials can be recycled as well as how they should be prepared. According to another study, Mason *et al.* (2004) suggest improved and on-going education and training is required in order to achieve a high standard of source separation performance. A cross contamination analysis from their investigation showed that the recycling rate could be increased to 88 % (w/w) for the kitchen/cafeteria residuals stream and to 84 % (w/w) in the concourse area, by improved source separation performance.

Bagozzi and Dabholkar (1994) results reveal that past recycling behaviour has twice the influence of attitudes on intentions to recycle. They point out that participants must possess knowledge of recycling to participate in the recycling process; past recycling behaviours provide the ability to predict future recycling behaviours. Suttibak and Nitivattananon (2008) investigated recycling performance among the municipalities in Thailand and also found that training is necessary for professional and managerial staff in a range of areas such as the use of specialised equipment, operation and maintenance, and monitoring and evaluation.

Fuller (1994) described the poor levels of cooperation and control of recycling-collection programs using voluntary approaches as being due to constant turnover of lower level employees and store managers in the shopping centre setting. In the long term, he identified that continuous training program implementation by the shopping centre managers was necessary to overcome the problem. Already a few shopping centres in UK (St Nicholas 2004; Queensgate 2010) have claimed that the delivery of accredited waste management training to retail staff has contributed to significant improvements in recycling rates.

Further investigation on the significance of training implementation is required. As it stands, the design and tailoring of recycling promotion through training especially in the shopping centre setting remains largely understudied.

3.4.7 Prioritise source separation

Separating or sorting waste has made recycling very labour intensive and cost inefficient (Pohlen and Farris, 1992). The task poses one of the greatest obstacles to achieving an efficient logistics program for recycling, as end users insist on a quality recyclable product without contaminations. Pohlen and Farris (1992) suggest that intermediate

processors will reject an entire truckload if inspection detects a mixed load. For old corrugated cardboard (OCC), US EPA (2004) also reckoned that recycled paper mills will only accept clean, dry cardboard, but they will reject a bale that has been contaminated with a large amount of other material, such as food waste. Hence, the key is to keep recyclables separate from other refuse to avoid contamination while maintaining the quality of recyclables collected. For wastes that cannot be easily sorted and recycled, one must consider whether alternative products could be used that are more easily recycled.

As a result, encouraging recycling participants to separate wastes into dedicated recyclable bins is the basic and, and perhaps the most cost effective way possible in many recycling programs. A recent study by Matsumoto (2010) indicates that Japanese municipalities have increased the frequency of recyclables collection after adopting comprehensive waste separation programs. He expects frequent recyclable collection is necessary although it raises the operational costs to municipalities. Without it, households do not segregate their wastes for recycling and will dispose of co-mingled wastes. As a result of this, municipalities have increased waste separation and separated into more than ten materials (Matsumoto 2011). In Germany, the *Grüner Punkt* or 'green dot' recycling scheme provides participants with up to seven recycling bins to separate different types of recyclables (German Federal Law Gazette, 2009).

Schultz *et al.* (1995) described that as participants begin to recycle more types of materials, they may find themselves separating those materials into numerous bins. A previous study by Thogerson (1994) put forward that local authorities must work on the need to provide collection systems that build on recyclers positive behaviour to sorting their recyclables, recognising that even well-motivated recyclers can perform badly due to force of habit or lack of appropriate knowledge. When the goal is to change non-recyclers behavior, the management of physical conditions and the management of information are equally important.

Despite the voluntary separation, other ways which require less participants effort is to implement co-mingled recycling, i.e. a single waste stream, in which wastes are mixed together in single collection bins, instead of being sorted into separate commodities. In a single stream, both the collection and processing systems are designed to handle this fully co-mingled mixture of recyclables, with mixed materials being separated for reuse at a materials recovery facility (Gultinan and Nwokoye 1975; Schultz *et al.* 1995). There were two studies which examined the participant rates between the voluntary and co-mingled recycling. The first study revealed the co-mingled recycling perceived higher participation rates compared to voluntary recycling (Gamba and Oskamp 1994). On the other hand, Folz (1991) correlational study examined 264 recycling coordinators from US municipal authorities and concluded that requiring separation does not significantly decrease participation in recycling programs, as there was no difference in estimated average participation rates for both approaches.

For commercial organisations such as shopping centres, convenience and simplicity are key factors considered by producers when deciding on the type of waste collection system. Indeed, recycling needs to be as simple as possible, and a two-stream system, mixed dry recyclables and residual waste is often optimal according to some studies (Folz, 1991; Gamba and Oskamp 1994). Only when a significant proportion of the waste is a single material (paper, glass, food, etc) will a co-mingled collection be appropriate and cost effective. Although the importance of waste separation in municipalities sector has been advocated by many authors, it can be argued that the scope of waste separation from commercial sectors are lacking. This also makes generalisation of these findings questionable from the shopping centre recycling point of view.

3.4.8 Proximity of recycling facilities

Making recycling participation more convenient would help to reduce personal cost, and thus should increase participation. Convenience is cited as an important factor related to participation (Glen 1989; Hageman 1989). Conversely, perceived inconvenience is cited as an important reason for not recycling (Vining and Ebreo 1990; De young 1989;1990). Coolidge *et al.* (1993) also noted that incorporation of appropriate recycling equipment and programmes are essential to expanding recycling services in a difficult area. Thus the provision of recycling equipment may improve the quality and capture of materials collected for recycling is a priority of any recycling schemes. The best predictors of high participation rate are structural variables such as accessibility and ease of use. Much research has been carried out which suggests that providing recycling facilities for segregation and storage increase convenience, and provides a visual reminder to recycle (Hageman 1989; Allen *et al.* 1989). Inconvenience was reported as a major influence on college student recycling behaviour by McCarty and Shrum (1994), who further commented that such concerns appeared to outweigh attitudes about the long-term importance of recycling behaviours. Williams (1991) reported that a lack of storage space was cited as the main reason for not recycling in a university campus. Proximity of recycling containers (Luyben *et al.*, 1979), has been found to be positively correlated with student recycling behaviour.

Another empirical investigation reported by the Scottish Institute of Sustainable Technology (2006) noted that one third of all households in Scotland are in multi-occupancy properties, which face particular difficulties in the storage and collection of recyclables. The Government recognised that the challenge for local authorities is to implement viable recycling schemes for these properties in a cost-effective manner. Besides that, several reasons for not participating in recycling were also highlighted in four other investigations. Vining and Ebreo (1990) found that non-recyclers reported more concern with the inconvenience of recycling than active recyclers. Gamba and Oskamp (1994) found that frequent recyclers were more likely than non-frequent recyclers to endorse personal inconveniences such as 'no space' for my recycling bin.

Steel (1996) described those people near to recycling centres or curb side recycling services as much more likely to recycle than those without such services available or nearby. Hage *et al.* (2009) also found that moral motives influence recycling rates. They describe convenience matters in the sense that property-close collection in multi-family dwelling houses leads to higher collection rates. The strength of moral norms explained a large part of variation between households, but the importance of these norms in driving recycling efforts diminished if improved collection infrastructure made recycling easier. Knussen *et al.* (2004) also found people will not recycle if it is difficult to dispose of items, even if they feel that they have the ability to do so. Further, Kelly *et al.* (2006) indicated that recycling could be improved by (1), providing information on the fate of recyclables following collection, and more widely practised by (2), making it more convenient, mainly with the introduction of more bins in strategic areas.

In addition, Marans and Lee (1993) explore relationships between the physical context or arrangement of offices and the recycling practices of the workers who occupy them. They found there are modest but significant relationships between the workers' responses to the two items and the frequency with which they recycle. Workers classified as frequent recyclers were more likely than infrequent recyclers to say the arrangement of their office supported their recycling. Similarly, frequent recyclers were more likely to report that recycling at their work was convenient than those classified as infrequent recyclers. From their investigation, Marans and Lee (1993) imply employees can be encouraged to recycle waste materials through the establishment of 'company-sponsored' programs, and recycling can also be facilitated through the design and management of the physical setting. i.e., the physical environment and the way it is organised and managed can encourage or impede the recycling of waste products. At the same time, the manner in which recycled products are collected and stored can affect the appearance and functioning of individual workstations and the overall office setting. As result, facility managers can work closely with architects, office designers, and furniture designers to

create the appropriate physical context that enables workers to easily engage in recycling practices.

Kelly *et al.* (2006) indicate that in the long term, failure to facilitate recycling at this stage is likely to be environmentally damaging; one way of dealing with a cognitive inconsistency (the failure to behave in accord with beliefs and attitudes) is to downplay the importance of the action. The result may be a population with little motivation to recycle in the future. Iyer and Kashyap's (2007) study suggests the lack of access to recycling facilities was cited as a key inhibitor to participation in the early days of recycling, which is generally not the case anymore.

Some empirical studies in municipal recycling, noted the availability of storage space to be an important factor as it allows participants convenience (Derksen and Gartrell 1993; Jakus *et al.* 1997). Jenkins *et al.* (2003) employed ordered logic models to explain the recycling frequency of five types of recyclables materials and determined that access to curb side recycling had an overall positive effect on the amount recycle with respect to all five materials, though not to the same extent.

Clearly most studies recommend the provision of adequate recycling bins at convenient locations on the premise of helping to increase the convenience of recycling, providing more recycling opportunities with the assistance of appropriate recycling information (McCarty and Shrum, 1994; Ludwig *et al.*, 1998; Williams and Kelly, 2003). This is in line with Kaplowitz *et al.* (2009) findings which indicate that knowledge alone is insufficient to promote recycling without the necessary logistics.

3.4.9 Materials collection methods

Shopping centres have the potential to arrange on-site sorting if materials are not collected fully co-mingled. Fuller (1994) identified two collection methods which usually

involve a combination of centre and tenant employees; sometimes the tenants were required to breakdown their wastes. At this point they could either take them to a centralised collection point, or make them available for a door-to door collection. The materials are bulked up using balers and compactors, or hauled to processors or users and passed from centre control. Collections of residual waste such as waste food and cooking oil, however, can be treated and recycled either on-site or off-site to turn waste into renewable energy or compost. In this regard, food waste is usually sent to anaerobic digestion or composting units (EFR 2010), while waste cooking oil can be treated at a bio-diesel plant (Stanely 2009).

Triantafyllou and Cherrett (2010) conducted a case study on the WestQuays shopping centre and identified the centre frequency of collection varied by waste type and type of business with clinical waste, used cooking oil and WEEE typically collected on fixed weekly visits, while fluorescent lighting tubes and batteries were collected by request and often, only a few times a year. They described, through coordinating the collection across retailers, *the centre* has improved its recycling rates, with a significant increase in the mean waste tonnage being diverted from landfill within two years. Despite the effort, collection methods highly depend on their suitability to the locational characteristics. Parson and Kriwoken (2011) suggest that inadequate storage space and containers were acknowledged as a particularly barrier in the business and administration, hospitality and personal services sectors. Inadequate storage facilities for those shopping centres in the UK built before 1970's hinder efficient waste management initiatives, as reported by Pitt (2005). It can be argued that such constraints may be overcome by the proactive establishment of collection methods for convenience in recycling participation.

Further, collection frequency and day of collection also relate to participants convenience in recycling (Schultz *et al.* 1995). As recyclables are collected more frequently, convenience maybe increased because materials are stored by recyclers for less time - recyclers have more opportunity to recycle - and if one pick-up day is missed the wait for

the next is shorter and the extra build-up of materials less. Material recovery has been noted to increase with collection frequency according to some studies (Foran 1987; Spurr 1988; Mersky 1988; Proemba and Vick 1990). Collecting recyclables on the same day that they are put out for collection also makes it much easier for recyclers (Foran 1987). In terms of collection frequency, the procedure is directly related to program cost (Stevens 1988). Both collection frequency and day consideration are equally important in coordinating recycling schedules.

The schedule of recyclables collection may also affect recycling participation, and two studies have experimentally assessed the effects. Everett and Peirce (1993) highlight a small positive effect on householder recycling rates when the collection frequency is increased, which is because the householder has an increased opportunity to recycle material that would otherwise have been discarded due to a lack of storage space. Another study, Folz (1991), found that cities with same day recyclables collection and other refuse did not report higher participation rates in recycling programs compared to cities with different collection day schedules.

In regard to cost incurred, two studies (Tucker and Fletcher, 2000; Woodard *et al.*, 2001) found that reducing the collection frequency can reduce costs without necessarily having a huge impact upon recovery of recyclables. Furthermore, Thomas (2001) indicated that reducing the range of recyclables collected can not only lead to greatly reduced costs but also a slight increase in recovery; conversely, an increase in the range can produce lower diversion due to the increased complexity of the scheme to the participants.

The lack of investigation in the previous study to assess the effects of collection method arrangements with respect to shopping centres means that more work is needed to generalise this factor.

3.4.10 Alternative recovery methods for residual waste

Recovering energy from waste which cannot sensibly be recycled remains a sound environmental objective. Indeed, the issues regarding food waste are astounding. It is estimated that in the UK approximately 18 – 20 million tonnes of food waste are generated each year from various sectors (DEFRA 2010a). DEFRA (2010a) argued that wasting food and drink contributes to climate change both through the unnecessary emissions from supplying the food and the methane released when it decomposes in landfill. To help out the UK *Food 2030* strategy, DEFRA (2010a) suggests anaerobic digestion technology has significant carbon and energy benefits over other options for managing food waste if separately collected. Already, many other European countries have shown that a vigorous energy from waste policy is compatible with high recycling rates (DEFRA 2007b). In the late 20th century, both OCED (1994) and DEFRA (2007b) reported alternative methods of waste disposal to landfill have begun to gain acceptance; for instance incineration, anaerobic digestion, composting and bio-fuel are among others that have begun to establish themselves in the market. DEFRA (2007b) research shows that recovering energy from residual waste, including by incineration, is a much better options than paying the cost for landfill. Pitt's (2005) investigation highlighted the concerns on the increasing waste disposal costs which are expressed by centre managers, but what may be lacking is an innovative and proactive response to their waste procurement strategy. To help out the shopping centre to meets recycling goals; centre managers need to assess the appropriate disposal and recovery strategies available. From this perspective, centre managers could consider by reconciling residual waste to energy with recycling by diverting residual waste components including food waste, waste cooking oil and landscape waste, to a dedicated recovery facility, therefore potentially realising lower recycling costs.

- **Anaerobic digestion**

Anaerobic digestion combined with composting is amongst other alternative methods to send organic waste, such as food and garden waste to landfill. In order to achieve this, such waste is diverted to an anaerobic digestion (AD) plant for recovery treatment to produce electricity for local needs. In the case of shopping centres, often food waste from catering premises represents a large quantity of the total waste output which could meet the necessary volumes to install a micro-anaerobic digestion facility on-site. By doing so, 100 % of the organic waste produced could be fed into this process which is then used to generate electricity to power the premises. Tilche and Malaspina (1998) consider anaerobic digestion as a biological treatment that is frequently the most cost-effective due to the high energy recovery linked to the process and its limited environmental impact. Further, an additional step in the process converts the residues from the anaerobic digester, or digestate material, into bio-compost Khoo *et al.* (2010). By this means, the waste is composted or anaerobically digested. This reduces the volume of waste and makes it biologically inactive so it can be landfilled without releasing methane (Khoo *et al.*, 2010). To date, a few centres and large supermarkets in the UK have already trialled this alternative to disposal to recycle food waste thus helping them to produce electricity (LetsRecycle, 2009; Castlepoint Shopping Centre, 2010).

Additionally, the most common method of bio-composting, i.e. without the integration of anaerobic digestion to produce energy, is a process which involves the use of microorganisms to break down the residues in the presence of oxygen, thus avoiding the production of methane (Tilche and Malaspina, 1998). Schleiss *et al.* (2008) describe that bio-compost material can be used as a replacement for mineral fertilizers. From the compost products, carbon dioxide savings can be achieved by the avoided production of the mineral fertilizers. *The Meadows Chelmsford* (Land Lease, 2007), *the Quays Newry* (Quays, 2008) and *the Centre:MK Milton Keynes* (theCentre:MK, 2010) are amongst the few shopping centres in UK to exploit on-site composting equipment to handle large amounts of food waste from the centres and turn it into compost within 6 to 8 weeks to be used for the landscaping of the site.

- **Biodiesel**

Biodiesel is one of the renewable alternatives energies that has been getting a lot of attention in the recent years, which exhibits similar properties as petroleum-derived diesel (Yee *et al.*, 2009). Biodiesel is a clean-burning alternative to petroleum diesel made from domestic, renewable resources such as vegetable oils, recycled cooking oil and animal fats. In this regard, proper recovery of waste cooking oil produced from shopping centre catering premises must be managed appropriately as it cannot be poured down drains or sewers due to blockages, odours or vermin. It is estimated that in the UK, more than 10,000 tonnes of used cooking oil are produced every week and there are approximately 200,000 sewer blockages and pollution incidents throughout England and Wales every year, 75% of which are directly related to deposits caused by fat, oils and grease (Water.org, 2009). Water UK supports recycling as it ensures that waste oil stays out of the drainage system. Also, the 'Animal By-Products Regulation – Guidance on Cooking Oil (2002/2774/EC)' requires that proper storage and collection must be made by authorised waste contractors for recovery or disposal. Thereby, to reduce dependency upon landfill sites, the collected waste oil will either be used for bio-diesel for transport fuel or for incineration for the generation of electricity. To date, two shopping centres in the UK for instance, *Liverpool One* and *theCentre:MK* already collect waste cooking oil from several of its restaurants and recycle it into clean bio-diesel for local transportation (Shopping Centre, 2010).

- **Incinerators**

Waste incinerators can only be utilised in restricted circumstances for recovery operations; if there exists no other sustainable recovery option available for shopping centres management to acquire this method of waste disposal. Johnke (2001) agreed this factor has a decisive influence on the calculated amounts of climate-relevant emissions

from waste incineration plants where energy utilisation is the credit allowed or allowable due to the substitution of energy from fossil fuels. Santoleri (1989) also argues that the concept of generating energy and power from combustion of refuse coupled with the increasing costs and distances of landfills has revived the interest in incineration as a means of reducing the quantity of waste to be landfilled. Nevertheless, appropriate operating measures are required based on a principle best practice should be to minimise the emission of pollutants (Waste Incineration Directive 2000/76/EC; integrated pollution prevention and control, 2010/75/EU). It is also reported that waste incinerator operators in UK have improved their environmental performance greatly in recent years, by around 90 %, significantly reducing the need for landfill (Environment Agency 2011; The National Archive 2011). Morcos (1989) describes that this approach also promotes local developments, by providing less expensive energy supplies for small businesses and industrial parks, as well as addressing the community health, economic and waste disposal problems. In one case, the *Meadowhall* shopping centre in UK has achieved zero waste to landfill in 2004, since all residual waste from the centre was sent to an incineration plant to provide the centre heating and lighting (BITC, 2006). In this regard, we can argue that, with a combination of recycling and proper pre-processing of shopping centre waste, the option for incineration can be made a less expensive and safe way to recycle or renew the residual waste in a sustainable manner.

The existing waste policies do not generally have a preference for one technology over another, with the exception of anaerobic digestion for treating food waste (DEFRA 2007b). Any given alternative method used is more beneficial if both heat and electricity can be recovered. The choice of recovery technology needs to reflect local circumstances, which will vary, but the policies expect greenhouse gas emissions to be a key consideration of those developing waste to energy plants. Thereby, the attention has been focused upon recycling as an effective method of energy recovery, which in turn can make a useful contribution to the local energy needs (Morcos, 1989; Reid Lea, 1996). To date, waste to energy transformation is an increasingly recognised approach to resolving

two issues in one - waste management and sustainable energy. In the UK, currently around 8 % of municipal waste is treated by waste to energy facilities but it is estimated this will rise to at least 25 % by 2020 (The National Archives, 2011). Further the UK government initiatives to encourage sustainable waste management efforts include the introduction of green tax breakers through the Enhanced Capital Allowances (ECA) for business investments in environmentally-friendly technologies (HMSO Treasury, 2002). This includes the Bio-fuels initiative for the energy efficiency program (HMSO Treasury, 2004), which could allow shopping centres to meet the carbon emissions targets at minimum costs.

Indeed, shopping centres can meet some of the requirements of the current waste polices by recycling its residual waste via energy production. Hitherto, the reconciliation of shopping centres residual waste to energy with recycling is a fairly new concept in the UK, thus no reported study has assessed the effects of these strategies In respect of the overall recycling program. More investigations need to be done in this area to find out the persisting effects of these strategies and to generalise the factor in relation to shopping centre waste management and recycling initiatives.

3.4.11 Materials Recycling/Recovery/Reprocessing Facilities (MRF)

It is imperative to note that provision for a material recycling/recovery/reprocessing facility (MRF) is increasingly important for municipalities and companies when maximising the value of recyclable material recovered from waste (Guiltinan and Nwokoye, 1975). Recyclables are processed at a MRF, where the heterogeneous collection is turned into homogeneous and hence marketable bales of recyclables. At this point, Pohlen and Farriss, (1992) advocated that the MRF could play a significant role in diverting material away from landfill and provide feed stocks of quality raw materials from its waste stream to industry. In most cases, MRFs are designed to separate co-mingled recyclables into their individual material streams and prepare them for sale into

the commodity markets. With over 80 municipal MRFs operating across the UK and around half of the local authorities operating some form of co-mingled collection of dry recyclable materials generated from both municipal and commercial and industrial (C&I) waste (WARP 2007), understanding the performance of such a recycling facility and where improvements can be made is of paramount importance.

More to the point, Waste & Resources Action Programme (WARP) (2007) also recognised the upward trend in the quantity of C&I and Construction and Demolition (C&D) being managed through MRFs in an attempt to reduce companies disposal costs. Because MRF are relatively new, and various MRFs do different things in different ways, cost estimates vary greatly. Therefore MRFs are expensive, as it has both capital and operating costs. An MRF also has differential transportation costs that must be factored in, and sometime this factor alone accounts for near absence of recycling (Truini 1999). Pohlen and Farriss (1992) demonstrate many forms of MRF joint ventures between municipalities and companies with other communities in an attempt to gain greater market leverage or reduce their costs, but this is only possible if the venture is able to keep unit sorting costs low (WARP, 2007).

Considering this, it may be sensible for larger shopping centre owners to invest in MRF through joint ownership and management of recycling centres. Yet, there are a limited number of cases which have been published linking shopping centre organisations with MRF. Although very few shopping centres are likely to operate MRF themselves, for example the *Meadowhall*, Sheffield (Meadowhall Shopping Centre, 2006), they will be involved in procuring services from local councils or private contractors that involve the design, commissioning and operation of an MRF. Understanding all stages from collection through sorting and bulking to the sale of recovered materials will ensure that, prior to embarking on the procurement route and preparing service specifications, shopping centres are better informed about the cost implications of alternative methods of disposal. However, WARP (2007) recognised that MRF capacity in the UK is growing

but it is unevenly distributed and investment in further capacity will be needed as demand grows. This adds an implication for shopping centre organisations since they must reduce transportation distances for collected recyclables to an MRF site, in order to cut financial and environmental costs. Further empirical investigation should examine the effects of MRFs on shopping centre recycling rates from various regions. In addition, differential studies to assess the consequences of MRFs between shopping centre scheme sizes could be influential in this regard.

3.4.12 Green lease

Previous studies have identified the conventional relationship between the landlord (as building owner) and tenant (as occupier) largely neglects environmental considerations (Hinnells *et al.* 2008). Nonetheless, the use of social norms to cement recycling participation were reported in some studies, and may work because people who make such pledges move beyond external justification for recycling and find their own additional reasons for recycling (McCaul and Kopp 1982; Pardini and Katzev 1984; Burn and Oskamp 1986; Wang and Katzev 1990). Shultz *et al.* (1995) described this as a competing explanation for the effectiveness of commitment interventions, suggesting that the changes are due to social pressures.

With this, a voluntary commitment by means of a 'Green lease' between owners and occupiers is based on the level of environmental ambition and degree of legal formality (Dowden, 2008). Sayce *et al.*, (2009) attest if all parties are committed to improving the green credentials of the building, many of the problems around equipment upgrades and so on can be sorted out by negotiation. This is even true during the life of a lease; with consent the parties can always agree to depart from the strict wording of a lease. However there has been little evidence of widespread adoption of green leases in the UK compared to other countries such as Canada and Australia. Few UK shopping centre organisations offer voluntary recycling commitment through 'Green leases' (Dowden, 2008). In 2009,

Hammerson group of UK shopping centres introduced a green clause under its standard UK lease contract as part of a wider program to engage, and work with, its occupiers (Hammerson 2011b). This approach provides a formal legal structure for increasing environmental accountability, and creating a shared commitment from both property owner and retailers towards greater waste efficiency and other environmental aspects. The primary objective is to raise awareness; it is referred to in the terms negotiated by agents. Owner and retailers agree a waste management plan, and appoint representatives to implement and monitor the plan. In 2009, 968 green leases had been signed across the Hammerson portfolio (Hammerson 2011b). PRUIPM and Land Securities are among a few other shopping centre owners whom offer this voluntary measure to occupiers for sustainable leasing (UNEP 2009).

Previous studies reported that such commitment produced an increase in recycling rates in both university communities (McCaul and Kopp 1982; Wang and Katzev 1990) and municipals recycling (Burn and Oskamp 1986; Pardini and Katzev 1994). Questions remained to help understand the significant relationship between the Green lease or written commitment and recycling achievement with regard to the shopping centre population, no doubt that the approach is considerably recent. Thus, a further study in this area is essential to generalise this factor.

3.4.13 Service provider contract provision

Despite limited studies on recycling contracts from commercial establishments, Folz and Hazlett's (1991) survey of 264 municipal recycling coordinators found those contracts with private haulers to collect recyclables were important in promoting higher levels of voluntary participation. To maximise profit, private haulers may have provided residents with free bins, or promoted recycling more extensively if contract provisions permitted them to retain all or part of the proceeds from the sale of recyclable products. This result

suggests there is significant effect in higher recyclables collection made when there is an effective outsourcing program in place.

Akin to this, any commercial waste in UK is usually collected by contractors, local authorities or through other routes e.g. in-house management (Cherrett *et al.*, 2007). As discussed in Chapter 2, waste contractors or local companies offering flexible services at competitive prices, with larger retailers occasionally using several different contractors to service their operational needs. Third party contractors on the other hand can operate in a number of different ways offering exclusive, shared, specialised, occasional, transit only and/or multi-client services (Rushton *et al.*, 2001). Shopping centres have to employ these licensed waste contractors for the collection of recyclables and residual waste, in accordance with Section 34 of the Environment Act 1995. The service provision may vary from single service to a bespoke package that meets client strategy in the collection and subsequent processing of waste streams, which may include pick up of recyclables, sorting, preparation for sale, shredding, crushing, baling, etc. It is also imperative to note that, to a certain extent, recycling and residual waste collection can be competitive activities. Hence, using more than one vendor is one way of assuring the recycling program always has a competitive balance and that the recycling services are maximised.

For shopping centres, it may be possible to select one contractor to take the majority of waste from the centre. This is more likely for large shopping centres in which they may have developed a facility and outlet for recycled materials (Meadowhall, 2006). Centre management will act as a co-ordinator for the provision of recycling facilities for the centre, arranging for uplift of recyclables and collection of non-recyclables. The main advantages of this method are that, by dealing with a single provider, co-ordination should be better, reduced or simplified administration, there should be fewer people involved, and financial recording of charges, invoice and income should be much simpler (Cant, 2005). It was argued that changes due to economies of scale may give greater influence over the recycling market to the contractor, hence reducing the likelihood of

recycling collections stopping if the market price drops (US EPA, 2004). The potential limitations of this preference are that larger contractors may only offer a restricted recycling service and may be unwilling to extend the recycling list to the less commonly recycled materials. This would leave the centre with no choice but to seek an alternative contractor or additional recycling contractors. Alternatively, the shopping centre may subcontract elements of a large contract of recycling services where they do not have the capacity and expertise to deliver all that is required, therefore it is necessary to get both parties contractor and client involved in the design of service provision.

- **Service Level Agreement (SLA)**

From a facilities outsourcing point of view, organisations generally distinguish between the roles of purchaser and service provider, and adopt the Service Level Agreement (SLA) as the basis for service delivery in which they can release management time through using support service providers (Alexander, 1996). A SLA is also known as a performance contract which is a contracting methodology designed to meet the specific needs set down by the user, and where achievement against set performance standards can be measured and reflected in the cost incurred for the level of service actually provided (RICS, 2007).

With an increased outsourcing approach to business support services, Goyal and Pitt (2007) demonstrate that SLAs act as an instrumental mechanism to facilitate the management of contracts through an objective approach, by governing the purchaser and service provider interfaces which allow smooth running of projects, avoids disputes between providers and clients that lead to a healthy relationship (Nazali and Pitt 2009), and adds real-values to the business (Sashar and Pitt 2009). It is also necessary for the established service provider to prepare themselves for a future competition, legislation, new product development and generation of an environment that insists business innovation, as they should respond by adopting a new approach to strategy (Goyal and

Pitt 2007). In addition, Hui and Tsang (2004) advocated that a service provider should have the ability to deliver such services with reasonable reliability, predictability, cost-effectiveness and on time performance. It is noteworthy that in order for such partnership to survive, it is essential that the service provider must be able to adapt and evolve.

In addition, Akhlaghi (1996) highlighted the contract clause for a municipal refuse collection contract as the effect of costs saving made has paramount importance in such the performance contract. Any introduction and benefits of innovative methods collection would be shared between contractor and the client. He rendered this as long-term incentive-based FM contract pattern with some degrees of variation in the form and detail which are now becoming common practice in the UK market. This is in-line with the NHS Purchasing and Supply Agency (NHS PASA) (cited in WARP, 2009); there are, however, additional service provisions which can be delivered, assisting the client in the successful implementation and reporting of the strategy, such as:

- quality audits to ensure there is no contamination of segregated waste;
- guidance / facilities / information to support waste segregation;
- feedback on waste volumes collected;
- confirmation of destinations for waste streams (e.g. waste to landfill, recycle/reused, incineration/energy from waste, hazardous waste);
- to “explore potential profit/savings sharing initiatives with the contractor”; and
- welcome any initiatives/innovations from the service provider to help minimise waste levels and embrace recycling.

Two case studies were reported have demonstrated these conditions; one is Westfield Shopping Town Mission Valley in the US, who outsourced three service providers, i.e. a hauler/recycler, a specialty recycler, and a reuse organisation, for a recycling and waste prevention program which helps to diverts 63 % of the shopping centre facility’s waste stream (US EPA, 2004). However, Prudential Property Investment Managers Ltd (PRUPIM) who own 14 shopping centres across UK, implemented a turnkey or multiple

services contract initiative for its recycling and waste prevention services with a single provider that handles a bundle of services with a set of initiatives incorporating the training of shopping centre staff, the procurement of recycling equipment, the introduction of new waste management policies and procedures, and the commissioning of regular waste audits for reporting to centre managers (BCSC 2009). The approach taken by the PRUIPM, is concur with Pitt (2005), as he advocated the application of new multiple contract management practices that drive innovative solutions, with creativity in contract delivery and service. However no empirical study has assessed the significant effect of recycling success between single and multiple services contract being implemented. This justifies that further investigation in this area is required to generalise this factor.

In summary, for outsourced services, the centre manager may consider ways in which economical waste disposal and recycling is ensured through identifying the best link between tenants, recycling facilities and service providers, with emphasis on achieving overall value from the contract. Provision of such contracts, both from client and service provider are equally important, as this will dictate the overall nature of recycling program and provide innovation opportunities.

3.4.14 Environmental Management System (EMS) certification

To date the most well-known and accepted EMS certification is the ISO 14000 series of standards which maybe the best example of a structured EMS. Apparently the rapid adoption of this EMS-ISO 14000 accreditation is occurring worldwide, and has emerged as a leading management tool to address environmental degradation at the company level (MacDonald 2005; Kaur 2011). The EMS is a voluntary and process-based management tool (Harsey 1998). It is a systematic process that formalises co-ordinated procedures or frameworks for corporations and other organisations to use in order to implement environmental goals, policies and responsibilities, as well as regular auditing of its

environmental features (Cascio, 1996; Spelleberg *et al.* 2004). This management tool essentially provides the framework for continual environmental improvement through effective management of companies' environmental impacts.

For the scope of organisational recycling, Spelleberg *et al.* (2004) argued that effective environmental policy plus practice can be successful without the adoption of EMS standard. Nonetheless, the implementation of an EMS may be considered essential because it helps an organisation to set and meet environmental objectives, enables co-ordination, and can assist with compliance at national and international levels (Babakri *et al.*, 2004). According to several authors (Sheldon 1997; Landin and Saizarbitoria, 2011) this management instrument was developed predominantly to assist commercial businesses in reducing their environmental impact, but also as an improvement in environmental standards and performance. In addition, organisations can reap a number of economic benefits including better conformance with legislative and regulatory requirements. The fundamental principle and scope of ISO 14001, is the concept of continual improvement (FFC, 1999). It is based on the quality management principle, i.e. Plan-Do-Check-Act methodology (Standards Australia/Standards New Zealand 2004) which include five phases that relate to Plan-Do-Check-Act; Environmental Policy, Planning, Implementation & Operation, Checking & Corrective Action and lastly Management Review (Martin 1998; Babakri *et al.* 2004; Spellerberg *et al.* 2004).

It is argued that the reasons for adopting the EMS standard range from compliance and consumer pressure to the potential for cost savings and corporate environmental responsibility. According to Barnes (1996) there are some potential benefits of implementing this standard, which include better customer relations, recognition from regulators, better control of environmental issues, and increased employees awareness of environmental concerns. As the standards offer strong emphasis on pollution prevention they can save companies money by improving efficiency and reducing costs of energy, materials, fines and penalties (Rondinelli and Vastag, 2000). Walker *et al.* (2007)

demonstrated that a clear and fully integrated environmental management system, such as ISO14001, will not only encourage organisational environmental improvement, but also promote better environmental understanding, improved facilities transparency and play a significant role in developing an appropriate systems approach to FM. They noted that EMS can make a significant contribution to making information more accessible while supporting the overall process of corporate social reporting.

However, does the ISO 14001 certification lead to better recycling performance for organisations? Some empirical studies have corroborated the positive qualities inherent in applying these standards for business competitiveness and efficiency, although critical studies also exist that stress negative aspects and weaknesses deriving from the implementation of these international standards (Heras *et al.*, 2008). According Heras *et al.* (2008) it is difficult to assess whether a change in performance is due to the influence of implementation of an EMS or due to other factors. Although some practitioner perspectives identify ISO 14001 as complying with environmental standards (Whitelaw, 1998; Woodside *et al.*, 2004), it does not establish absolute requirements for environmental performance other than a commitment to compliance with applicable regulations (Delmas, 2002). Arguably ISO 14001 is defined as a procedural standard rather than a performance standard, although this may need to be examined and analysed in greater depth as various studies have indicated that the standard is often understood by participants in terms of compliance with environmental legislation and regulations (Heras *et al.*, 2008). (Clapp, 2001) also describes that the requirement to comply with environmental regulations may not lead to much improvement, as firms should in theory already be complying with such regulations.

Indeed, investigation regarding quality management in recycling performance is currently understudied. However, research into the relationship between ISO 14001 certification and the recycling performance of organisations has grown of late, with number of perspectives. A few case studies discuss the positive impact of ISO 14001 certification on

recycling performance. For example, Rondinelli and Vestage (2000), in their study of an internal manufacturing firm's perspective, found that ISO 14001 certification led to more ideas among the employees for materials recycling and increased their commitment to recycle. Additionally, during the period following the achievement of ISO 14001, the amount of waste that had to be sent to landfills was reduced to approximately 35 % within 3 years, and the waste cost of production per ton of aluminum dropped from \$8.33 in 1995 to \$6.50 in 1998. Both studies by Quazi (1999) and Parry (2000) found similar results whereby improvement in recycling is one of the more quantifiable business benefits of ISO 14001 and some companies have captured the cost savings associated with reducing waste.

Mohammed (2000), for example, conducted a survey by sending questionnaires to 106 ISO 14001 certified firms in Japan in 1997. The results of the survey found more than 60% of the respondents have given special consideration to the reuse and recycling of their packing and final products. Babakri *et al.* (2004) reported that 177 US companies' recycling performance was significantly positively affected by ISO 14001 certification. Their study also found smaller firms experience greater improvement in recycling performance than larger firms due to the certification. It seems likely that the adoption of EMS and certification of the ISO14001 standard were effective because it allows companies to take a pervasive management approach to recycling.

With regard to recycling initiatives at shopping centre organisations, however, no reported study has been conducted to assess the effects of the certification for this type of organisation.

3.4.15 Monitoring and reporting feedback of recycling performance

Another key aspect of recycling strategy is by carrying out a performance audit. According to McGregor, (2000) any type of organisational support facility (that also

including the waste management and recycling facilities) should be reviewed, selected and operated in an efficient manner which addresses the needs of the businesses. From the FM viewpoint, Tucker and Pitt (2009) describe performance measurement as the process of setting key drivers in order to assess, evaluate, and change core business objectives if necessary. Such an approach can act as a tool for more effective management, as explained by Amaratunga and Baldry (2002) that “results in performance measurement indicated what happened, not why it happened, or what to do about it”. Featherstone and Baldry’s (2000) evaluation through open assessment provide assistance for facilities improvement, “enabling the encouragement of innovation”. It is therefore important when trying to maintain an acceptable environment that encourages participants to recycle that performance of particular facilities is measured.

Providing accurate and relevant facilities information to building occupants permits improvements of service delivery within an organisation which in turn can enhance their service provision (Tucker and Pitt 2010). Featherstone and Baldry (2000) discuss the significance of the positive impact of effective FM upon service delivery. On the contrary, poor facilities practices can also significantly hinder the delivery of core services. Hence, it can be argued that measuring facilities performance for recycling and waste prevention services is integral to the successful implementation of continuous improvement and added value within business.

Amartunga *et al.* (2004) revealed one of the critical factors to meet customer expectation is the degree of partnership and communication with facilities provider. To do this, facilities provider need to have a clear idea of end-user targets and should select core outcome measures for those targeted segments. Quite possibly, the most common approach is by carrying out regular monitoring and reporting of recycling rates and disposal of waste to landfill. In the case of recycling and waste prevention services, Lehmand and Geller (2004) explain the appropriate performance reporting strategy involves providing information to participants about their environment-relevant

behaviours. Such data make the consequences of behaviour (e.g., money spent, environmental degradation, targets and benchmarking) more prominent, and increases the possibility of behaviour change corresponding with the consequences reported.

Timmlert and Williams (2008) describe measuring performance on recycling by providing a report or feedbacks are highly effective at reducing contamination of waste. This topic has continued to be a popular intervention technique in more recent environmental and recycling research. On a university campus, Larson *et al.* (1995) posted the number of aluminium cans deposited in a recycling container over the previous week. Without any other persuasive environmental message, this intervention has led to a 65 % increase over baseline in the number of cans recycled. On the other hand, two experimental studies on municipal recycling communities were observed; first, Schultz (1998) found that group or individual feedback about curbside recycling amounts increased the recycling rates, while interventions using pleas and information-based strategies did not. Second, DeLeon and Fuqua (1995) demonstrated that combining a public commitment to recycle paper with feedback published in a local newspaper has resulted in a 40 % increase in the weight of recycled paper for residents of an apartment complex. A few researchers (Goldenhar and Connell, 1992; Katzev and Mishima, 1992) have also highlighted similar results on performance feedback, finding it to be positively correlated with student recycling behaviour. Kim *et al.* (2005) established that removal of the recycling feedback corresponded with a decrease in the percentage of recyclable materials correctly separated on campus. In a study examining the relative effects of feedback strategies on recycling knowledge, attitudes, beliefs and behaviour of university students, Goldenhar and Connell (1992) found students receiving recycling feedback had higher levels of recycling behaviour than those in the recycling education or control groups. These studies clearly indicated the importance of performance reporting on recycling by providing feedback to a specific community a significant contribution can be made to attain higher rates of recovery. Nevertheless no reported study has been carried

out to measure the effects of performance reporting on recycling from the shopping centre perspective.

Likewise, it can be argued that auditing shopping centre tenants' waste disposal and recycling performance, and providing feedback to tenants on how they can improve, may be of the essence. Understanding how a building is performing by comparing site data against recognised indicators can be a valuable tool for assessing whether the recycling facilities within a building have a fundamental problem. Recycling coordinators need to monitor the progress of existing recycling programs in order to evaluate and make changes as needed, and report back to tenants about their recycling accomplishments. Perhaps shopping centre recycling coordinators could use this opportunity to reinforce the positive habits they are developing as shopping centre tenants grow accustomed to recycling and the procedures they have already implemented. Folz (1999) did contend that consistent and reliable performance information is a good defence against the critics of recycling. It also communicates to people just how important their sustained participation is to continued program success. Certainly, enhanced accountability and continued improvement in recycling performance would follow.

3.4.16 Recycling C&D waste during fit-out works

Already many building stocks are aging, hence owners and occupants are looking for more energy efficient and environmentally sustainable property (Genre *et al.* 2000). We have also witnessed increasing needs for shopping centre buildings to expand and be refurbished, and refurbishments often constitute an excellent opportunity for improving the environmental balance, improved comfort and occupants' productivity. Also, quite often shopping centre management coordinate fit out works based on the occupancy required by the tenants. BFM and BRE (2004) define refurbishments as the removal and replacement of internal fixtures. This process is different from demolition as it does not involve the removal of the underlying the fixtures. However, Li *et al.* (2010) argue there

are overlaps between refurbishment and demolition as the refurbishments process involves removal of fixtures in a similar manner to the soft strip phase of demolition, and the installation of new fixtures is similar in manner to the first and second fit out stages of a new build project.

Debris from this activity is considered as construction and demolition (C&D) wastes, namely as inert waste. Roche and Hegarty (2006) further that C&D waste also includes surplus and damaged products and materials arising in the course of construction work or used temporarily during the course of on-site activities. The European Waste Catalogue (EWC) classifies C&D waste into the following 8 categories: (1) concrete, bricks, tiles and ceramics; (2) wood, glass and plastic; (3) bituminous mixtures, coal tar and tarred products; (4) metals (including their alloys), (5) soil (including excavated soil from contaminated sites), stones and dredging spoil; (6) insulation materials and asbestos-containing construction materials; (7) gypsum-based construction material; (8) other construction and demolition waste. At this juncture it is mandatory that centre managers and contractors report any waste production (UK EPA 1990: Part 2, Section 34).

By comparison, previous research has discovered that the environmental impact of retrofit and fit-out works is less than that new build projects (BFM and BRE 2004), because the materials and components dismantled from the buildings usually contain the potential value of reuse or recycling (Thorpe 2008). No previous research focused on the performance of shopping centre in waste management of retail space retrofit works, but Miller *et al.* (2006) have identified some problems in the current system of waste management in commercial retrofit and the areas where there is potential to improve performance:

- Lack of monitoring of waste arising.
- No effective means of planning for waste minimisation.
- No contractual arrangements for waste minimisation.

Shopping centres are often occupied, which results in limited space and short schedules for site work. This brings great challenges to material handling, storage and waste management throughout the execution of a project. Peng *et al.* (1997) advocate that provision must be made to provide adequate space for C&D processing equipment, an area for the incoming waste materials, and space for the processed materials. Also there are other challenge in using recycled aggregates which have been highlighted (Peng *et al.* 1997; Fatta *et al.* 2003; Lu *et al.* 2011). In one typical example, they have to be separated from other demolition debris before use, and with special care. As a result, a lot of potentially recyclable materials in the C&D waste stream are disposed of at landfills and dump sites.

These problems indicate that on-site waste management planning is not well conducted through integration with project delivery. This however can be resolved by encouraging the centre management and development partners, who undertake most of the on-site work, to improve their involvement in on-site waste management in retail fit-out works. DEFRA (2008) suggests other key benefits from the initiatives may include materials resource efficiency, by promoting the economic use of construction materials and methods so that waste is minimised and any waste that is produced can be re-used, recycled or recovered in other ways before disposal options are explored. Also, proper management of C&D waste can reducing the risk of fly-tipping by restricting the opportunities available for the illegal disposal of waste by ensuring compliance with existing legal controls and providing a full audit trail of any waste that is removed from the work site. The British Council of Shopping Centres (2011) also highlights this importance and it is made clear when a lease is under negotiation to avoid a dispute at later stages. This includes a number of charges that may be applied such as design approval fee, waste removal charges, and deposits held for possible rectification of damage by the tenant's shop-fitting contractor to landlord's areas the during fit out process. Therefore, it is necessary for centre managers to develop and improve knowledge and techniques regarding on-site waste management planning during retail

space fit-out works which can help achieve the centre waste management and recycling objectives.

Overall, appropriate planning, collection and management of waste during tenant fit-out and other refurbishment work is clearly becoming cost-efficient as processing and disposal costs rise (WARP, 2009; WARP, 2011b). Apparently, due to the lack of empirical evidence on recycling C&D from shopping centre fit out works, further investigation is required before this factor can be generalised.

3.4.17 Monetary incentives or rewards

It is argued that the provision of monetary incentives or rewards, including interest and compensatory goods for recycling members, transportation costs, and low investment costs significantly affect the performance of recycling (Suttibak and Nitivattananon, 2008). A similar issue of reward or incentives has been identified as a key factor for recycling initiatives and is a prime topic for recycling research.

Earlier investigations from Vining and Ebreo (1990) found that non-recyclers reported more concern with financial incentives and rewards than did the recyclers. Gamba and Oskamp (1994) also found that infrequent recyclers were more likely to identify financial incentives as motivation for recycling, stating that they recycled to earn money, or to reduce garbage cost. Yau (2010) also assessed the impact of reward schemes he found that reward schemes had a significant positive correlation with the volume of recyclables collected. Shaw and Maynard (2008) noted the positive changes in recycling schemes may also potentially be achieved through financial incentives, but preferably delivered either as rewards or as rebates, rather than penalties.

Even so Iyer and Kashyap (2007) caution the use of incentives because the behaviour is not typically sustained after removing the reward. Earlier research evidence to add weight

to these thought (Pardini and Katsev, 1984). Schultz *et al.* (1995) describe the rewarding of recycling – the “consequence variable” – was noted to have led to positive changes in recycling performance, although enhancement effects were short-lived after termination of reward schemes. Allen *et al.* (1993) found that financial rewards did have an effect on recycling frequency, but could not modify recycling behaviour in the long term. Results from on-campus recycling suggest that use of financial motivations can be ineffective, as most students state that such an approach would not encourage them to recycle (Clay 2005). However, other studies agree that short term monetary incentives, such as lotteries that reward a random recycler, do not produce long lasting changes in behaviour (De Young, 2000; Oskamp *et al.*, 1991). These evidence suggests that maintaining such incentives over long time periods is not feasible and research has continued to investigate this issue.

A recent study conducted by Timlett and Williams (2008) found incentives by using simple, low-cost methods to engage with residents at the point of service delivery was highly effective at reducing waste contamination among residents. However, another recycling study on office layout in Taiwan revealed that workers who felt that economic incentives and monetary rewards were unimportant tended to be more active recyclers than others (Maran and Lee 1993). The reported studies highlight the significant contribution that monetary incentives or rewards might have on recycling, however there is a tendency that the initiative may not be feasible in some cases.

This initiative however would require substantial revision of the processes and systems used to collect, transport, and sort recyclable waste. With the findings of the DEFRA (2005) scheme which suggest that financial incentives could be utilised to enhance recycling in the longer term provided appropriate service enhancements can be put in place (AEAT, 2006) to address perceived shortfalls with the existing recycling scheme. In the case of shopping centre recycling schemes, alternative charging arrangements are an option whereby charges could be attributed to occupiers in proportion to the waste

produced (Queensgate 2010). As such, savings on disposal costs, combined with the revenue from the segregated materials, enable the shopping centre to invest in additional recycling initiatives and reduce the direct cost to retailers. Income generated by the scheme could then be credited back to the service charge (Meadowhall 2006; Hammerson 2011a). Despite the rather low apparent potential of incentives to enhance recycling amongst recyclers, the relatively low costs for implementation and maintenance are attractive. As a consequence, before reward schemes are considered, it is essential to ensure that the collection scheme is operating well and that effective communications are in place.

3.5 Developing the theoretical framework: Key finding of objective one

The first objective of this research is to develop a theoretical framework on the basis of the principle factors affecting the success of shopping centre recycling; this will underpin the overall research process. The theoretical framework has been built up based around a collection of interrelated concepts derived from the existing recycling domain, together with critical success factor theory and the concepts of recycling 'success'. This is structured using three principle dimensions which correspond to the first three research questions and objectives of the research highlighted in Chapter 1. Consequently, the conceptual framework for shopping centre recycling success is illustrated in Figure 3.1.

The established concept of critical success factors and how recycling success could be defined is built-in under this framework, where the use of self-reported measures of implementation success are used to gauge shopping centre recycling performance. Adding to the framework, the critical elements of success play a part in relation to shopping centre recycling initiatives. Overall seventeen (17) recycling themes were regarded as the critical factors that have an impact to the success of shopping centre recycling programs. These themes were reflected in, or had resonance with, previous

research findings whilst others related specifically to this study. This chapter has discussed these factors at length.

The framework conceptualises the links between 17 recycling factors (variables) and recycling implementation success (outcome variable). Bearing in mind the potential bias from assessment, the framework is therefore moderated by classifying the research sample using three groups of shopping centre scheme format (to act as moderating variables). For this particular work, all 17 factors represent the Critical Success Factors context as recycling variables which can play several roles. Two key roles assumed are *independent variables* and *dependent variables*, which help the researcher to identify both the level of critical importance and level of implementation success when making statistical inferences. The moderating variables representing the three groups of shopping centre scheme chosen for this research, are presented as independent variables (also known as the predictor or explanatory variables) which are the factors that the researcher thinks explain variation in the dependent variable, especially when differential statistics are anticipated.

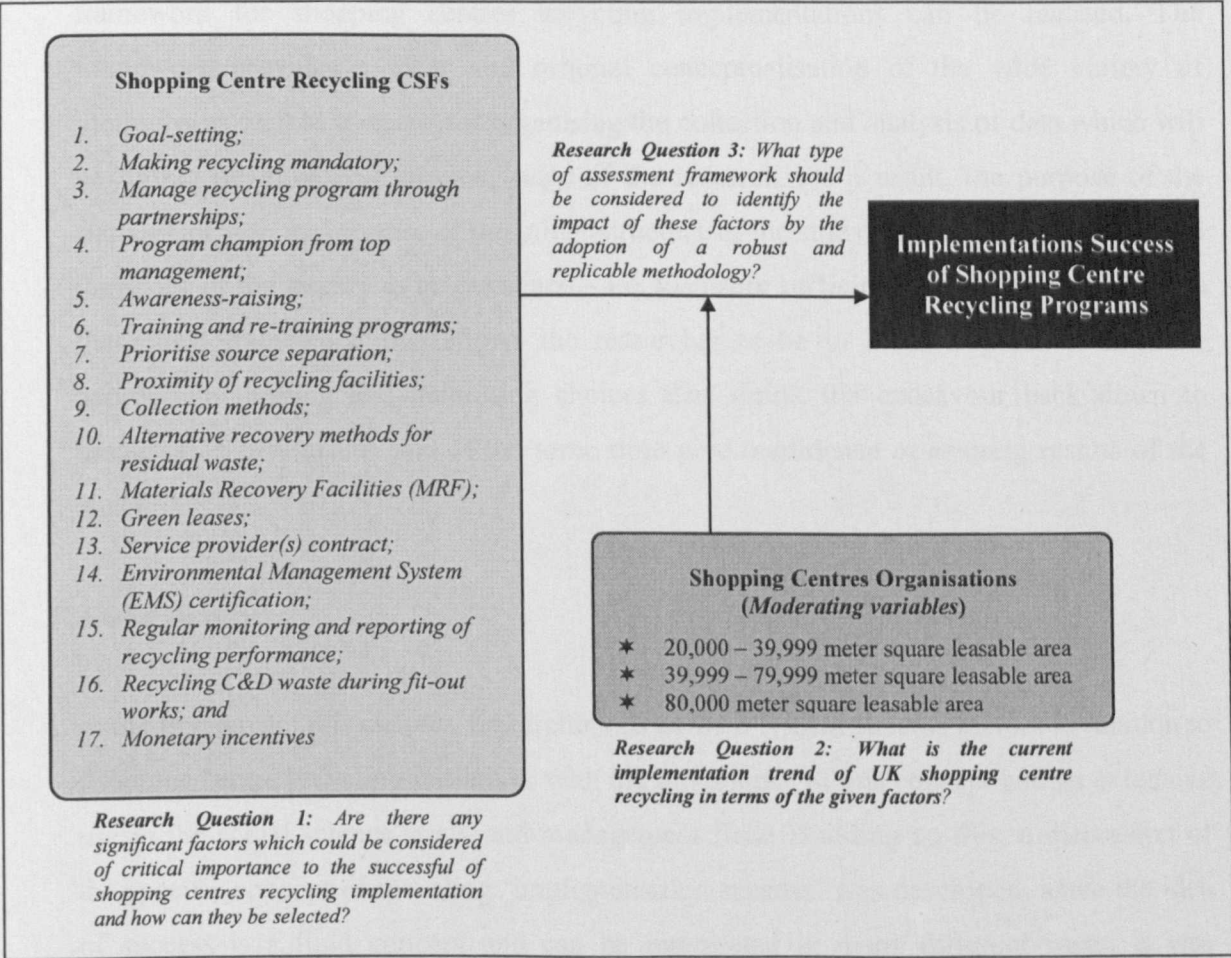


Figure 3.1: Theoretical framework for assessing shopping centres recycling performance

The recycling ‘implementation success’ is the outcome variable, the one that the researcher is trying to hypothesise or predict. Variation in the moderator variables or dependent variables is what the researcher is trying to explain. These variables can inevitably be manipulated; thus the framework may be modified in the light of empirical findings and statistical analyses to be presented later in Chapter 5.

Given these theoretical underpinnings, the development of performance measurement framework for shopping centres recycling implementations can be realised. The framework provides a clear and original conceptualisation of the wide variety of literature, as well as a means for organising the collection and analysis of data which will be further developed in the next stage of the research. As a result, the purpose of the framework is to make sense of the initial structure of the study and therefore helps define the scope of the inquiry to be examined – i.e. to ensure sufficient validity and utility. The theoretical framework also allows the researcher to be in a better position to make appropriate limiting and delimiting choices that shrink the endeavour back down to manageable parameters, and at the same time give confidence of ensuing results of the study.

3.6 Summary

In the first part of this chapter, researcher has defined critical success factors in relation to shopping centre recycling initiatives with the importance of this concept and its extensive use in the social science study and management field. Building on this, a discussion of the specific concept of recycling ‘implementation success’ was developed, since the idea of success is a fluid concept and can be interpreted in many different ways. It was therefore important to establish how recycling success would be defined to fit the purposes of this research.

The second part of the chapter has covered a broad review of literature in the recycling domain to address the principle factors affecting a shopping centre recycling program. A number of themes that emerged were reflected in, or had resonance with, previous research findings whilst others related specifically to this study. However, a definitive answer to this problem is difficult given the current state of the literature. Although understanding of the variables is beginning to emerge, several clear limitations were

addressed. As a result, this chapter found that there were seventeen (17) main factors that determined the success of shopping centre recycling (which are further illustrated in Figure 3.1). To confirm these factors, they will be scrutinised with key informants in industry throughout an interview phase to validate and established which factors are viewed as critical to shopping centre recycling programs.

The review of prior literature within recycling and FM domain was reiterated based around the first three research questions which pertain to the first objective of this research (i.e. to develop a conceptual framework on the principle factors affecting the success shopping centre recycling initiatives). As a result, this chapter has constructed the conceptual elements which represent the theoretical way of framing the research from the outset. This allows for appropriate research designs and methods to be considered and further developed, and this is consciously discussed in Chapter 4. Further analyses to validate the factors involved, and investigate the extent to which these factors have significant impact to shopping centre recycling success are presented in Chapters 5, 6 and 7 of this work.

Chapter Four: Research Design and Methodology

4.1 Introduction

This Chapter discusses the selection of an appropriate research methodology and related issues. The main issues to be described include (1) the scope of research and key questions involved; (2) relevant application of interpretive and positivist approaches; and (3) research design and methods of analysis employed. The aim of the research is to investigate success factors which are considered to be of critical importance to the successful implementation of UK shopping centre recycling.

4.2 Research scope

The goal of this research is to bridge the gap between the theoretical concepts of solid waste recycling and shopping centres, and to identify factors that influence shopping centre recycling success as perceived by the UK shopping centre organisations. Regardless of procedural differences, most shopping centre recycling programs have common interests – reliance on operational cost effectiveness, environmental sustainability, and many. Attempt to incorporate proactive FM measures when dealing with recycling initiatives. Therefore, a key component of this study is to establish the most important recycling factors involved. In addition, it is important to understand how recycling success can be measured and the extent to which the identified success factors are currently presented by the shopping centre organisations. This will be based on the conceptual framework developed and the proposed methodology employed.

Limited methods have been developed previously to define recycling success from the UK shopping centre perspective. Most existing recycling studies derived from other sectors, such as municipal, commercial office and academic institutions, have considered a range of research designs (as discussed in Section 3.4). In this regard, a tailored

research model that is suited to critical success factor theory and shopping centre recycling practise in this research will be useful in guiding the identification of current implementation success.

The outcome of the study will facilitate the critical decisions undertaken by the waste or recycling administrator in the shopping centre environment by providing relevant indicators for a number of recycling assessments. This research will also be useful for facility design and planning from the perspective of recycling infrastructure at shopping centre premises, and help put the principles of business sustainability and cost feasibility into practise. Essentially, the identification of these factors will benefit shopping centres by facilitating the delivery of successful recycling schemes, providing a comprehensive picture regarding the imminent trends of recycling development, and giving vital insight into how to make provision for the appropriate required resources. Therefore, rigorous and robust research methodology is imperative to understand the relevant complex social policy issues.

4.2.1 Applications of Critical Success Factors (CSFs) methodology

As discussed previously in Chapter Three, the application of a CSF methodology is a procedure that attempts to make explicit those few key variables or activities that dictate managerial success. This method has been used as a management measure for the past six decades in financial services (Boynton and Zmud, 1984), project management (Cooke-Davies, 2002; Bryde, 2008), military defence (Tishler *et al.*, 1996), information systems (Bullen and Rockart, 1981), the manufacturing industry (Mohr and Spekman, 1994), waste water management (Keremane and McKay, 2009); and municipals recycling (Suttibak and Nitivattananon, 2008). This scientific methodology significantly helps researchers and managers to understand the key areas in which to invest their resources and time. Ideally, these CSFs are observable in terms of the impact on the organisation to allow it to have guidance and indications on its achievement of them.

According to Yin (2009) and Gill and Johnson (2010), there are number of different research approaches that ones research can be based upon. In order to identify the relevant success factors, Esteves (2004) suggests that a wide array of research methods can be used between qualitative and quantitative methods. Among them are, for instance, the realisation of case studies (e.g. Sumner, 1999), group interviews (e.g. Khandewal and Miller, 1992), structured interviews (Rockart and Van Bullen, 1986), as well as the analysis of relevant literature (e.g. Esteves and Pastor, 2000). According to Shah and Siddiqui (2006) the most frequently used method to identify success factors from the larger population is the realisation of a questionnaire. It is an approach that should be pursued as it provides value in giving due focus to a limited set of factors, which are deemed to be the most critical for a program success.

Given that the scope of this research relates to the provision and management of shopping centre recycling schemes, the application of the CSFs methodology in this setting is deemed to be relevant. This methodology in essence will assist the researcher to identify key issues, questions, and choices to be addressed as part of the strategic planning effort for shopping centre recycling. By doing this, the study has employed the methodological triangulation to empirically investigate the CSFs and key issues regarding UK shopping centre solid waste recycling initiatives.

4.2.2 Application of methodological triangulation

With regard to the study that will be looking into the CSFs methodology itself, Olsen (2004) suggests a triangulation process using two methods to authenticate earlier findings is appropriate. Accordingly, researchers can use both quantitative and qualitative types of data. It is assumed that different research methods should not be considered as mutually exclusive but be considered as complementary (Tashakkori and Teddlie, 2003). It is argued (Jick 1979; Fellows and Liu, 2003; Sarantakos, 2005; Nachmias and Nachmias,

2008) that employing more than one research method, such as combining qualitative and quantitative approaches, will lessen or eradicate the disadvantages of each individual method and will reap the advantages of each. Given the analogy of triangulation as a basic principle of geometry, multiple viewpoints allow for greater accuracy; organisational researchers can improve the accuracy of their judgments by collecting different kinds of data bearing on the same phenomenon (Jick 1979).

The call for multi-methods of measurement was initially recommended by Campbell and Fiske (1959), who developed the concept of "multiple operationism" to assess convergence. According to Bouchard (1976), the logic underlying operationism requires that convergence is determined through two (or more) different methods, thus ensuring that variance reflected by a construct is not the result of any one measurement. Convergence enhances the likelihood that the results are valid and not a methodological artefact. Denzin (1978) and Jick (1979) have emphasised this concept of focusing on distinct methods, for example, investigator inference and secondary data. Denzin' (1978) labelled this type of approach "triangulation" and defined it as "the combination of methodologies in the study of the same phenomena".

Triangulation has been defined by Denzin (1978) as:-

"The scientist, then, designates units of reality to act upon, formulates the definition of those objects, adopts research methods to implement these lines of action, and assesses the fruitfulness of any activity by the ability to develop, test, or modify existing social theory. Thus, both concepts and research methodology act as empirical sensitizers of scientific observation. Concepts and methods open new realms of observation, but concomitantly close others. Two important consequences follow: if each method leads to different features of empirical reality, then no single method can ever completely capture all the relevant features of that reality; consequently, sociologists must learn to employ multiple methods in the analysis of the empirical events".

Denzin (1978) advocated that the sociologist should examine a problem from as many different methodological perspectives as possible so that fully grounded and verified theories can be generated. To do this, Sarantakos (2005) pointed out that triangulation would allow researchers to obtain a variety of information on the same issue and use the strengths of each method to overcome the deficiencies of the other. He suggests the method could achieve a higher degree of validity and reliability to overcome the deficiencies of single method studies. In addition, Fellow and Liu (2003) illustrate that triangulation research, where quantitative and qualitative methods gain through synergy, can be powerful to gain insights and results from the multi-dimensional view of the subject being studied. Webb *et al.* (1966) again coin the triangulation term in the context of validating by subjecting it to "the onslaught of a series of imperfect measures". They suggest that the best way to apply triangulation is to choose data sources which complement one another and (if possible) include compensating biases. However, the downside to using a triangulation research method is that it could be useless if it is based on the wrong conditions and research foundations. It could also be used as a way of legitimising personal views and interests and is difficult to replicate Lamnek (1988).

As stated earlier, triangulation was identified as a suitable method for enhancing the quality of research and there are many who consider triangulation as important to improving the quality and validity of social science research (Patton 2002; Fellows and Liu, 2003; Olsen 2004; Sarantakos, 2005; Naclunias and Naclunias 2008; Creswell, 2009). Olsen (2004) contended that the conflict and subsequent debates over quantitative and qualitative research methods lead to the conclusion that more than one research method may and should probably be employed in order to fulfil the aim(s) of research. It is undeniable that the multitude of choices (i.e. qualitative, quantitative or triangulation) available must be used appropriately depending on the different situation. No one research method is superior to another. Both the quantitative and qualitative research strategies have their own particular strengths and weaknesses. It is the appropriateness of the method of investigation that is the main concern in a particular research problem

(Trow, 1957). One must consider the purpose of the inquiry, the questions being investigated and the resources available.

4.3 Research questions

Following previous discussion in chapter three, this research is based on the following research questions:

- Q1. Are there any the significant factors which are considered to be of critical importance to the successful recycling implementation for shopping centres, and how can they be identified?*
- Q2. What is the current implementation trend of UK shopping centre recycling in terms of the given factors?*
- Q3. What type of assessment model should be considered to identify these factors by the adoption of a robust and replicable methodology?*

This study therefore will be focused on seeking answers to the three key questions raised above, by investigating shopping centre management using Critical Success Factor (CSF) theory together with research of shopping centre solid waste recycling initiatives.

4.4 Designing the research

Research design provides an overall guidance for the collection and analysis of data for a study (Churchill 1979). The importance of research design stems from the role of research as a critical link between theory, argument and the empirical data collected (Nachmias and Nachmias 2008). A choice of research design 'reflects decisions about the priority being given to a range of dimensions of the research process (Bryman and Bell 2007), and this of course will have considerable influence on the selection of methodological procedures chosen by the researcher in the course of this research study.

It is therefore a blueprint that enables researchers to find answers to the questions being studied for any research project. Along with the clear research plan it provides constraints and ethical issues that a study will inevitably encounter must also be taken into account (Saunders *et al.* 2007).

It is true to say that a research methodology is a continuing process. According to Pole and Lampard (2002), research is a careful search which is capable of withstanding close examination and is aimed at gathering information which can be used to produce or to enhance knowledge. It is a continuum that is ever changing and ever developing. Results, conclusions, values and validity of a research hinge upon a well-designed research methodology. The selection of a methodology based upon sound theory which is able to produce reliable results is considered to be of vital importance (Creswell, 2009). Therefore, it is imperative to capture the nature of a research subject, its aims and research questions and the resources as these normally determine the design and strategy to be used for carrying out the investigation (Brunner and Ernst, 1986; Tashakkori and Teddlie, 2003; Creswell, 2009).

4.4.1 Qualitative versus quantitative research methods

According to Fielding and Schreier (2001) advocates of particular methodologies have been concerned more with asserting or defending their accustomed lines of inquiry than with indicating the possible points of convergence with other approaches. Nachmias and Nachmias (2008) distinguished three 'traditional' methods used for broadening knowledge: the authoritarian mode, where knowledge was gained from some person or institution who are socially or politically defined as qualified sources of knowledge; the mystical mode, where knowledge is obtained from supernaturally knowledgeable authorities and the rationalistic mode. The rationalistic mode is a school of philosophy which suggests that the totality of knowledge comes from conforming strictly to the

forms and rules of logic and is founded on two beliefs; what must be true in principle and what is logically possible and permissible.

In general there are two types of methodology available for any study: quantitative and qualitative. However, there is a school of thought that a third type of methodology exists which specifically relates to those who subscribe to the critical philosophies. This was born out by the works of Karl Marx (1818-1883) although Sarantakos (2005) argued that it has yet to be fully recognised within the scientific research community. The differences between them are distinct and varied. Punch (2005) describes that quantitative research is empirical research where the data is in the form of numbers, and the strategy is underpinned by experimentation and usually attempts to compare or correlate one study group with another. Qualitative research strategy on the other hand tends to rely more on employing (in many cases) ethnography, case studies, and grounded theory. The decision regarding the use of qualitative or quantitative (or both) depends upon the research question as it is currently posed and the phase of the research cycle that is on-going (Tashakkori and Teddlie (2003). It is therefore germane to state that selection of appropriate research strategy will depend on the nature of the research (Keith, 2005).

- **Quantitative technique**

The quantitative (or positivistic) technique makes use of quantitative measurement and statistical analysis. This research technique was developed by August Comte whose philosophy on positive phenomena was revolutionary and challenged the established metaphysical and theological theories of the time. His philosophy formed a basis for scientific or quantitative methodologies to flourish and has proven to be the dominant method of research up until the 1960s (Sarantakos, 2005).

Fellow and Liu (2003) describe that the quantitative method is to seek to collect factual data and apply scientific techniques to obtain measurements in 'the form of quantified

data while qualitative methods seeks to gather insights and to understand people's perceptions of the 'world' either as an individual or groups. The quantitative-experimental approach requires operationalisation of independent and dependent variables that can be statistically analysed based upon the research hypotheses (Field 2009). This confirmed (Patton, 2002) that the quantitative approach has outcomes which are identified and measured as specific variables; treatments and programs are conceptualised as discrete, independent variables. The characteristics of program participants were also described by standardised and quantified dimensions. The emphasis on quantitative research is to prove or disprove the research hypothesis in a statistically analytical way and as such deliver prescriptive findings (Creswell 2009; Tashakkori and Teddlie, 2009). Creswell (2009) describes that data gathered through the quantitative method is thin and shallow but generalised and produces findings that are prescriptive in nature while data in gathered through qualitative methods is thick, deep and holistic and produces findings that are descriptive in nature.

To put it more simply, this approach implies that the theory must be first generated and then tested by empirical observations. If the theory is falsified, it has to be rejected, and a new one formulated to replace it. The quantitative theory was believed to be a more accurate, valid, reliable and objective form of research than the qualitative methodologies. Although Tashakkori and Teddlie (2009) point out that the issues of reliability and validity seem to pre-occupy the minds of quantitative researchers while qualitative_researchers concern themselves more with the relevance and in-depth observations.

- **Qualitative technique**

Qualitative techniques or interpretive research employs a method of data collection and analysis that is non-quantitative and is intended to observe social reality as experienced

by the respondent. Methodologies such as phenomenology, hermeneutics and social interactionism are considered qualitative in nature (Sarantakos, 2005).

Weber (1933), from his theories on Verstehen (translated from German as "understanding"), suggests that Verstehen is an approach that seeks to understand the other person's point of view - what his/her actions mean to him/her. He argued that natural sciences are separate and distinct from social sciences because of the differences in the nature of the subject matter and suggested that it should be accepted that different methods of research would be required to study each class of science accurately and correctly. Therefore, it is important for any research project that a well-structured and supported methodology is developed at an early stage of the study.

Accordingly the term qualitative research is used as the generic name for a number of investigative methodologies, which include ethnography, participant observations, naturalistic and field research (Creswell, 2009). Qualitative research is empirical research where the data is not in the form of numbers. A few scholars (Bryman and Bell, 2007; Patton, 2002; Creswell and Plano-Clark, 2007; Creswell 2009) argue that qualitative research methods have common features when tackled in a holistic way, since they attempt to provide a contextual understanding of complex interrelationships, as well as the causes and consequences of human behaviour.

Phenomenology is one of the philosophical roots of qualitative research and stresses the subjective aspects of human behaviour which includes people's motives and the beliefs behind their social actions. Taylor *et al.*, (2000) explained the phenomologists view from the eyes of the participants and how they interpret their world. Therefore, it is important for the researcher to understand the participants' viewpoints, because their perceptions may influence their behaviour. However, Lamnek (1988) was concerned that this qualitative-experimental method may limit the focus, scope or operation of research. Since the qualitative methodologies comprise a small number of respondents where the

use of sampling techniques is avoided, and inferences are presented in a descriptive form rather than formulae or statistics, the researcher is required to 'enter into the lives' of the subjects being studied. With this approach, one seeks to avoid either the deliberate manipulation of variables or the study of attitudes or indicators as variables isolated from the wider totality; this is opposed to the characteristic traditional surveys. In this manner, qualitative research can be seen as an exploration of the subject; discovery is part of the process and explanations for phenomena are determined without prior supposition or hypotheses. For this reason the researcher requires a long-term study in order to make the researcher's presence as neutral as possible in the course of observation.

4.4.2 Approach taken by previous research

There is an abundance of texts which present a wide range of research methodologies from which to select the most suitable for a particular research project. As such, there are various dimensions for theoretical and methodological selections, most of which have been well captured by Burrell and Morgan (1979) whose abstract classification schema for understanding broad streams of social science approaches to empirical research has inspired many scholars (Chua, 1986; Laughlin, 1995). There are number of different research approaches upon which ones research can be based (Yin, 2009; Gill and Johnson, 2010).

As the scientific field in regard to shopping centre recycling is still rather young, much of the commercial recycling literature tends to be practitioner based case-studies and lacks empirically tested research findings (Fuller 1994; Pitt 2005; Baharum *et al.* 2010; DEFRA 2010b). The results published to date are rather isolated and comprehensive approaches are rare.

However, what research does exist, mainly exhibits characteristics of the positivist approach. Generally, it attempts to operationalise and measure certain variables

indicating an assumption that an objective truth based on causality can be sought. The main tools used to achieve this are questionnaires and surveys using relatively large sample sizes which are common characteristic of this approach. Although the entire research within the commercial waste management and recycling area does not adopt a positivist approach, the majority of popular studies seem to assume this method. Table 3.1 (in Chapter 3, Section 3.4) gives examples of major studies where the positivist approach has been favourably employed.

Solid waste recycling has been researched from several unique points of view; each discipline looks at the influence of different variables on recycling as outlined in Section 3.4. It has a very broad outlook overlapping several disciplines from the applied to the social sciences, and it has been researched from several unique points of view (Folz and Hazlett 1991; Schultz *et al.* 1995; Ezeah, 2006). As a result of this overlapping nature, data generated from solid waste recycling research often vary from general descriptive information common with human subject investigation to finite experimental data.

Despite the use of standard methodology and terminology, Thomas (2001) suggests that progress has been made in explaining the barriers to implementing success factors which might encourage enhanced recycling implementation from the wider recycling community. However most solid waste recycling research does not address the CSF and methodological triangulation theories; as Table 3.1 provide evidence to indicate that past recycling research has been largely dominated by qualitative methods, and to date, there is a growing indication of increasing methodological diversity being adopted by recycling researchers (Folz, 1991, 1995; Margai, 1997; Nelson, 2002; Tonglet *et al.*, 2004; Kaplowitz *et al.*, 2008; Suttibak and Nitivattananon, 2008; Triantafyllou and Cherrett, 2010). Therefore, discussion of research philosophies as they apply to recycling research can no longer be neglected.

4.4.3 Pragmatism research approach

In order to establish a set of CSFs for shopping centre waste recycling, according to Esteves (2004), a wide array of research methods can be used. Among them are for instance the realisation of case studies (e.g. Sumner, 1999), group interviews (e.g. Khandewal and Miller, 1992), structured interviews (Rockart and Van Bullen, 1986), as well as the analysis of relevant literature (e.g. Esteves and Pastor, 2000). According to Shah and Siddiqui (2006) the most frequently used method to identify success factors is the realisation of a questionnaire.

Even so it is important for a researcher to develop a sound methodology in order to determine which paradigm is appropriate to undertake an investigation. According to Tashakkori and Teddlie (1998), the aggregation of knowledge always follows four paradigms i.e. Positivist (quantitative), Post-positivism, Pragmatism, and Constructivism (Interpretivist/qualitative) approaches. Methodologists when supporting competing paradigms for studying the social and natural science, often cite the conflicting and competing perspectives on the philosophical nature of knowledge. Epistemology, ontology and axiology are the assumptions that are within any research; positivism, post-positivism, constructivism or interpretivism, and pragmatism have their core, criteria for the valuation and reliability of the knowledge that is derived from carrying out research (Tashakkori and Teddlie, 1998 and 2009; Travers, 2001). Through the use of such techniques researchers could obtain a superior scientific understanding of society, which can explain people's actions.

Evidence from previous recycling studies indicate (see Table 3.1) that positivist and interpretative approaches to recycling research are favoured. These two research paradigms have dominated claims regarding their superiority in management research and many authors have identified a number of different paradigms which largely depend on this positivist/interpretative dichotomy (Burrell and Morgan, 1979; Laughlin, 1995;

Lincoln and Guba, 2000). Indeed, it has been argued that 'to be located in a particular paradigm is to view the world in a particular way' (Burrell and Morgan, 1979). Paradigms thus define different views of the social world based upon different meta-theoretical assumptions with regard to the nature of science and society. These methodological approaches are mostly relevant to strategy and solid waste recycling program research.

As discussed earlier, to date, there seems to be a precedent in the solid waste recycling research leaning towards the quantitative or positivist end of the research philosophies continuum. As this research is based upon three research questions as stated in Chapter One and reiterating during the introduction to this Chapter, it is believed that the study is exploratory in nature. For the purpose of this investigation and to illustrate the research design, the cycle of scientific methodology moves from grounded results through inductive logic to general inferences, then from those inferences through deductive logic to tentative hypotheses of the research outcomes. Given this perspective, the three phased approach taken for this research implements the pragmatism research paradigms, which takes on the aspects of both qualitative and quantitative techniques together as data creation methods. Here the pragmatic point of view assumes that either method is useful, rejecting the choice between positivism, post-positivism and constructivism with regard to methods, logic, and epistemology of the research being considered. Pasirin (2005) hails pragmatism as the establishment of mixed methods and, depending on the nature of research, it can be implemented to yield better outcomes.

One of the primary reasons for implementing a mixed methods approach in this research has been to incorporate views from industry, which would not be possible with a purely positivist approach. In this regard, shopping centre managers represent the key decision makers who can confirm findings from the literature and therefore make the research more robust. A purely interpretivist approach was rejected also because this approach relies heavily on the in-depth analysis of a small number of cases in order to understand

behaviour (Bryman and Bell, 2007). Constrained by this limitation, the researcher believes that the sequential approach to a mixed method strategy is appropriate. The orientation of pragmatism toward both subjective and objective points of view could yield better results, as described by Pansiri (2005). Howe (1988) explained that pragmatism is appealing because a) it gives us a paradigm that philosophically embraces the use of mixed method and mixed model designs, b) it eschews the use of metaphysical concepts (truth, reality) that have caused so much endless discussion and debate, and c) it presents a very practical and applied research philosophy.

Given the secondary aim of this study is to establish which of the aforementioned critical success factors have an impact on recycling implementation success, the use of a small sample may give an indication of what the key factors are but it would be difficult to infer any reasonable conclusions regarding the entire UK shopping centre population. For that reason, a purely interpretivist approach was considered inappropriate. This is especially important given the numbers of shopping centres. Several reasons for rejecting the purely interpretivism approach also apply to the realism approach. The main aim of realists is to uncover the underlying mechanisms behind reality (Fisher, 2010). However, the purpose of this study is to identify which factors are more central to the implementation success of shopping centre solid waste recycling and not to find out the reasons behind why this is the case. Although this may be a valuable pursuit, this has been identified as a prospect for further research and is not within the focus of the current study.

Figure 4.1 shows graphically positioning of this research paradigm in terms of the three components of philosophical assumptions, showing how they interact in a dynamic, multi-virtuous and systematic way, together forming a guiding framework for a congruent and coherent system of thought and action. This framework model was adapted from Sexton (2007) in order to help outline the philosophical basis for the chosen research paradigm and research strategy, i.e. the pragmatism approach.

Figure 4.1: Positioning the ‘Pragmatism’ research paradigm

(Source: Adapted from Sexton, 2007)

To summarise, this research adopts a sequential phased approach; it begins with an interpretive method in order to explore a set of CSFs for shopping centre solid waste recycling, and is followed by positivist method, to confirm the CSFs. Here the research intends to explore the set of CSFs, which are rooted in the notion of real-world experience. It is accepted that this knowledge is socially constructed through interpretations of the key participants in the process of implementing recycling initiatives at shopping centre organisations. At later phase of the positivist approach, the researcher intends to confirm these CSFs throughout the perceptions and actions of the key participants involved in the process of delivering recycling, and attempt to understand the way in which they comprehend their world collectively.

From an ontological point of view, this study progresses from the idealism to the realism approach. At the initial phase of the data collection, the nature of this research was to seek understanding of the participants' varying perceptions and meaning via human interactions. This means that this research does not treat the phenomenon under study as an independent and single reality. Instead, it accepts the knowledge claims by understanding the participants' interpretations in relation to the reality.

In terms axiological perspective, this phenomenon under study is interpreted within a context through direct interactions with key decision makers in the industry. The research questions that are being posed in this study are not only exploratory but also explanatory. In line with Yin (2009), this requires in depth analysis of how the appropriate variables are interrelated. For that reason, ethnography with key decision makers interviews were carried out in order to assess and establish factors with a potentially high influence after a set of recurring factors were gathered through secondary data. This was then followed by a hypothetical study by means of both inferential and differential analysis from the data gathered from macro level questionnaire surveys.

This methodological approach is similar to the strategy adopted by several scholars (Suttibak and Nitivattananon 2008) in determining the success factors influencing the performance of municipal waste management relating to solid waste recycling covering a total of 120 solid waste recycling programs located in different urban areas of Thailand. Mathi (2004), Jang *et al.* (2008) and Mouzughi (2009) are in favour of some degree of methodological liberalism in synthesizing paradigms where appropriate in environmental-recycling operation research.

4.5 Phased approach taken by this research

The research approach, strategy and time horizon can be derived from the research philosophy. It is normally argued that research approaches are attached to different

research philosophies (Saunders *et al.* 2007). With regard to the approach taken for this research however, the choice of research philosophy was made independently of previous research and was based on a consideration of the original hypothesis and key questions raised. After determination of the research approach, the researcher proceeded to consider whether the present study should be exploratory, explanatory, or descriptive. The approach must reflect the first two objectives of the research which are firstly to establish the critical success factors for shopping centre solid waste recycling; and secondly, to determine the current implementation trend of these factors by the UK shopping centres.

In order to achieve these research objectives, a mixed methods approach was employed and justified earlier in this Chapter. The early phase of the research method utilised the interpretivist research approach, as an exploratory venture, in order to establish and confirm the CSFs to be used in the research. This was done through the analysis of findings from semi-structured interviews with key informants from shopping centre organisations. This reflects the interpretivist approach given the small sample size and in-depth analysis of meanings.

Moreover, given the lack of availability of prior evidence to formulate hypothesised relationships for causal examination, it was deemed that a cross-section descriptive survey was the most appropriate option for this research. Thus, the next phase of the research employed the cross-section descriptive survey through a macro level questionnaire survey to assess the relationship between the identified CSFs, shopping centre recycling and perceptions of implementation success. Measurement of certain variables is one of the key characteristics of the positivist approach. In addition, the development and testing of the three research hypotheses developed as a result of interviewing key informants gives further confidence to the use of this methodology formulation and testing of hypotheses is a key feature of the positivist approach.

As a result, by adopting both the interpretivist and positivistic view, the present study showed a focus on CSFs shopping centre recycling theory testing. Theory development by means of interpretivism was first adopted as the framework for developing the positivist approach and testing hypotheses in an explicit research context. This emphasises both the inductive and deductive orientation of the research, underpinned by the theoretical framework developed throughout the review of pertinent literature.

4.5.1 Methods for data creation and analysis employed

Critical to establishing a rigorous and robust research design is the development of the CSFs for shopping centre solid waste recycling. As outlined in the Table 4.1, a sequential three phased research approach was designed to allow rigorous and robust techniques for data creation and analysis for the development of CSFs theory at every phases to inform subsequent phases. Relevant procedures taken in every phase of the research together with justification and resulting outcomes for every phase is highlighted in this section. To ensure that the factors identified in the first stage are indeed the correct and comprehensive set of factors that impact on shopping centre solid waste recycling initiatives, the first stage was a broad review of solid waste recycling literature which highlighted key areas of investigation in respect to shopping centres recycling implementation, and also established the importance of CSFs to the recycling field.

The critical review of literature identified a wide range of factors that potentially could have an effect on shopping centre recycling success. Consequently the next stage was an iterative process, whereby each of the factors was assessed independently, with the aim of establishing which of these factors were recurring in the literature and were linked to the success of shopping centre recycling and perceptions of implementation success.

A final outcome of the iterative literature search process was the confirmation of some factors. In total 17 factors were identified as being associated with recycling success.

This stage formed the basis for the development of the CSFs for shopping centre solid waste recycling implementation success which underpin this research.

The next stage utilised the results of the literature review to confirm findings from the first phase. As this research concentrates on specific issues regarding solid waste recycling themes in the context of the UK shopping centres, this research seeks an in-depth understanding of the social process associated with critical issues with regard to recycling, which will be extracted from research participants' opinions, not only from statistical data. Based on this argument, the second phase of this research is exploratory and designed to build theory. Thus, four shopping centre representatives, who represents as the key informants from the shopping centre sector, were interviewed. The four interviewees were selected based on specific recognition awarded by the local councils and other environmental agencies for their best practise in recycling initiatives.

The primary objective here was to establish whether the 17 identified constructs were indeed viewed as necessary and sufficient factors for shopping centre recycling success. The interviews also had the aim of capturing the understanding that participants held for the success factors. This was a very important procedure within the research as the identified constructs are very broad and require further clarification in order to be able to arrive at useful conclusions. Thus, the interviews served to confirm the influence of the constructs on recycling implementation success as perceived by key decision makers in the sector.

Content analysis from the interviews indicated clearly fifteen (15) of the seventeen (17) constructs identified from literature review, with one new construct being perceived by key decision makers from the shopping centres sector as impacting on their recycling success. In sum, eighteen (18) constructs were revealed after the exploratory phase. This however raised the issue of whether the other three (3) remaining constructs from literature review should be eliminated from the research process at this stage or not. As a

result, all eighteen (18) constructs should be carried forward and tested into the confirmatory phase of the research. Primarily, the reason was because it was deemed more viable to eliminate constructs as not having an impact on recycling success at the last phase of the research, after the perceptions of all constructs were considered by respondents at once. Although the aim of the interviews was to prove or disprove the association between the identified factors and shopping centre recycling success, findings from the literature indicated the existence of other constructs as well. For comprehensive purposes, the remaining three constructs which were not verified in the exploratory phase could not be easily disregarded, and were carried forward to the confirmatory phase of the research.

Table 4.1: Three phased research procedures.

| | Procedures | Justifications | Outcomes |
|---|---|--|---|
| First Phase [review of secondary data] | Review of solid waste recycling factors and CSFs literature | To establish development of existing research in the area of shopping centre solid waste recycling; [Objective 1] <i>To develop a theoretical framework on the principle factors affecting the success of shopping centres recycling programs.</i> | To date there is no research on CSFs shopping centres solid recycling; most of the previous research generally focused on other sectors; Development of theoretical framework for shopping centres recycling success. |
| | Identification of most common CSFs | Various literature on CSFs – needed to focus on factors identified as having an impact on solid waste recycling and perceived organisational implementation success | Identification of 17 key factors that have an impact on recycling implementation success in shopping centre sector. |
| Second Phase [Exploratory via Interpretivist approach] | Semi-structured interviews with 4 key decision makers in the UK shopping centre sector (<i>4 interviewees were selected based on best practise recognition for recycling initiatives by local councils</i>) | To confirm findings from Phase One of the research, and allow for new variables to be presented in this exploratory phase. [Objective 2] <i>To identify and validate the key success factors for shopping centre recycling.</i> | Confirmation of 15 out of 17 variables identified in literature review, together with 1 new construct revealed from the interview process. In total 18 constructs to be considered. |
| | Review understanding of constructs by the interview participants (i.e. key informants in the industry) | Due to broad constructs, confirmation of those constructs was required match the findings from literature. | Clearer understanding of constructs, and used to inform the development of the survey tool and theoretical construct for the research. |
| | Use of latent content analysis to analyse interview | Typical method of analysing qualitative interview data | Development of 18 themes regarding CSFs and perceived factors. |
| | Development of research hypotheses | Allow for testing of research findings using rigorous and robust research methods. | Development of 3 research hypotheses that can be tested throughout the quantitative method. |
| Third Phase [Cross-section descriptive via Positivist approach] | Review of construct derived from Phase One interviews | All constructs reviewed to ensure results from interview are incorporated into survey tool. | For purpose of inclusivity, all 18 constructs were considered in the questionnaire survey. |
| | Choice of survey tool | [Objective 3] <i>To establish the extent to which of these critical success factors have impact on the recycling implementation success by the UK shopping centres;</i> Utilised pre-validated tools if available to increase validity and reliability of results. | No pre-validate tool existed for all construct, as the pre-validated tools used in different context and for different purposes, thus new survey instrument need to be developed. |
| | Development of survey instrument based on interviews | Need to incorporate findings from Phase Two into development of survey instrument | Development of new survey instrument |
| | Wider data collection through self-completed questionnaires | Use of self-completed questionnaires reaches wider audience throughout UK, increase ability to confirm findings from interviews. | 94 completed questionnaires from respondents in shopping centre sector in England excluding Wales, Scotland and Northern Ireland. |
| | Data analysis using differential and inferential statistical methods (ANOVA, MANOVA, Pearson correlation, Hierarchical regression) | Confirm results from macro level survey; Rigorous and robust methods of analyses. | Analysis results established associations between CSFs shopping centre solid waste recycling, supporting the 4 hypotheses tested. |

The findings from the interpretivist approach of the second phase enriched the results of this research method and allowed for a deeper analysis to be undertaken. This in-depth analysis of findings was reflected in the development of the final phase (positivist approach of the research) further consolidating the identification of CSFs in shopping centres recycling, supporting the research aims. In consequence, having reviewed the literature and analysed the interviews, the final phase was a confirmatory stage whereby a macro level survey was carried out with the aim of establishing the association between the eighteen (18) constructs, and to identify whether these constructs have an influence on shopping centres recycling implementation success.

To date research, no study has been performed which exclusively compares the CSFs of recycling between shopping centre organisations. However there are pre-validated tools used in different contexts and for different purposes. These are mainly from municipal recycling studies (Folz and Hazlett, 1991). However, no pre-validated survey tool relevant to the current research could be found for all constructs; hence a new survey instrument was developed. The new survey instrument was informed by feedback and responses from interviewees regarding the different constructs as well as their perception of shopping centre recycling as a whole. Primarily, the validation process of the survey tool was carried-out to ensure accuracy of the constructs and internal consistency of the data to be measured.

As it has been mentioned earlier in this chapter, the main aim of this research is to examine the successful implementation of shopping centre recycling initiatives and to establish factors related to their success. This task is to be accomplished by setting out the variables associated with the implementation of recycling initiatives. Hence it is of paramount importance in a research study such as this to identify clearly what

instruments and procedures are to be used in data collection and analysis. Table 4.1 summarises the process and key phases in this investigation.

The three phased approach to research design allowed for the identification of CSFs in shopping centre solid waste recycling implementation. The following section elaborates the three research phases employed.

4.6 Phase 1: Development of theoretical framework

The initial methodology for this research took into account the current characteristics of retail shopping centre recycling research, in keeping with Reed (1998) and Galvan's (2006) views that the method underpinning a research synthesis should be an iterative process. They argued that the important concept to grasp is that the literature search is not just one distinct step in a research task. It is both a step and an iterative feedback loop. Defining an unsolved problem determines the kind of literature search that is appropriate, and performing a literature search helps define an unsolved problem.

The first phase of this research attempted to achieve the first research objective, i.e. developing a conceptual framework for shopping centre recycling implementation success; this is illustrated in Figure 3.1, Section 3.5). According Miles and Huberman (1994), a conceptual framework is a visual or written product, one that "explains, either graphically or in narrative form, the main things to be studied—the key factors, concepts, or variables—and the presumed relationships among them". By principle, the theoretical elements within the framework are important in this exploratory study, where at this early stage of the research, the researcher has limited understanding about what trends exist. As Heinrich (1984) advocated even carefully collected results can be misleading if the underlying context of assumptions is wrong. There are two primary reasons why theoretical frameworks are important at this stage of the research; (1) no matter how little the researcher has thought about the topic, and how unbiased the area understudy is

perceived, it is impossible for a human being not to have preconceived notions, even if they are of a very general nature. These fundamental beliefs about human nature affect how the researcher looks at things when carrying out the research. In this sense, the researcher is guided by the theoretical framework which tends to guide what the researcher perceived in an organisation he observed whilst reducing the problem considerably by simply making the implicit framework become explicit. Once it is explicit, the researcher could deliberately consider other applicable frameworks, and potentially try to distinguish the organisational situation through different lenses.

Given the size and scope of the literature concerning recycling, the main focus of the literature review was to discover the factors that influence success of shopping centre recycling, and to ensure that the factors identified are indeed accurate and comprehensive. In order to have confidence in the identified factors, the review of literature was a multi-staged iterative process, as illustrated in Figure 4.2.

Figure 4.2: Iterative process of literature review.

(Source: Reed 1998)

Chapter Two was a broad review which highlighted solid waste policies at the commercial retail sector level of the UK, with specific attention given to the shopping centre position in material resource recovery. From the review of prior literature, for the retail sector, the greater behaviour change and public awareness of environmental issues has increased pressure on retailers, suppliers and shopping centre managers to improve their environmental performance (Pitt, 2005; DEFRA 2010b). In addition, the costs of both landfill disposal and compliance with environmental legislation are set to increase further in the near future. This justifies the adoption of proactive recycling initiatives through effective FM in shopping centre management, and confirmed the importance of research in this area.

As was discussed in Chapter 3, research examining solid waste management has tended to focus on compartmentalised activities, such as waste recycling, reuse or prevention, with little cross-over between them. Add to these, the vast majority of existing recycling studies that originate from the United States (Folz 1991; Folz and Hazlett 1991; Schultz *et al.* 1995) and it is easy to appreciate that recycling is a heavily researched topic especially from both institutional (Marans and Lee 1993; Ludwig *et al.* 1998; Kelly *et al.* 2006; Kaplowitz *et al.* 2008; Tudor *et al.* 2008; Mahmud and Osman 2010) and municipal sectors (Folz 1991; 1995 and 2004; Margai 1997; Kinnaman 2000; Sakai 2000; Macy and Thompson 2003; McDonald and Oates 2003; Tonglet *et al.* 2004; Timlett and Williams 2007; Suttibak and Nitivattananon 2008; Sidique *et al.* 2009). Further, much of the research in the recycling domain examines both the descriptive and explanatory elements of recycling on the impact of recycling success.

To this end, a considerable amount is already understood regarding recycling. However, how recycling relates to the shopping centre sector is still fairly understudied. Despite the prime example of Fuller's (1994) exploratory study on the US shopping centre recycling strategies in the 90's, overall the literature review revealed that much of the shopping centre solid waste recycling literature lacks empirical testing and consists predominantly

of practitioner based success stories (BEC, 2004; Recycle Zone, 2010; Queensgate 2010; BCSC 2010).

The critical review of literature reconciles a number of factors that potentially could have an effect on shopping centre solid waste recycling implementation success. However, certain factors had to be categorised under one comprehensive heading as different research gave different themes to similar areas. For example communication, campaign, and exhibition were all grouped under the awareness heading. Finally, the iterative literature search process confirmed some factors as being continuously linked with shopping centre recycling success. In total, the literature review arrived at seventeen (17) factors identified as associated with the success of shopping centre recycling initiatives.

As a result, findings from the literature review process have resulted in a research framework for shopping centre recycling success that conceptualised the links between the 17 recycling variables, shopping centres scheme formats and implementation success. This is detailed in Section 3.5 and forms one of the original contributions to knowledge of this work.

Based on the conceptual framework established for this research, the next phase sought to prove the importance of the identified success factors. As a consequence, this literature review phase revealed seventeen (17) factors to be carried forward to the next phase; to be confirmed through interviews with key informants in the shopping centre industry.

4.7 Phase 2: Exploratory phase of key informant interviews

Key informant interviews were carried out in order to select and assess factors with a potentially high influence after a set of 17 influencing factors was gathered through extensive literature review. The key aim of this exploratory phase was to identify a robust set of success factors associated with achieving an overall success of shopping centre

recycling initiatives. Further, this phase is required to validate the literature review findings and confirm that the recycling variables reflect the main concerns of the participants in the industry.

As discussed in Section 4.4.3, the research adopted an inductive approach for the exploratory stage in order to ascertain the main factors that lead to success in shopping centre recycling initiatives. Although, there is a lack of research in the shopping centre recycling field, it was deemed important to explore whether the variables proposed by the previous research from relevant sectors were utilised by those actively implementing recycling initiatives in shopping centres. This is imperative to find out whether these factors were viewed as critical and satisfactory for recycling implementation success.

4.7.1 Interview process development

To confirm the variables, the interviews were semi-structured in order to address a particular topic but also to allow for any emergent themes to develop (Jankowicz 2000). This format was integral to the aim of this research phase which was to reconcile variables identified from the existing literature but also allow other relevant issues to be presented.

Thus, a sample of the population for traditional scheme format, i.e. regional and community shopping centres based on the Pan European Shopping Centre Guideline (ICSC 2005) was used to identify the interviewees or participants from the industry. This format was previously defined in Chapter 2, Section 2.4.2, to allow particular sampling selection. Moreover, this guideline was also used to ensure non response bias in the selection of variables to be employed in the study. The interview procedure was pre-tested with the supervisory team and a number of minor changes were made as a result.

As mentioned earlier in Section 4.5.1, only four interviewees were selected based on recycling recognitions awarded from their best practise in the recent years. With the anticipated competencies and experience gained by these interviewees, the researcher assumed the selected interviewees capable to provide productive response throughout the interview process. As shown in Table 4.2, the number of key informant interviews that could be conducted was limited to 4 interviewees over the period of four months, due to the lack of time available for interviewees, and resources due to geographical constraint. The interviewees were contacted first by both email and telephone to explain the purpose of the research and to arrange for a meeting. Moreover, it was semi structured and the CSFs in shopping centre recycling were the general theme in the questions that were asked, with the aim of answering the research questions and objectives of the study (see detail interview question in Appendix A). At the same time the chance was given to the key informant interviewees to comment regarding how the recycling was implemented and the relevant processes involved.

Table 4.2: Interviewees' profiles

| Tag | Recycling Coordinators | Shopping centre scheme | Position in material extended channel | Recognitions |
|------------|-------------------------------|---|--|-------------------------------------|
| SC1 | Centre manager | Very Large (above 80,000m ²) | Waste Producer & Broker | Environmental award |
| SC2 | Deputy general manager | Very Large (above 80,000m ²) | Waste Producer | EMS best practise |
| SC3 | Facilities manager | Very Large (above 80,000m ²) | Waste Producer & Broker | Waste management & Recycling awards |
| SC4 | Assistant centre manager | Medium (between 20,000-39,999m ²) | Waste Producer | Recycling awards |

Consent was taken from the interviewees to access documents and files regarding the initiatives. Anonymity and confidentiality were assured to the interviewee. The interviewees were asked to provide documents, reports, or any useful materials that show

the progress (or process) of implementing recycling initiatives. In return, a report of the findings will be sent to the interviewee.

Accordingly, 3 of the 4 interviews were face-to-face with the centre managers, or those with position equivalent to recycling coordinators (i.e. facilities managers), at the shopping centre office of each. Every interview was digitally-recorded by consent of the interviewee. The length of time for the interview varied, mainly due to the availability of the interviewee. On average, each interview lasted one hour. One interview was conducted via telephone due to difficulties encountered in arranging a convenient time and location. To ensure no information loss throughout the procedure, follow-up phone calls were made to cover some aspects that were not fully covered in the interview.

Audio recording was identified as the most suitable method of fully capturing the content of the interviews. Through audio recording, the interviewer could focus on the conversation and maintain eye contact with the interviewee, which has been found to be helpful in an interview situation (Oppenheim, 1992; Creswell and Plano Clark, 2007) without having to be concerned with note-taking. Therefore, permission was sought prior to the interview taking place. This was obviously not possible for the telephone interview and hence note-taking was used. Further, to validate responses, rephrasing of interviewees feedback was performed continually during the interviews. Essentially this technique was employed to confirm understanding of responses and reduce interviewer bias (Jankowicz 2005).

4.7.2 Analysis of interview

In this research, the qualitative data stemmed from the four interviews (transcribed from the digital audio recorder) and documents collected from participating shopping centre organisations. Once a summary document was created for the interviews from the

transcripts, a qualitative content analysis was adopted to analyse the open-ended questions. Accordingly, qualitative content analysis has been defined as:

- “a research method for the subjective interpretation of the content of text data through the systematic classification process of coding and identifying themes or patterns” (Kent, 2001; Hsieh and Shannon, 2005);
- “an approach of empirical, methodological controlled analysis of texts within their context of communication, following content analytic rules and step by step models, without rash quantification” (Mayring, 2000); and
- “any qualitative data reduction and sense-making effort that takes a volume of qualitative material and attempts to identify core consistencies and meanings” (Patton, 2002).

Precisely, this technique was used to analyse the qualitative data in order to discover other hidden factors that lead the shopping centre managers to implement the recycling initiatives effectively. Content analysis was therefore developed throughout the coding process, which involved choosing themes from the common discussion points and primary patterns of the interviews. The constant comparative method along with open coding, axial coding, and selective coding were employed to aid in the identification of separate themes (Neuman, 1997; Cavana *et al.*, 2001). At the beginning, themes were assigned to the data based on first thoughts. The themes were then re-examined and compared to other themes to eliminate any potential overlap that existed. When overlap was identified the themes were reanalysed and collapsed or expanded as deemed appropriate. Once the interview transcripts were coded to appropriate themes they were structured into groups to allow for further latent content analysis and interpretation. A matrix approach was then used to help identify patterns in the data (O'Dwyer, 2002).

Resulting from the latent content analysis, only fifteen (15) variables were apparent of the seventeen (17) variables identified from literature review, and one (1) new variable was

presented by the key informants through interview, as shown in Table 4.3. As portrayed in the prior recycling literature and for comprehensive purpose of the study, eighteen (18) variables or recycling success factors in total were considered to be of significance in successful implementation of shopping centre recycling initiatives.

Table 4.3: Validating the shopping centre recycling CSFs

| Critical Success Factors | Literature review | Key informants Interview |
|---|-------------------|--------------------------|
| 1. Goal-setting policy | √ | √ |
| 2. Partnerships | √ | √ |
| 3. Program champion from top management level | √ | √ |
| 4. Awareness-raising | √ | √ |
| 5. Training program | √ | √ |
| 6. Prioritise source separation | √ | √ |
| 7. Materials collection methods | √ | √ |
| 8. Alternative recovery methods for residual waste | √ | √ |
| 9. Provision for Materials Recovery Facilities (MRF) | √ | √ |
| 10. Green lease | √ | √ |
| 11. Service provider contract provision | √ | √ |
| 12. Regular monitoring and reporting of recycling performance | √ | √ |
| 13. Recycling C&D waste during fit-out works | √ | √ |
| 14. Monetary incentives or rewards | √ | √ |
| 15. Proximity of recycling facilities for separate storage | √ | - |
| 16. Making recycling mandatory | √ | - |
| 17. Environmental Management System (EMS) certification | √ | - |
| 18. Marketing recyclable materials for exchange | - | √ |
| Total items | 17 | 15 |

In sum, the result from this second phase of the research was the confirmation of the variables identified in phase one together with an in-depth understanding of the key recycling issues perceived by the key informants in the industry. Furthermore, this process allowed for the development of the research hypotheses testing and formed the basis for the development of the positivist research approach, as a survey instrument is discussed in the following section.

4.8 Phase 3: Confirmatory phase of questionnaires survey

The third objective of this study is to permit a better understanding of what combination of factors constitutes the best practise in shopping centre recycling. A cross-sectional study aims at to examine how differences between the UK traditional shopping centre scheme formats interact with a series of individual characteristics to influence engagement in recycling initiatives.

It must be noted that beside the interview, the questionnaire survey was used as main data collection instrument of this study because the questionnaire survey enables researchers to examine and explain relationships between constructs in depth, in particular cause-and-effect relationships (Saunders *et al.* 2007). The questionnaire covered the literature identified during the first phase of research as well testing the three hypotheses developed as a result of the second phase of exploratory research. Given the large number of variables under question together with the size of population understudy, the most appropriate means to collate this was deemed to be the most appropriate method by which to collect data.

A key aim in developing the questionnaire, which was self-administered and distributed via both online and postal services, was to attain the objective three; to assess the impact of the critical success factors on recycling implementation success in UK shopping centres, by using specific hypothesis tests. Appendix B presents a blank copy of the

respondents' questionnaire as designed by the researcher along with his supervisory team. The rationales that informed the choice of questions were essentially twofold. First, there was the desire to obtain data that on analysis could help realise the immediate objectives and hypotheses testing of the research. Secondly, it was necessary to gather empirical data in critical areas of UK shopping centres recycling where presently there is none.

4.8.1 Development of the survey instrument

Several scholars (Oppenheim, 1992; De Vaus, 2002; Baker, 2003; and Leitz, 2009) have outlined the critical elements of a good survey and recommended best practises for questionnaire design and administration. Following their recommendations, the questionnaire was designed for self or guided completion and worded so as to be brief, and easy to interpret, completely without bias or ambiguity, and focused on current attitudes and recent behaviour. Also, Converse and Presser (1986) have argued that although the use of closed or structured questions forces respondents into adhering to pre-defined answers limiting the representation of individual views, closed questions do allow for better detection of similarities and differences amongst the sample population. This is one of the main aims of this research in drawing up a general view of the variables influencing respondents' implementation success.

The questionnaire consists of four sections, and total of 36 questions over 6 pages. A mixture of closed and open-ended questions is used, and almost all require respondents to tick appropriate boxes. The respondents were able to skip question(s) where they found it difficult to disclose the information due to confidentiality. The first section represents general information, followed by section two which identifies respondent's occurrence in carrying out the initiatives. The third section of the questionnaire measures the constructs in terms of their importance and implementation success on a five point Likert scale. It also assesses ranking of these constructs from overall perceptions. The approach

represents an attempt to seek factual responses and to facilitate respondents in answering the questionnaire.

4.8.2 Pre-testing of the questionnaire

Pre-testing of questionnaire surveys is often essential to establish that a questionnaire is well designed and will be able to achieve all the data gathering objectives. According to Munn *et al.* (1999), apart from being useful in evaluating the clarity, feasibility and comprehensiveness of a survey, pilot studies go a long way in testing the rigour and robustness of methodological frameworks for survey. For these reasons, an attempt to pre-test the survey instrument was carried out in two rounds with different a set of objectives for each round.

After the questionnaire was conceptually developed, it was first reviewed by the researcher's supervisory team, led by a professor in the area of FM (FM). The purpose of this revision was to ensure that the questionnaire possessed face validity, and to reduce wording ambiguity and potential confusion in each question. Some questions were rephrased to ensure clarity. Once the target questionnaire was refined, it was ready for pre-testing with potential informants to establish an initial reliability assessment.

The first round of the questionnaire pre-test was aimed to capture potential wording ambiguities, timing, and other difficulties encountered by the respondents in completing the questionnaire. This round involved interviewing two shopping centre managers; the outcome from these interviews revealed that interviewees are not inclined to give hard figures about the operational cost involved or the volumes of waste disposal and recycling due to commercial confidentiality. Amendments were made accordingly.

The second round of questionnaire pre-test aimed to provide assurance that there were no ambiguous nor confusing questions, and served to obtain some confidence of the

questions' validity and the likely reliability of the data that would be collected. Pole and Lampard (2002) argues that to ensure validity of responses, it is often necessary to ensure that the sample for a pre-testing survey is selected from, or approximates to, the actual sample of the main survey. At this point the sample for the pre-testing of the survey in this research had been drawn from nine shopping centres managers during the BCSC conference held from 9th to 11th November 2009 in Manchester. The initial descriptive analysis was run using statistical techniques (i.e. means, standard deviation, and initial reliabilities). The results were satisfactory.

4.8.3 Sampling determination

Sampling is “the selection of a fraction of the total number of unit of interest to decision makers for the ultimate purpose of being able to draw general conclusions about the entire body of units” (Parasuraman *et al.* 2004). “A conclusion can be made from the sample about the population to achieve the research objective” (Saunders *et al.* 2007). It is, therefore, rare for research to survey the entire population due to cost and geographical constraints, especially, when the population is very large. The present research incorporates the procedure for drawing a research sample based on Churchill and Iacobucci's (2004) and Wilson's (2006) suggestions as illustrated in Figure 4.3.

In addition, Pitt (2005) argues that the waste trends from UK shopping centres were varying according to site characteristics and the size of the shopping centre. With regard to this inference, the researcher believes that classifying the type of respondent based on shopping centre size is appropriate to minimise respondent bias. There was no classification standard for UK shopping centre size and format, therefore the sampling determination for this survey adopted the working definition for a traditional shopping centre scheme format, as outlined in the International Standard for European Shopping Centres (ICSC Research, 2005).

Figure 4.3: Procedure for drawing a research sample.

(Adapted from Churchill and Iacobucci's, (2004) and Wilson's, 2006)

It was deemed appropriate to adopt this model as it helps the researcher to determine the sample size according to the types of respondent based on scheme sizes against the overall population of traditional UK shopping centres, to identify if there are any significant differences with regard to each construct developed in the questionnaire. With total population of 598 traditional shopping centre formats, the study only focuses on 20,000 meter square leasable area. This brings about a total of 211 sample size to be observed. Table 4.4 shades the relevant elements of the sampling model utilised in this work, which excludes the traditional shopping centres with less than 20,000 meter square of gross leasable area. Main reasons for excluding this respondent group were due to the

basic operational characteristics (Musa and Pitt, 2009) and less volume of waste generated by this group in contrast to larger scheme groups. As a result of this, a sample of 211 shopping centres was selected, which represent Medium, Large and Very Large scheme types of traditional shopping centre formats.

Table 4.4: Numbers of respondent according to shopping centre schemes

(Source: BCSC (2003); ICSC (2005))

The final version of the questionnaire was printed out and posted with pre-paid return envelopes to 211 shopping centre managers throughout the United Kingdom, of which 30 were Very Large scheme, 48 were Large scheme, and 133 were Medium scheme, as detailed in Table 4.4. The field study was carried out during February to April 2010 ended with 25 % response rate. Due to the low response rate, a re-run survey was deemed necessary, and the original questionnaire format was adapted using the Bristol Online survey; this was carried out between May and July 2010. This was to ensure adequate sample size for statistical analysis.

As a result the response rate was 44.5 %, which ended with a sample size of 94 responses, of which 17 were Very Large scheme, 22 were Large scheme, and 55 were Medium scheme. Margin of error for this pooling sample is 5.43% with a confidence level of 95% to be evaluated. This rate is deemed adequate for statistical analysis to be employed according to Yu and Cooper (1983), Sue and Ritter (2007) and Field (2009).

4.8.4 Consideration of respondents' bias

It has become widely accepted that correlations between variables measured with the same methods are inflated due to the action of common method bias, also referred to as common method variance (Bogazzi *et al.* 1991; Podsakoff *et al.* 2003; Spector 2006). Although a number of sources suggested that this problem is overstated (Spector 2006), statements suggesting that common method bias is a serious problem persist.

Podsakoff *et al.* (2003) describe the common method bias as a concern when the instruments the researcher employs enter into or affect the scores or measures that are being gathered, resulting in measurement error which may in turn undermine the validity of the conclusions about relationships between measures (Nunally 1994). Spector (2006) noted that the concern for bias is mostly raised when cross-sectional, self-reported surveys are employed as a research instrument. Campbell and Fiske (1959) argue that one needs comparative methods to know whether there is such bias.

Recognising the issue of respondent bias and its serious consequences to the overall findings, the present study followed Podsakoff *et al.*'s (2003) recommended remedies to minimise and control bias from potential sources, provided that remedy techniques are applicable in this research context. In view of that, the present research considered two techniques to control the bias by means of procedural remedies and statistical remedies as suggested by Podsakoff *et al.* (2003).

Given that there was no pre-validated survey instrument developed to steer the present work, it was not possible to obtain ratings from other sources for the item constructs. Instead, several procedural remedies related to questionnaire design were considered specifically for measuring the item constructs presented in section three of the questionnaire. First, careful construction and clarity of the scale items was achieved using a systematic questionnaire and measure development process. Second, psychological

separation of questions was used in the questionnaire. According to Podsakoff *et al.* (2003), psychological separation is an attempt to “make it appear that the measurement of the predictor variable is not connected with or related to the measurement of the criterion variable”, and is recommended when it is not possible to gather data from different sources. The researcher believes that respondents are less likely to alter their answers once they have already moved onto the further part of the questionnaire. Finally, the anonymity and confidentiality of participants were guaranteed.

Statistical remedies were employed to eliminate the possibility of bias between the responses of different respondent groups, responses of each group were analysed separately, to control overall representative bias. Such statistical methods used in the present study were analysis of variance methods, i.e. the (Multivariate Analysis of Variance) MANOVA, Univariate Analysis of Variance (ANOVA) and Hierarchical multiple linear regressions (explained in Section 4.9).

4.9 Methods for statistical data analysis employed

It is noted that statistical techniques are a major tool for data analysis in social science research (Nachmias and Nachmias 2008; Field 2009). However, most of multivariate techniques share a common limitation: each technique can only investigate one relationship at a time (Hair *et al.* 2006). In order to achieve the third objective of this research (i.e. to establish the extent to which of the critical success factors have an impact on the recycling implementation success of UK shopping centre), several methods of statistical analysis are used to assess the current practice (will be explained further in Chapter Five, Section 5.6)

Recognising the objectives of the present study is regarded as the most effective analytical instruments (Byrne 2002; Hair *et al.* 2006; Field 2009). Hence, for the purpose of setting up the hypotheses tests for this research, Pearson product–moment correlation,

ANOVA, MANOVA and hierarchical multiple linear regression procedures were employed as applicable methods of statistical analysis.

Data generated from the questionnaire survey was analysed using the Statistical Package for the Social Sciences (SPSS, Version 17). Most of the data generated from Section Three of the questionnaire survey was ordinal in nature (responses were mainly ratings measured on the Likert scale). However, the normality test was not deemed necessary under this condition as Analysis of Variance (ANOVA) capable solve this issue. Practically, ANOVA provides a statistical test of whether or not the means of several groups are all equal, and therefore generalises *t*-test to more than two groups. Doing multiple two-sample *t*-tests would result in an increased chance of committing a type I error. This procedure concurs with Tonglet *et al.* (2004) as this was performed using parametric statistical tests, namely the ANOVA.

As some of the data from the questionnaire survey was nominal in nature. According to Field (2009) and Tabachnick and Fidell (2001), such data is best analysed using descriptive and any inferential statistics. Descriptive statistics describe samples of subjects in terms of variables or some combination of variables (Tabachnick and Fidell, 2001). It therefore involves the use of frequencies, percentages, means and standard deviation to describe variables encountered during the study. These techniques were employed for analysing data relating to the characteristics of the organisations represented by respondents. Graphical techniques were utilised for presenting the results from these analyses including charts and tables as elaborated in Section 6.3.

4.9.1 Pearson's correlations procedure

There are several statistical techniques that allow researchers to measure the extent to which two variables are associated by a single summarising measure. Such measures of relationship, often referred to as a correlation coefficient, reflect the strength and the

direction of association between the variables, and the degree to which one variable can be predicted from the other (Nachmias and Nachmias 2008). It ranges from +1 to -1. A correlation of +1 means that there is a perfect positive linear relationship between variables, a correlation of -1 means that there is a perfect negative linear relationship between variables, and finally, a correlation of 0 means that there is no relationship between variables (Nachmias and Nachmias 2008). The final step in the relationship analysis procedure was to use the data to examine if there is any significant correlation between the importance levels of recycling factors and the extent to which these factors are presented by the shopping centres management. Pearson correlation analysis was deemed the most appropriate method to achieve this aim as correlation analysis tests whether a relationship exists between two variables (Field, 2009). Further detail of this procedure can be illustrated in Figure 4.4.

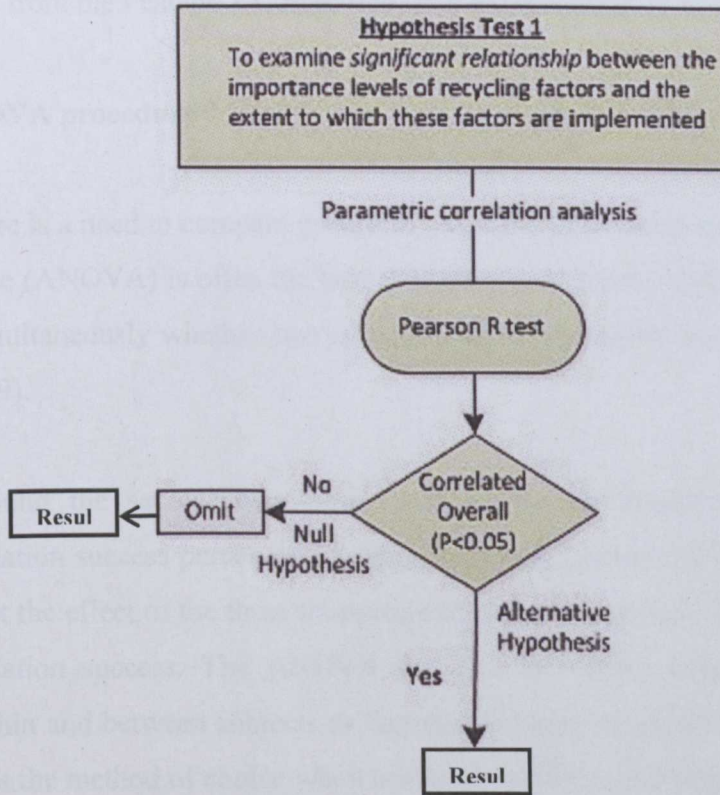


Figure 4.4: Hypothesis test using Pearson correlation procedure

Moreover there is support in the waste recycling literature for the use of correlation analysis in establishing the association between variables (Mersky 1988; Folz and Hazlett 1991; Clarke and Maantay 2006) and thus, this research is not diverging from norms set in the solid waste recycling field. Thus, to establish the relationship between the two variables, the perceptions of critical importance and implementation success attached to the 18 constructs were correlated using the Pearson product–moment correlation analysis technique. This involves initially setting up compound variables in SPSS in order to enable the testing of the association between two variables. This data was extracted from Section Three of the questionnaire. The resulting correlation coefficients (r values) indicate the strength of association for each individual construct between the perceptions of importance and implementation success. Detailed procedure on relationships analysis and results from the Pearson’s Correlation tests are presented in Section 6.4.

4.9.2 ANOVA procedure

Where there is a need to compare groups of cases for differences in their means, Analysis of Variance (ANOVA) is often the best statistical test option. ANOVA is a technique for testing simultaneously whether two or more population means are significantly different (Field 2009).

Based around the second hypothesis, testing was developed to evaluate recycling implementation success perceived by three respondent groups. A one way ANOVA was used to test the effect of the three shopping centre scheme groups’ variations on recycling implementation success. The ANOVA test can be within subject, between subjects, mixed within and between subjects or factorial between subjects (Field, 2009). One way ANOVA is the method of choice when testing for differences between multiple groups. It assumes that the mean is a valid estimate of centre and that the distribution of the test variable is reasonably normal and similar in all groups Essentially, this technique was

used because this set of analytic procedures allows one to test if the means being compared are vary from one another (Tabachnick and Fidell, 2001; Field, 2009). In this procedure, one estimate comes from the differences among scores within each group. This estimate is considered a random or error variance. The second estimate of variance comes from differences in group means. This is considered a reflection of group differences. Where two of these estimates do not vary significantly, a conclusion is made that all of the group means come from the same sampling distribution of means and that the slight differences between them are due to random error (Tabachnick and Fidell, 2001). Where, however, the group means differ significantly, a conclusion is made that they were drawn from different sampling distribution of means, and the null hypothesis that the means are the same is rejected.

Primarily the aim of using this statistical procedure is to avoid using a single criterion to measure implementations success. Given the problems inherent in previous measurement instruments for recycling success highlighted in Section 3.3 of Chapter Three, subjective self-reported measures of success were anticipated. This approach is in line with Dawes (1999), as he stated “*one common feature of research on company’s performance is that studies generally incorporate subjective measures of performance as the dependent variables*”. He goes on to say that the term subjective is used to mean that the company’s performance score is derived using a scale rating. These can be contrasted with an objective measure that would be an actual percentage or figure, for example, percentage of waste recycled or cost versus saving made from operations. Jaworski and Kohli (1996) point out that the reliance on subjective measures is a limitation of the research to date. However, there are several advantages to using them to since accurate, precisely comparable, and centrally collected data (e.g. cost) is not readily available (Dawes 1999). Dawes (1999) added the subjective measures may be more appropriate than objective measures for comparing performance in cross-industry studies because performance levels can vary considerably across industries, obscuring any relationship between the independent variables and company performance. Thus, subjective measures might be

more appropriate in this situation because managers can take the relative performance of their industry into account when providing a response. In doing so, the study developed a new series of summated rating scales, capturing the entire recycling implementations domain of shopping centre recycling. The respondents were asked to evaluate the level of implementation effectiveness for the 18 constructs used in the Section Three of the questionnaire, based on a five point Likert scale. Therefore, a multi-faceted indicator of shopping centre recycling implementation success will be measured and considered as a fair representation of an organisation's perceptions of its levels of success.

Prior to the ANOVA test, to determine the variations of recycling implementation success between respondent groups, it is imperative to construct a composite variable to define the dependant variable (DV), as implementation success proxy. In construct phenomenon, i.e. recycling implementation success cannot be measured directly by one single measure. Thus a proxy measure through multiple questions (Lewis and Slack, 2003) extracted from the questionnaire, was used to capture this multidimensional or composite variable which represents the overall implementation success for shopping centre recycling. The proxy measure was to ascertain the overall mean value to be used as DV during the ANOVA procedure. In view of that, the proxy measure for the composite variable can be defined by the following equation:

$$\textit{Implementation success proxy (DV)} = D1... D18/18 \textit{ item constructs} = \textit{mean score.}$$

Equation 4.1

Analysis of variance on the effect of recycling implementation success level on three shopping centre scheme groupings was based on an initial hypothetical premise as summarised by the null hypothesis in Section 6.5.1.

Analysis of variance can be summarised mathematically in terms of the partition of the sum of squares as

$$SS = \sum (x - \bar{x})^2$$

Equation 4.2

Where SS = sums of squares, x = individual estimate and \bar{x} = average or mean score.

$$s^2 = \frac{\sum_{i=1}^n (x - \bar{x})^2}{n-1}$$

Equation 4.3

Where x and \bar{x} are individual scores and the group's mean score, respectively.

The numerator part is called the *sum of squares* of deviations from the mean, and the denominator is called the *degrees of freedom*.

The square root of variance is standard deviation, S , a measure of variability:

$$S = \sqrt{s^2}$$

Equation 4.4

Variation is calculated as the ratio of mean square deviation between respondent groups and within respondent groups, otherwise known as the (F) statistic. The extent or how significant (insignificant) the calculated variation is can be reflected by the value of the (P) statistic; where $P \leq 0.05$ the level of variation is said to be statistically significant. Results of this test (as shown in Table 6.31, Section 6.5.3 of Chapter Six) indicate that the variation (Sum Of Squares), the degrees of freedom (df), and the variance (Mean Square) are given for the within and the between groups, as well as the F value (F) and the

significance of the F (Sig.). Sig. indicates whether the null hypothesis – i.e. the population means are all equal – has to be rejected or not.

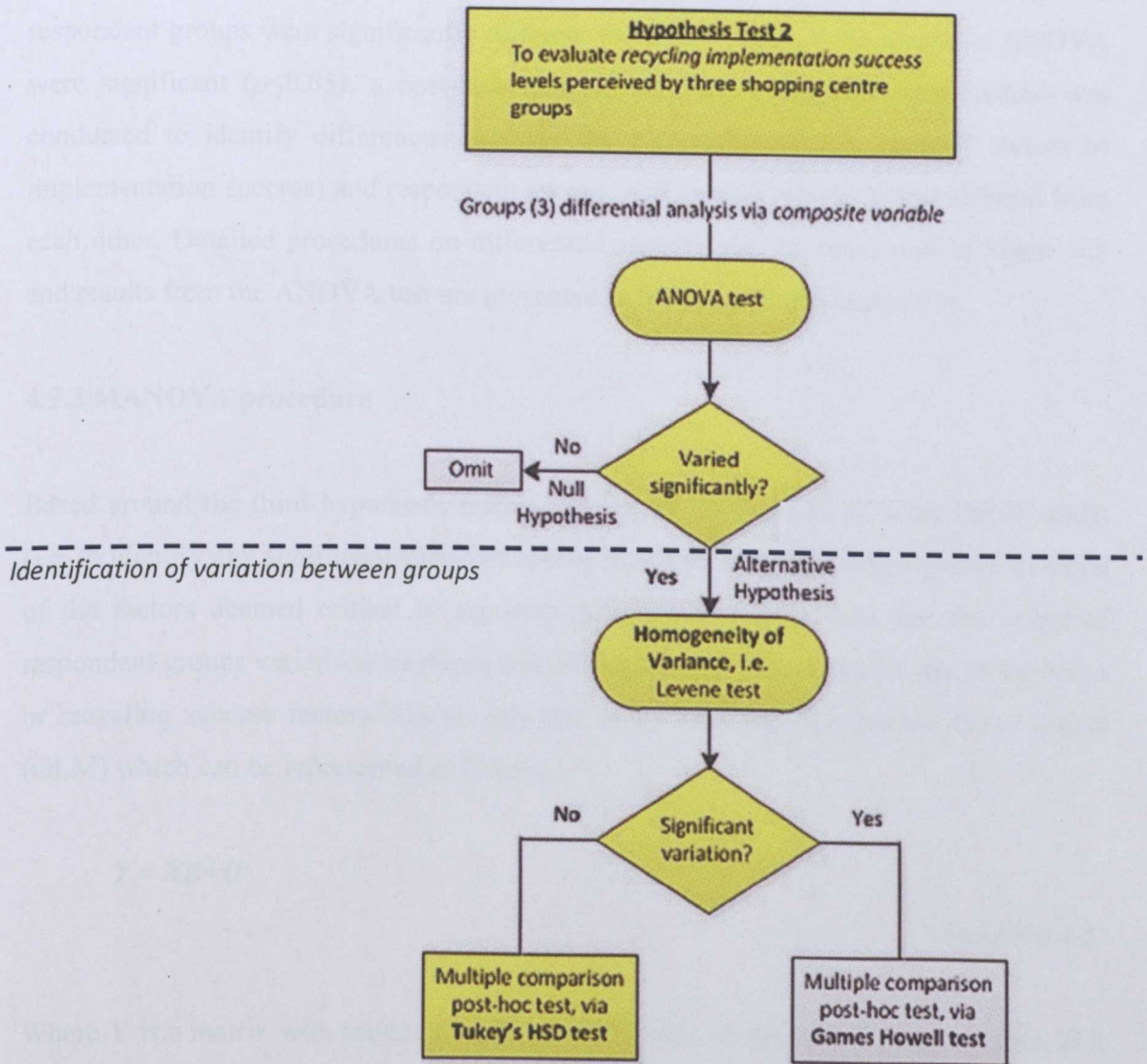


Figure 4.5: Hypothesis test using ANOVA and Post-Hoc procedures

As such, results having a significance of 0.05 downwards are assumed to be conclusive. That is, if a particular result that has a 0.05 probability level or less or has occurred by chance, the null hypothesis will be rejected. At this point, it is important to realise that the one-way ANOVA is an omnibus test statistic, but is unable to find out which specific respondent groups were significantly different from each other. If the results of ANOVA were significant ($p < 0.05$), a post-hoc analysis with the Tukey HSD test method was conducted to identify differences between the composite variable (overall factors of implementation success) and respondent groups, and specify which groups differed from each other. Detailed procedures on differential analysis can be illustrated in Figure 4.5 and results from the ANOVA test are presented in Section 6.5 of Chapter Six.

4.9.3 MANOVA procedure

Based around the third hypothesis testing developed for this part of quantitative study, (i.e. to identify any significant variation among the three shopping centre groups in terms of the factors deemed critical to success). MANOVA was used to test the effect of respondent groups variations on perception of importance with regard to the 18 variables or recycling success factors. Statistically the study employed the general linear model (GLM) which can be represented as follows:

$$Y = XB + U$$

Equation 4.5

Where Y is a matrix with series of multivariate measurements, X is a design matrix, B is a matrix containing parameters that are usually to be estimated and U is a matrix containing errors. In principle, the general linear model incorporates a number of different statistical models such as ANOVA, MANOVA, ordinary regression, F-test and t-test (Field 2009). Where there is only one column in Y (i.e., one dependent variable) then the model can also be referred to as the multiple regression model (Mardia *et al.*,

1979). Hypothesis testing using general linear model can be made in two ways: multivariate and mass-univariate. Most of the data generated from the questionnaire survey were ordinal in nature (responses were mainly ratings measured on the Likert scale). This group of data were initially subjected to a test for normality which showed that data were approximately normally distributed. Following Folz and Hazlett (1991), analysis of such rating data was carried out using Multivariate Analysis of Variance (MANOVA). Figure 4.6 illustrates the MANOVA procedure used in this study.

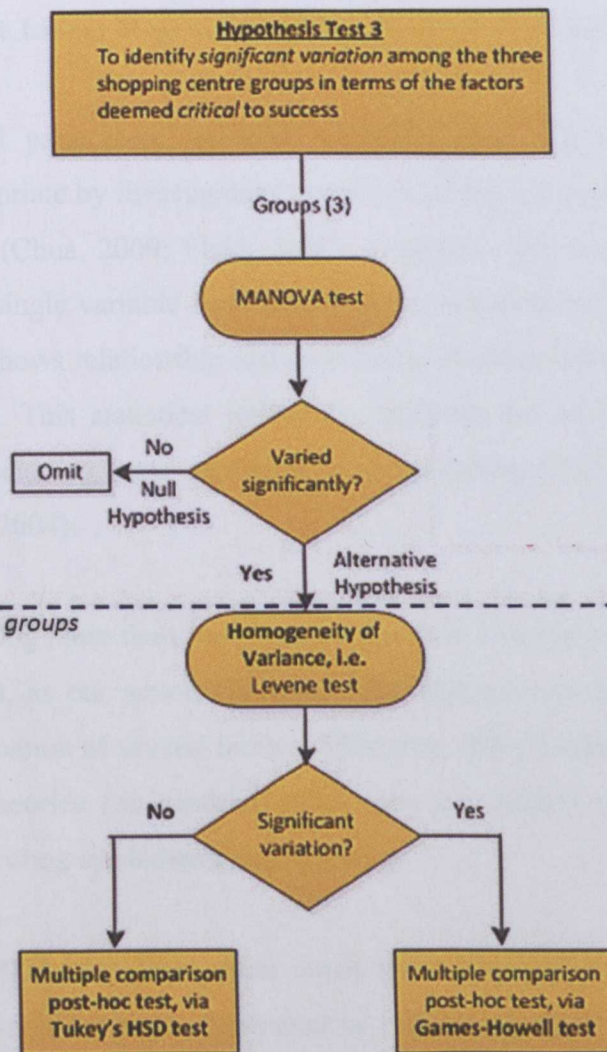


Figure 4.6: Hypothesis test using MANOVA and Post-Hoc procedures

To identify any difference in regard to the critical importance of recycling factors between the three shopping centre scheme groups, a brief description dealing with the hypothesis three testing together with the detailed MANOVA procedures is included in Section 6.6. Results having a significance of 0.05 downwards are assumed to be conclusive. That is, if a particular result has a 0.05 probability level or less or has occurred by chance, the null hypothesis will be rejected.

4.9.4 Hierarchical Multiple Linear Regression (MLR) analysis procedure

To observe the influential parameters involved, multiple linear regressions (MLR) analysis was deemed appropriate by investigating the effects of the independent variables on the dependent variable (Chua, 2009; Field, 2009). In general, the purpose of linear regressions is to predict a single variable from one or more independent variables. The result of linear regression shows relationship and correlation between dependent variable and independent variables. This statistical method is probably the most widely used method in social science including waste management and recycling studies (Folz, 1991; Hass, 1997; Tonglet *et. al*, 2004).

In regard to this study, having more than one predictor variable is useful when predicting the respondents perception, as our actions, thoughts and emotions are all likely to be influenced by some combination of several factors. Therefore, (MLR) was chosen so that the researcher can test theories (or models) about precisely which set of CSFs is influencing the overall recycling implementation success.

The general purpose of MLR is to learn more about the relationship between several independent or predictor variables and a dependent or criterion variable. The estimated regression function describes the nature of the relationship between independent and dependent variables. The method do not directly manipulate the predictor (or

independent) variables but instead just measure the naturally occurring levels of the variables and see if this helps the researcher to predict the score on the dependent variable (or dependant/explanatory variable).

Consequently, MLR with several predictor variables is an extension of linear regression with two predictor variables (Chua, 2009). A linear transformation of the X variables is done so that the sum of squared deviations of the observed and predicted Y is a minimum. The computations are more complex, however, because the interrelationships among all the variables must be taken into account in the weights assigned to the variables. The interpretation of the results of a MLR analysis is also more complex for much the same reason. Statistically the MLR formula which can be represented as follows:

The prediction of Y is accomplished by the following equation:

$$Y'_i = b_0 + b_1X_{1i} + b_2X_{2i} + \dots + b_kX_{ki}$$

Equation 4.6

The "b" values are called regression weights and are computed in a way that minimises the sum of squared deviations

$$\sum_{i=1}^N (Y_i - Y'_i)^2$$

Equation 4.7

in the same manner as in simple linear regression. In this case there are K predictor variables rather than two and K + 1 regression weights must be estimated, one for each of the K predictor variable and one for the constant (b_0) term. Given the context of the present observation, 18 predictor variables (IV) are taken into account in this model.

To do this, the researcher referred the 18 recycling factors as independent variables or predictors, and the overall recycling implementation success as dependant or explanatory variable (Y). These predictors and explanatory variables were then computed under the MLR equation, as given in the *equation 4.6*. Value for the dependant variable, Y , again, is referred to the proxy measured of recycling implementation success as prescribed in the previous ANOVA procedure (detailed in Section 4.9.2).

Based on these equations, it determines the strength of relationship between the variables. This is measured by the coefficient of determination, denoted by R^2 . This measures the percentage of the total variation in the dependent variable that is 'explained' by the variation in the independent variable. The R^2 statistic ranges from 0.000 to 1.000. If there is a perfect linear relationship between the independent variable and the dependent variable then $R^2 = 1.000$. At the other extreme, if there is no relationship between the independent variable and the dependent variable, then none of the variation in the dependent variable is explained by the variation in the independent variable and $R^2 = 0.000$.

Then again, the degree to which two or more independent variables are related to the dependent variable is expressed in the correlation coefficient R , which is the square root of R^2 . The value of R can range from -1.00 to +1.00. The value of -1.00 represents a perfect negative correlation, while a value of +1.00 represents a perfect positive correlation. If $R=0$, then there is a lack of correlation between the independent variable (predictors) and the dependent variable.

It is of importance to clarify the types of variables available for this analysis and to also define the research question from a theoretical perspective. Besides the 18 recycling factors, it is imperative to note the relevance of the three different respondent groups understudy associated with bias in parameter estimation (Whittingham *et al*, 2006). In this occurrence the variance of respondent groups could be moderated and controlled.

Thus, respondent groups bias therefore can be controlled by using the three shopping centre scheme formats, as *confounding variables* (Chua, 2009).

Examining the information available from the output of the questionnaire survey, 18 recycling variables and 3 groups of shopping centre scheme formats (confounding or controlling variables) were identified. According to Cohen (2007) and Aron et al (2009), hierarchical regression involves theoretically based decisions for how predictors are entered into the analysis. Simultaneous and stepwise regressions are commonly used to explore and maximise prediction, whereas hierarchical regression is typically used to examine specific theoretically based hypotheses, as noted by Cohen (2007) and Wampold and Freund (1987). For this reason, a hierarchical model of MLR analysis was deemed appropriate to extend the MLR model which previously focused only the predictor variables. In so doing, to examining the influence of several predictor variables in a sequential way, such that the relative importance of a predictor may be judged on the basis of how much it adds to the prediction of a criterion, over and above that which can be accounted for by other important predictors. Cohen (2007) added two major advantages of hierarchical regression: (a) extraction of as much causal inference as the data will allow and (b) a unique partitioning of the total variance of the criterion that can be accounted for by individual predictors as indicated by the increase in R^2 . When using hierarchical regression, the variance of the criterion attributed to a predictor variable depends on its relationship with the criterion and on what has already been entered into the model.

In this regard, to determine the most effective control variables factor, the *enter* method in linear regression was used (Saunders *et al*, 2003; Chua, 2009), therefore to be computed in the SPSS during first phase of the *hierarchical* model of MLR. The second phase of the *hierarchical* model of MLR is to identify the significant relationship amongst the importance of 18 recycling CSFs (predictors) that predict the overall recycling implementation success (criterion variable). To proceed with this analysis

procedure, a *stepwise* method was employed subsequently after the *enter* method. One advantage of the *stepwise* method is that it should always result in the most parsimonious model and economical (Diekoff, 1992). This could be important when the researcher wanted to know the minimum number of variables the researcher would need to measure to predict the criterion variable (Chua, 2009).

Regarding the significance of correlation, typically, in many sciences, results that yield $p \leq .05$ are considered borderline statistically significant, and $p \leq .005$ or $p \leq .001$ levels are often called 'highly' significant (Saunders *et al.*, 2003; Chua 2009). Provided the theoretical assumptions are satisfied, the regression estimators, i.e. the hierarchical model of MLR, are optimal in the sense that they are unbiased, efficient, and consistent. Efficient means that the estimator has a smaller variance than any other estimator. While consistent means that the bias and variance of the estimator approach zero as the sample size approaches to infinity. This could precisely define the important predictors or influential parameter that determined the overall recycling implementation success.

4.10 Convergence of Research Findings

In addition to the existing substantive issues and theoretical conceptualisations, many existing measurement instruments to define the success of recycling have not been subjected to rigorous psychometric assessments of dimensionality, reliability and validity. At this point, it is necessary to assess both the validity and reliability of this research.

4.10.1 Reliability

Reliability refers to the consistency or stability of a measure. Denzin (1970) states that multiple and independent methods should, if reaching the same conclusions, have greater reliability than a single methodological approach to a problem. This combination of

methodologies in the study of the same phenomenon is known as triangulation. From a qualitative method perspective, Eisenhardt (1989) recommends that the researcher start with a broad research question, establish systematic data collection and ensure case access to create strong triangulated measures. Qualitative research findings can be strengthened in this way by combining participant observation with interviews and documentary sources (Hammersley and Atkinson, 1983) in a single case.

For example, some recycling studies have merely used internal consistency measures to assess both reliability and dimensionality of the employed items (Hopper and Nielsen 1991; Oskamp *et al.* 1991; Hernandez *et al.*, 1999; Tonglet *et al.*, 2004). In the case of second hypothesis testing to assess the overall level of recycling implementation success between the three groups of shopping centre schemes, it has been argued that such items are combined in reality measure to correlated yet distinct constructs (Schlegelmilch *et al.*, 1996). Spector (1992) advocated a combination of all items might as well yield internal consistency, even though they reflect two or more different constructs. Nevertheless, it was found that some environmental studies have aggregated items into composite measures without any reliability or validity verifications (Lowe *et al.* 1980; Corrado and Ross, 1990).

Research replication is described as the test of reliability of the research. In reality, it is not possible to have an exact replication given that no two occasions are ever the same (Ankrah, 2007). As Brinberg and McGrath (1985) pointed out, research replication is concerned with determining whether the set of findings from a research investigation can be arrived at or reproduced when the same instruments, research design, and research strategy are used i.e. assessing the extent to which the same findings occur if the study is repeated with no factors varied. For an investigation such as this one, beyond the limitation of precedent studies from the same sector, it may not be possible for this survey to be directly replicated. It must however be emphasised that the questionnaire

was developed and pre-tested accordingly, to ensure that the data collected was accurate and reliable.

4.10.2 Validity

Validity is one of the main concerns with research. Validation of the interview phase of this research depends on the presentation of solid descriptive data, meaning that the researcher must lead the reader to an understanding of the meaning of the experience under study (Stake, 1995). In essence, validation is an interpretive understanding of truth (Angen, 2000). Thus, triangulation is not a tool or a strategy of validation, but an alternative to validation in this context (Denzin and Lincoln, 2003). For the qualitative interview research method, data triangulation is particularly important in order to fortify validation in the absence of cross case comparison. Remenyi *et al.* (1998) suggest using multiple data sources, establishing an identifiable chain of evidence, and having a draft reviewed by the key informants to strengthen construct validity in this regard. For these reasons, interview questions were pre-tested by the key informants both from the academic and industrial point of view to ensure the right context and terminologies were used in the instrument.

On the other hand, validation from the questionnaire phase of this research can be affected by different kinds of factors. These factors could be either internal or external to the investigation and capable of invalidating its findings (Steyerberg 2003). Controlling all possible factors that threaten the research's validity is a primary responsibility of every researcher. Internal validity is affected by flaws within the study itself such as not controlling some of the major variables, or problems with instruments used in the research. Research results can be said to be internally invalid because they may have been affected by factors other than those thought to have caused them, or because the interpretation of the data by the researcher is not clearly supportable (Steyerberg, 2003). Factors which affect internal validity include: sample population, time, attrition and

instrument sensitivity. In order to ensure internal validity of the survey instrument for the present research, appropriate procedures were anticipated throughout the development of the questionnaire instrument.

In terms of external validity, the extent to which one can generalise the findings from a piece of research to a larger group or other contexts is termed external validation. According to Robson (2004), generalisability refers to the extent to which the findings of the enquiry are more generally applicable outside the specifics of the situation studied. In other words, a research that lacks external validity cannot be applied to other contexts. Factors that affect external validity include: population characteristics, research environment, researcher influence, time and data collection methodology. External validation confers greater confidence in the quality of a research finding (Steyerberg, 2003). It is primarily targeted at ensuring the robustness of the research and about its applicability in the widest possible dimension (Rosenthal and Rosnow, 2008). Broadly, external validation consists of three components: *replication*, *convergence analysis* and *boundary search*. Brinberg and McGrath (1985) are of the opinion that it is this process of validation that transforms research information into knowledge.

For the interview method applied, the research goal is to offer interview description (including data collection procedures) that would allow the reader to repeat the research process in another case (Kidder & Judd, 1986; Vaughan, 1992). Although it was argued that a single case (interview) may not provide sufficient evidence to make robust generalisations, it can establish the existence of a phenomenon (Van Maanen, 1988), which is adequate for the purposes of exploratory research (Remenyi *et al.*, 1998). Thus, a single case can be generalisable to theoretical propositions (Yin, 1984), creating a distinction between analytical and statistical generalisability (Yin, 2003).

Further the principle of convergence otherwise referred to as methodological triangulation is key to assessing the robustness of a piece of research (Denzin, 1978;

Smith, 2007; Rosenthal and Rosnow, 2008). Convergence analysis assesses the broad range of conditions (scope of the findings) under which the findings will hold. Convergence is achieved when there is agreement of substantive outcomes derived from the use of different and independent models, methods, and/or occasions (Ankrah, 2007). In seeking to evaluate the internal validity of this research therefore the strategy implemented in Nelson (2002), and Suttibak and Nitivattananon (2008) was followed. This strategy involves the search for convergence between research findings and published research.

In other words, unlike replication, some of the factors are consciously varied, the study is repeated (Fuller, 1994; Pitt, 2005) and the results are assessed to see if they converge with the original findings. In the case of this research, findings from the interview phased have been used primarily as a method to validate the findings from the literature review carried out during the initial phase of this research. It has earlier been pointed out that published studies in recycling domain which could provide an ideal basis for comparison of this nature are very limited. Although there is a lack of precedent studies relevant to the UK shopping centre sector in particular, discussion and results from the preceding chapters of this thesis have demonstrated that findings from this research are mostly supported by published literature from relevant recycling communities, rather than shopping centre sector specifically. Given that this study is exploratory in nature, it is necessary to point out that the absence of direct convergence from similar sectors does not necessarily imply a lack of internal validity. Rather, it may well be a sign of new insight (Ankrah, 2007). Also, questionnaires survey employed in the third phase of this research were thoroughly analysed using MANOVA in order to eliminate representative bias in determining the extent to which the factors have an impact on recycling success.

In sum, the best practise recommendation for convergence of research findings has been considered through which information was synthesised from literature review, interview and questionnaire survey to form the basis of deductions that have been made and

conclusions arrived at in respect of this research. The final chapter of this thesis includes a set of CSFs for UK shopping centre recycling initiatives, with a number of critical areas identified to realign current implementation success on recycling from UK shopping centre organisations perspectives.

4.11 Summary

This chapter has reviewed the research methodology used in carrying out this study. A three phased research mixed methods approach has been adopted employing qualitative and quantitative strategies. Firstly, a detailed literature review was carried out to construct a set of seventeen (17) CSFs in shopping centre recycling followed by key informant interviews to add one recurring factor, with eighteen (18) CSFs or recurring factors altogether. This served to further confirm the CSFs identified from existing literature and acilitated exploration of other issues arising in the sector in greater detail.

Following this, a set of questionnaires were designed to draw perceptions from three groups of key decision makers according to UK traditional shopping centre scheme formats, (i.e. above 20,000 m² of leasable area). The purpose here was to acquire data regarding the defined success factors in relation to shopping centre recycling scheme implementation success. Prior to a macro level questionnaire survey throughout the UK population, pre-testing of the questionnaire was carried out to validate and fine tune certain aspects.

Data collected was analysed using the Statistical Programme for Social Sciences, (SPSS, version 17) and Microsoft Excel software packages. Key statistical tests carried out included the Multivariate Analysis of Variance (MANOVA), Analysis of Variance (ANOVA), Pearson product-moment correlation and hierarchical model of multiple linear regressions (MLR) analysis. The output of the data analysis forms the basis of the deductions and conclusions that are offered in this research to address its overarching aim

and objectives. A number of best practice recommendations have been presented alongside a set of strategies designed to achieve the aims and objectives of the present research in accordance with the existing theoretical framework for shopping centre recycling implementation success.

Chapter Five: Qualitative Data Analysis – Interview Results

5.1 Introduction

The discussion in Chapter Three provided insights into critical elements of recycling initiatives where various organisations and researchers have examined recycling programs across several communities. They have drawn conclusions about program elements that appear to be effective in overcoming barriers to increased recycling. These prior studies provide information about the recycling success factors in addition to further insights relevant to shopping centre recycling implementation. However, limited information exists to provide a clear and complete understanding of the factors involved, and which factors make their implementation a success. In particular, due to difficulties in generalising specific factors and a lack of current knowledge regarding current implementation of recycling schemes in the shopping centre community.

First and foremost, the aim of this chapter is to present results and analysis of qualitative primary data gathered as part of this research. Insights regarding the critical success factors of the current shopping centre recycling practices are obtained from the key informants in the industry, and findings are presented according to the second objective of the research; i.e. to identify critical success factors associated with shopping centre recycling initiatives.

To this end, semi-structured interviews were carried out with four (4) recycling coordinators from shopping centre organisations in the United Kingdom. The interview results provide important insights into how these shopping centre organisations engage in recycling initiatives, how they perceive success, and to validate the literature findings presented in Chapter Three.

The interview process outlined earlier in Chapter Four is briefly summarised in this chapter, followed by a discussion of some of the initial responses of interviewees, and a brief explanation of the analysis technique. This chapter then focuses on the overview of interviewees' responses and their relationship in achieving a successful outcome of recycling implementation. The rationale of recycling engagement is examined first, and two main reasons are identified: (1) perceived environmental impact to business, and (2) financial feasibility. The chapter then discusses how recycling implementation success is perceived along with the content of the CSFs reported by the interviewed participants, including obstacles faced in pursuing the initiatives. A detailed interpretation and discussion of the CSFs is outlined with specific hypotheses development to be carried out during the confirmatory phase of this research.

5.2 Summary of semi-structured interview employed

The research methodologies used, including the interview sample and data collection process, were detailed earlier in Section 4.7 of Chapter Four. As intended, the interview process used was a semi-structured face-to-face interview technique. This allowed the interviewer to modify the questions, if necessary, based on the response made by the recycling coordinator being interviewed while still ensuring that the interviewees provided details on specific aspects of the relevant process involved. Only one interview was carried out through telephone conversation due to his busy schedules and geographical constraints. The rest of the interviews were face-to-face meetings conducted at the interviewee's shopping centre office. On average, the interviews were conducted by the researcher over a four months period and ranged from 30 minutes to just over one hour in duration. Each interview began with a brief introduction of the research and a brief explanation of CSFs and recycling program success. The interview questions focused on gathering background information about the interviewee about the rationale and organisational aims behind the initiatives and information about the factors affecting recycling success.

Specific details about the key informants contacted for interview, including the interviewee, are kept anonymous and remain confidential to the researcher. To ensure anonymity and confidentiality of the results a four character identification tag was assigned, as presented in Table 4.2, Section 4.7.1, to indicate the details of the key informants, including the region, job, shopping centre scheme size, location of shopping centre and its position in the materials extended channel network of each shopping centre interviewed. In the case where there are three shopping centres with the same scheme size format, two shopping centres may act as waste brokers within the material extended channel network.

5.2.1 Data analysis techniques

Notes were taken during each interview and 3 of the 4 interviews were audio-recorded for subsequent transcription. Before beginning the coding process, the audio-recorded interviews were transcribed verbatim and the un-recorded interview was transcribed from detailed notes. A specialised audio-typist was not used for the transcription to allow the researcher to work the data and to ensure that data confidentiality was maintained. The transcribed interviews were analysed using a content analysis as explained earlier in Section 4.7.2 of Chapter Four.

5.3 Results of interview responses

To achieve the second objective of the research to identify key success factors for shopping centre recycling initiatives, primary data was gathered from the semi-structured interviews. The interview process posed at least seven key questions to all interviewees (as provided in Appendix 1). The responses to each of one of the questions are discussed below; Table 5.1 provides a summary of responses. Details profiles of the interviewees are given in Table 4.2, in Section 4.7.

Table 5.1 Summary of interview responses

| Items | SC1 | SC2 | SC3 | SC4 |
|--|---|--|---|---|
| Company Size | <ul style="list-style-type: none"> - Regional Shopping Centre (Very Large scheme format) - 165 tenants with 4 anchors | <ul style="list-style-type: none"> - Regional Shopping Centre (Very Large scheme format) - 160 tenants with 3 anchors | <ul style="list-style-type: none"> - Regional Shopping Centre (Very Large scheme format) - 270 tenants with 10 anchors | <ul style="list-style-type: none"> - Community Shopping Centre (Medium scheme format) - 55 tenants with 5 anchors |
| Business case and Contribution to Organisational Aims | <ul style="list-style-type: none"> - Green image - Landfill cost was neither financially or environmentally justifiable - Recycling provide best value for tenants | <ul style="list-style-type: none"> - CR reporting and sustainable retail development - Recycling is cost effective to centre operation | <ul style="list-style-type: none"> - Environmental sustainability image - To drive service charge value to retailers | <ul style="list-style-type: none"> - Sustainability of the local community - Revenue gained from recycling |
| Recycling background | <ul style="list-style-type: none"> - 5 years - Year 2009: 0.0152 tonnes/m² waste produced, 51% recycled - Year 2008: 0.0181 tonnes/ m²waste produced, 48% recycled - Year 2007: n/a | <ul style="list-style-type: none"> - 6 years - Year 2009: 0.0267 tonnes/ m²waste produced, 73% recycled - Year 2008: 0.0511 tonnes/ m²waste produced, 30% recycled - Year 2007: 0.0421 tonnes/sqm waste produced, 35% recycled | <ul style="list-style-type: none"> - 10 years - Year 2009: 0.0144 tonnes/ m²waste produced, 100% recycled - Year 2008: 0.0130 tonnes/ m²waste produced, 100% recycled - Year 2007: 0.0122 tonnes/sqm waste produced, 73% recycled | <ul style="list-style-type: none"> - 3 years - Year 2009: 0.0064 tonnes/ m²waste produced, 65% recycled - Year 2008: 0.0066 tonnes/ m²waste produced, 49% recycled - Year 2007: n/a |
| Number of materials recycled | <ul style="list-style-type: none"> - Corrugated cardboard (50%) - Paper (10%); Polythene (15%); Glass (20%); WEEE (1%); Other (4%) | <ul style="list-style-type: none"> - Corrugated cardboard (50-60%) - Paper (10-15%); Polythene (15-20%); Glass (15-20%); Food waste (10-20%) | <ul style="list-style-type: none"> - Cardboard, Glass, Paper, Aluminum cans, Soft plastics, Plastic bottles, Hard plastics, Wooden pallets, Coat hangers, metal, retailer cages, and WEEE. | <ul style="list-style-type: none"> - Cardboard (50-60%); Polythene (20-30%); Foodwaste (10-30%); Office paper/Other (5-10%). |
| Measurement system for recycling success | <ul style="list-style-type: none"> - Diversion rate; and - Net cost per tonne. - Benchmark with ISO14001. | <ul style="list-style-type: none"> - Diversion rate; - Benchmark with ISO1401;BRE Green Guide | <ul style="list-style-type: none"> - Diversion rate; - Participation rate; - Quantity recovered; - Benefit/cost ratio; - Net cost per tonne; and - Opportunity cost analysis. - Benchmark with ISO14001 | <ul style="list-style-type: none"> - Diversion rate - Opportunity cost analysis |

| | | | | |
|---|--|---|---|---|
| <p>Critical Success Factors (CSFs)</p> | <ul style="list-style-type: none"> - Multiple service contracts with single provider to provide staff training, on-site collection and equipments. - Passionate team. - Investment in Resource Recovery Facility or MRF; - broker locally to get best value for recyclables result in no need of added cost by using external company; - Partnership with WRAP, and Coca-Cola Enterprises Ltd. recoup program; - Education and awareness and drive for improvement among team; - Consistently review other locations and exhibitions; - Share best practise with other shopping centres and landlords; - Knowing the volume of the waste generated is the key for getting competitive bids. | <ul style="list-style-type: none"> - Door to door collection of recyclables due to layout constraint, whilst providing 1st class service to retailers. - Continue national support services provider to provide multiple services (i.e. cleaning, waste management and ancillary services) - On-site waste management plan for retailers fit-out works, and achieved C&D waste recycling target figure of 80%, achieving a recycled rate of 85-95% on retail fit-out. - Directed 73% of waste (in 2009) from landfill with significantly increasing our proportion of waste going to MRF; - Engagement with both in house and service provider for on-going management, monitoring and performance reviews. - Financial incentive to waste contractor for increasing recycling. - Any obstacles in the infrastructure should be identified and remedied before the awareness campaign begins. | <ul style="list-style-type: none"> - The Centre invested £35,000 in facilities to sort, separate and send materials for recycling. - Partnerships with local community; - Reduced service charge from recycling revenue; - Close relationship with retailers and shoppers; - Support from top management level; - Ready to share their knowledge on sustainable waste management with other businesses. - Better control of information exchange for marketing recyclables materials. - Fuel own vehicles from Biodiesel created from waste cooking oil. - 63% of waste goes to the Waste to Energy plant, which heats Sheffield's small businesses and provides free electric car charging point. - 37% of waste is sorted and segregated in the resource recovery centre. - Bespoke training to staffs at all levels | <ul style="list-style-type: none"> - Back up from landlord to invest in compactor and baler on site; - Maintain good relationships with city council, WARP, ENVIROWISE Coca-Cola Ltd. recoup program and recycling vendor; - Using single recycling vendor to collect recyclables and residual (for waste-to-energy). - Constant policing (monitoring); due to staff turnover within units, and storage limitation. - Calendar events to increase environmental awareness (i.e. Compost day, Earth Day, Big Tidy-up Event). - One off induction to educate newly appointed store managers dealing with shopping centre operations, including on-site health & safety and waste management procedures. |
|---|--|---|---|---|

| | | | | |
|--------------------------|---|---|---|--|
| Obstacles | <ul style="list-style-type: none"> - Retailers pressure with staffing levels not having buy in to strategy; - | <ul style="list-style-type: none"> - Retailers staff don't understand the benefit of recycling, they don't care. | <ul style="list-style-type: none"> - Economic conditions; - Technology advancements (slow); - Taxation on alternative to landfill. | <ul style="list-style-type: none"> - Retailers apathy; - 10-20 years tenancy leased for anchor stores; - Difficult to monitor anchor stores as they instigate their own environmental policy. |
| Resource required | <ul style="list-style-type: none"> - Lease specifies requirements; - Retailers resource and staff training | <ul style="list-style-type: none"> - Tenant waste liaison; - Waste policy/handbook; | <ul style="list-style-type: none"> - Local investment in regional initiatives - Tax breaks for green practises | <ul style="list-style-type: none"> - Constant policing and educating of retailers, particularly due to staff turnover within units |

As identified by the latent content analysis techniques used, the interview questioning led to a number of important responses regarding the rationale of undertaking the recycling initiatives, including the program background, key success factors and obstacles in pursuing the initiatives. Outcomes from the interviews represent the different characteristics of shopping centre organisations in terms of their size. One interviewee (SC4) represents the community level of shopping centre with 3 years of recycling experience, while the remaining interviewees (SC1, SC2, SC3) are at regional level with 5 to 10 years of experience in the initiatives.

The following sections present the findings from the interviews employed.

5.3.1 Business case

A variety of responses we provided for this question to highlight the rationale of management commitment and their approval to embark on investment in recycling programs. The majority of the interviewees conveyed similar view and understanding of what of the impact that recycling initiatives could have on shopping centre business. The most common reasons revealed by all the interviewees for embarking on recycling program were in twofold: (1) the need to be 'environmentally responsible business' and

(2) 'financial feasibility' to the organisation. One interviewee (SC2), a Deputy Centre manager expressed that, *"I believe people want to shop at a shopping centre that is responsible. Sustainability is not a problem, it's a business opportunity, and we must grasp that with both hands"*.

On the other hand, one interviewee (SC3), a Facilities manager pointed out *"Due the size our (shopping centre name) it is extremely important that we do look at all our environmental impacts is high on government agenda, we believe that we are exceeding what the government requires of the company"*. During the interviews, one issue that stood out was the corporate environmental reporting requirements that are involved in waste and recycling accounting. Deputy Centre Manager [SC2] relates the influence of his recycling program: *"We are responsible to improve our corporate portfolio through our corporate social reporting... If you exist in a community like this with a footprint that we have ... the only way you can continue to operate successfully is to be environmentally sound."*

Given the high fuel and energy cost as well the statutory implications to shopping centre operation, the cost issue has contributed significantly to recycling becoming central in shopping centre business. All interviewees highlighted (SC1, SC2, SC3 and SC4) that "recycling is cost saving to centre operation". A number of interviewees indicated the same magnitude of such implications, and Centre Manager (SC1) commented, *"Just a few years previously in (year), we produced 2000 tonnes of waste of which 80% went to Landfill at a cost to the Service Charge paid for by the retailers. Recognising this was a situation that was neither financially or environmentally justifiable."* Other examples of this characteristic of cost implication to shopping centre operation were given *"Wasted material is valued at around ten times its cost price, once transport and double handling is factored in"* (SC2); *"we can avoid large financial penalties associated with landfill"* (SC3); *"It's cheaper to recycle, we get revenue from the efforts we made"* (SC4); and such *"opportunities can often save in waste management costs or be cost neutral"* (SC1).

5.3.2 Contribution of recycling program to organisational aims

In responses to this question, all interviewees put forward comparable perspectives in which two specific themes emerged. First, the majority of the interviewees (SC1, SC3 and SC4) highlighted that recycling is creating a certain “image” for shopping centre. Two interviewees (SC1 and SC3) recognised they operate because they felt that their shopping centres appear to be centred on community image and perceived sustainability impact on the company’s reputation, profit and ability to attract investment. As explained by SC1, a Centre Manager who said “...*we know very well the consequences of it (environmental issues)... both government and community also have their expectations, I believe, at the end of the day, it reflects how we dealt with it*”. A number of interviewees (SC1 and SC3) also demonstrated on the importance of remaining at the “forefront of the recycling initiatives” and keeping abreast of new methods, of managing waste and recycling while aiming to establish or maintain their leading roles in sustainability. SC3 commented that “*advances and improvements in our recycling efficiencies are a perfect example of doing the ‘right thing’ having a tangible business effect.*”

Among other achievements of recycling programs, it was commented that they “*add value to customers*”, since recycling is seen as a means of reducing service charge to tenants for some shopping centres (SC1 and SC3), therefore leading to higher level of customers satisfaction. “*It is essential that we continue to drive service charge value to our retailers whilst at the same time achieving our corporate responsibility aims*” (SC1). Such strategic orientation was regarded as one of the fundamental motivations to drive corporate image while delivering best value to tenants. These two elements were reported independently and were viewed as consequences of each other.

5.3.3 Measuring the success of recycling

In general, one important response given by a Deputy Centre Manager (SC 2), as he commented on this question, *“Eliminating our landfill charges and increasing recycling therefore, not only helps the environment but also makes economic sense for our operation, that’s what I mean ‘success’.”* Further to this, more specific responses were given under this underlying theme which varied from having single measurement system to more developed systems of measuring the recycling success. At first, all responses to this question followed a similar theme, that being the majority of the interviewees were fairly convinced of a common system in measuring their recycling program success. Four interviewees confirmed that they are implementing the most common system of measuring the success of recycling program using the ‘diversion rate’ unit (SC1, SC2, SC3 and SC4). As stated by SC1 *“...diversion rate is much simpler (less technical) to report our success to the community at large”*. The use of the same definition over time promotes consistency and comparability among these rates. On the other hand, only one of the interviewee (SC3) indicated that his organisation already had several measurement systems included ‘participation rate’, ‘quantity recovered’ and ‘benefit per cost ratio’. These measurement systems are applied by the interviewees predominantly to aid decision making for specific program changes if they are in view of further investment in new initiatives.

Despite all that, ‘cost opportunity analysis’ (SC3 and SC4) was another theme among those identified from the interviews. Facilities manager (SC4) noted that, *“Identifying waste collection savings is the key to make sure that our recycling cost is feasible... we need to know which costs are fixed and variable... That’s why every cost decision we made, we must look at how much margin can we offset from the number of collections to be made (by haulers)”*. Facilities Manager (SC3) also highlighted *“As with all recycling collection efforts, a success of a recycling program is one that diverts large volumes of material at low costs, ...because at the end of the day, it goes back to how much money we spent (invested) for it”*.

5.3.4 Shopping centre recycling CSFs

A wide range of factors were deemed to be critical in the success of shopping centre recycling program across the different interviewees.

The majority of interviewees assumed that having good **partnerships** is a pre-requisite for their recycling program success. The terms relationship, collaboration, cooperation and partnership were used interchangeably by the majority of interviewees. There are several reasons for shopping centres to move forward from traditional management to a collaborative approach when dealing with waste management and recycling program. Shopping centre recycling program involved in partnering are required to develop a new culture based on mutual understanding and values and to develop a deep understanding of how they can mutually benefit from the cooperation. Knowledge sharing and *“educating different parties on what partnerships is all about can help to attain these objectives”* (SC1). SC4 also highlighted having good partnership with external organisations was necessary, as he revealed that, *“Building on a partnerships with the Council, environment agency (ENVIROWSE) and corporate sector (i.e. Coca-Cola Ltd. Recoup program) to offer further support to our recycling program and eventually help us to succeed... We value this partnership is vital and where we’re able to learn some best practise at no cost”*. This was viewed as very important as knowledge sharing mutually gained across organisational boundaries was instigated by the interviewee. Moreover, two interviewees (SC1 and SC3) conveyed their *“willingness to share best practise on sustainable knowledge with other shopping centres and landlords”*.

Partnerships within organisational boundaries were also recommended. Some examples of the phrases used include *“passionate team”* (SC1), *“working with the staff achieving the objectives”* (SC3), *“engagement with both in house and service provider”* (SC2), *‘long term tenancy leased* (SC4) and *“close relationship with our retailers and shoppers”* (SC3). In this situation, all interviewees revealed the importance of having

good partnerships, as a Facilities Manager (SC3) stated that *“You need the community behind you otherwise you won’t do the things you want to do, you won’t be able to”*.

Other factor believed to have great influence on recycling program success was the implementation of **monitoring and reporting of the recycling program** which SC2 commented, *“Measuring, monitoring and reporting remain key to on-going waste management strategies, and we recognise that we still have room to improve”*. Availability of information on performance and reporting also leads one organisation to justify that *“what happens to the materials they put into their recycling bins, and what they are doing is actually have some impact”* (SC4). Other comments on this topic included that shopping centres *“need that to give feedback to the units about how they are performing”* (SC2), *“offer opportunities for feedback and suggestions”* (SC3) and *“to improve the performance”* (SC2). Specific arrangements were also implemented *“in accordance with the ISO14001 procedures for on-going management, monitoring and performance reviews to improve recycling reporting”* (SC2). Apparent improvements made from the initiative were reported which included *“better access and signage”* (SC1), and *“staff in attendance to welcome and advise tenants, and facilities for additional recyclable materials”* (SC3). Further, SC1 also advocated, *“knowing the volume of the waste generated is the key for getting competitive bids”* when marketing the recyclables waste. All in all, each interviewee had the responsibility of performing audits regularly to measure the effectiveness of the program whilst identifying the lowest cost options that meet the recycling objectives set. Such implementation was also said to *“fine-tune the existing program”* (SC1 and SC2), including coordinating the size and location of containers, and the frequency of collections.

Marketing recyclables was also considered as success factor for shopping centre recycling programs. Despite being a waste producer, only two interviewees’ (SC1 and SC3) perceived themselves hold the position of waste broker for the recyclables they processed. As broker, this appears to be a critical factor as one of the interviewees (SC3)

commented that, *“The entire recycling takes place there, there is the revenue side to the waste. Everything that we handle on site, we baled on-site and we sent off-site... we look for the best price ... as where we can get the best price we will sell the materials to it. For cardboard, we get £3,500-4000 a month to just sell on the cardboard”*. In this regard, the broker usually *“gets the best value for recyclables resulting in no need of added costs by using external company to provide recycling services”* (SC1).

Other critical factor considered by the interviewees was **target or goal setting policy** established for recycling to increase participation and diversion levels. Although there is no statutory target required for commercial waste producers such as in shopping centre sector, this was viewed as very important by all interviewees. This factor is very difficult to achieve as it needs to come from the individual retailers efforts particularly and cannot be instigated by the organisation alone. One interviewee (SC1) highlighted his attempt during the initial years of the program, *“Understandably, it took some time for the retailers to get used to the new system, but we are extremely pleased that it is going so well. We are grateful to retailers’ staff for playing their part by sorting their waste.”* Further, similar themes were found as each interviewee stated their *“targets for the percentage of waste recycled on yearly basis”* (SC1, SC2, SC3 and SC4). *“By having such target we’re able to achieve a 73% recyclables recovered target in year 2009”* (SC2). SC3 was convinced that *“with the separate collection systems together with a waste-to-energy facility for processing food waste from the centre this significantly helps us to reach 100% targets for diverting a large volume of bio-degradable waste from landfill”*.

The **provision of collection methods** was essential and can have a significant impact on the success of shopping centre recycling program, as all of the interviewees share similar strategies to ensure that the *“process of collecting the materials is controlled, safe and minimises costs”* (SC1, S2, and SC3). All four key informants also stated the *“collections system of commingled dry recycling and residual waste are likely to see a significant*

increase their recycling rates". Other characteristics for the provision of collection methods given were "retailers take-back program" (SC4), "reduced general waste skip collection" (SC1 and SC4), "Door-to-door collections" (SC2), and "number of recyclables collected" (SC3 and SC4). Interviewee (SC2) commented, "The functional design of a container has a tremendous impact on participations. I mean, the best designs will encourage usage, with features such as integrated signage and custom openings. For example, small, round openings accept cans and bottles, at the same time discourage shoppers from litter in and contaminating the waste stream. In terms of waste collection, interviewee (SC3) commented "...by fine tuning the collections service offered to retailers and adapting methods to provide a first class service, culminating into a 20 minute response time to any retailer requesting extra collections outside of their normal times. These advances and initiatives have been made against a background of limited storage space and the necessity to comply with the stringent requirements of the local fire officers, which can limit the ability, on occasions, to fully maximise all available techniques".

Provision for a service provider contract is expected to have impact on the recycling success mainly for shopping centres that outsource recycling services to private haulers. This factor was viewed as important to ensure elements of recycling services anticipated in the contract are included to ensure success of implementation. Out of 4 interviewees only one interviewee (SC2) related the theme of the provision of a service provider's contract as the centre contracted out recycling services through franchise agreements, which requires the hauler to provide the centre with integrated waste management including recycling services. Examples of the characteristics of service provider contract provision include aspects of service coordination mainly the 'allocation of recycling containers', 'up-to-date lists of acceptable materials', and 'clear reporting requirements'. Engagement with the service provider and a coordinated approach to planning could provide clarification of the opportunities, costs and benefits of providing recycling services. SC2 commented, "They (service provider) have worked closely with

the (shopping centre) management team in considerably improving recycling levels and producing on-going initiatives for sustainability. This is one of the many reasons that (service provider) contract was extended.”

Two interviewees (SC2 and SC3) believed **Green leases**, which offer tenants a written pledge, have influence on the success of the shopping centre recycling program. The simple yet vital importance of taking the written pledge makes it an instrumental tool which allows retailers to comprehend the recycling program offered. Such features of this factor pointed out by the interviewees were “*lease specifies requirements*” (SC1), “*guidance on environmental issues*” (SC3), and “*agreements with retailers to build partnerships and share solutions*” (SC4). SC3 also demonstrated, “*All our retailers have signed up to an Environmental Charter, and a Green File of guidance on environmental issues was created. Since then, staff environmental training, a monthly Green Newsletter for retailers and bi-annual waste audits have been introduced.*”

Creating proper **monetary incentives** was expressed by all interviewees to have impact on the program success. Implementing any recycling program requires adequate funding. In this case, allocations can be derived from the “*tenant service charged fee*” (SC3) and the “*landlord*” (SC4) provide incentives to shopping centre management to establish, develop or endorse recycling programs. SC3 highlighted, “*Our retailers currently pay for the service charge for all the waste management initiatives including recycling and for the energy, ...and because the initiative that we got in place we’re able to reduce the service charge on a yearly basis by offsetting it with the revenue that we produced, this certainly add value to our tenants*”. Other characteristics also given were “*revenue is reinvested in additional recycling initiatives*” (SC3), “*retailers incentives*” (SC1 and SC3) and “*haulers incentives*” (SC2).

Provision for **Materials Recovery Facilities (MRF)** was among other success factor associated with the high volumes of recycling from shopping centres. Two interviewees

(SC1 and SC3) who are from a large shopping centre background, highlighted the recycling success achieved by *“diverting general waste which normally goes to incinerators to the one facility (on-site MRF) that basically hand picks out materials which are sent off for recycling”* (SC3). Some other important characteristics of such facilities conveyed were *“achieved excellent target by recycling around about 90% of waste form the centre”* (SC3), *“savings on transport and disposal costs”* (SC3), and *“created social, environment and business benefits”* (SC3). SC3 also mentioned that, *“by working in partnership with [employment organisation], adults with learning difficulties have benefited from job opportunities. They are also extremely good at running the facility efficiently while maintaining an excellent working atmosphere... and capable to sort, separate and send materials for recycling, including cardboard, glass, paper, aluminium cans, soft plastics, wooden pallets, plastic bottles, coat hangers, fluorescent tubes, hard plastics, metal, retailer cages, toner cartridges and electrical goods”*. SC1 also commented, *“We broker locally to get best value for recyclables result in no need of added cost by using external company to sort our recyclables”*.

Another theme that emerged from the interview process that has significant impact to recycling program success was the utilisation of **alternative recovery methods for residual waste**. This theme was viewed as necessary by all interviewees (SC1, SC2, SC3 and SC4) as they made the attempt to reconcile contaminated waste and waste cooking oil to generate energy into their recycling strategy. As one interviewees commented (SC4), *“there is no doubt that we will continue to produce waste that can't be practically recycled, so perhaps incineration isn't quite the scary monster it appears to be, if it generates electricity and safely gets rid of some nasty waste... I think it is vital that we don't dismiss technologies out of hand until we have a real in-depth understanding of them. Science and technology hold the only key to a green and sustainable future”*. Despite the utilisation of *“incinerator”* (SC1, SC2, SC4) gave further examples of the characteristics of alternative recovery methods for residual waste such as *“the anaerobic*

digestion facility to turn waste food into BioGas (SC3)” and “fuel local transport from Bio-diesel created from waste cooking oil” (SC3).

Three out of four interviewees (SC1, SC3 and SC4) perceived having a **program champion** from top management as critical to recycling success for shopping centre recycling. Essentially, top management has the freedom to provide or withhold their support which has positive influence on participants recycling behaviour. Among the characteristics of program champion from top management expressed by the interviewees were “*appointment of dedicated team*” (SC3), “*staff in attendance to welcome and advise tenants on recycling issues*” (SC3) and “*facilities and equipment investment*” (SC1, SC3 and SC4). SC3 commented, “*It’s all about team efforts at (centre name), every project that we investigate.... I discussed it at management level first and then go down through the staff level, because at the end of the day, they don’t do the job and the project won’t work... We believe the success of our initiative depends not only on the management but also on retailers, employees and customers understanding and supporting our proposals*”.

Moreover, the provision of **construction and demolition (C&D) waste generated from fit-out** works at the centre was suggested to have impact to recycling programs from the centre, although “*it accounts minor fraction of shopping centre waste streams*” (SC4). Out of four interviewees, only two interviewees (SC2 and SC4) recognised that “*fit-outs works occur through-out the property life cycle and generate significant amounts of waste presents opportunities for more reduction, reuse and recycling of waste from the centre, thus project costs saving can be made*”. One interviewee (SC2) commented, “*For all fit out projects which require CDM (Construction Design and Management) regulations 2007, we asked our tenants to let us know about their fit-out plans so that we can work together to coordinate waste management... in some cases we also encourages occupiers to appoint a waste management contractor who can undertake segregation of all waste on-site to enable effective re-use and recycling and to minimise waste to*

landfill, and provide waste data to the our construction team to communicate and monitor results”.

Another the key success factor assumed to have an impact in the recycling program was the **separation of waste** at source by the retailers. Regardless of the co-mingled waste collection method for further sorting at the material recycling facility, sorting requests at some earlier source were mentioned by three interviewees (SC1, SC3 and SC4). The initiative to separate the recyclables from the waste stream was considered as *“the easiest way to recycle by sorting out the different items which can be recycled from those that can’t”* (SC4) and *“providing quality recyclables that is less contamination”* (SC1). Furthermore, one interviewee (SC3) stated that, *“By initiating a food segregation scheme, raw and packaged food can now be recycled into bio-fuel and renewable energy”*. Related to this matter is the knowledge that retailers’ staff must have to maintain high diversion of recyclables from the centre solid waste stream.

Other factors believed to have influence on the recycling success within the community of shopping centre were **training** and **awareness**. These two factors were seen as interrelated since providing knowledge and promoting recycling behaviour throughout the community involved, *“educating of retailers due to staff turnover within units and customers to minimise waste leaving the shopping centre; and to be more costs effective for our tenants in relation to their service charge”* (SC1) and *“to assure our role as a partner of choice”* (SC2). SC4 also commented that, *“We have implemented a communication process including face to face, written documents and leaflets with every units and neighbouring outlets around the area to address environmental issues and we try to adopt the team approach that it’s everyone’s responsibility to keep (shopping centre name) clean, tidy and safe....waste bins have to be altered to force retailers to recycle correctly”*. Further, availability of *“awareness campaigns and exhibitions also lead to greater participation in recycling that drive for improvement among team”* (SC3).

5.3.5 Obstacles

Even successful recycling programs can face hurdles during implementation which result in low participation. Most of the critical factors for success cited were in themselves the factors that posed problems in pursuing the recycling program initiated by the interviewees'. The interviewees also mentioned some factors regarding program elements that appear to be effective in overcoming barriers to increased recycling.

One of the key challenges for shopping centre recycling program identified by all interviewees was that of recycling **awareness**. Although there was awareness of the importance of recycling initiatives among participants, it was not always forthcoming which is essential if there was to be any chance of success. This was reflected in the comment made by three interviewees, who mentioned that, *“some of the retailers staff don't understand the benefit of recycling”* (SC2), *“retailers apathy”* (SC4) and *“retailers pressure with staffing levels not having buy in to strategy”* (SC1). Further, *“any obstacles in the infrastructure should be identified and remedied before the awareness campaign begins, I mean by preparing collection staff and contractors and ensuring that the recycling infrastructure can deal with increased demand. Ensure that each element of the campaign is appropriately staffed and that staff are fully trained.”* (SC3).

Another barrier highlighted was **marketing the recyclables** from shopping centre. Given the current economic difficulties, the failure of recyclable prices could make expenditure for shopping centre recycling program go beyond the revenue from sales of recyclable materials, particularly when the long-term benefits of recycling are monetised. The uncertain and unpredictable market for recyclables has provided economic and environmental challenges to shopping centres who have positioned themselves as a broker. Two of four the interviewees (SC1 and SC3) emphasised a highly volatile recycling market presents an extra challenge to them. For example, SC3 commented that *“We've been relying on limited vendors ...although we have problem in terms of who we*

go to, who would take our recyclables at a good price. Also, the recession has caused the market to be very volatile, especially for our cardboard and paper. We have to have better control over this (marketing), I mean, information exchange is absolutely vital for this kind of control (to offset the cost of recycling program) while providing quality recyclables (low contamination)”.

Another problem identified, which also related to rewards for recycling, is that of providing the appropriate **incentive** to retailers. Providing incentive was considered a major success factor but it is also a major challenge in the pursuit of recycling program. The reality of this situation was commented on by SC4 who said, *“It’s difficult to police who did their part ... some units by nature of their business produce more waste compared to othres. How, can we use incentives when each units has a different waste stream coming in... we look at it is but difficult to implement.”*

5.4 Interview results: key findings of objective two

Objective two of this research is to identify and confirm key success factors for shopping centres recycling initiatives by carrying out interviews of the key informants in the shopping centre industry. Primarily the interviews were to refine the theoretical framework underpinning this research by establishing the critical success factors for shopping centre recycling. The interviews also served the purpose of validating findings from the literature review, identifying key issues, and contextualising these issues from key informants in the industry. Consequently, findings from this phase of research were also be used to assist the development of the questionnaires survey tool which is integral to the next phase of the research process.

Interpretation of interviewees’ responses was made using latent content analysis, and 15 specific themes were identified. Accordingly, these themes representing the factors of

critical importance to shopping centre recycling programs and details of the themes identified are discussed as follows.

5.4.1 Partnerships

Shopping centre recycling programs involving partnerships were highlighted as a key component necessary for recycling success. Internal partnering between landlord, centre management and tenants is required to develop a new culture based on mutual understanding and values and to develop a deep understanding of how the community should evolve and mutually benefit from the recycling cooperation. External partnership attempts were made as the key informants also look further than local authorities collaboration; Environment Agency, Envirowise, community groups, local businesses as well as other shopping centres can all be utilised to gain the support and expertise. These do however require time and resources to foster and service.

5.4.2 Monitoring and reporting of recycling performance

Having the ability to undertake recycling performance assessment was identified by the key informants as a critical success factor for recycling programs. Primarily, the initiative to monitor and report performance in recycling could contribute to the effectiveness of awareness campaigns and also act as a benchmark for future developments. This is where the key performance indicators detailed in the report come into play and progress can be made.

5.4.3 Marketing recyclables materials for exchange

Although this factor was not identified in the prior literature review chapter, this was clearly accentuated by the key informants who also represent themselves as waste broker locally. The key informants also see the costs of participating, taking the time and energy

to separate, store, and transport the material and sometimes paying a drop-off fee for the privilege as outweighing the benefits. Despite the ability to get the best value from recycling, they could save the cost of hiring external companies. Although they are not able to affect market prices, they can definitely be a smart seller who achieves that delicate balance between assuring reliable markets in the long run and receiving competitive prices in the short run. Nonetheless, marketing the recyclables was also identified as an obstacle to the success of recycling programs due to volatile market price affected by the current economic circumstances.

5.4.4 Goal setting policy

Establishing diversion targets by having a goal setting policy for shopping centre recycling programs was acknowledged as critical factor that leads to program success. The intent of having this policy is to provide a benchmark for program performance that specifies what the organisations want to accomplish from time to time. In effect, this requires that the program be designed and delivered to the target audience, considering whether they will achieve the aims and objectives, together with appropriate resources required, and a detailed schedule to achieve diversion levels of recyclables from the waste stream.

5.4.5 Materials collection methods

How waste collections from shopping centre premises should be arranged was highlighted as critical factor necessary for successful recycling program, mainly in terms of cost. Communities within the shopping centre sector that know where recyclable waste containers have been distributed and how often they are emptied are better able to target promotions, educational efforts, and other outreach activities that encourage positive participation. Another the primary concern relating to this component is choosing

between co-mingled or sorted waste, and scheduling the collections that provides the most cost efficient solution.

5.4.6 Service provider contract provision

The provision for service provider contract was recognised as a critical factor for shopping centres that outsourced waste management and recycling services to private contractor. Hence appropriate coordination of service level agreements or a performance contract between the parties involved can determine the success of a recycling program.

5.4.7 Green lease

Offering voluntary measure in the form of Green lease was acknowledged as critical success factor for shopping centre recycling program. Although the initiative is relatively new, it was perceived as a vehicle to encourage tenants to adopt positive environmental behaviour by integrating material resources, water and energy consumptions into actions. In general, this would enable landlords, centre management and tenants to work together to reduce the environmental impact of their commercial properties via best practise principles.

5.4.8 Monetary incentives or rewards

Monetary incentive was highlighted by the key informants as critical to achieve recycling success for the recycling program. Providing such an incentive to tenants was also identified as barrier to the success of shopping centre recycling program due to the nature of waste streams produced by different tenants. In this regard, it seems that shopping centres with high performing programs are more likely to have variable fee systems for the waste generated by tenants. In such a system the centre management could reduce their fees as the volume of discards is diverted from refuse to recycling. The strategy

would give tenants a financial pledge to ensure that the centre continued to have a successful recycling program with high levels of positive participation and low contamination. If these goals were maintained then centre tenants or the private hauler could remain 'entitled' to receive the 'rewards' resulting from high recycling turnover.

5.4.9 Provision for material recycling facility (MRF)

The availability of MRF was identified as a critical factor as shopping centres favourably get access to this facility through private haulers in order to increase recycling whilst avoiding the unnecessary cost to landfill disposal. For larger shopping centres that already have MRFs on-site, this enables them to process huge volumes of recyclables effectively. As a broker, this not only saves the cost of hiring private contractors for managing recyclables, but also creates business, social and environmental profits simultaneously.

5.4.10 Alternative recovery methods for residual waste

The fresh concept of reconciling energy-from-waste into shopping centre recycling program was regarded as a critical success factor for recycling programs. The strategy was not only viewed as a critical success factor but was perceived as one of the potential cost savings which could be made when compared to landfill disposal. Further, the government Enhanced Capital Allowance (ECA) initiative apportioned for businesses that invest in energy efficient technologies could back up the cost anticipated for the initiative. This investment may be sensible for large shopping centre schemes that generate greater volume of waste than small schemes.

5.4.11 Program champion from top management level

Having a recycling program champion was essentially viewed to be important for a successful recycling implementation within the shopping centre organisation because of its ability in bringing about organisational change in recycling behaviour. This was instigated by providing a program representative to give technical assistance on site, on an as-needed basis. Further, the initiative of the program championing skills is to mobilise participants' opinion, resolve conflicts and win the hearts and minds of the landlord, staff, tenants and customers involved in the initiatives.

5.4.12 Awareness-raising

Developing awareness of the shopping centre recycling community was also recognised as a key component of success for recycling programs. However, the lack of recycling awareness among retailers was also identified as one of the main barriers to the recycling success affected by a high retailers' staff turnover, and lack of waste disposal and recycling procedure delivered to retailer staff. Targeted outreach programs to tenants by means of frequent mailings and personal visits were some of the ways identified to increase awareness, in addition to providing information to tenants and shoppers through campaigns and exhibitions in order to influence positive recycling behaviour and high participation. Thus, an effective awareness raising program was viewed as a pre-requisite for a shopping centre recycling program.

5.4.13 Training program

The significance of training implementation to enhance shopping centre staffs and tenants on how to recycle on site was acknowledged by the key informants as one of the critical factors to overall program success. This initiative is required when organisations intend to assess program performance and strategies for improving the quality of participation in collection and sorting of materials for recycling from the shopping centre waste stream in order to meet the end market requirements.

5.4.14 Recycling C&D waste during fit-out works

Managing waste debris from fit-out projects was regarded as essential as it presents an opportunity to increase shopping centre recycling as suggested by the interviewees. The ability to instigate an on-site waste management plan for occupiers during fit-out works has enabled proactive measures to be undertaken that encourage occupiers to establish simple rules and systems of operation, maintain close working relationships with the building management, manage building access and egress, minimise disruption to other occupiers and minimise risks (to safety, environment, systems and infrastructure).

5.4.15 Prioritised source separation

The importance of separating the recyclables at some earlier source was identified by the key informants as a critical factor necessary for program success. The reality of the problem promotes the removal of all designated recyclable materials from the waste stream and also helps in achieving high diversion rates. The initiative of source separation promotes clean, marketable materials by limiting levels of contamination, which enables shopping centre organisations to receive more economic benefits. This can be achieved through not disposing of recyclable materials as solid waste, or not having co-mingled sorted at a private MRF. If done correctly, the shopping centre is likely to receive better revenue by sale of quality recyclable material.

5.5 Self-reported measure of recycling implementation success

This section confirmed how the success of shopping centre recycling program is to be measured. It was evident from the analysis that each interviewee's organisation seems to have established rigorous methods for measuring recycling activity and its effect on performance. There was an obvious continuum of approaches to measuring the

performance where, on one end, all key informants agreed on diversion rate, while on the other end, the success of recycling is measured through cost-effectiveness of the recycling program.

One of the notable measures of success identified was the *diversion rate* which is the simplest method of reporting success to the wider community as cited by the interviewees. The diversion rate is the result of dividing the amount of designated recycling material set out by the total amount of waste set out for collection. From here, the analysis portrayed that effective recycling diverts large volumes of material at low costs. That is why the majority of the key informants tend to focus more on minimising operational costs when dealing with overall program performance.

As suggested by the interviewees, operating shopping centre recycling programs that reduce the total cost of solid waste management is the ultimate goal to aim for. Recycling provides wider, longer term environmental and economic benefits compared to waste-to-energy transformation or disposing at landfill sites. Nonetheless, it is imperative to note that those added benefits may not be accurately reflected in existing costs and revenues. Recycling generally begin with a sizeable initial cost when compared to the tipping fee at landfill, particularly since it must account for equipment, labour and transportation costs. This maybe offset in the longer term by any revenue received from selling the recyclables. In this regard, the cost-effectiveness of the recycling program relies on so many variables that it must be analysed individually for each proposed program.

To conclude, the researcher believes that a self-reported measure of implementation success could be employed to assess both the individual factors and overall shopping centre recycling program. To gauge the implementation success for shopping centre recycling programs, a measure through a success 'proxy', by incorporating all variables or recycling factors identified from the secondary data and interviews, could be employed in this research as a fair representation of overall trends and progress made by the

shopping centre organisations. Consequently, this finding will be used as a key criterion for the researcher to attain the third objective of the research by carrying out this aforesaid approach.

5.6 Development of deductive observations for the third research objective

The content analysis outlined in the previous section, examined and confirmed 15 out of the seventeen (17) factors identified as part of the literature review phase. Findings from the interview also revealed a single new factor, i.e. *marketing recyclable materials for exchange* perceived by two interviewees. The outcome from the inductive phase of the research has enabled the crystallisation of these constructs and confirmation of what is meant by these factors. In sum, these fifteen (15) factors were viewed by key informants from the industry as critical to the success of recycling program; this means there are eighteen (18) factors altogether. However, the other remaining 3 factors were not confirmed, through the qualitative analysis, as being critical to recycling program success, although they were identified in the prior literature. This raises the question of whether these factors should be included in the next phase of the research.

For the reasons of inclusivity, it was decided that all factors identified both in the literature and interviews will be considered as recurrent themes, therefore will be carried forward into the next phase of the research. This gives the opportunity for further confirmation of the fifteen (15) factors identified in the exploratory phase and also allows for the other three (3) factors (i.e. proximity of recycling facilities, making recycling mandatory and environmental management system) to be investigated in the confirmatory stage of the research phase through a large scale questionnaire. This will allow further refinement of the findings, and gives greater assurance in the ensuing results.

To validate the above results, the third objective of the research deals with **discovering the extent to which these 18 factors impact on shopping centre recycling**

implementation success. In order to reach the third objective of this research, a series of deductive research methods will be carried out which includes the following observations:-

- a. To examine if there is any significant correlation between the importance levels of recycling factors and the extent to which these factors are presented by the shopping centres management;
- b. To evaluate the levels of recycling implementation success perceived by three shopping centre groups (*i.e. Medium or 20000-39,999 m²; Large or 40,000-79,999 m²; and Very large or above 80,000 m²*);
- c. To identify if there any significant variation among the three shopping centre groups in terms of the factors deemed critical to the implementation success of shopping centres recycling; and
- d. To identify the influential parameter (predictor) involved towards the overall success of shopping centres recycling implementation (criterion variable).

Given the characteristics of shopping centres differ in terms of scheme size (International Council of Shopping Centers (ICSC) Research (2005), it is noteworthy that traditional scheme formats of shopping centre above 20,000 m² of leasable area will be selected as the sample population for this part of the study. The above observations will be further explored in a series of statistical analyses through a large scale questionnaire in the confirmatory phase of this research and this will be explained in detail in Chapter Six.

5.7 Summary

This chapter achieved the second research objective to identify the key success factors from key informants in the industry. In undertaking this examination, this chapter has presented qualitative information, i.e. the inductive strategy gathered for this research, by means of semi-structured interviews undertaken with four (4) recycling coordinators recognised for shopping centre recycling initiatives in the UK. This chapter also focused specifically on responses made by the interviewees in relation to the key success factors of shopping centre recycling. The discussion identified the organisational aims, key factors involved and obstacles affecting the overall implementation of the initiatives. Analyses of the interview results were also used to validate and confirm findings derived from the literature reviews and further contextualise key issues in regard to shopping centre recycling.

Findings from the interviews identified fifteen factors perceived as critical factors for recycling implementation success; these are defined and discussed in Section 5.4.1 – Section 5.4.15.

The remaining three factors namely, making recycling mandatory, environmental management system (EMS) and proximity of recycling facilities for separate storage were not confirmed as a result of the exploratory interview phase. However, since these factors were identified as critical in the literature, they will not be withdrawn. Instead the researcher decided to include these factors and perform further investigation of these items in the confirmatory phase of the research.

The following chapter will elaborate the confirmatory phase of the research with the main focus to achieve the third objective of this research, to confirm the remaining three (3) factors, and further establish the extent to which the CSFs impact on the implementations success of shopping centre recycling programs in the UK. This process will be carried out through a series of deductive research observations, as pointed out in Section 5.6 of this chapter.

Chapter Six: Quantitative Data Analysis - Questionnaires

Survey Results

6.1 Introduction

This chapter describes the results derived from the survey as part of the aim to explore the key success factors through use of quantitative data to generate and test hypotheses. This closely follows the classic hypothetico-deductive model, which uses quantitative data to explain findings and processes. The data collated is presented based around the third objective of the research to establish the extent to which the critical success factors have had an impact on the recycling implementation success of UK shopping centre organisations. To arrive at the third objective of this research, detailed observations were carried out as follows:

- a. To examine if there is any significant correlation between the importance levels of recycling factors and the extent to which these factors are presented by the shopping centres management;
- b. To evaluate the levels of recycling implementation success perceived by three shopping centre groups (*i.e. Medium or 20000-39,999 m²; Large or 40,000-79,999 m²; and Very large or above 80,000 m²*);
- c. To identify if there any significant variation among the three shopping centre groups in terms of the factors deemed *critical* to the implementation success of shopping centres recycling; and
- d. To identify the influential parameter involved towards the overall shopping centres recycling implementation success.

This chapter firstly describes (Section 6.1 and 6.2) the background of the quantitative data collection. This is followed with part two (Section 6.3) of the chapter which deals with descriptive analysis of the data collected from retail centre managers undertaking recycling initiatives. The third part of this chapter reports the primary results of the statistical analysis with appropriate hypothesis testing pointed out earlier.

For the research and data collection methodologies utilised, please see Section 4.8 of Chapter Four.

6.2 Data collection

Questionnaire survey data was collected through electronic and postal media, between February and April 2010. Unfortunately the response rate was low, therefore a re-run survey between April to August 2010 was deemed necessary to obtain an adequate sampling size for suitable statistical analysis. The survey was primarily targeted to all traditional UK shopping centres scheme format above 20,000 m² of leasable area. The total sample size accounts for 211 units of shopping centres; 94 questionnaires were returned, representing a 44.5 % total response rate. It is noteworthy that the 94 response received were from regions throughout England - no-responses were received from Wales, Scotland and Northern Ireland. Henceforth, the anticipated results will only focused on England perspective only.

The composed data was analysed using the SPSS package (version 17). Descriptive statistics, such as frequencies, mean and percentages were used. In addition, standard statistical analysis procedures were utilised by using *Pearson correlation* analysis, *Univariate and Multivariate Analysis of Variance* (ANOVA and MANOVA) and Hierarchical multiple linear regressions in order to analyse the data obtained from the

Section Three of the questionnaire. The *Pearson correlation coefficients* analysis was proposed to examine relationships between perceptions of importance attached to recycling factors and the extent to which the factors are presented. On the other hand, both ANOVA and MANOVA methods were anticipated to investigate differences within the perceived factors between the three shopping centre scheme groups which are deemed to be of critical importance to recycling success. Lastly, hierarchical multiple linear regression was also carried out to permit a better understanding of what combination of factors constitutes the best practise in the overall implementation of shopping centre recycling. The last three methods were intended to evaluate the level of implementation success between the three respondent groups. Detailed examination of each hypothesis is presented in Section 6.4, 6.5, 6.6 and 6.7.

6.3 Descriptive analyses

The following sections provide a full description and analysis of each part of the survey instrument in detail.

The whole sample size is comprised of 94 responses (44.5 %). The descriptive data collected from these responses is composed of 11 main sections:

1. Characteristics of respondents position;
2. Characteristics of responding shopping centres scheme format;
3. Characteristics of responding shopping centres region;
4. Existence of recycling policy and time of starting the recycling initiatives;
5. Information related to sorting location for co-mingled recyclables;
6. Characteristics of waste management methods and facilities;
7. Indicators used for measuring the rates of recycling success;
8. Characteristics of the environmental management system certifications;
9. Characteristics of waste management and recycling service contracts;

10. Characteristics of responding shopping centres waste data: Estimated recyclables material generation by respondents; and
11. Factors ranking for the critical importance of shopping centre recycling.

6.3.1 Characteristics of respondents' position

As can be seen in Figure 6.1 the majority of the respondents were Assistant Centre Managers or Deputy General Managers due to the fact that they are primarily responsible for support services and operational aspects for the establishment. This is followed by Centre Managers, which were predominantly from smaller shopping centre schemes. It can be concluded that almost all the respondents were experienced practitioners at senior and executive levels, dealing with waste management and recycling initiatives on a day-to-day basis. Therefore, their response can be considered as reliable and provide the study with valuable information.

Table 6.1: Respondents position at shopping centre establishments

| Respondent Position | N | % |
|---|----------|----------|
| Centre Manager/General Manager | 42 | 44.7 |
| Assistant Centre Manager/Deputy General Manager | 43 | 45.7 |
| Facilities/Operations Manager | 5 | 5.3 |
| Waste Manager | 2 | 2.1 |
| Property Manager | 2 | 2.1 |
| Total | 94 | 100.0 |

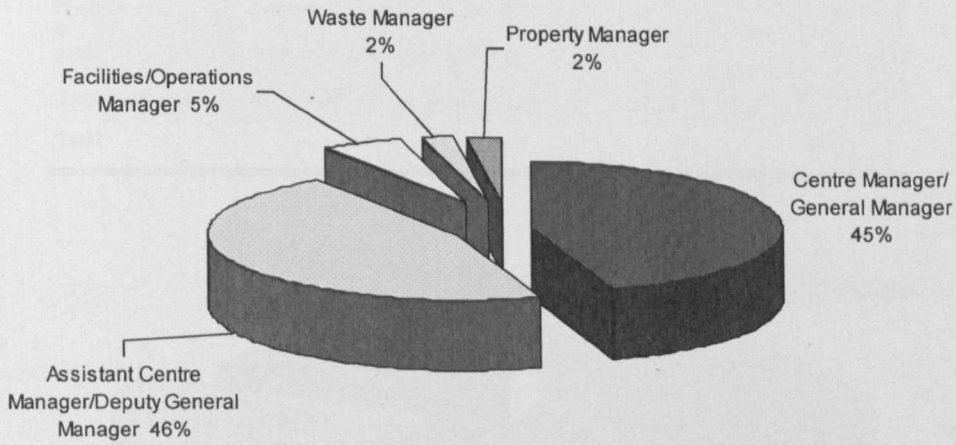


Figure 6.1: Respondents position at shopping centre establishments

6.3.2 Characteristics of responding shopping centres scheme format

According to the survey results, there were 94 shopping centre establishments from different regions which participated in the present study. Table 6.2 and Figure 6.2 indicate the shopping centre scheme groupings according to the size of the responding establishments. The majority of the respondents (57.4 %) were from the medium scheme (20,000 to 39,999 m²). 23.4 % were from large shopping centre schemes, followed by 18.1% from the very large schemes, which account for only 17 respondents.

Table 6.2: Respondents shopping centre schemes format

| Scheme format | Leasable area – size (m ²) | N | Valid % |
|---------------|--|----|---------|
| Medium | Between 20,000 m ² to 39,999 m ² | 55 | 58.5% |
| Large | Between 40,000 m ² to 79,999 m ² | 22 | 23.4% |
| Very Large | above 80,000 m ² | 17 | 18.1% |
| Total | | 94 | 100.0 |

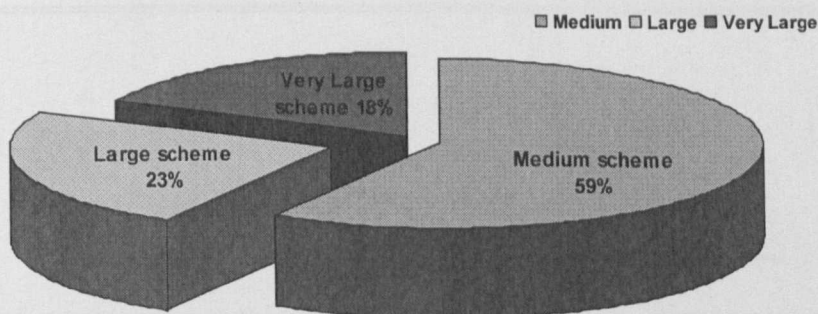


Figure 6.2: Respondents shopping centre schemes format

6.3.3 Characteristics of responding shopping centre region

As can be observed in Table 6.3, 94 respondents were from eleven different regions throughout England. No responses from Wales, Northern Ireland and Scotland were recorded. Figure 6.3 outlined the geographical breakdown of the responding shopping centres schemes according to each region in England.

Table 6.3: Shopping centres breakdown by region and schemes format

| Shopping centre schemes format | North West | North East | Yorkshire & Humberside | West Midlands | Midlands East | Midlands East Anglia | Greater London | South East | South West | Wales | Scotland | N. Ireland | Frequency |
|---|------------|------------|------------------------|---------------|---------------|----------------------|----------------|------------|------------|----------|----------|------------|-----------|
| Medium (20,000 – 39,999 m ²) | 3 | 3 | 5 | 0 | 7 | 8 | 17 | 9 | 3 | 0 | 0 | 0 | 55 |
| Large (40,000 - 79,999 m ²) | 5 | 1 | 0 | 0 | 2 | 1 | 8 | 5 | 0 | 0 | 0 | 0 | 22 |
| Very Large (above 80,000 m ²) | 1 | 3 | 1 | 4 | 2 | 0 | 1 | 3 | 2 | 0 | 0 | 0 | 17 |
| Total | 9 | 7 | 6 | 4 | 11 | 9 | 26 | 17 | 5 | 0 | 0 | 0 | 94 |

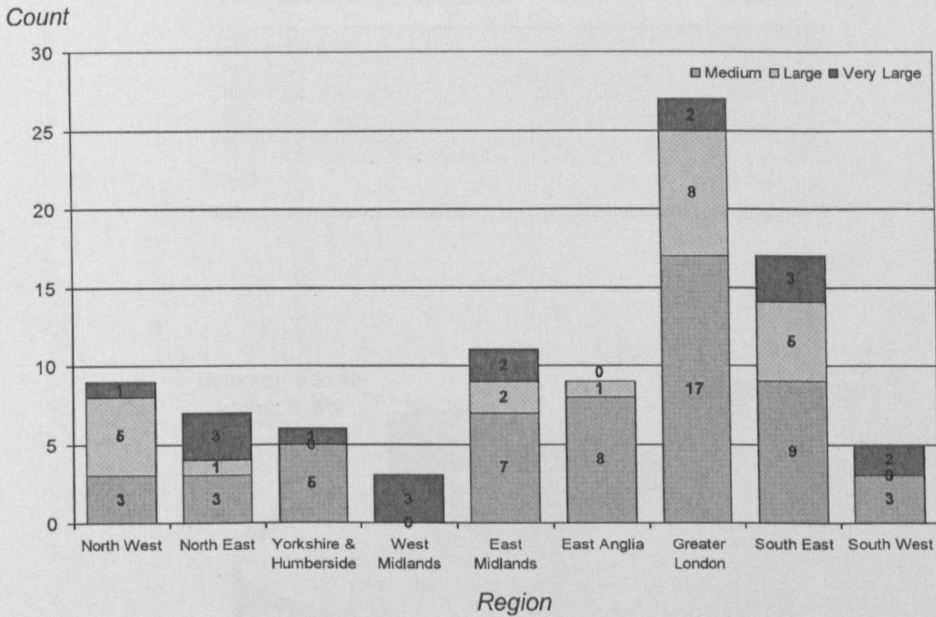


Figure 6.3: Shopping centres breakdown by region and schemes format

6.3.4 Existence of recycling policy and time of starting the recycling initiatives

Based on the survey response, all respondents claimed to have recycling policies established for each of their organisations. Figure 6.4 revealed that the majorities (85.1 %) of the respondents' had practiced recycling initiatives for their community of shopping centres for between 2 and 5 years. Only 8.5 % of them had been involved in recycling less than two years, while 6.5 % had experienced such initiatives for between 6 and 10 years. Consequently, the surveys returned could be regarded as reliable due to the participants experience in recycling initiatives within their organisations.

Table 6.4: Respondents experience in recycling policy

| Years of recycling experience | N | % |
|-------------------------------|----|-------|
| Less than 2 years | 8 | 8.5% |
| Between 2 to 5 years | 80 | 85.1% |
| Between 5 to 10 years | 6 | 6.4% |
| Total | 94 | 100.0 |

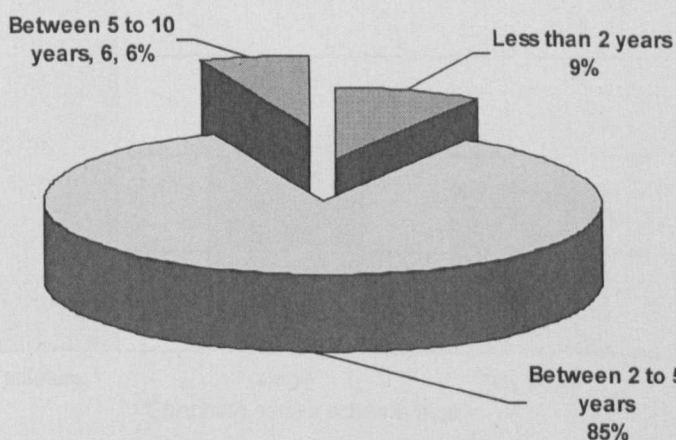


Figure 6.4: Respondents experience in recycling policy

6.3.5 Information related to sorting location for co-mingled recyclables

The success of drop-off recycling by respondents is largely dependent on recyclers (retailers and shoppers) participation and sorting activities. As recycling participation requires investment of time, space, money and effort, convenient on-site recycling should increase. The survey conducted observes respondents preferred approach for sorting their co-mingled recyclables. Respondents from Medium scheme formats have their sorting activities both on-site and off-site. As shown in Figure 6.5, out of 22 respondents from Large schemes, 50 % sort their recyclables on-site, whereas the remaining separate the recyclables on both sites. From the Very Large scheme, 6 centres sort their co-mingled recyclables on-site; alternatively 11 respondents from this scheme format cover both sites for sorting facilities.

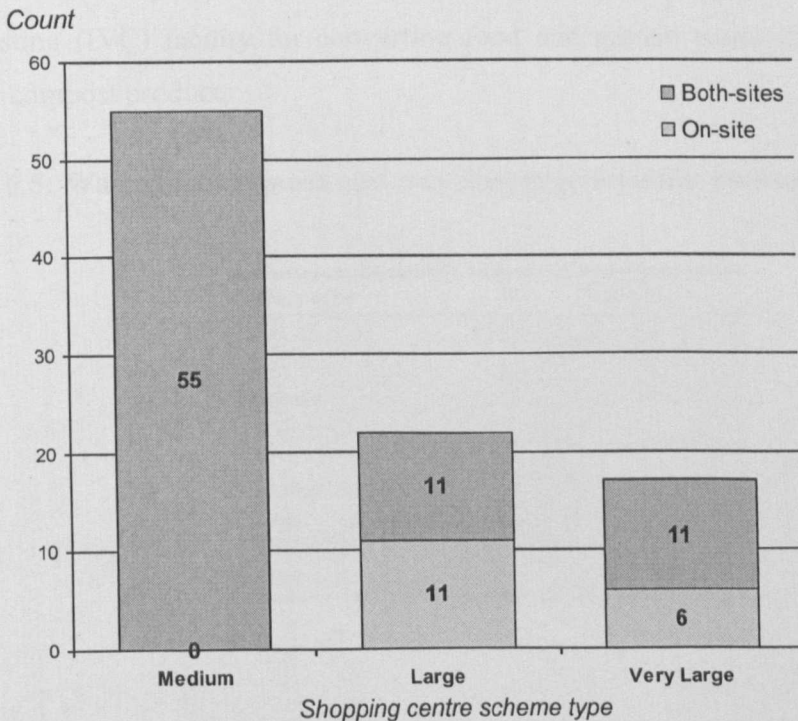


Figure 6.5: Respondents preferred location for sorting of co-mingled recyclables.

6.3.6 Characteristics of waste management methods and recycling facilities

Respondents were asked to specify their facilities for consolidating and storing waste prior to disposal. Figure 6.6 highlights the fact that all respondents had compactors and balers on-site to bundle recyclables materials like cardboard, plastic and papers, which is then sent off for processing to a production facility or paper mill. However, out of 94 respondents, the result finds that only 2.1 % of centres reconcile recycling initiatives with some alternative recovery method by transforming food and residual waste into energy using anaerobic digestion. The survey also finds that only one respondent (1.1 %) reported converting its waste cooking oil from restaurants into bio-diesel possibly to fuel local transport. Apparently the remaining fraction of residual waste from shopping centres is incinerated for energy recovery, as five centres (5.3 %) make use of this alternative recovery method. Another 5.3 % of the respondents make use of an in-vessel composting (IVC) facility for converting food and garden waste into a range of high quality compost products.

Table 6.5: Waste management and recycling type facilities procured by respondents

| Facility type | N | Valid % |
|-------------------------------------|----|---------|
| Compactor | 94 | 100.0% |
| Baler | 94 | 100.0% |
| Incinerator | 5 | 5.3% |
| Material/Resource Recovery Facility | 9 | 9.6% |
| Anaerobic Digestion | 2 | 2.1% |
| In-vessel composting (IVC) Facility | 5 | 5.3% |
| Biofuel plant | 1 | 1.1% |

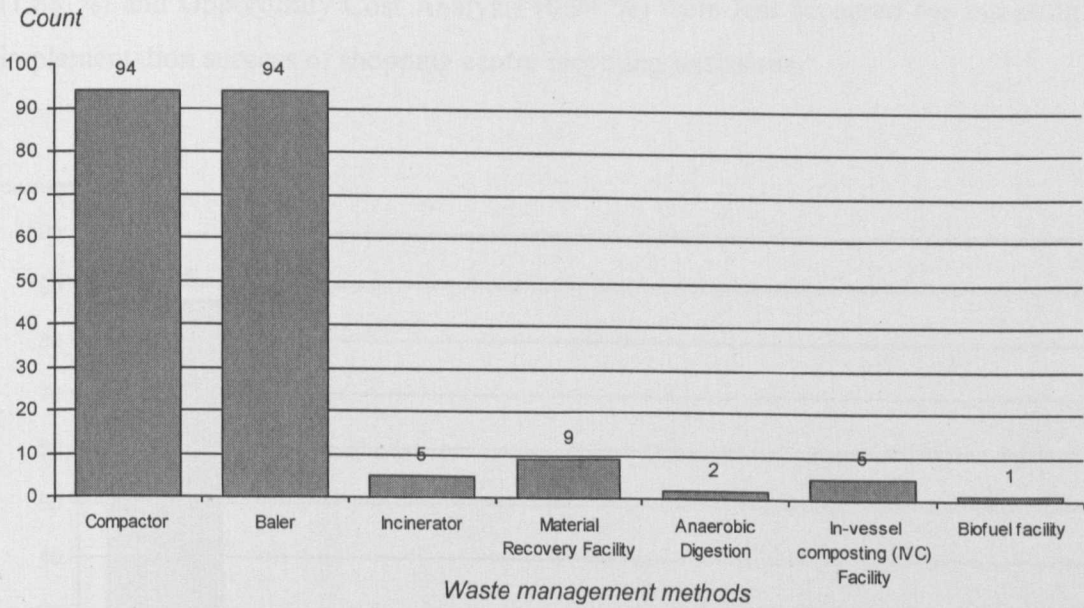


Figure 6.6: Waste management and recycling type facilities procured by respondents

6.3.7 Indicators used for measuring the rates of recycling success

Regarding the effort of minimising waste and having an efficient waste management policy, this extends to having a unique measurement method for recycling rates, as respondents have a vital role to drive targets and monitor waste disposal and recycling rates. As shown in Figure 6.7, Diversion rate, i.e. the percentage weight of total solid waste that was neither landfilled nor incinerated is the most preferred indicator with 87.42 % of the respondents referring to this unit. Only 8.46 % of the respondents measures the quantity of recyclables collected per tenant per unit of time. 3.76 % of the respondents referred to the Benefit per Cost ratio unit which estimates the respondents' revenue from sales of recyclables, disposal cost saving, operation and maintenance cost.

The remaining possible measurement units, Participant rate (1.88 %); Net Cost per Tonne (1.88 %) and Opportunity Cost Analysis (0.94 %) were less favoured for assessing the implementation success of shopping centre recycling initiatives.

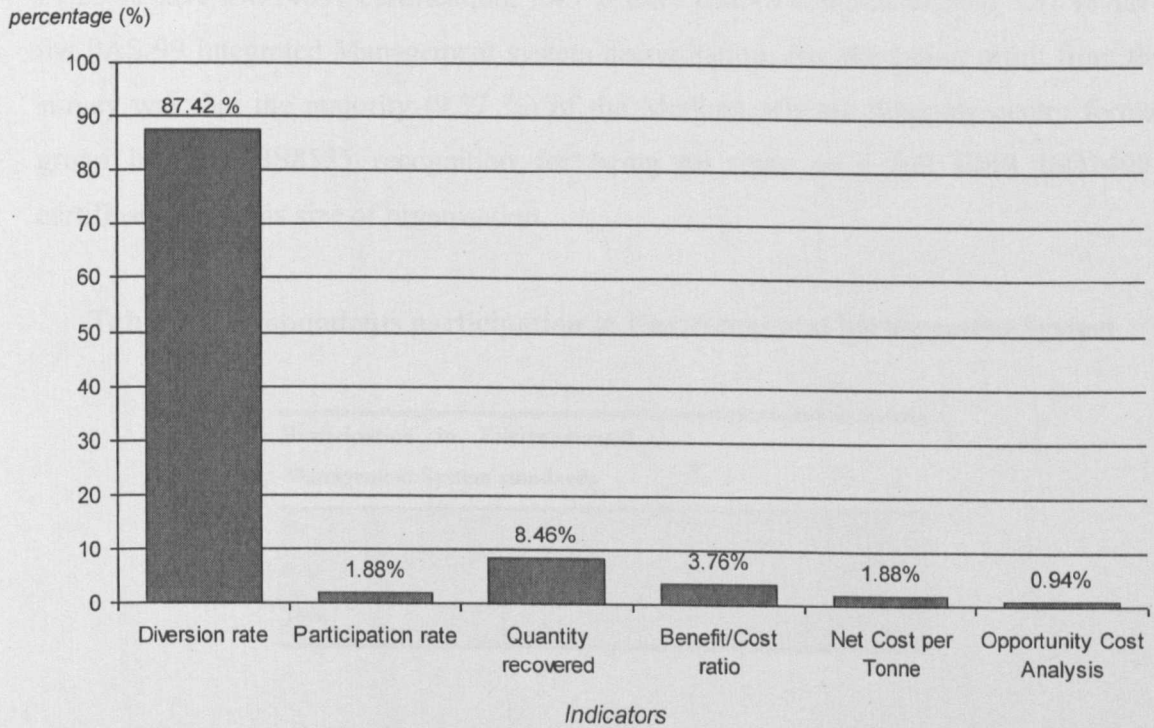


Figure 6.7: Respondents preferred recycling indicators

6.3.8 Characteristics of environmental management system (EMS) certifications

To sensibly manage shopping centre operational resources, and improve the reliability and credibility of organisational environmental policy, EMS certifications may help shopping centre management to prove to its customers (i.e. tenants and shoppers) that they are committed to meeting the environmental standards. Survey results shown in Table 6.6 reveal that there are various environmental management tools which have been presented by 21.3 % of the respondents. This included PAS 99 Integrated Management,

ISO 14001, BS 8555, and the Eco-Management and Audit Scheme (EMAS) certifications. Many respondents (78.7 %) however stated non-participation in EMS certification. Out of 20 respondents who implement the initiative, most are from the Very Large and Large shopping centre scheme format groups (as shown in Figure 6.8), where 21.25 % have ISO14001 certification, 7.43 % have EMAS compliance, and 5.31 % have the PAS 99 Integrated Management system accreditation. An interesting result from the survey was that the majority (9.57 %) of the Medium scheme shopping centre format group had the BS8555 recognition for being en route to a full EMS ISO14001 certification for this size of organisation.

Table 6.6: Respondents participation in Environmental Management System

| Participation in Environmental Management System standards | N | % |
|---|----------|----------|
| No | 74 | 78.7% |
| Yes | 20 | 21.3% |
| Total | 94 | 100.0% |

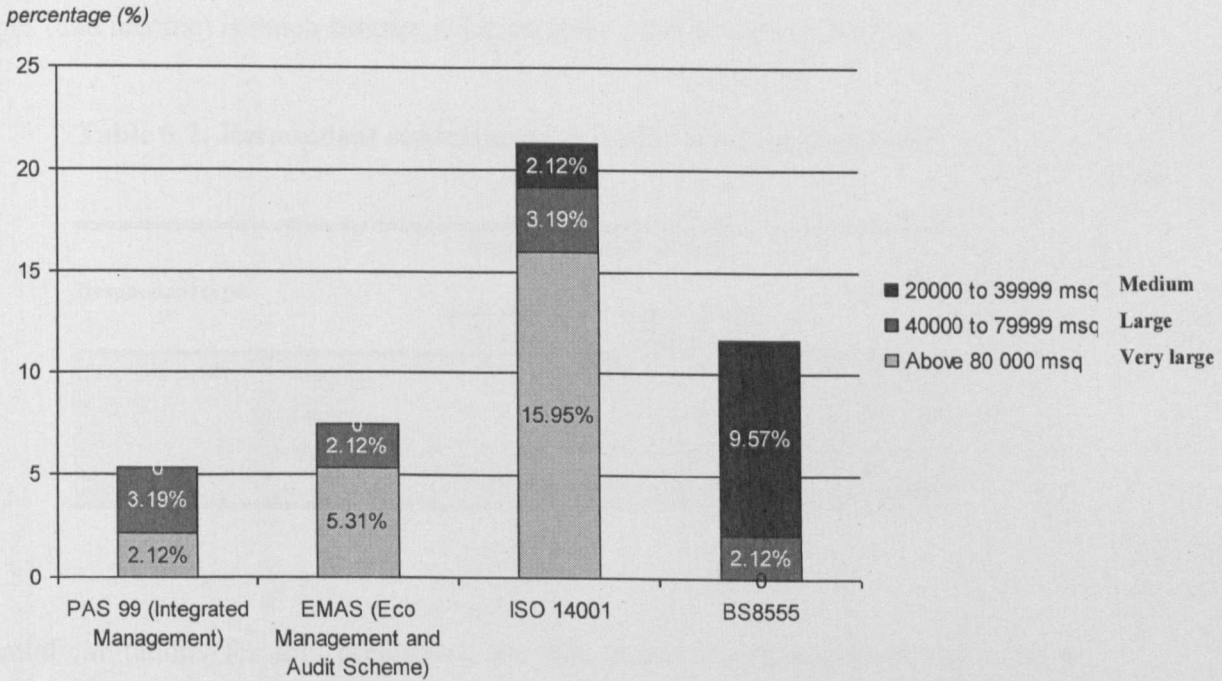


Figure 6.8: Respondents preferred recycling indicators

6.3.9 Characteristics of waste management and recycling service contracts

Competition for waste management services is very intense in some geographical areas, allowing choice from a wide range of waste management and recycling companies. Survey results shown in Table 6.7 found 8.4 % of the respondents opt for single contract that allows a contractor to take the majority of waste from the centre and be responsible for the recycling component as well. This is more likely for larger shopping centres which have developed a facility and outlet for recycled materials, as revealed in Figure 6.9 which portrays the larger shopping centre schemes tend to procure a single service contract compared to smaller shopping centre schemes. The main advantages of this method are that, by dealing with a single provider this helps to ease co-ordination,

reduced administration, results fewer people being involved, and financial recording of charges (and income) is much simpler, thus resulting a less expensive service.

Table 6.7: Respondent contracted service for waste management

| Respondent type | | Contracted service for waste management | | Total |
|------------------------|------------|---|----------------------------|-----------|
| | | Single Service Contract | Multiple Service Contracts | |
| Shopping center scheme | Medium | 0 | 55 | 55 |
| | Large | 3 | 19 | 22 |
| | Very Large | 6 | 11 | 17 |
| Total | | 9 (8.4%) | 85 (91.6%) | 94 (100%) |

Potential limitations for this preference are that larger contractors may only offer a restricted recycling service and, after initiation of the project, may be unwilling to extend the recycling list to the less commonly recycled materials. This would leave the centre with no choice but to seek an alternative contractor or additional recycling contractors. Alternatively, shopping centres may subcontract elements of a large contract where they do not have the capacity or expertise to deliver all that is required. As for this case, 91.6 % of the respondents prefer multiple-service contracts, thus contracting out for recyclables collections (i.e. WEEE, Clinical Waste, Cooking Oil, Fluorescent Lighting Tubes, Confidential Waste, etc.) and using local authority services for waste treatment and disposal services.

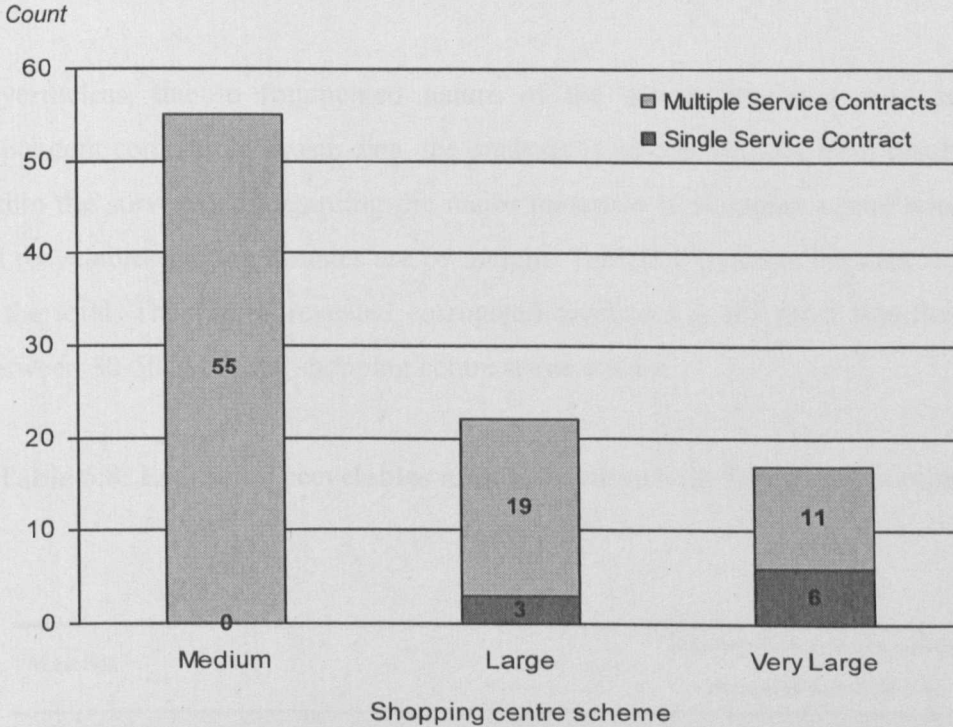


Figure 6.9: Respondents type of contracted service for waste management by shopping centre schemes format

6.3.10 Characteristics of responding shopping centres waste data: Estimated recyclables material generation by respondents

The characterisation of waste is a fundamental prerequisite for the mitigation of environmental impacts associated with solid waste recycling. The survey aimed to take the analysis to the next step, by estimating the material composition of total respondents' waste stream generated annually from shopping centres. On average respondents produce much larger quantities of relatively homogeneous wastes which are by products, and

most of which derives from various forms of product packaging, routine retailers operations, retrofitting works and on-site maintenance.

Nevertheless, due to fragmented nature of the survey response and sensitivity of respondent commercial waste data, the analysis is pieced together from results available within the survey data regarding the major materials in shopping centre waste streams. All recyclables waste estimates are by weight. Table 6.8 presents the data as percentage of the total. The survey revealed corrugated cardboard is the most significant element (between 30-50 %) of the shopping centre waste stream.

Table 6.8: Estimated recyclables material generation: Estimated percentages by material

| Material | Estimated recyclables material generated annually (%) |
|--|--|
| <i>Old Corrugated Cardboard</i> | 30% - 50% |
| <i>Paper</i> | 10% - 20% |
| <i>Glass</i> | 15% - 20% |
| <i>Plastic</i> | 10% - 15% |
| <i>Oil and Food</i> | 10% - 15% |
| <i>Construction and Renovation waste (inert waste)</i> | 5%-10% |
| <i>Metal</i> | 1% - 5% |
| <i>WEEE</i> | 1% - 5% |
| <i>Garden waste</i> | 1% - 5% |
| <i>Textile</i> | 1%-3% |
| <i>Furniture</i> | 3% -6% |

6.3.11 Factor ranking for the critical importance of shopping centre recycling

To construct factor rankings, respondents were asked to respond to the success factors listed in Section Three of the questionnaire, based on a five-point Likert scale of relative importance (1 – Not Important, 5 – Extremely Important). This instrument was designed

to rank the success factors based on shopping centre perceptions. Table 6.9 portrays the output from the analysis outlining three key descriptive statistical parameters: number of responses, mean, and standard deviation.

Table 6.9: Critical success factors rank analysis, ordered by descending mean value

| Factor Name | N | Mean | Std. Dev. |
|--|----|------|-----------|
| Goal-setting policy | 94 | 4.77 | .426 |
| Partnerships | 94 | 4.67 | .516 |
| Proximity of recycling facilities for separate storage | 94 | 4.47 | .581 |
| Service provider contract provision | 94 | 4.45 | .561 |
| Alternative recovery methods for residual waste | 94 | 4.38 | .551 |
| Program champion | 94 | 4.34 | .498 |
| Training program | 94 | 4.28 | .473 |
| Materials collection methods | 94 | 4.16 | .693 |
| Monitoring and reporting of recycling performance | 94 | 4.13 | .626 |
| Green Lease | 94 | 4.10 | .749 |
| Awareness-raising | 94 | 4.10 | .777 |
| Prioritised source separation | 94 | 4.00 | .816 |
| Recycling C&D waste during fit-out works | 94 | 3.97 | .782 |
| Provision for materials recycling facilities (MRF) | 94 | 3.90 | .734 |
| Environmental Management System certification | 94 | 3.86 | .811 |
| Making recycling mandatory | 94 | 3.09 | .667 |
| Marketing recyclables materials for exchange | 94 | 2.84 | 1.030 |
| Monetary incentives/rewards | 94 | 2.44 | .874 |

Descriptive statistics from the Table 6.10 identified twelve factors to have a mean value of 4.0 and above which were ranked according to their means. The role of the shopping

centre recycling coordinator is vital in the successful recycling initiatives. Primarily, the executions of goal-setting policy, manage recycling program through partnerships, proximity of recycling facilities for separate storage, service provider contract provision, alternative recovery methods for residual waste, program champion from top management, training program, materials collection methods, regular monitoring and reporting of recycling performance, green lease, awareness-raising, and prioritise source separation to a some extent are found to be critical to shopping centre recycling implementation success.

6.4 Pearson's Correlations results for relationship analysis between the importance of recycling factors attached and the extent to which the recycling factors are implemented by shopping centre organisations

As has been outlined in the third objective, the study intended to establish whether there are any significant correlations between perceptions of importance attached to the factors for successful recycling and the extent to which these factors are presented by responding shopping centre organisations. This data was obtained from Section Three of the questionnaire. The relationships employed consist of achieved implementation effectiveness compared to the expected achievement and has led to the following hypothesis testing.

6.4.1 Hypotheses tests

Is there association between the importance level of each recycling factor and the extent to which the factor has been implemented by the shopping centre organisations?

Null hypothesis (H₀)

There is no association between the importance level of each recycling factor and the extent to which the factor has been implemented.

This null hypothesis is evaluated against the alternative hypothesis:

Alternative hypothesis (H₁)

There is association between the importance level of each recycling factor and the extent to which the factor has been implemented.

The hypothesis test is based on a direct reflection of the third research objective for the whole population. Findings are arranged in the order of research question and pertaining null hypotheses. The outcomes are reported with statements of results and tables from the Pearson Correlation test undertaken. Results having a significance of 0.05 or 5 per cent probability level downwards are assumed to be conclusive. That is, if a particular result that has a 0.05 or 5 per cent probability level or less or has occurred by chance then the null hypothesis will be rejected.

6.4.2 Descriptive analysis

Descriptive statistics included group means and standard deviation to check for normality and variability. This was the first step in analysing the data to help decide whether parametric or non-parametric statistics were appropriate. The group distributions were found to be normal and both were equal in standard deviation. The descriptive statistics showed reasonable normality which permitted the use of parametric statistics.

6.4.3 Correlation analysis between perspective of importance attached to the recycling factors and the extent to which the recycling factors are implemented

The Pearson product-moment correlation coefficient was performed to detect the relationship between two variables from the perspective of importance attached to the factors (Independent Variables) and the extent to which the factors are present

(Dependent Variables). This statistical test is an appropriate statistical procedure because it is used with scaled data to assess the linear association between two variables and assumes a normal distribution. (Sheskin, 2000). As highlighted earlier in Section 6.4.1, if the calculated value (ignoring the sign if it is negative) is equal to or greater than the critical value then the correlation is significant at the 0.05 or 5 per cent probability level, so we can reject the null hypothesis and accept the alternative hypothesis. However, if the calculated value is less than the critical value then the correlation is not significant so we retain the null hypothesis and reject the alternative hypothesis.

To achieve this, Pearson correlation analysis was performed to quantify the strength of association between the importance of 18 recycling factors and its implementation success perceived by the respondents. Analysis results (see Table 6.10) has revealed only 10 recycling factors which have significant correlation (*P* or *sig.*) at 0.05 or 5 per cent probability level, between the variables (i.e. perspective of importance attached to the factors and the extent to which the factors are implemented). Overall, the correlation analysis further suggests that only 10 recycling factors to demonstrate relationships with the variables presented.

Table 6.10: Pearson's Correlation Coefficients results between the levels of recycling importance and its implementation for 18 recycling factors

| Success Factors | Variables type | N | Means | Std. Dev. | r | Sig. |
|--|-----------------------------------|----|-------------|-------------|--------------|-------------|
| Goal-setting policy | Importance (DV ^a) | 94 | 4.77 | .426 | .143 | .170 |
| | Implementation (IV ^b) | | 4.55 | .561 | | |
| Partnerships | Importance (DV ^a) | 94 | 4.67 | 5.16 | .089 | .395 |
| | Implementation (IV ^b) | | 2.79 | 1.269 | | |
| Proximity of recycling facilities for separate storage | Importance (DV ^a) | 94 | 4.47 | .581 | .410* | .000 |
| | Implementation (IV ^b) | | 4.44 | .578 | | |
| Service provider contract provision | Importance (DV ^a) | 94 | 4.45 | .561 | .193 | .062 |
| | Implementation (IV ^b) | | 4.17 | .580 | | |
| Alternative recovery methods for residual waste | Importance (DV ^a) | 94 | 4.38 | .551 | .213* | 0.39 |
| | Implementation (IV ^b) | | 4.45 | .541 | | |
| Program champion | Importance (DV ^a) | 94 | 4.34 | .498 | .319* | .002 |
| | Implementation (IV ^b) | | 4.26 | .462 | | |
| Training program | Importance (DV ^a) | 94 | 4.28 | .473 | .158 | .129 |
| | Implementation (IV ^b) | | 4.20 | .540 | | |
| Materials collection methods | Importance (DV ^a) | 94 | 4.16 | .693 | .417* | .000 |
| | Implementation (IV ^b) | | 4.38 | .531 | | |
| Monitoring and reporting of recycling performance | Importance (DV ^a) | 94 | 4.13 | .626 | .244* | .018 |
| | Implementation (IV ^b) | | 4.40 | .574 | | |
| Green Lease | Importance (DV ^a) | 94 | 4.10 | .749 | .289* | .005 |
| | Implementation (IV ^b) | | 4.19 | .610 | | |
| Awareness-raising | Importance (DV ^a) | 94 | 4.10 | .777 | .336* | .001 |
| | Implementation (IV ^b) | | 4.15 | .687 | | |
| Prioritised source separation | Importance (DV ^a) | 94 | 4.00 | .816 | .520* | .000 |
| | Implementation (IV ^b) | | 4.12 | .760 | | |
| Recycling C&D waste during fit-out works | Importance (DV ^a) | 94 | 3.97 | .782 | .313* | .002 |
| | Implementation (IV ^b) | | 4.29 | .521 | | |
| Provision for materials recycling facilities (MRF) | Importance (DV ^a) | 94 | 3.90 | .734 | .179 | .085 |
| | Implementation (IV ^b) | | 3.99 | .647 | | |
| Environmental Management System certification | Importance (DV ^a) | 94 | 3.86 | .811 | -.118 | .258 |
| | Implementation (IV ^b) | | 2.12 | .841 | | |
| Making recycling mandatory | Importance (DV ^a) | 94 | 3.09 | .667 | -.055 | .597 |
| | Implementation (IV ^b) | | 1.66 | .665 | | |
| Marketing recyclables materials for exchange | Importance (DV ^a) | 94 | 2.84 | 1.03 | -.090 | .390 |
| | Implementation (IV ^b) | | 3.20 | .811 | | |
| Monetary incentives/rewards | Importance (DV ^a) | 94 | 2.44 | .874 | .242* | .019 |
| | Implementation (IV ^b) | | 1.53 | .772 | | |

*. Correlation is significant at the 0.05 level (2-tailed).

DV. 5-point scale, low scores indicate not importance, high score indicate extremely importance.

IV. 5-point scale, low scores indicate not implemented, high score indicate effectively implemented.

6.4.4 Conclusion

From the relationship analyses results obtained in Table 6.10, only 15 recycling factors were positive thus shows that those respondents assigning a relatively high to importance to dealing with these factors tend to implement the factors effectively. On the other hand, the remaining three (3) recycling factors which shown negative relationship between the two variables tested; i.e. *Marketing their recyclable materials for exchange*, *Environmental Management System certification*, and *Making recycling mandatory*.

According to this result, *making recycling mandatory* implementation considered less effective by respondents. Similar result obtained for the *EMS certification* given the fact that most respondents pursuing the conventional practise although they see the importance of EMS implementation. Lastly, given the fact that majority of the respondents were from smaller scheme format of shopping centres and not the position as a waste broker to sell large volume of their recyclables (except cardboards and plastics). Hence *Marketing their recyclable materials for exchange* perceived less effective in terms of its overall implementation.

Given the alternative hypotheses for 10 recycling factors are retained, only 7 show greater strength of correlation between their importance and level of implementation presented at 1% confidence level. These factors namely *Prioritised source separation*, *Materials collection methods*, *Proximity of recycling facilities for separate storage*, *Awareness raising*, *Program champion*, *Recycling C&D waste during fit-out works*, and *Green Leases*. Whereas lesser correlations strength at 5% confidence obtained for *Monitoring and reporting of recycling performance*, *Monetary incentives or rewards and Alternative recovery methods for residual*.

Despite the aforesaid results, there were no statistically significant results discovered for the remaining 8 recycling factors. For that reason, the null hypotheses of no relationship

between the two variables for the 8 recycling factors were retained. These recycling factors includes *Service provider contract provision, Provision for material recycling facility, Training program, Goal setting policy, and Manage recycling program through partnerships* which in general shows weak correlations between the level of importance and the extent to which the factors have been presented.

6.5 ANOVA results for recycling implementation success variations between shopping centre scheme groupings

This section deals with measuring participants' perceived level of implemented recycling success. There are currently no mechanisms by which to measure overall recycling success based on shopping centre size, so the aim of this section is to avoid using a single criterion to measure implementation success. Instead the participants were asked to evaluate the level of effectiveness for each implementation variable based on a five point Likert scale. Herewith, a multi-faceted indicator of shopping centre recycling implementation success is considered.

6.5.1 Hypothesis test

Is there any variation in recycling implementation success between the three groups of shopping centre scheme formats?

Null hypothesis (H_0)

The mean values of recycling implementation success are the same across three shopping centre scheme groupings.

This null hypothesis is evaluated against the alternative hypothesis:

Alternative hypothesis (H₁)

The mean values of recycling implementation success vary across three shopping centre scheme groupings.

Based around the abovementioned hypothesis testing, this section portrays the results of the ANOVA procedure employed. ANOVA was used to test the effect of respondent variation with respect to reported recycling implementation success. This technique was used because one way ANOVA allows one to test if the mean values being compared are different (varied) from each other. ANOVA is particularly useful in this work because it can compare means irrespective of whether the dependent variable is an interval or ordinal scaled data. As highlighted in Section 4.9.2 of Chapter Four, results having a significance of 95 per cent downwards are assumed to be conclusive. That is, a particular result that has a 95 per cent probability or less or has occurred by chance will cause the null hypothesis to be rejected.

6.5.2 Descriptive analysis

To assess whether there are mean level differences between the between the three respondent groups (i.e. the independent variable; Very Large schemes, > 80000m², Large schemes of 40000m² to 79999m², and Medium schemes of 20000 to 39999m²) of shopping centre schemes in regard to successful recycling implementation (i.e. the dependent variable, by means of proxy measures), the study tested the hypothesis using repeated ANOVA. As outlined in Table 6.11, N represents the number of responses – note that N shows an indication of unequal cell sizes. Table 6.12 portrays the output from the analysis outlining three key descriptive statistical parameters: mean values, standard deviation, standard errors at the 0.95 per cent confidence interval, and the number of responses from each group. The total number of samples analysed (N), for the three respondent groups was 94.

In this construct, levels of recycling implementation were utilised for the 18 success factors. Respondents were asked to rate their implementation success for factor listed on a five-point Likert scale (1 - not implemented, 5 - effectively implemented). This was designed to measure the level of implementation in relation to the 18 recycling factors derived from the previous findings, i.e. prior literature and interview elements of this research. All 18 recycling factors were pooled together as a *composite variable* in order to construct a proxy measure for overall recycling implementation success. Details of the analysis is further explained in the following section.

Table 6.11 Between-Subjects Factors

| Respondent type | | N |
|----------------------------------|----------------------------|----|
| Shopping centre schemes (groups) | Medium (20000 to 39999m2) | 55 |
| | Large (40000m2 to 79999m2) | 22 |
| | Very Large (above 80000m2) | 17 |
| Total | | 94 |

Table 6.12: Means, Standard Deviations and Standard Error Comparing Three Shopping Centre Scheme Groups

Level of Overall Recycling Implementation Success

| Respondents (Shopping centre Scheme) | N | Mean | Std. Deviation | Std. Error | 95% Confidence Interval for Mean | | Minimum | Maximum |
|---|----|---------|----------------|------------|----------------------------------|-------------|---------|---------|
| | | | | | Lower Bound | Upper Bound | | |
| | | | | | Medium | 55 | | |
| Large | 22 | 67.4545 | 3.20308 | .68290 | 66.0344 | 68.8747 | 62.00 | 73.00 |
| Very Large | 17 | 70.5882 | 4.01651 | .97415 | 68.5231 | 72.6533 | 62.00 | 78.00 |
| Total | 94 | 66.8830 | 3.73261 | .38499 | 66.1185 | 67.6475 | 59.00 | 78.00 |

6.5.3 Analysis of variance

Determination of recycling implementation success was measured by means of a *composite variable* (DV). Since recycling implementation success cannot be measured directly by one single measure in construct phenomenon (as discussed in Section 3.3.2 of Chapter Three), a proxy measure by means of multiple questions was used to capture such a construct. Therefore the 18 success factors were pooled together to measure the overall degree of recycling implementation success via a proxy measure to ascertain the overall mean value, which is comparable to recycling implementation success (DV). Hence, the proxy measure for this *composite variable* can be further defined by the following equation:-

$$DV = \sum_{x=N}^{x=1} \frac{D_x}{N} = \text{composite variable} = \text{mean score}$$

Equation 4.6

ANOVA on the effect of recycling success among the three groups of shopping centre scheme formats was based on an initial hypothetical premise as summarised by the aforesaid null hypothesis. Variation is calculated as the ratio of the mean square deviation between shopping centre scheme groups and within shopping centre scheme groups, otherwise known as the (F) statistic. The extent of the calculated variation is reflected by the value of the (P) statistic; where $P \leq 0.05$, the level of variation is said to be statistically significant. As shown, Table 6.13 shows the variation (Sum Of Squares), the degrees of freedom (df), and the variance (Mean Square) within and the between groups, as well as the F value (F) and the significance of the F (Sig.). Sig. indicates whether the null hypothesis – the population means are all equal – has to be rejected or not.

From the ANOVA test results in Table 6.13 indicate that the mean value of *recycling implementation success* differed or varied significantly between groups {**F (2,91) = 16.47; P = 0.000**}. As a result, the null hypothesis is rejected and the alternate hypothesis

is retained thus suggesting that the mean value of recycling implementation success from the samples varied significantly.

Table 6.13: One-Way ANOVA in Recycling Implementation Success Tests by Shopping Centre Scheme Groups

| Level of Overall Recycling Implementation Success | | | | | |
|---|----------------|----|-------------|-------|------|
| | Sum of Squares | df | Mean Square | F | Sig. |
| Between Groups | 344.395 | 2 | 172.20 | 16.47 | .000 |
| Within Groups | 951.318 | 91 | 10.45 | | |
| Total | 1295.713 | 93 | | | |

Rejecting the null hypothesis does not mean that all the population means differ. Hence, to study the group(s) of respondents which had different perceptions of recycling implementation success, a post hoc test procedure is followed to reveal which means differ from each other.

6.5.4 Test of Homogeneity

The test of homogeneity is presented in Table 6.14. The Levene statistic is designed to test the null hypothesis that the variances of the groups are the same. In this case, the Levene statistic is testing whether the variances between shopping centre scheme groups are the same. Where the Levene statistic is significant (i.e. < 0.05), we conclude that the variances are significantly different. As a result, it was necessary to rectify the differences between the group variances by transforming the data and performing a post hoc test.

Table 6.14: Test of homogeneity results for interaction between shopping centre scheme groups on overall recycling program success.

| Level of Overall Recycling Implementation Success | | | |
|---|-----|-----|------|
| F | df1 | df2 | Sig. |
| .268 | 2 | 91 | .766 |

As presented in Table 6.14, there is no significant variation in recycling implementation success; ($P > .766$). For this reason a post-hoc test (with Tukey HSD) that does not assume normality of data would be preferred.

6.5.5 Post-Hoc comparison tests

Though the ANOVA test result (refer in Table 6.13) helped to determine the statistical significance of variance between the factors, it did not indicate the actual point of variation or how these factors differed. To establish this information, a post-hoc test was required, which compares the means of the group of respondents. Here, the Tukey HSD test assumes equal variances were used since the Levene's Test is not significant ($P = .766$).

The result of post-hoc comparison with Tukey HSD test is shown in Table 6.15. This explains the differences in model predicted means for each factor pair. Columns 1 and 2 of the table display the factors being tested. Where the P (sig.) value (column 5) is less than 0.05, variation in the means between factors is assumed to be statistically significant.

Table 6.15: Post Hoc result with equal variances assumed (Tukey HSD) test

| (I) Shopping centre scheme | (J) Shopping centre scheme | Mean Difference (I-J) | Std. Error | Sig. | 95% Confidence Interval | |
|----------------------------|----------------------------|-----------------------|------------|------|-------------------------|-------------|
| | | | | | Lower Bound | Upper Bound |
| Medium | Large | -1.94545* | .81563 | .050 | -3.8888 | -.0021 |
| | Very Large | -5.07914* | .89723 | .000 | -7.2169 | -2.9414 |
| Large | Medium | 1.94545* | .81563 | .050 | .0021 | 3.8888 |
| | Very Large | -3.13369* | 1.04409 | .010 | -5.6214 | -.6460 |
| Very Large | Medium | 5.07914* | .89723 | .000 | 2.9414 | 7.2169 |
| | Large | 3.13369* | 1.04409 | .010 | .6460 | 5.6214 |

*. The mean difference is significant at the 0.05 level.

Table 6.16: Result of the Post Hoc (Tukey HSD^{a,b}) for level of overall recycling implementation success

| Shopping centre scheme | N | Subset for alpha = 0.05 | |
|------------------------|----|-------------------------|---------|
| | | 1 | 2 |
| Medium | 55 | 65.5091 | |
| Large | 22 | 67.4545 | |
| Very Large | 17 | | 70.5882 |
| Sig. | | .094 | 1.000 |

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 24.498.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

Results from the post hoc comparison revealed statistically significant variations were found. All P (*sig.*) values for each pair of factors were less than 0.05, with the exception of the comparison between medium and large schemes where the P (*sig.*) value was exactly 0.05.

The Homogenous Subset as shown in Table 6.16 portrayed an adjusted Tukey test that is appropriate for non-familiar group sizes, as in this case. The estimated means for the two

homogeneous subsets are shaded. Note that there was no statistically significant difference ($P = .094$) between *Medium* and *Large scheme* group means, as shown in Subset 1. In Subset 2, the *Very Large scheme* is shown, indicating that this group was not significantly different ($P= 1.000$).

6.5.6 Conclusion

The above results indicate the level of overall recycling success or performance perceived by each shopping centre scheme group. The results indicate that *Very Large* shopping centres perceived the overall recycling implementation success to be 70.6 per cent; this is followed by the *Large scheme* group at 67.5 per cent whereas the *Medium scheme* groups successfully implemented their recycling initiatives at 65.5 per cent

6.6 MANOVA results for perception of importance of recycling factors between shopping centre scheme groupings

This section reports the preliminary findings from statistical analysis which deals with hypotheses 3 which was derived from the third research objective: is there any differences in regard to the critical importance of recycling factors between the three shopping centre scheme groups. A brief description dealing with the hypothesis testing together with statistical procedures are included in the following sections.

6.6.1 Hypotheses test

Is there any variation of critical importance for each recycling factor across the three groups of shopping centre scheme format?

Null hypothesis (H_0)

There is no difference between the critical importance of each recycling factor across shopping centre scheme groups.

This null hypothesis is evaluated against the alternative hypothesis:

Alternative hypothesis (H₁)

There is a difference between the critical importance of each recycling factor across shopping centre scheme groups.

Based on the above hypotheses, participants' level of importance in respect of recycling factors at shopping centre establishments is measured again through Section Three of the questionnaire survey.

6.6.2 General Linear Model (GLM) of MANOVA procedure

As highlighted in the research methodology chapter, statistically the third hypothesis study presents the general linear model (GLM) which can be represented by the linear model (see detail description and *Equation 4.5* in Section 4.9.3).

Since the group of data were initially subjected to a test for normality which showed that data were approximately normally distributed. The analysis of such rating data was carried out using MANOVA procedure, which is in line with Folz and Hazlett (1991). In so doing, MANOVA statistical procedure was employed to disclose the results from the data collected. Results having a significance of 95% downwards are assumed to be conclusive. That is, a particular result that has a 95% probability or less or has occurred by chance will cause null hypothesis to be rejected.

6.6.3 Descriptive analysis

In response to the present study, multivariate analysis was used to carry out comparison analysis of recycling activities amongst the three shopping centre respondents groups (i.e. Very Large, Large, and Medium schemes) as shown in Table 6.11. N represents the number of responses (from this table N shows indication of unequal cell sizes). Table 6.17 presents the output from the analysis outlining three key descriptive statistical parameters: mean, standard deviation and number of responses from each group, based around the Likert scale across the 18 recycling success factors observed.

Table 6.17: Means and Standard Deviations Comparing Three Respondent Groups

| Factors | Respondent type (shopping centre scheme) | Mean | Std. Deviation | N |
|--|---|------|----------------|----|
| Goal-setting policy | Medium | 4.82 | .389 | 55 |
| | Large | 4.64 | .492 | 22 |
| | Very Large | 4.76 | .437 | 17 |
| | Total | 4.77 | .426 | 94 |
| Making recycling mandatory | Medium | 3.22 | .567 | 55 |
| | Large | 3.00 | .617 | 22 |
| | Very Large | 2.76 | .903 | 17 |
| | Total | 3.09 | .667 | 94 |
| Program champion from top management | Medium | 4.31 | .466 | 55 |
| | Large | 4.36 | .492 | 22 |
| | Very Large | 4.41 | .618 | 17 |
| | Total | 4.34 | .498 | 94 |
| Training | Medium | 4.15 | .356 | 55 |
| | Large | 4.50 | .512 | 22 |
| | Very Large | 4.41 | .618 | 17 |
| | Total | 4.28 | .473 | 94 |
| Prioritise source separation | Medium | 4.02 | .828 | 55 |
| | Large | 4.05 | .722 | 22 |
| | Very Large | 3.88 | .928 | 17 |
| | Total | 4.00 | .816 | 94 |
| Service provider contract | Medium | 4.55 | .538 | 55 |
| | Large | 4.41 | .503 | 22 |
| | Very Large | 4.18 | .636 | 17 |
| | Total | 4.45 | .561 | 94 |
| Proximity of recycling facilities for separate storage | Medium | 4.51 | .505 | 55 |
| | Large | 4.32 | .646 | 22 |
| | Very Large | 4.53 | .717 | 17 |
| | Total | 4.47 | .581 | 94 |

| | | | | |
|--|------------|------|-------|----|
| Alternative recovery methods for residual waste | Medium | 4.45 | .503 | 55 |
| | Large | 4.32 | .477 | 22 |
| | Very Large | 4.24 | .752 | 17 |
| | Total | 4.38 | .551 | 94 |
| Manage recycling program through partnerships | Medium | 4.67 | .511 | 55 |
| | Large | 4.73 | .456 | 22 |
| | Very Large | 4.59 | .618 | 17 |
| | Total | 4.67 | .516 | 94 |
| Monitoring and reporting of recycling performance | Medium | 4.15 | .524 | 55 |
| | Large | 4.09 | .684 | 22 |
| | Very Large | 4.12 | .857 | 17 |
| | Total | 4.13 | .626 | 94 |
| Collection methods | Medium | 4.20 | .678 | 55 |
| | Large | 4.09 | .750 | 22 |
| | Very Large | 4.12 | .697 | 17 |
| | Total | 4.16 | .693 | 94 |
| Awareness raising | Medium | 4.20 | .704 | 55 |
| | Large | 3.86 | .834 | 22 |
| | Very Large | 4.06 | .899 | 17 |
| | Total | 4.10 | .777 | 94 |
| Environmental Management System certification | Medium | 3.84 | .898 | 55 |
| | Large | 3.91 | .750 | 22 |
| | Very Large | 3.88 | .600 | 17 |
| | Total | 3.86 | .811 | 94 |
| Green Lease | Medium | 3.91 | .701 | 55 |
| | Large | 4.23 | .752 | 22 |
| | Very Large | 4.53 | .717 | 17 |
| | Total | 4.10 | .749 | 94 |
| Marketing recyclable materials for exchange | Medium | 2.55 | .662 | 55 |
| | Large | 2.86 | 1.082 | 22 |
| | Very Large | 3.76 | 1.393 | 17 |
| | Total | 2.84 | 1.030 | 94 |
| Monetary incentives or rewards | Medium | 2.38 | .757 | 55 |
| | Large | 2.41 | .854 | 22 |
| | Very Large | 2.65 | 1.222 | 17 |
| | Total | 2.44 | .874 | 94 |
| Recycling C&D waste during retrofit and fit-out works | Medium | 4.00 | .816 | 55 |
| | Large | 3.86 | .710 | 22 |
| | Very Large | 4.00 | .791 | 17 |
| | Total | 3.97 | .782 | 94 |
| Provision for MRF | Medium | 3.80 | .779 | 55 |
| | Large | 3.95 | .653 | 22 |
| | Very Large | 4.18 | .636 | 17 |
| | Total | 3.90 | .734 | 94 |

6.6.4 Between subject analysis of variance of the importance of shopping centre recycling CSFs

A test of Between-Subjects Effects (see Appendix D) is summarised in the Table 6.18; this is performed using aforesaid procedure to determine the level of importance of the listed shopping centre recycling initiatives (dependent variables) between the respondent groups. Each item in the model is tested for its ability to account for variation on the dependent variables. The significance value (P) for each term is less than 0.05 ($P < 0.05$). This implies that a significant statistical variation in the level of importance between the respondent groups on the listed factors exists. As shown, the Table 6.18 indicates the variation (Type III Sum Of Squares), the degrees of freedom (df), and the variance (Mean Square), as well as the F value (F) and the significance of the F (Sig.). Sig. indicates whether the null hypothesis – the population means are all equal – should be rejected or not.

The test results revealed that the mean values of the 4 dependent variables, i.e. making recycling mandatory, training program, green leases and marketing recyclable materials for exchange, differed or varied significantly across shopping centre groups. Null hypothesis H_0 is thus rejected and the alternate hypothesis that **the mean values of some factors of recycling initiatives in the sample varied across shopping centre scheme groupings** is retained. This variation is reflected as the ratio of mean square deviation between shopping centre scheme groups and within shopping centre scheme groups, otherwise known as the (F) statistic.

Table 6.18: Summarised model for Tests of Between-Subjects Effects (Corrected Model)

| Dependent Variable | Type III Sum of Squares | df | Mean Square | F | Sig. |
|--|-------------------------|----|-------------|-------|-------------|
| Goal-setting policy | .520 ^a | 2 | .260 | 1.45 | .241 |
| Making recycling mandatory | 2.879 ^b | 2 | 1.439 | 3.41 | .037 |
| Program champion | .152 ^c | 2 | .076 | .30 | .740 |
| Training program | 2.354 ^d | 2 | 1.177 | 5.81 | .004 |
| Prioritised source separation | .299 ^e | 2 | .149 | .22 | .803 |
| Service provider contract provision | 1.809 ^f | 2 | .904 | 3.00 | .055 |
| Proximity of recycling facilities for separate storage | .651 ⁱ | 2 | .325 | .96 | .386 |
| Alternative recovery methods for residual waste | .745 ^j | 2 | .372 | 1.23 | .296 |
| Environmental Management System certification | .186 ^k | 2 | .093 | .35 | .709 |
| Monitoring and reporting of recycling performance | .049 ^l | 2 | .024 | .06 | .941 |
| Materials collection methods | .223 ^m | 2 | .112 | .23 | .796 |
| Awareness raising | 1.806 ⁿ | 2 | .903 | 1.51 | .226 |
| Partnerships | .092 ^o | 2 | .046 | .068 | .934 |
| Green Lease | 5.494 ^q | 2 | 2.747 | 5.36 | .006 |
| Marketing recyclable materials for exchange | 19.320 ^r | 2 | 9.660 | 11.09 | .000 |
| Monetary incentives or rewards | .935 ^s | 2 | .467 | .61 | .548 |
| Recycling C&D waste during retrofit and fit-out works | .313 ^t | 2 | .157 | .25 | .778 |
| Provision for MRF | 1.913 ^u | 2 | .957 | 1.81 | .170 |

Results revealed there are significant differences in the perceptions by the shopping centre scheme groups for:

1. **Making recycling mandatory** { $F(2,91) = 3.41; P < 0.05$ };
2. **Training program** { $F(2,91) = 5.81; P < 0.05$ };
3. **Green leases** { $F(2,91) = 5.36; P < 0.05$ }; and
4. **Marketing recyclable materials for exchange** { $F(2,91) = 11.09; P < 0.05$ }.

In order to further identify which means differ from each other, a post hoc test procedure for identified variables was performed (see Section 6.6.6).

The service provider contract provision { $F(2,91) = ; P = 0.055$ } factor shows an interaction which is borderline significant, indicating that small differences exist between the perception of shopping centre scheme groupings in regard to the level of importance of this recycling initiative.

The remaining 14 factors showed no significant statistical variations amongst the respondent groups or instances of variation which could be ascribed to chance occurrence, hence, the null-hypothesis were accepted. These factors are:

1. Program champion;
2. Partnerships;
3. Goal-setting policy;
4. Prioritised source separation;
5. Service provider contract provision;
6. Proximity of recycling facilities for separate storage;
7. Recycling C&D waste during fit-out works;
8. Environmental Management System (EMS) certification;
9. Monitoring and reporting of recycling performance;
10. Materials collection methods;
11. Awareness raising;
12. Monetary incentives or rewards;
13. Alternative recovery methods for residual waste; and
14. Provision for Materials Recovery Facility (MRF).

6.6.5 Estimated marginal mean and standard error

Table 6.19 summarises the model-estimated marginal means and standard errors at a 95 % confidence interval for the 4 recycling variables identified in the previous section

which differed or varied significantly across shopping centre groups. Table 6.17 presents an outline of grand mean for the dependent variables. From Table 6.19, it is possible to explore interaction effects between all 3 factors (i.e. Medium, Large and Very Large schemes). While Medium schemes' level of importance for *making recycling mandatory* for instance, is at a mean of 3.22, Very Large schemes have a much lower mean of 2.78. However, the variables pattern for *green lease* and *marketing recyclable materials for exchange* revealed that Very Large schemes have a greater margin between the each of the respondents' means. There is also a distinct trend for the *training program* variable which indicates that Large schemes have a higher mean of 4.50, while Very Large schemes have a mean of 4.41, followed by Medium schemes which having the lowest mean of 4.15. This suggests an interaction effect between the perceived levels of importance for shopping centre recycling initiatives in regard to these variables from respondents.

Table 6.19: Summarised model for estimated marginal means and standard error

| Dependent Variable | Type of shopping centre respondent (scheme) | Mean | Std. Error | 95% Confidence Interval | |
|---|---|------|------------|-------------------------|-------------|
| | | | | Lower Bound | Upper Bound |
| Making recycling mandatory (Grand mean = 3.09) | Medium | 3.22 | .088 | 3.044 | 3.392 |
| | Large | 3.00 | .139 | 2.725 | 3.275 |
| | Very Large | 2.78 | .158 | 2.452 | 3.078 |
| Training program (Grand mean = 4.28) | Medium | 4.15 | .061 | 4.025 | 4.266 |
| | Large | 4.50 | .096 | 4.309 | 4.691 |
| | Very Large | 4.41 | .109 | 4.195 | 4.629 |
| Green lease (Grand mean = 4.10) | Medium | 3.91 | .097 | 3.717 | 4.101 |
| | Large | 4.23 | .153 | 3.924 | 4.530 |
| | Very Large | 4.53 | .174 | 4.184 | 4.874 |
| Marketing recyclable materials for exchange (Grand mean = 2.84) | Medium | 2.55 | .126 | 2.295 | 2.795 |
| | Large | 2.86 | .199 | 2.468 | 3.259 |
| | Very Large | 3.77 | .226 | 3.315 | 4.214 |

6.6.6 Post Hoc Multi Comparison tests

Although the test of between subjects effects (see Table 6.18 and Appendix D) helped to determine the statistical significance of variance between the factors, it did not indicate the actual point of variation or how these factors actually differed. To ascertain this information, it was therefore necessary to carry out a post-hoc test. Following Field (2009), the Tukey HSD test assumes equal variances were used (i.e. the Levene's Test is not significant; $P > 0.05$, refer to Appendix E) and the Games-Howell test was chosen for equal variances not assumed (i.e. the Levene's Test is significant; $P \leq 0.05$, refer in Appendix E: Test of Homogeneity of Variances).

The post-hoc comparisons results using Games-Howell test are shown in Table 6.20a, and the results post hoc comparisons with the Tukey HSD test are shown in Table 6.20b. Both show the differences in model predicted means for each pair of factor levels. Columns 2 and 3 of the table display the pairs of factors being tested. Where P value (column 6) is less than 0.05, variation in the means between factors is said to be statistically significant.

Table 6.20a and 6.20b portray the results of some variations with regard to the importance level of shopping centre recycling initiatives. Actual points of variation in the level of importance for the observed 4 variables were between the *Medium scheme* and the *Very Large scheme*, except in the *training program* variable. It is noteworthy that a statistically significant variation was found (from Games-Howell test) between the *Medium scheme* and the *Large scheme* in the *training program* variable. The mean difference between the two scheme groups was -0.355, thus indicating a significant difference.

Considering the level of importance of the *marketing recyclable materials for exchange* factor, the variation level between *Large* and *Medium schemes* as well as *Large* and *Very Large schemes* was not statistically significant. Equally, the *making recycling mandatory*

factor, there was a statistical variation in the level of importance between *Medium* and *Very Large schemes* ($P= 0.36$), with mean difference of .453. The Homogenous Subsets tables, as shown in Appendix F, depict an adjusted Tukey test that was appropriate when group sizes were not similar (Field, 2009), as in this case. Note that there was not a statistically significant difference ($P = .417$) between the *Very Large* (mean = 2.76) and *Large schemes* (mean = 3.00), as shown in Subset 1. In Subset 2, average (i.e. *Large scheme*; mean = 3.00) and highest (i.e. *Medium scheme*; mean = 3.22) groups means are shown, indicating that they were not significantly different ($P= .471$).

Table 6.20a: Post Hoc result with unequal variances assumed (Games-Howell) test

| Dependent Variable | (I) Type of shopping centre respondent (scheme) | (J) Type of shopping centre respondent (scheme) | Mean Difference (I-J) | Std. Error | P (Sig.) | 95% Confidence Interval | |
|---|---|---|-----------------------|------------|----------|-------------------------|-------------|
| | | | | | | Lower Bound | Upper Bound |
| Training program | Medium | Large | -.355* | .119 | .016 | -.65 | -.06 |
| | | Very Large | -.266 | .157 | .234 | -.67 | .13 |
| | Large | Medium | .355* | .119 | .016 | .06 | .65 |
| | | Very Large | .088 | .185 | .883 | -.37 | .54 |
| | Very Large | Medium | .266 | .157 | .234 | -.13 | .67 |
| | | Large | -.088 | .185 | .883 | -.54 | .37 |
| Marketing recyclable materials for exchange | Medium | Large | -.318 | .247 | .415 | -.93 | .29 |
| | | Very Large | -1.219* | .349 | .007 | -2.11 | -.33 |
| | Large | Medium | .318 | .247 | .415 | -.29 | .93 |
| | | Very Large | -.901 | .409 | .087 | -1.91 | .11 |
| | Very Large | Medium | 1.219* | .349 | .007 | .33 | 2.11 |
| | | Large | .901 | .409 | .087 | -.11 | 1.91 |

*. The mean difference is significant at the 0.05 level.

Table 6.20b: Post Hoc result with equal variances assumed (Tukey HSD) test

| Dependent Variable | (I) Type of shopping centre (scheme) | (J) Type of shopping centre (scheme) | Mean Difference (I-J) | Std. Error | Sig. | 95% Confidence Interval | |
|----------------------------|--------------------------------------|--------------------------------------|-----------------------|------------|------|-------------------------|-------------|
| | | | | | | Lower Bound | Upper Bound |
| Making recycling mandatory | Medium | Large | .218 | .164 | .382 | -.17 | .61 |
| | | Very Large | .453* | .180 | .036 | .02 | .88 |
| | Large | Medium | -.218 | .164 | .382 | -.61 | .17 |
| | | Very Large | .235 | .210 | .504 | -.26 | .74 |
| | Very Large | Medium | -.453* | .180 | .036 | -.88 | -.02 |
| | | Large | -.235 | .210 | .504 | -.74 | .26 |
| Green Lease | Medium | Large | -.318 | .181 | .188 | -.75 | .11 |
| | | Very Large | -.620* | .199 | .007 | -1.09 | -.15 |
| | Large | Medium | .318 | .181 | .188 | -.11 | .75 |
| | | Very Large | -.302 | .231 | .395 | -.85 | .25 |
| | Very Large | Medium | .620* | .199 | .007 | .15 | 1.09 |
| | | Large | .302 | .231 | .395 | -.25 | .85 |

*. The mean difference is significant at the 0.05 level.

Just as with the importance level of the *green lease* factor, the level of variation the between *Large* and *Medium schemes* as well as *Large* and *Very Large schemes* were not statistically significant. The adjusted Tukey test (see Appendix F) indicates there was no statistically significant relationship between the *Medium* and *Large schemes* ($P= .270$), as well as the average (i.e. *Large scheme*; mean = 4.23) and highest (i.e. *Very large scheme*; mean = 4.53.) groups means ($P= .307$).

6.6.7 Conclusion

Based on the findings of the above results, one can conclude that there were only 4 factors of critical importance perceived differently across respondent groups, i.e. *Training program*, *Marketing recyclable materials for exchange*, *Making recycling mandatory*, and *Green lease*. This shows that the general trend of the data related to the aforementioned factors varies accordingly in respect to the shopping centre scheme groups, whereas the remaining 14 factors were perceived equally by all.

6.7 Predictive validity using hierarchical model of MLR technique

To ascertain the third research objective of this research to predict significant recycling factors involved in the overall recycling implementation success, a statistical hierarchical regression model was estimated. Predictive (or criterion) validity refers to the degree to which an item (or instrument) can predict an independent relevant criterion which is related to the phenomenon being measured (Chua 2009; Field 2009). Hence this analytical method was used so that the inferences can be made about the linear correlation that exist between shopping centres recycling implementation success (criterion variable), 18 recycling factors (predictor variables) and 3 groups of shopping centre scheme formats (confounding variables).

Thus, the purpose of using hierarchical regression is to test theoretical assumptions and to determine the degree to which variables entered later in the analysis account for variance in the criterion over and above that which is accounted for by variables entered earlier in the analysis. The researcher arranged two steps (as explained in Section 4.9.4) in such a way as to reflect the principle of causal priority and to test the hypothesis.

6.7.1 Hypothesis test

Is there relationship between the recycling factors and the extent to which they have been successfully implemented by the three groups of shopping centre organisations?

Null hypothesis (H_0)

The success of shopping centres recycling implementation between the three shopping centre scheme formats is not related to:

1. Goal-setting;
2. Making recycling mandatory;
3. Manage recycling program through partnerships;

4. Program champion from top management;
5. Awareness-raising;
6. Training and re-training programs;
7. Prioritise source separation;
8. Proximity of recycling facilities;
9. Collection methods;
10. Alternative recovery methods for residual waste;
11. Materials Recovery Facilities (MRF);
12. Green leases;
13. Service provider(s) contract;
14. Environmental Management System (EMS) certification;
15. Regular monitoring and reporting of recycling performance;
16. Recycling C&D waste during fit-out works;
17. Monetary incentives; and
18. Marketing recyclables materials for exchange.

This null hypothesis is evaluated against the alternative hypothesis:

Alternative hypothesis (H₁)

The success of shopping centres recycling implementation between the three shopping centre scheme formats is related to the 18 recycling factors.

To ascertain the relative importance of the 18 recycling factors that influence on shopping centres recycling implementation success, hierarchical model of MLR analysis was carried out according to the abovementioned hypotheses. This empirical analysis would validate the existing trend in relation to the influenced parameter involved toward the overall recycling implementation success.

6.7.2 Descriptive analysis

As described earlier, *hierarchical* regression is an extension of MLR in which the *confounding variables* together with 18 *independent variables* were analysed together throughout to predict the dependent variable. Theoretically, the objective is to use both the *confounding variables* (i.e. three groups of shopping centre scheme format) and *independent variables* (i.e. importance of 18 CSFs) whose values are known to predict the single dependent variable (i.e. overall recycling implementation success via proxy measure). This procedure has been described earlier in Section 4.9.4.

Table 6.21: Variables Entered/Removed^a

| <i>Multivariate equation</i> | Variables Entered | Method |
|------------------------------|--|---|
| Model 1 | Shopping centre scheme format ^b | Enter |
| Model 2 | Importance of Proximity of recycling facilities for separate storage | Stepwise (Criteria: Probability-of-F-to-enter \leq .050, Probability-of-F-to-remove \geq .100). |
| Model 3 | Importance of Making Recycling mandatory | Stepwise (Criteria: Probability-of-F-to-enter \leq .050, Probability-of-F-to-remove \geq .100). |

a. Dependent Variable: Level of Overall Recycling Implementation Success

b. All requested variables entered (Controlled variables).

In correspond with the researcher's theoretical assumptions; this study employed the hierarchical model of MLR that enter the variables into the model in a specified order (2 steps; first, the enter method and secondly, the stepwise method). In the first procedure, the researcher has specify the three shopping centre scheme formats (control variables) by take on the Enter method to engaged inferences of the three groups of shopping centre scheme format. This is the case using three different groupings of the data. Then the *Stepwise* method is chosen in the second statistical procedure to analyse the predictor variables. Using the stepwise method is important to reveal the minimum number of variables the researcher would foresee the influential parameters out of the importance of 18 recycling CSFs (refer Table 6.21).

Results presented in Table 6.22 shows all the three regression models provided built upon the criterion variable (overall recycling implementation success) and its predictor variables (recycling factors) can be generalised against the population. In this case, it can be concluded the regression Model 3 demonstrates the *importance of recycling facilities proximity for separate storage* and *importance of making recycling mandatory* were the only two recycling variables related to the criterion variable, at $p < 0.05$. Overall correlation between the criterion variable and the two predictors as resulted in the regression model (Model 3), $R = 0.58$ with 33.1 per cent of the variance is related. This also suggests the remaining 16 recycling factors were removed from the analysis (based on the *stepwise* method discussed in Section 4.9.4).

Table 6.22: Hierarchical regression model for shopping centre recycling implementation success

| Multivariate Equation | t-test | | | R | R ² | Adjusted R ² | ANOVA ^a | | | |
|-----------------------|-----------------------------------|----------|-------------|------|-------------------|-------------------------|--------------------|----------|-------------|-------------------|
| | β | <i>t</i> | <i>Sig.</i> | | | | <i>df</i> | <i>P</i> | <i>Sig.</i> | |
| Model 1 | (Constant) | | 82.825 | .000 | .511 ^a | .262 | .254 | 1 | 32.591 | .000 ^b |
| | Shopping centre scheme formats | .511 | 5.709 | .000 | | | | 92 | | |
| Model 2 | (Constant) | | 21.732 | .000 | .544 ^b | .295 | .280 | 93 | 19.082 | .000 ^c |
| | Shopping centre scheme formats | .517 | 5.870 | .000 | | | | 2 | | |
| | Proximity of recycling facilities | .184 | 2.092 | .039 | | | | 91 | | |
| Model 3 | (Constant) | | 19.882 | .000 | .575 ^c | .331 | .309 | 93 | 14.837 | .000 ^d |
| | Shopping centre scheme formats | .465 | 5.205 | .000 | | | | 3 | | |
| | Proximity of recycling facilities | .189 | 2.196 | .031 | | | | 90 | | |
| | Making Recycling mandatory | -.195 | -2.183 | .032 | | | | 93 | | |

a. Dependent variable: Level of Overall Recycling Implementation Success

b. Controlled variables: (Constant), Shopping centre scheme format

c. Predictors: (Constant), Shopping centre scheme format, Importance of Proximity of recycling facilities for separate storage

d. Predictors: (Constant), Shopping centre scheme format, Importance of Proximity of recycling facilities for separate storage, Importance of Making Recycling mandatory

Result in Model 3 represents 31 per cent of the variation in the shopping centres recycling implementation success rate data is explained. This is not a very large amount. This validates that the explanatory power of this model is modest (Adjusted $R^2 = 0.31$), but indicates the importance of *importance of proximity of recycling facilities for*

separate storage and *making recycling mandatory* towards overall implementation success. However in Model 2, the value of $R^2 = 0.295$ described 29.5 per cent of the variance in the overall implementation success influenced by the variance of *proximity of recycling facilities*. When the additional components to the model were entered into multiple regression, the percentage of variance explained increased by 3.6 per cent to 33.1 per cent, with *making recycling mandatory* variable and *proximity of recycling facilities for separate storage* variable being statistically significant.

Moreover, the *t-test* result also indicated the variable coefficient is significant at the 5 per cent confidence level. The *t-test* gives a measure of the contribution of each variable to the model. A large value indicates that a unit change in this predictor variable has a large effect on the criterion variable. Based on the result shown, the *t* and *Sig of t (p)* values give a rough indication of the impact of each predictor variable – a big absolute *t* value and small *p* value suggests that a predictor variable is having a large impact on the criterion variable (refer Table 6.22). Negative relationships for *making recycling mandatory* variable ($\beta = -.195, p < .05$) explained this factor has less effect on the overall implementation success although it is a significant factor. On the other hand the *proximity of recycling facilities for separate storage* variable ($\beta = .189, p < .05$) shows a moderate effects. These are the only two contributing factors reported to have major impact on the overall success of shopping centres recycling implementation.

To conclude the regression model for this observation, the connotation of the Model 3 and the significance of the predictor variables are given below:

Adjusted $R^2 = .309$; $F_{3,93} = 14.8, p < 0.005$ (using both *enter* and *stepwise* methods)

| <i>Predictor variables</i> | Beta (β) | <i>Sig. of p</i> |
|---|----------------------------------|-------------------------|
| <i>Shopping centre scheme formats</i> | .456 | $p < 0.05$ |
| <i>Proximity of recycling facilities for separate storage</i> | .189 | $p = 0.03$ |
| <i>Making Recycling mandatory</i> | -.195 | $p = 0.03$ |

Regression equation identified, Model 3:-

Predicted variables (Overall level of recycling implementation success), y

$$= (\text{shopping centre scheme formats}) + (\text{Proximity of recycling facilities}) + (\text{Making recycling mandatory}) \\ = (.465) + (.189) + (-.195)$$

Overall, the regression results lead to the acceptance of the null hypothesis that there is no relationship between all recycling factors towards the overall recycling implementation success except for the *proximity of recycling facilities* and *making recycling mandatory*. Therefore, the alternative hypothesis that there are relationships of the *proximity of recycling facilities* and *making recycling mandatory* variables for the overall implementation success must be accepted. This is the case using three different shopping centre scheme format groupings of the data. The above regression equation can be interpreted as estimates of this relationship.

6.7.3 Conclusion

Result from the hierarchical model of MLR on the study population (N=94) has revealed two recycling variables, i.e. *recycling facilities proximity for separate storage* and *making recycling mandatory*. This explained 31 per cent of the variation in the existing recycling implementation success for each group of the shopping centre scheme formats. This is not a very high value but two of the variable coefficients are statistically significant at the 5 per cent level. In essence, the result demonstrates that there is strong evidence that these variables have an effect on the overall implementation success of shopping centres recycling. Therefore, the null hypotheses were accepted except for the two recycling factors mentioned. It is therefore concluded that there are a statistically significant relationship for *recycling facilities proximity for separate storage* and *making recycling mandatory* towards the overall shopping centres recycling implementation success. Although, again, the model cannot be used with much confidence for predicting the shopping centres recycling implementation success.

6.8 Summary

Several statistical procedures were carried out to assess the trends and relevant hypotheses findings based around the data collected from the 94 respondents who have had experience in waste management and recycling in UK shopping centres, exclusive of Northern Ireland, Scotland and Wales. The overall response rate as 44.5 %, with margin of error account for 5.43% at a 95% confidence level, these reflected a cross-section of the three different scheme formats throughout the UK.

Since the role of shopping centre management is very vital in the successful recycling initiatives, a statistical investigation was carried out to find the factor ranking of the CSFs based on the respondents perception. A descriptive statistics from Table 6.9 of Section 6.3.11, revealed the 12 recycling CSFs to have a mean value of 4.0 and above which were ranked according to their means. Primarily, the executions of the following 12 recycling CSFs to a great extent are found to be critical to shopping centre recycling success:-

1. Goal-setting policy (mean = 4.77);
2. Partnerships (mean = 4.67);
3. Proximity of recycling facilities for separate storage (mean = 4.47);
4. Service provider contract provision (mean = 4.45);
5. Alternative recovery methods for residual waste (mean = 4.38);
6. Program champion (mean = 4.34);
7. Training program (mean = 4.28);
8. Materials collection methods (mean = 4.16);
9. Monitoring and reporting of recycling performance (mean = 4.13);
10. Green Lease (mean = 4.10);
11. Awareness-raising (mean = 4.10); and

12. Prioritised source separation (mean = 4.00).

Furthermore, the first hypothesis tests using Pearson correlation analysis of the 18 recycling success factors revealed only 10 recycling variables were associated with the extent to which the factors were implemented by respondents. These inclusive of prioritised source separation ($r = 0.520$, $P < 0.01$), collection methods ($r = 0.417$, $P < 0.01$), proximity of recycling facilities for separate storage ($r = 0.410$, $P < 0.01$), awareness raising ($r = 0.336$, $P < 0.01$), program champion ($r = 0.319$, $P < 0.01$), recycling C&D waste during fit-out works ($r = 0.313$, $P < 0.01$), green leases ($r = 0.289$, $P < 0.01$), monitoring and reporting of recycling performance ($r = 0.244$, $P < 0.05$), monetary incentives or rewards ($r = 0.242$, $P < 0.05$), alternative recovery methods for residual waste ($r = 0.213$, $P < 0.05$), were the only 10 to demonstrate relationships with the variables presented. This suggests that influence by overall management approaches may not yet be the most pervasive.

The ANOVA results in accordance with the second hypotheses test indicated there is significant difference regarding the implementation success of recycling presented by the three groups of respondents. The *Very Large scheme* group perceive their implementation success for recycling as having a 70.6 % success rate. This is followed by the *Large scheme* group with 67.5 % rate of success and the *Medium scheme* group (65.5%) with a marginal difference of 2 % compared to the *Large scheme* group.

In addition, a comparison was made between three shopping centre scheme formats (i.e. *Very Large*, *Large*, and *Medium schemes*) to identify any differences regarding the critical importance of recycling factors between respondents. Based on the third hypotheses test, the MANOVA results revealed that there were only four recycling factors of critical importance perceived differently across the respondent groups. These are:-

1. making recycling mandatory { $F(2,91) = 3.41$; $P = 0.037$ };

2. training program { $F(2,91) = 5.81; P = 0.004$ };
3. marketing recyclable materials for exchange { $F(2,91) = 11.09; P = 0.000$ }; and
4. green leases { $F(2,91) = 5.36; P = 0.006$ }.

The above results show that the general trend of the data related to the aforementioned factors varies according to the size of shopping centre scheme formats, whereas the remaining 14 factors were perceived equally across the three respondent groups.

Lastly, to identify the influential variables involved in regard to the overall implementation success for shopping centre recycling, the analysis hierarchical model of MLR was carried out accordingly considering the three different shopping centre scheme format groupings. Out of all variables tested, the analysis identified that the *proximity of recycling facilities* and *making recycling mandatory* variables have the significant effects towards the overall recycling implementation success. The regression model from the analysis also revealed 31 per cent of the variation in the existing recycling implementation success for each group of the shopping centre scheme formats. Although this is not a very high value but two of the variable coefficients are statistically significant at the 5 per cent level.

Overall, these results based on analytical methods to ascertain the third objective of the research have provided general trend based on the population (N=94) under study. Detail discussions of these results will be elaborated further in the following chapter.

Chapter Seven: Findings and discussions

7.1 Introduction

This chapter reconciles the present research findings of actual shopping centre recycling practices in the UK with theoretical ideals, comparing and contrasting the critical elements of success for recycling coordinators in shopping centres. The discussions in this chapter are centred on the overarching findings in relation to existing knowledge, reflecting on from the differences discovered and the magnitude by which current knowledge in the shopping centre recycling domain has been extended. As a result, this research has arrived at four (4) specific findings based on the three (3) research objectives outlined in Chapter 1, Section 1.5). These research findings are listed and will be discussed throughout this Chapter;

1. Identification of the set of critical factors that drive shopping centre recycling success;
2. Perceptions of shopping centre recycling implementations trend;
3. Evaluation of recycling implementation success as perceived by UK shopping centre organisations; and
4. Identification of factors that have impact on the overall implementation of shopping centre recycling success.

Briefly, the numbered findings are based on comprehensive discussions in relation to the analysis of results from both quantitative and qualitative data which has been presented in Chapter Three, Five and Six of this thesis, and subsequently scrutinised with respect current related literature.

7.2 Major findings: Identification of Critical Success Factors (CSFs) for shopping centre recycling initiatives experienced by centre managements in the UK

As elaborated in Chapter Three, there is little scientifically solid research published on factors affecting the implementation success of shopping centre recycling from an integrated perspective. In order to fully address the second objective of this research (i.e. to identify the key success factors for shopping centres recycling initiatives) it was important to identify which of the critical success factors had more of an impact on perceptions of shopping centre recycling success than the others. In this regard, the discussion of findings is carried out based on the integration of the whole research study: secondary data, interviews and large scale survey, and reflecting on the theoretical framework underpinning this research. Each factor is discussed separately according to a triangulation method. It will be linked to the previous literature studies in Chapter Three, the results of the interview data analysis in Chapter Five and the results of quantitative analysis in Chapters Six.

At the time of this research, the researcher finds that one recycling factor (i.e. making recycling mandatory) as not being of critical importance to the success of shopping centre recycling implementation than expected (will be further elaborated in Section 7.3). As a result, a set of eighteen (18) CSFs highlights the major findings established from this research. To highlight the critical importance of the identified success factors, each summary of these factors is itemised in sequence, following on from the mean factor ranking obtained from the survey (see Section 6.3.11, Table 6.9).

7.2.1 CSF 1: Goal-setting policy

(Mean = 4.77)

As supported by Hamad *et al.* (1981), McCaul and Kopp (1982), Folz (1991), Folz and Hazlett (1991), this study clearly reveals that goal setting policy is critical factor in the

success of shopping centre recycling programs. This is in line with findings from key informants (n=4) in industry who identified goal-setting policy as having a significant effect in increasing the volume of materials being recycled. The interviewees also felt that setting recycling targets in place provides a framework for program evaluation and specific waste reduction efforts are likely to follow. The preliminary goals should be flexible and subject to re-assessment and adjustment as necessary which allows for the allocation resources required for future development.

An interesting point come out from these findings, which implies that goal-setting policy initiative may be viewed by the centre managements as a prerequisite to the development of successful recycling program. The implications of goal setting policy for recycling instigated by the shopping centre management correspond with Pieters (1991), Heinen (1995), Enz and Siguaw (1990) Goodman (2000) and Schendler (2001), and may lead to improved operational cost and compliance with organisational waste management operations.

7.2.2 CSF 2: Making recycling program through partnerships

(Mean = 4.67)

There was no evidence of attention being given to this factor specifically to shopping centre recycling in prior studies, but this research finds that managing recycling program through partnerships is a critical factor to the success of shopping centre recycling.

From the interviews (n=4) with key informants from industry, it was revealed that partnership initiatives, both internal and external are seen as the main conditions required for successful concession implementation for recycling initiatives. In essence, key informants cited that the external partnership initiative in shopping centre recycling programs allows for the availability of knowledge sharing on the best practise, availability of specialised recovery technology, and effective collection systems and

logistic capabilities when transferring recyclables to the market. The interviews also revealed that internal partnerships between the centre management, retailers and shoppers could improve their involvement in shopping centre recycling programs. This is supported by a few scholars (Bartone *et al.*, 1991; Cointreau-Levine, 1994; Rosenau, 2000; Achankeng, 2004; and Backstrand 2006) who embrace partnerships. This is a result of partnerships providing the cooperative mechanism of choice for pooling capabilities and resources to address waste management and recycling problems effectively, particularly in private business sectors.

Clearly, there is a challenge for shopping centre managers to develop a networking ability that enables them to connect their resources to those of other actors and this requires further efforts. In this regard centre managers must enhance cooperative behaviour at internal and external levels in order to successfully implement their recycling program. This is in agreement with Bartone *et al.* (1991) and Rosenau (2000) as they stated that private establishments are in a better position to perform economic tasks, innovate and replicate successful experiments, adapt to rapid change, abandon obsolete activities and perform complex or technical tasks.

7.2.3 CSF 3: Proximity of recycling facilities for separate storage

(Mean = 4.47)

Providing close proximity to dedicated recycling facilities may improve the quality and capture rate of materials collected for recycling. This research finds that this is one of the critical factors to shopping centre recycling success as perceptions resulting from the survey have a high mean for this factor (shown in Table 6.10). More to the point, results from regression analysis also reveal that this recycling factor has significant effect to the overall implementation success perceived by all respondents (detailed in Section 6.7). The reason behind this was cited by Pitt (2005) as he described increasing waste trends in the UK shopping centres. Many centres which were constructed in the 1970's have issues

in this regard since recycling and waste management were issues that were not taken into account during their design.

This also aligns with Coolidge *et al.* (1993) who says that incorporation of appropriate recycling equipment is essential to expanding recycling services to difficult areas. Moreover, Luyben *et al.* (1979), Glen (1989), Hageman (1989), Vining and Ebreo (1990), De young (1989; 1990), Williams (1991), Maran and Lee (1993) Coolidge *et al.* (1993), Gamba and Oskamp (1994), Iyer and Kashyap (2007) and Hage *et al.* (2009) perceived the proximity of recycling facilities as making recycling participation more convenient which would help to reduce personal cost, and thus should increase recycling behaviour.

On the other hand, the research also reveals that the proximity of recycling facilities to separate storage within shopping centre premises has not been cited throughout the interview process. Iyer and Kashyap (2007) state that the lack of access to recycling facilities was cited as a key inhibitor to participation in early days of recycling, which is generally not the case at the present as results of improved building guidelines. Marans and Lee (1993) added recycling coordinators should work closely with facilities designers to create appropriate physical context that enables individuals to easily engage in recycling practises. Seeing the significant implication of making recycling more convenient to tenants, one interviewee (n=1) reveals that space limitations in the premises necessitates the provision of door-to-door recyclables collection from tenant units to ensure greater recovery of recyclables is achievable. Given the evidence from both the interview and survey perceptions, this research therefore confirms the proximity of recycling facilities for separate storage as being of critical importance to the success of shopping centre recycling implementation.

7.2.4 CSF 4: Service provider contract provision

(Mean = 4.45)

Despite the limited study on recycling contracts from commercial establishments, the effect of service provider contract provision has not been investigated widely in prior studies. However this research finds that the provision for service provider contracts was recognised as critical factor mainly for shopping centre organisations that employed waste management and recycling services to private waste haulers and contractors for collection of residual and recyclables from the centre if they do not have the capacity and expertise to deliver all that is required. According to Pitt (2005) shopping centre management is lacking in innovative and proactive response to waste and waste contract management. He furthers the application of new multiple contract management practices that drive innovative solutions, creativity in contract delivery and service and general good service is badly needed.

Findings from the survey (detailed in Table 6.7, Section 6.3.9) show that 8.4 % of the respondents (n=94) opt for a single contract that allows a contractor to take the majority of waste from the centre and be responsible for the recycling component as well. This is more likely for some larger shopping centres as they already have MRFs and outlets for recycled materials. Hence the larger shopping centre schemes are more likely to procure a single service contract when compared to smaller shopping centre schemes. The main advantages of this method are that dealing with a single provider helps to ease co-ordination, reduces administration, and involves fewer people, In addition the financial recording of charges and income is much simpler which result in a less expensive service. This views are upheld by Alexander (1996) and Cant (2005).

Nonetheless, potential limitations for this preference are that larger contractors may only offer a restricted recycling service and, after initiation of the project, may be unwilling to extend the recycling list to the less commonly recycled materials. This would leave the centre with no choice but to seek an alternative contractor or additional recycling contractors. Otherwise, shopping centres may subcontract elements of a large contract

where they do not have the capacity or expertise to deliver all that is required. As for this case, the majority or 91.6% of the respondents (n=94) prefer to use multiple contract management practises, to sub-contract for recyclables collections (i.e., WEEE, Clinical Waste, Cooking Oil, Fluorescent Lighting Tubes, Confidential Waste, etc.) and utilised local authorities services for waste treatment and disposal services as required.

Moreover, this research also finds specific elements of service coordination cited by the interviewee (n=1) mainly the allocation of recycling containers, up-to-date lists of acceptable materials, and clear reporting requirements by the service provider. This interview finding also infers that the engagement with the single service provider with a coordinated approach to planning in effect could provide clarification of the opportunities, costs and benefits of providing recycling services, that adds real value to business (Hui and Tsang 2004; Sashar and Pitt 2009). This corresponds to Folz and Hazlett (1991) as they found significant effect in higher recyclables collection made from effective outsourcing programs. Goyal and Pitt (2007), RICS (2007) and Nazali and Pitt (2009) all explain that appropriate coordination of service level agreements or performance contracts between private contractor and client determines the success of support services provided to one organisation. Therefore the provision of a service provider contract is important as it will dictate the overall nature of recycling program and perhaps also provide opportunity for innovation. Generally, shopping centres are capable of providing adequate waste management and recycling services when proper contract arrangements are set.

7.2.5 CSF 5: Alternative recovery methods for residual waste

(Mean = 4.38)

Despite the lack of investigation made in regard to alternative recovery methods for residual waste prior to recycling studies, this research finds the concept of reconciling energy-from-waste in shopping centre recycling programs was regarded as a critical

factor for success. This agrees with the new waste management policy in England (DEFRA 2011b) which promotes the alternative recovery initiative mainly for residual waste such as waste cooking oil and other contaminated waste which cannot be recycled. The strategy was not only viewed as a critical success factor but was perceived as one of the ways of cutting costs which result from landfill disposal (Environment Agency, 2011) and could also make some useful contribution to local energy needs (Morcos, 1989; Ried Lea 1996).

Following the results from the interviews (n=4), this research finds shopping centre management already exploits the alternative recovery options as part of shopping centre recycling initiatives, mainly through the use of incinerators and anaerobic digestion facilities to transform residual waste, i.e. food waste, into energy for local electricity. Findings from the interviews also reveal the centre management initiative to provide bio-diesel created from waste cooking oil to fuel local transport. This aligns with DEFRA (2010) as the initiative has significant carbon and energy benefits over other options of managing food waste if separately collected. Furthermore, the benefits of Enhanced Capital Allowance (ECA) apportioned for businesses that invest in such energy efficient technologies may ease the cost anticipated for the shopping centre to take part in this initiative (HM Treasury 2002; 2004). Remarkably the findings reveal that technological investment for reconciling waste-to-energy in shopping centre recycling initiatives is relatively a new concept. However this is only really feasible for larger shopping centres given the cost anticipated, and the reasonable volume of waste generated compare to the smaller centres. Otherwise, it can be argued that smaller centres may acquire such technological advancement directly through waste hauliers or service provider arrangements. Most importantly, further implications of reconciling the alternative recovery options could allow shopping centre organisations to meet the carbon emissions targets at the lowest cost as proposed by DEFRA (2011b).

7.2.6 CSF 6: Program champion

(Mean = 4.34)

Program champion from top management level in shopping centres is recognised in this study as a critical factor to the success of recycling implementation. This finding coincides with Folz (1991), Maran and Lee (1993), Enz and Siguaw (1999), Vicente and Reis (2007) and Parsons and Kriwoken (2009) as program champion support from top management has a positive effect on successful waste reduction and recycling program.

This research also finds that the interviewees (n=3) viewed the program champion for shopping centre recycling to be important to a successful implementation because of its ability in bringing about organisational change in recycling behaviour. This was instigated by providing a program representative to give technical assistance on site, on an as-needed basis. Further, the objective of the program champions is to mobilising participants' opinion, resolve conflicts and win the hearts and minds of the landlord, staff, tenants and customers involved in the recycling program. Parsons and Kriwoken (2009) also noted that at corporate level, encouragement of the head offices to introduce positive waste management and recycling policies at the every level of an organisation could greatly improve levels of recycling participation. Moreover, the interviewees felt that consent from the top management of shopping centres to provide necessary investment in recycling facilities and equipment such as balers, compactors and other technological advancements can be put in place. In line with Hersey (1998) and Zutshi and Sohal (2004), such commitments could essentially help recycling implementation because it allows commitment of resources such as time, money and staff. Without the accessibility of adequate resources which are provided via program champion initiative, shopping centres may experience delays to implement recycling programs. Certainly, no project can be successful without a program champion from the top management level to instigate recycling at organisational level.

7.2.7 CSF 7: Training program

(Mean = 4.28)

Another critical factor that has an impact on successful implementation of shopping centre recycling programs identified from this research is having a training program. The finding is supported by De Yound (1989), Bagozzi and Dabholkar (1994), Mason *et al.* (2004) and Iyer and Kashyap (2007) as they relate the vital role of training efforts in influencing knowledge about recycling, recycling attitudes, and recycling behaviour to encourage individual and organisational waste reduction and recycling. Although previous literature suggestions on training are less uniform than in other areas, they do suggest the possible existence of a relationship between greater training and recycling rates.

Analysis of interviews from this research also suggests the significance of a training program to enhance shopping centre staff and tenants in terms of their knowledge of how to recycle. The interviewees (n=4) mentioned the importance of the initiative when the organisations intended to assess program performance and strategies for improving the quality of participation to collect and sort materials for recycling from the shopping centre waste stream in order to meet the end market requirements. De Young (1989) also advocates that recycling education via training programs should communicate time and space needs for recycling, inform people about where to go for assistance, and explain what materials can be recycled as well as how they should be prepared. The interviewees also felt that there were difficulties with the initiatives, such as trying to get retailers to adopt the program due to the retailers' apathy, and high staffing turn over. This was argued previously by Fuller (1994) as he identified the poor levels of cooperation and control of recycling-collection programs; using voluntary approaches was due to constant turnover of lower level employees and store managers in the shopping centre setting. In the long term, he identified that a continuous training program implementation by the shopping centre managers was necessary to overcome the problem.

7.2.8 CSF 8: Materials collection methods

(Mean = 4.16)

This research finds the provision of materials collection methods to be a critical factor that influences the success of shopping centre recycling. This is supported by Schultz *et al.* (1995), Tucker *et al.* (2000), Woodard *et al.* (2001), Triantafyllou and Cherrett (2010), Parson and Kriwoken (2011) as they describe coordination of waste and recyclables collection methods should be convenient and simple to achieve success in any recycling program.

This research also reveals the perception of how waste collections should be arranged in relation to cost effectiveness. This was highlighted by the interviewees (n=4) as a key component necessary for successful implementation of shopping centre recycling programs. Findings of the interviews suggested communities within shopping centres that know where recyclable waste containers have been distributed and how often they are emptied are better able to target promotions, educational efforts, and other outreach activities that encourage positive participation. Despite the effort, it has been argued that collection methods highly depend on its suitability of locational characteristics according to some studies (Baharum and Pitt, 2010; Parson and Kriwoken 2011). The interview findings also reveal the issue of inadequate storage space and containers. This constraint may be overcome by the proactive provision of collection methods for convenience in recycling participation. In terms of technical aspects, both Fuller (1994) and Baharum and Pitt (2010) described providing door-to-door collection to retail units as necessary in some cases. Another primary concern relating to collection methods, cited from the interview, is designing the frequency of recyclables collections and reducing the number of general waste skips to be collected by private hauliers to mitigate collection cost. This coincides with Triantafyllou and Cherrett (2010) as they found the coordination of collection methods across retailers may improve recycling rates. Furthermore, it was also

argued that collection frequency is directly linked to program cost (Stevens, 1988); Tucker *et al.*, 2000; Woodard *et al.*, 2001; and Thomas, 2001). As a result, both collection frequency and reduced number of general waste skips perceived equal importance in coordinating recycling collections in order save money. Through increased recycling, shopping centre organisations are in a better position to mitigate landfill tax and therefore control their operational costs.

7.2.9 CSF 9: Monitoring and reporting feedback of recycling performance

(Mean = 4.13)

In this research, monitoring and reporting of recycling performance is recognised as a critical factor to the success of shopping centre recycling programs. This is supported by Folz (1991) as he contended consistent and reliable performance information is a good defence against the critics of recycling, and also communicates to people just how important their sustained participation is to continued program success. Timmlett and Williams (2008) added the approach is highly effective at reducing contamination of waste. Although there is limited evident with regard to this initiative from commercial establishments, this factor however coincides with several scholars within FM literature who are concerned with facilities performance characteristics (Featherstone and Baldry, 2000; McGregor, 2000; Amaratunga and Baldry 2002; Amartunga *et al.*, 2004; Lehmand and Geller, 2004; Tucker and Pitt 2009).

Findings from the interview with the key informants (n=4) in the industry also reveal the importance to undertake performance assessment for recycling programs and reporting it to the community at large. This is supported by Schultz (1998), DeLeon and Fuqua (1995), Goldenhar and Connell, (1992), Katzev and Mishima, (1992) and Kim *et al.* (2005) as they found that the importance of monitoring the recycling performance and reporting it back to specific community has significant contribution to higher rates of materials recovery. The interviewees also felt that the initiative to monitor and report

feedback of their recycling performance could contribute to the effectiveness of awareness campaigns and also act as a point of reference for future program development. This is where the key performance indicators detailed in the report come into play and progress can be made, which in turn can enhance their service provision (Tucker and Pitt, 2010). In line with Lehmand and Geller (2004), appropriate performance reporting strategy involves providing information to participants about their environment-relevant behaviours. Such data makes the consequences of behaviour in terms of the amount of money spent, environmental degradation, targets and benchmarking more prominent, and increases the possibility of behaviour change corresponding with the consequences reported. As stated by Featherstone and Baldry (2000), evidential evaluation through open assessment is paramount for facilities improvement, and to enable innovation. By this means, we can argue that by performing audits to shopping centre waste and recycling performance, and providing feedback to tenants on how they can improve could have significant effects on the success of shopping centre recycling programs.

Clearly, understanding how such programs are performing by comparing site data against the recognised indicators can be a valuable tool to assess whether the recycling facilities within the premises have a fundamental problem. They could use this opportunity to reinforce the positive habits they are developing as shopping centre tenants grow accustomed to recycling and the procedures they have already implemented. As a result, monitoring and reporting feedback of shopping centre recycling performance is integral to the successful recycling implementations of continuous improvement and therefore adds value to shopping centre business.

7.2.10 CSF 10: Green Lease

(Mean = 4.10)

Green lease is also acknowledged from this research as one of the critical success factors for shopping centre recycling programs. This research finds that the shopping centre Green lease is usually known as a written pledge which exploits the use of social norms to encourage recycling participation that has been done in the past 20 years, but generally considered as a new approach for commercial leasing purposes. Some reported studies (McCaul and Kopp 1982; Pardini and Katzev 1984; Burn and Oskamp 1986; Wang and Katzev 1990) found this commitment strategy may work because people who make such pledges move beyond external justification for recycling and find their own additional reasons for recycling. However, there is little evidence of widespread adoption of green leases in the UK compared to other countries such as Canada and Australia (Dowden, 2008).

Interview findings from the research reveal that the Green lease has been put into practice by some of the UK shopping centre organisations as part of key informants (n=2) recycling programs to endorse retailers to partake in the recycling program offered. The key characteristic of the Green lease portrayed by the interviewees was to develop agreements with retailers to build partnerships and share solutions. As stated by Sayce *et al.* (2009), if all parties are committed to improving the green credentials of the building, many of the problems around equipment upgrades and so on can be sorted out by negotiation. Theoretically, this initiative is notably linked to McCaul and Kopp (1982), Burn and Oskamp (1986), Wang and Katzev (1990) and Pardini and Katzev (1994), who observed the voluntary recycling mechanism as a way to promote greater recycling commitments.

Even though the Green lease initiative is relatively new for most shopping centre organisations in the UK, on the whole it was perceived as a vehicle to encourage tenants toward positive environmental behaviour by integrating material resources, water and energy consumption into actions. This would enable landlords, centre managers and

tenants to work together in best practise to reduce the cost of environmental impact from their commercial activities.

7.2.11 CSF 11: Awareness-raising

(Mean = 4.10)

Another critical factor that has impact to the success of shopping centre recycling programs that has been revealed from this research is awareness-raising. Awareness-raising is paramount in every shopping centre organisation to inform retailers and shoppers about what they should do as well as the value and benefits of recycling. Clearly this is supported by Marans and Lee (1993), Schultz *et al.*, (1995), Folz (1991; 1999), Fuller (1994), Dahle and Neumayer (2001), Barr *et al.* (2005), Kaplowitz *et al.* (2009), Parsons and Kriwoken (2009) and Timlet and Williams (2009) as they generally accept this factor has been critical to sustaining recycling program participation.

In addition, this research also finds that interviewees felt that there was poor recycling awareness among retailers, which was one of the main barriers to recycling success. This was largely attributed to high turnover of retailer staff, underprovided recycling procedures delivered to retailer staff and retailers apathy to perform actions. As stated by Featherstone and Baldry (2000), the lack of formal awareness of one organisational mission is a significant contributing factor towards a lack of co-ordination of different work functions within that organisation. This inevitably leads to alienation of support facility functions and the fulfilment of a secondary and purely reactive role. To overcome these issues, this research finds targeted outreach programs to tenants throughout frequent mailings and personal visits, and providing information during campaigns and exhibitions to influence positive recycling behaviour and promote greater participation. Fuller (1994) also described such promotional tie-ins with recycling campaigns during occasional events could be used to increase participation.

Clearly, the research finds the main reason behind the implementation of awareness-raising is related to the lack of recycling commitment, apathy and can sometimes act as a potential barrier that prevents everyone from taking part in a recycling program. To ensure sufficient recycling knowledge is provided amongst the retailers and shoppers, therefore, persistent and proactive measures are important to the success of shopping centre recycling implementation.

7.2.12 CSF 12: Prioritised Source Separation

(Mean = 4.10)

As stated by Pohlen and Farris (1992), separation of waste has made recycling very labour intensive and cost inefficient. For that reason, this research has finds the element of prioritising source separation as a critical factor to the successful implementation of shopping centre recycling programs. Many authors advocate that encouraging participants to separate their waste into dedicated recycling bins is basic and, and perhaps the most cost effective way possible in many recycling programs (Pohlen and Farris, 1992; Thogerson, 1994; Matsumoto, 1011).

This research also reveals the importance of separating the recyclables at earlier sources by the shopping centre management. This was cited by the interviewees (n=3) as a critical factor necessary for program success when it comes to operational cost. The reality of the problem promotes the removal of all designated recyclable materials from the waste stream and also helps in achieving high diversion rates. The interviewees were also concerned that the initiative to separate waste at earlier some source promotes clean, marketable materials by limiting levels of contamination, which enables shopping centre organisations to receive the benefits of cost avoidance by not disposing of recyclable materials as solid waste, or rather allowing co-mingled waste to be sorted at a private MRF, therefore enabling them to receive better revenue by the sale of quality recyclable material. Finding from the interviews also identified that only two large shopping centres

use with a with two-stream system, mixed dry recyclables and residual waste, and sort them at their own MRF, which the interviewee felt resulted in cost savings since no external contractor was required. According to Folz (1991) and Gamba and Oskamp (1994), this strategy is often optimal and makes recycling programs less complicated.

Given that cost, convenience and simplicity are key characteristics considered by centre managements when deciding on the type of waste separation system to fulfil, it could be argued that that the co-mingled sorting can be cost inefficient mainly for those shopping centres which do not have their own MRF infrastructure. Therefore, whatever approach taken by the centre managements, clearly the task poses one of the greatest challenges to achieving a cost efficient waste separation package for shopping centre recycling, as end users insist on quality recyclable products without contamination.

7.2.13 CSF 13: Recycling C&D waste during fit-out work

(Mean = 3.97)

The effects of recycling construction and demolition (C&D) waste during fit out works in shopping centre organisations has not been investigated widely in prior studies. Nevertheless this research finds that recycling C&D waste during fit-out works is a critical factor contributing to the overall success of shopping centre recycling. This was viewed necessary because the materials and components dismantled throughout the fit-out works usually contain the potential value of reuse or recycling (Thorpe 2008). Hence appropriate waste planning, collection and management of waste during tenant fit-out and refurbishment works of a shopping centre may promote waste minimisation and resource efficiency on site.

Research from the interviews also reveals that recycling C&D waste during fit-out work may occur throughout the property life cycle and generate significant amounts of waste. As a result there are many opportunities for reduction, reuse and recycling of such waste

from the centre. It was cited by the interviewees (n=2) that appropriate on-site waste management planning is essential during the fit out so disposal charges can be reduced. This in line with WARP (2009; 2011b), the practice is becoming increasingly cost-efficient as processing the C&D waste and disposal costs rise. Centre managements also felt that encouraging tenants to appoint waste management contractors who can undertake effective re-use and recycling to minimise C&D waste, and make C&D waste data available to the centre management to monitor results. The ability to instigate an on-site waste management plan for tenant fit out works enables proactive measures which encourages tenants', contractors and centre managers to establish simple rules and systems of operation, maintain close working relationships with the centre management, manage building access and egress, minimise disruption to other occupiers, and minimise risks (to safety, environment, systems and infrastructure). Waste management coordination is key to reducing C&D waste on-site as Miller *et al.*, (2006) noted the potential improvement for commercial retrofit can be instigated by the parties involved in monitoring the C&D waste arising, effective on-site waste management planning and contractual arrangements for waste minimisation.

Clearly, managing waste debris from shopping centre fit-out work is regarded critical as it presents an opportunity to increase recycling by the shopping centre organisations. All possible alternatives should be identified before establishing a waste recycling operation and existing or previous operations should be carefully considered between the centre managers and contractors.

7.2.14 CSF 14: Provision for Materials Recovery Facility (MRF)

(Mean = 3.90)

As stated in Chapter Three, the effect of material recovery facility (MRF) to the success of organisational recycling programs has not been empirically examined widely in prior studies. However, this research clearly confirms the relevance of MRF to the success of

shopping centre recycling programs. This was supported by Guiltinan and Nwokoye, (1975), Pohlen and Farriss, (1992) and WARP (2007) as they noted that provision of MRF is increasingly important for both municipalities and commercial companies to maximise the value of recyclable material recovered from waste, but also for diverting material away from landfill and providing feed stocks of quality raw materials from its waste stream to industry.

This research also finds the availability of MRF was cited (n=2) by the interviewees as a critical factor to achieve high recycling targets. Findings from the interviews disclose some shopping centres favourably get access to MRF through private hauliers in order to increase recycling at the same time as avoiding cost for landfill disposal. For larger shopping centres that already have the MRF on-site, it enables them to process huge volumes of recyclables effectively. For them, managing and sorting the recyclables does not only save the cost of hiring a private contractor and transportation, but also creates business, social and environmental profits simultaneously. This finding accords with Truini (1999) as he noted that MRF has differential transportation costs that must be factored in, and sometime this factor alone accounts for the near absence of recycling. Given the limited MRF capacity throughout UK (WARP 2007), this may have implications for shopping centre organisations to reduce transportation distances for co-mingled waste collected to be processed at private MRF sites.

7.2.15 CSF 15: Environmental Management System (EMS) certification (Mean = 3.86)

This research also confirms the Environmental Management System (EMS) certification has significant influence to shopping centre recycling success. This is supported by Mohammed (2000) and Babakri *et al.* (2004) as they found recycling performance is positively affected by EMS-ISO 14001 certification because it allows companies to take a pervasive management approach to recycling programs. Also, the rapid adoption of the

EMS-ISO 14000 standard has emerged as a leading environmental management tool to address environmental problems at the company level (MacDonald 2005; Kaur 2011) that are voluntary and process-based (Harsey 1998). The main reasons cited for adopting the EMS certification range from compliance and consumer pressure to the potential for cost savings and sustainability (Barnes, 1996; Rondinelli and Vastag, 2000; and Walker *et al.*, 2007).

On the contrary, it was also argued that effective environmental policy plus practise can be successful, without adoption of EMS (Spelleberg *et al.* 2004). The EMS standard implementation may be considered essential because it helps an organisation to set and meet environmental objectives, enables co-ordination, and can assist with compliance at national and international levels (Babakri *et al.*, 2004). From the interviews, this research identifies that none of the centre managers highlighted the EMS certification as a critical factor for their centre's recycling program. However, specific procedures for on-going management, monitoring and performance reviews to improve recycling reporting in accordance with ISO14001 were cited by one of the interviewees as part of the company's commitment to ISO14001 compliance. This suggests that the fundamental principle and scope of the EMS is the concept of continual improvement while making information more accessible and supporting the overall process of corporate social reporting appears relevant especially for larger organisations of shopping centres.

This research also finds only 21.3 % of the total respondents (n=94) currently holding the EMS credentials, these includes the PAS 99 Integrated Management (5.31 %), Eco management Audit Scheme (7.4 %), ISO 14001 (21.3 %) and BS8555 (11.7 %) (as detailed in Section 6.3.8). The results indicate that the majority of the EMS – ISO14001 implementations were instigated by larger shopping centres. This suggests that as long as centre managers are able to instigate effective recycling policies, programs and practises as embraced by an EMS, acquiring the EMS credential may not be needed for smaller shopping centres. This in line with Sheldon (1997) Federal Facilities Council (FFC)

(1999), Delmas (2002) and Landin and Saizarbitoria (2011) as they explained that the EMS instrument was developed predominantly to assist commercial businesses in reducing their environmental impact, but also to an improvement in environmental standards and performance, from which organisations can reap a number of economic benefits including higher conformance with legislative and regulatory requirements.

7.2.16 CSF 16: Making recycling mandatory

(Mean = 3.09)

This research finds that the making recycling mandatory initiative is deemed a critical requirement for the current implementation of shopping centre recycling as a whole. Although the statistical result from *Pearson correlation* identified there is no significant relationship between the importance level of making recycling mandatory and the extent of mandatory recycling perceived (detailed in Table 6.10 and Section 6.4.4 of Chapter Six) by this sector. Although this factor perceived highly importance, nevertheless the implementation success on this factor perceived less effective by the majority of the respondents. On the other hand, result from the *hierarchical multiple regression* model demonstrates the *importance of recycling facilities proximity for separate storage* and *importance of making recycling mandatory* were the only two recycling variables related to the overall shopping centres recycling implementation success, at 5 per cent significant level (as discussed in Section 6.7.2). These results portrayed the importance of the factor in relation to the overall success of respondents recycling programs, though the existing policy on public recycling is still voluntarily.

As provisioned in Section 46 of Environmental Protection Act 1990, the section only guarantees that local authorities carry out their waste collection duties, but does not enforce participation in recycling schemes at municipal level. On the other hand, DEFRA (2007) emphasised the introduction of the mandatory policy should not be perceived as an opportunity for an additional revenue streams, however the main aim should be to get

the public to recycle and authorities could be successful by just using the threat of fining the non-recyclers if they do not participate in the recycling schemes.

In line with two other studies (Everett and Peirce, 1993; Noehammer and Byer, 1997) it was found that although mandatory schemes are able to achieve higher participation rates than voluntary schemes, the provision of appropriate infrastructure and costs of enforcement are significant factors to back up the mandatory policy. According Jenkins *et al.* (2003) well-designed voluntary schemes can still achieve comparable results to mandatory ones as they found no difference in the volume of recyclables collected from mandatory and voluntary household recycling programs across 20 metropolitan statistical areas in the United States. Furthermore, the drawback of mandatory recycling programs was highlighted by Matsumoto (2010) as he revealed in his study sample of residents in Japan who do not perform their sorting duties and consequently dispose of mixed waste - this results in a high cost of waste treatment by the councils.

At the present mandatory recycling seems to be less effective impending to the current development of commercial recycling infrastructure provisioned by the FM in shopping centres. In the near future, mandatory recycling is expected to be prominent factors for the UK commercial sector such as shopping centres (confirmed in Section 7.6). Despite of the waste disposal costs incurred, voluntary recycling may continue to be the primary method of diverting shopping centre waste from disposal.

7.2.17 CSF 17: Marketing recyclable materials for exchange

(Mean = 2.84)

The effects of marketing recyclable materials from commercial establishments have not been considered in prior recycling literature as a critical factor necessary for recycling program success. The exploratory phase of this research finds that centre managers who positioned themselves as a waste broker have an important role to market the recyclable

materials that they process. Consequently, the initiative results in a pulling effect, drawing the recyclables demand through the 'product system life cycle' (Fuller 1994) channel directly from retailing activities. In this regard, Pohlen and Farris (1992) described communications as paramount to provide the linkage between a recyclable source and an appropriate market or subsequent channel member. Virtually every channel member possesses some capability to communicate with an upstream or downstream market. Brokers have developed a unique core competency to fill this role, particularly for smaller communities or low-volume producers (Pohlen and Farris 1992).

From the interviews conducted as part of this research, it has been found that there are shopping centres (n=2) who position themselves as a waste broker for the recyclables they process. This appears to be a critical factor for the centre managers as the ability to market their recyclable products at competitive price relates to the success of the shopping centre recycling program. This aligns with Pohlen and Farris (1992) as they described that recyclers require a market for their product, and end users require a steady, uninterrupted supply of recyclable commodities to operate efficiently. End users must rely on multiple sources to obtain feedstock, and must communicate requirements to alternative sources as the availability of the commodities market for recyclables expands or contracts. Besides, the interview also finds that centre managers see the costs of participating, taking the time and energy to separate, store, and transport the material and sometimes paying a drop-off fee for the privilege as outweighing the benefits. As well as getting the best value out of recyclables, centre managers could also save the cost of hiring external company.

Furthermore, marketing the recyclables was also identified as an obstacle to the success of recycling program by the centre managers due volatile market price, particularly for OCC paper affected by the global economic circumstances. The European Recovered Paper Council (ERPC) (2010) also revealed that the recycling rate for paper had reached 72.2 % across Europe, above an industry commitment of 66 % for 2010, with the total

amount of 58 million tonnes recycled. This 72.2 % rate happened at a time of recession and when economies recover, the sector has predicted that the recycling level may fall temporarily because it may not match up to the increase in paper consumption. Therefore the figure in the consecutive year is expected to drop between 3 to 5 %. Given the economic volatility for the demand and supply of OCC paper in the sector, this certainly presents a challenge to centre managers to make some profit out of the recyclables they produced. Although they are not able to affect market prices, but they can definitely be a smart seller who achieves that delicate balance between assuring reliable markets in the long term, and receiving competitive prices in the short term. Clearly this research finds marketing recyclables materials has direct repercussions to the success of shopping centre recycling when it comes to profit making from selling recyclable products.

7.2.18 CSF 18: Provision for monetary incentives or rewards

(Mean = 2.44)

Another critical factor to the success of shopping centre recycling that this research finds is monetary incentives or rewards. Many scholars finds the positive impacts of monetary incentives or rewards have a significant positive relationship with the volume of recyclables collected as they recognised the provision of monetary incentives and rewards as a key factor for recycling programs and a prime topic for much of recycling research (Vining and Ebreo, 1990; Gamba and Oskamp 1994; Shaw and Maynard 2007; Suttibak and Nitivattananon, 2008; Yau 2010).

This research also finds from the interviewees (n=3) that this factor is considered as critical to the success of shopping centre recycling. However, the interviewees felt that providing such incentives to tenants was also seen as barrier to the success of shopping centre recycling program due to the nature of the waste stream produced by different tenants. Based on the interview findings, centre managers with high performing programs are more likely to have variable fee systems for the tenants waste, which is a system that

allows the centre management to reduce their fees as the volume of discards is diverted from refuse to recycling. In essence, the strategy would give tenants a financial incentive to help make sure that the centre continues to have an effective recycling implementation and that positive participation and contamination are low enough that centre tenants or the private haulier would remain 'entitled' to receive the 'rewards' resulting from high recycling turnover. This is supported by Timlett and Williams (2008) as they found incentives by using simple low-cost methods to engage with residents at the point of service delivery was highly effective at reducing waste contamination among residents.

Despite the rather low apparent potential of incentives to enhance recycling amongst recyclers, this initiative has a relatively low cost for implementation and maintenance, making it attractive. As a result, we can argue that before incentives or reward schemes are considered by the centre managers, it is essential to ensure that the collection scheme is operating well and that effective communications are in place to address such opportunity.

7.3 Implementations trend perceived for shopping centres recycling

Another significant finding from this work is the perception of implementation success for shopping centre recycling initiatives in the UK. So as to achieve the third objective of this research, the approach ideally is to define, confirm and compare the current practises adopted by the centre managers concerning the eighteen (18) CSFs involved, and speculate regarding the implementation trend based on the first hypothesis (highlighted in Section 5.6 and Section 6.4.1); results of this test are summarised in Table 7.1.

To examine this scenario, *Pearsons correlation* analysis was used to explain the degree of association between levels of critical importance and the extent to which the CSFs have been implemented. As detailed earlier in Chapter 6, Section 6.4.3, the first

hypothesis test reveals that a greater level of importance was positively associated with the implementations of prioritised source separation ($r = 0.520, P < 0.01$), materials collection methods ($r = 0.417, P < 0.01$), proximity of recycling facilities for separate storage ($r = 0.410, P < 0.01$), awareness raising ($r = 0.336, P < 0.01$), program champion ($r = 0.319, P < 0.01$), recycling C&D waste during fit-out works ($r = 0.313, P < 0.01$), Green Leases ($r = 0.289, P < 0.01$), regular monitoring and reporting of recycling performance ($r = 0.244, P < 0.05$), monetary incentives or rewards ($r = 0.242, P < 0.05$), alternative recovery methods for residual waste ($r = 0.213, P < 0.05$), service provider contract provision ($r = 0.193, P = 0.062$), provision for material recycling facility ($r = 0.179, P = 0.085$), training program ($r = 0.158, P = 0.129$), goal setting policy ($r = 0.143, P = 0.170$), and ($r = 0.089, P = 0.395$). On the contrary, greater levels of importance were negatively associated with the implementations of marketing their recyclable materials for exchange ($r = -0.090, P = 0.390$), Environmental Management System certification ($r = -0.12, P = 0.258$), and mandatory recycling ($r = -0.55; P = 0.597$) at the shopping centre organisations.

Table 7.1: Hypotheses tests results from relationship analyses between the importance levels of recycling factors and the extent to which the recycling factors have been implemented by the shopping centre organisations

| Hypotheses Tests: <i>Is there association between the importance level of each recycling factor and the extent to which the factor has been implemented by the shopping centre organisations?</i> | Null Hypothesis (H₀) | Alternative Hypothesis (H₁) |
|---|--|---|
| <i>Goal setting policy</i> | Retained | Rejected |
| <i>Partnerships</i> | Retained | Rejected |
| <i>Proximity of recycling facilities for separate storage</i> | Rejected | Retained |
| <i>Service provider contract provision</i> | Retained | Rejected |
| <i>Alternative recovery methods for residual waste</i> | Rejected | Retained |
| <i>Program champion from top management level</i> | Rejected | Retained |
| <i>Training program</i> | Retained | Rejected |
| <i>Materials collection methods</i> | Rejected | Retained |
| <i>Monitoring and reporting of recycling performances</i> | Rejected | Retained |
| <i>Green lease</i> | Rejected | Retained |
| <i>Awareness raising</i> | Rejected | Retained |
| <i>Prioritised source separation</i> | Rejected | Retained |
| <i>Provision of recycling C&D waste during fit-out works</i> | Rejected | Retained |
| <i>Provision for material recycling facilities(MRF)</i> | Retained | Rejected |
| <i>Environmental Management System (EMS) certification</i> | Retained | Rejected |
| <i>Making recycling mandatory</i> | Retained | Rejected |
| <i>Marketing recyclable materials for exchange</i> | Retained | Rejected |
| <i>Monetary incentives or rewards</i> | Rejected | Retained |

While all fifteen (15) factors of recycling importance shows relationships with the extent to which the factors have been implemented by the shopping centre organisations, only ten (10) to demonstrate relationships with the variables. These are presented in Table 7.1 as having the alternative hypothesis retained, and also been shaded for ease of identification.

An interesting point to come out from this analysis is that overall approaches designed for shopping centre recycling programs may be not the most pervasive methods as there are there three CSFs that show negative relationships.

Despite all the 17 CSFs described in Section 7.2, marketing recyclable materials for exchange ($r = -0.090$, $P = 0.390$) reported less importance. The reason behind is that high fraction of the respondents do not market their recyclables themselves, instead these materials were collected and put on the market by the waste hauler or broker on their behalf. Similar result given to Environmental Management System certification ($r = -0.12$, $P = 0.258$) factor, as this was also reported to hold less importance compared to what they was presented. It seems that it is not necessary for smaller shopping centres to take up EMS credentials provided that effective recycling policy and sensible recycling practices are in place (as discussed in Section 7.2.15). This was shown clearly in the results that the majority of the respondents have corresponded, and demonstrated through other initiatives in their program.

Moreover, the majority of the respondents perceived the relevance of mandatory recycling ($r = -0.55$; $P = 0.597$), however the investigations apparently show that making recycling mandatory is less significant for successful implementation. As a result, this factor is considered not deemed a critical requirement for the current implementation due to several reasons, as explained earlier in Section 7.3. Instead voluntary recycling may continue to be the primary method for the most shopping centre recycling initiatives.

Overall, this research has found clear evidence of the set-up of shopping centres recycling programs which exhibit some emerging factors (see detail in Section 7.4).

7.4 Evaluation of recycling implementation success rate perceived by the UK shopping centre organisations

The third finding reveals the perceptions with regard to the level of recycling implementation success instigated by the UK shopping centre organisations. Waste trends from UK shopping centres vary according to the economy of scale (Wang, 2005) and site characteristics (Pitt 2005). Therefore researcher believed that by classifying the types respondent based on shopping centre size was appropriate in order to minimise respondent bias. Although there was no classification of standard existing for UK shopping centre size and format, the sampling determination for this survey adopted the working definition for traditional shopping centre scheme formats, i.e. *Very large*, *Large* and *Medium*, as outlined by the International Standard for European Shopping Centres (ICSC Research, 2005; Lambert, 2006). In the final database, a total of 211 traditional scheme formats of UK shopping centres meeting the definition of above 20,000 meter square were included for the respondent pool.

Also, it is imperative to note that this research avoids using a single criterion to measure recycling implementation success due to several reasons (as explained in Section 3.3.2 of literature review chapter, as well in the methodological procedures explained in Section 4.9.2). Hence, the second hypothesis test was carried out using the ANOVA test procedure to identify the implementation success level between the three groups of shopping centre scheme formats. This approach is considered a fair representation of an organisation's perception of its levels of success.

Table 7.2: Hypothesis test result from analyses of variance (ANOVA) for identifying recycling implementation success level between the three groups of shopping centre scheme formats, i.e. Very large, Large and Medium.

| Hypothesis Test <i>Is there any variation in recycling implementation success level of between the three groups of shopping centre scheme formats?</i> | Result |
|--|-----------------|
| Null Hypothesis (H₀) <i>The mean value of recycling implementation success level is the same across three shopping centre scheme groupings.</i> | Rejected |
| Alternative Hypothesis (H₁) <i>The mean values of recycling implementation success level varies across three shopping centre scheme groupings</i> | Retained |

Hypothesis result depicted in the Table 7.2 indicates that alternative hypothesis of the mean values for recycling implementation success level varies across three shopping centre scheme groupings was retained. Hence, further analysis of post hoc procedures (as detailed in Section 6.5.5) was necessary to reveal the precise variations of the implementation success level perceived by the three groups of traditional shopping centre scheme formats. Overall, this research finds there is a differing perception on the implementation success of recycling presented, and disclosed the *Very Large* (above 80,000 m²) scheme group perceived highest success at 70.6 %; this was followed by the *Large* scheme group (40,000 – 79,999 m²) which had a 67.5 % implementation success rate, whereas the *Medium* scheme groups (20,000-39,999 m²) perceived a 65.5 % implementation success rate.

Overall, the results concur with Pitt's (2005) arguments, as this finding justifies that there is relationship between the size of shopping centre and the way recycling initiatives being implemented in the UK. Without doubt, larger shopping centres generate a higher volume of waste and recyclables compared to smaller ones therefore larger shopping centres

require greater development in terms of waste management resources and business support to initiate such a recycling program. Despite all recycling factors anticipated, this research also finds the key advantages featured by the larger centres are through the exploitations of MRF (as explained in Section 5.4.9) and alternative recovery methods, i.e. waste-to-energy (as explained in Section 5.4.10), which significantly off-sets the waste management cost and also creates business, environmental and social profits. The marginal difference of implementation success rates between the three shopping centre schemes groups also provides clear evidence that there is a competitive perseverance in pursuing these recycling CSFs. In turn, this amplifies organisational profits, the environmental friendly image and also add-value to tenants (as pointed out in Section 5.3.2). This evidence reveals that economies of scale do occur for larger shopping centre as a result of the increased operating size of their recycling facilities and infrastructure.

7.5 Identification of recycling factors that have impact on the overall implementation success of recycling according to shopping centre scheme formats

According Noehammer and Byer (1997) and Williams and Kelly (2003), there are no ideal designs for a recycling program. Instead the characteristics and need of the community should dictate the recycling program design. In regard to shopping centre recycling community it is therefore important to understand the centre managers' decision to design and implement recycling programs that suit the atypical surroundings of such a community. Underpinned by the theoretical framework of this research, this scenario is researched by employing two statistical analyses methods, i.e. the MANOVA and hierarchical of multiple linear regressions (MLR) procedures to identify exact practices in regard to the implementation success of shopping centres recycling CSFs across the three respondent groups.

Table 7.3: Hypotheses tests results from analyses of variance (MANOVA) of recycling factors between the three groups of shopping centre scheme formats, i.e.

Very large, Large and Medium.

| Hypotheses Tests: <i>Is there any variation of critical importance for each recycling factor across the three groups of shopping centre scheme formats?</i> | Null Hypothesis (H₀) | Alternative Hypothesis (H₁) |
|---|--|---|
| <i>Goal setting policy</i> | Retained | Rejected |
| <i>Partnerships</i> | Retained | Rejected |
| <i>Proximity of recycling facilities for separate storage</i> | Retained | Rejected |
| <i>Service provider contract provision</i> | Retained | Rejected |
| <i>Alternative recovery methods for residual waste</i> | Retained | Rejected |
| <i>Program champion from top management level</i> | Retained | Rejected |
| Training program | Rejected | Retained |
| <i>Materials collection methods</i> | Retained | Rejected |
| <i>Regular monitoring and reporting of recycling performances</i> | Retained | Rejected |
| Green lease | Rejected | Retained |
| <i>Awareness raising</i> | Retained | Rejected |
| <i>Prioritised source separation</i> | Retained | Rejected |
| <i>Recycling C&D waste during fit-out works</i> | Retained | Rejected |
| <i>Provision for material recycling facilities(MRF)</i> | Retained | Rejected |
| <i>Environmental Management System (EMS) certification</i> | Retained | Rejected |
| Making recycling mandatory | Rejected | Retained |
| Marketing recyclable materials for exchange | Rejected | Retained |
| <i>Monetary incentives or rewards</i> | Retained | Rejected |

Based on the MANOVA analysis, as summarised in Table 7.3, fourteen (14) CSFs across the three shopping centre groups showed no significant differences between the levels of critical importance, while four (4) did in fact significant differences. These recycling variables identified are Training program, Green lease, marketing recyclable materials for exchange, and making recycling mandatory.

The implementation of a training program improves the quality of participation in collecting and sorting materials for recycling in the shopping centre waste stream in order to meet the end market requirements. Further, this research finds the importance of a training program to be perceived differently across the shopping centre groups mainly between the Medium and Large shopping centre scheme formats (as detailed in Section 6.6.6, Table 6.20b). This aligns with the interview results where it was indicated that smaller centres felt that providing training programs was of less importance compared to the larger centres (Section 5.3, and Table 5.1). Interviewees commented that such provision is offered only to newly appointed store managers during a one-off induction program that briefly explains the facilities support provided by the centre management on-site. However, larger shopping centre organisations recognised the importance of a training program and instigated bespoke training to all staff and retailers regarding waste management and recycling procedures on-site.

This research also finds different perceptions regarding the importance of the Green lease initiative across the three shopping centre groups. As the initiative is aimed at retailers to build partnerships and share best practise solutions with landlords and centre managers so as to reduce the environmental impact of their commercial activities. As shown in the results in Section 6.6.6, Table 6.20b, there is a great mean difference between the *Medium* and the *Very large schemes* which matches work from Downen (2008). It is thought that as the initiative is relatively new, it is currently favoured by large commercial organisations in the UK, effectively from corporate social reporting (CSR).

As detailed in Section 6.6.6, Table 6.20a, marketing recyclable materials for exchange revealed a different perception mainly between the *Medium* and the *Very Large* shopping centre scheme formats. Although this factor was not identified in the prior studies, the implication of marketing the recyclables to the extended channel or end market was accentuated by the key informants in the industry to assuring reliable markets and receiving competitive prices from the entire operations (detail in Section 5.4.3). The

MANOVA results clearly indicates that the initiative was predominantly instigated by larger shopping centres due to economies of scale and the reasonable volume of recyclables produced which allows them to market the materials directly rather than hiring external companies to sell on their behalf.

The final factor considered to instigate different perceptions on the levels of importance to the success of shopping centre recycling is making recycling mandatory. As shown in Section 6.6.6, Table 6.20b, this factor is perceived differently between the *Medium* and the *Very large* shopping centre schemes. While the importance of making recycling mandatory has been argued by other scholars (Everett and Peirce, 1993; Noehammer and Byer, 1997), the provision of appropriate infrastructures and degree and costs of enforcement are significant factors to steer such policy. This was demonstrated by larger shopping centre groups and the way recycling infrastructures has been instigated as to some extent mandatory policy can be an alternative option. Concurring with the interview findings, the survey results also indicate the importance of mandatory recycling was not verified by the majority of the survey respondents as a success factor. In view of that, the result also supports the exclusion of making recycling mandatory from the whole set of shopping centre recycling CSFs as deliberated in Section 7.3.

In addition, the study has determined the influential parameters out of the overall recycling CSFs that have major effect on overall implementation success of shopping centres recycling. This was identified using the hierarchical regression procedures (elaborated in Section 6.7). As result of this analysis, a regression model revealed the combination of two recycling variables, i.e. *recycling facilities proximity for separate storage* and *making recycling mandatory* were considered to have significant effect amongst the three different shopping centres scheme groups (Refer Section 6.7.3 and Table 7.4).

Table 7.4: Hypotheses tests results from hierarchical multiple linear regression between recycling factors, the three groups of shopping centre scheme formats against the overall shopping centres recycling implementation success.

| Hypotheses Tests: <i>Is there relationship between the recycling factors and the extent to which they have been successfully implemented by the three groups of shopping centre organisations?</i> | Null Hypothesis (H₀) | Alternative Hypothesis (H₁) |
|--|--|---|
| <i>Goal setting policy</i> | Retained | Rejected |
| <i>Partnerships</i> | Retained | Rejected |
| <i>Proximity of recycling facilities for separate storage</i> | Rejected | Retained |
| <i>Service provider contract provision</i> | Retained | Rejected |
| <i>Alternative recovery methods for residual waste</i> | Retained | Rejected |
| <i>Program champion from top management level</i> | Retained | Rejected |
| <i>Training program</i> | Retained | Rejected |
| <i>Materials collection methods</i> | Retained | Rejected |
| <i>Regular monitoring and reporting of recycling performances</i> | Retained | Rejected |
| <i>Green lease</i> | Retained | Rejected |
| <i>Awareness raising</i> | Retained | Rejected |
| <i>Prioritised source separation</i> | Retained | Rejected |
| <i>Recycling C&D waste during fit-out works</i> | Retained | Rejected |
| <i>Provision for material recycling facilities(MRF)</i> | Retained | Rejected |
| <i>Environmental Management System (EMS) certification</i> | Retained | Rejected |
| <i>Making recycling mandatory</i> | Rejected | Retained |
| <i>Marketing recyclable materials for exchange</i> | Retained | Rejected |
| <i>Monetary incentives or rewards</i> | Retained | Rejected |

The relevance of recycling facilities proximity for separate storage to achieved recycling success however concurs with previous researchers (Luyben *et al.* 1979; Glen, 1989; Hageman, 1989; Vining and Ebreo, 1990; De young, 1990; Williams, 1991; Maran and Lee, 1993; Coolidge *et al.*, 1993, Gamba and Oskamp, 1994; Iyer and Kashyap, 2007 and Hage *et al.* 2009). It was also argued that the previous waste disposal facilities in shopping centres was the major drawback in the overall waste management success in

this sector (Pitt, 2005), as the incorporation of appropriate recycling facilities is essential to expanding recycling services to difficult areas Coolidge *et al.* (1993). The consequence of this recycling variable is essential to make recycling participation at shopping centres more convenient that also help to reduce personal cost, and thus should increase recycling behaviour.

Besides that, making recycling mandatory was also recognised as primary success factor contributing to the overall effect of recycling implementation success. Even so the respondents perceived this recycling variable as highly important, the implementation success for this variable was less effective (as elaborated in Section 6.4 and Section 7.2.16). The reasons behind are two-fold. First, the current policy on recycling voluntarily as provisioned in Section 46, Environmental Protection Act 1990. Second, the success of mandatory recycling can only be achieved if there is sufficient recycling infrastructure in place at shopping centre premise. This is in line with other recycling researchers as they argued that the increased effectiveness of mandatory recycling schemes can only be achieved if there is sufficient infrastructure in place to back-up the scheme (Everett and Peirce 1993; Mersky 1988; Tilman and Sandhu 1998; Suttibak and Nitivattananon, 2008). Given the current development in local recycling infrastructures, the researcher expects the effect of mandatory recycling can be very successful in the near future if this sustain. Also, such changes need to occur in local governments, education systems, and the economy before a mandatory recycling program could realistically be implemented.

7.6 Summary

In conclusion, this research has put forward four (4) critical findings that will be contributed to the knowledge in the area of shopping centre recycling initiatives in the UK. One of the key findings identified from this research is the identification of eighteen (18) shopping centre recycling CSFs. With the combination of proximity for recycling

facilities and making recycling mandatory perceived to be dynamic factors towards the overall success of existing shopping centre recycling programs.

It is also imperative to note that the evidence from this research portrays the current information and implementation trend of the shopping centre recycling CSFs that have been practised, with specific emphasis on three groups of shopping centre scheme format. Essentially, the identification of the set of shopping centre recycling CSFs may guide recycling coordinators and FM at shopping centre organisations to focus on particular actions necessary for the implementation success of shopping centres recycling in near future.

Chapter Eight: Conclusions, Contributions and Future Direction

8.1 Introduction

The aim of this research was to investigate critical success factors associated with the overall recycling implementation success instigated by respondents from shopping centres throughout United Kingdom. The general conclusions made in this research provide answers to general research questions. For more clarity the research questions will be repeated. As noted in Chapter One, the purpose of this research was to examine the three (3) research objectives related to performance of shopping centres recycling programs. To answer this set of objectives, the research design and methodology incorporated a systematic study of literature, including the review and validation of the literature findings, which was followed by an extensive data collection, analysis and interpretation. The findings of the literature review, interviews and questionnaire survey, are presented and analysed in Chapter Three, Chapter Five and Chapter Six of this thesis. These findings were then discussed, scrutinised and integrated with one another, reviewed, and validated in terms of the current literature. Finally, the composite findings, presented in Chapter Seven, formed the basis of an implementation model for use among shopping centres management considering or already adopting recycling initiatives. This chapter also outlines the study's contribution to both research and practice. It then concludes with the study limitations and provides suggestions for future research directions that have emerged.

8.2 Research summary

As the aim of this research is to investigate critical success factors associated with the success of recycling implementation at shopping centre organisations in the UK, specific

considerations were given to assess the critical success factors (CSFs) from the FM point of view at shopping centre operations.

8.2.1 Recycling variables (CSFs) for UK shopping centres

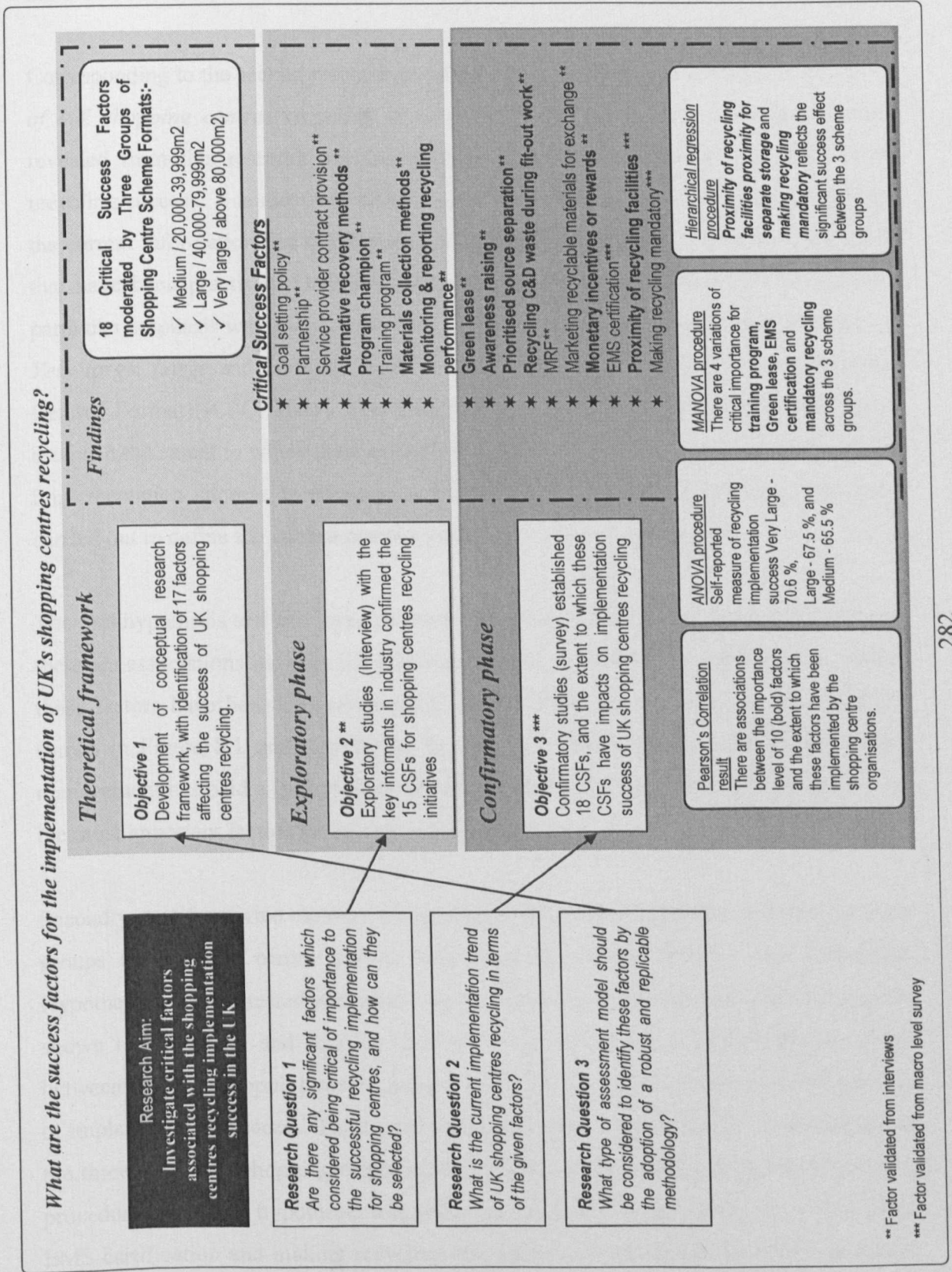
In relation to research question one: *Are there any significant factors which are considered to be critical importance to successful recycling implementation in shopping centres, and how can they be selected?* This research concludes that the environmental aspect of recycling is not a new phenomenon within all industries and thus implementation methodologies are still developing with experience. The current waste management system in the UK for shopping centres and other commercial organisations to comprehensively manage their waste stream is dependant entirely on the existing waste policies and directives that favour the benefits of resource recovery and recycling practises. As this policy puts an emphasis on the economic driver or incentive of the 'polluters pay' principle, there is no target set for UK businesses to recycling. Instead, the business case is fashioned to sustain operating costs and bring about proper waste management and recycling at the company level.

To date, there are a number of approaches to recycling that have been established by FM in shopping centres throughout the country. However, the initiatives are still relatively young compared to other industries and the empirical research related to implementation and measured success is not extensive; there is much to learn. Therefore to understand truly shopping centre recycling implementation, one has to profit from organisational experience. Underpinned by the theoretical research framework developed for the first research objective (shown in Figure 8.1 and detailed in Section 3.5), a critical look at what others have done, their feedback, obstacles, results, and overall approach to shopping centre recycling implementation have proven essential. Whilst focusing on this research question, it was found that in order for FM in shopping centres to adequately maintain sustainability and other business implications, common key factors must be

identified. Consequently, exploratory phase was set up and interview studies carried out on shopping centre organisations in the UK have confirmed that factors of critical importance exist and should be given special consideration when carrying out the initiatives. This has been a primary focus of the research. As a result, eighteen (18) CSFs were identified to be vital to recycling program implementation success. These CSFs are:-

1. Goal setting policy
2. Partnerships
3. Proximity of recycling facilities for separate storage
4. Service provider contract provision
5. Alternative recovery methods for residual waste
6. Program champion from top management level
7. Training program
8. Materials collection methods
9. Monitoring and reporting of recycling performances
10. Green lease
11. Awareness-raising
12. Prioritise source separation
13. Recycling C&D waste during fit-out works
14. Materials Recycling/Recovery facilities (MRF)
15. Environmental Management System (EMS) certification
16. Making recycling mandatory
17. Marketing recyclable materials for exchange
18. Monetary incentives or rewards

Figure 8.1: Summary of research framework



** Factor validated from interviews

*** Factor validated from macro level survey

8.2.2 The current practise

Corresponding to the second research question: *What is the current implementation trend of UK shopping centres recycling in terms of the given factors?* Important findings revealed from this research are the eighteen (18) factors related to shopping centre recycling success. It is also imperative to note the evidence from this research portrays the current information and implementation trend of the shopping centre recycling CSFs that have been practised. Underpinned by the conceptual framework of this research, particular emphasis was given to the three groups of shopping centre scheme formats, i.e. *Very large, Large and Medium*, based on guidelines from the Pan European Shopping Centres Format (ICSC, 2005). The third objective of this research was carried out to establish the extent to which these critical success factors have an impact on the recycling implementation success in shopping centres. In doing so, four hypotheses tests were carried out to define the current practise perceived by these organisations.

The first hypothesis test employed *Pearsons* correlation analysis and the study discovered there are associations between the importance level of 10 factors and the extent to which these factors have been implemented by the shopping centre population in general (as shown in Figure 8.1 and detailed in Section 7.4). This evidence signifies that centre management has paid a great deal of attention to these 10 factors, considering them to be the most important factors in their recycling program.

Secondly, a self-reported measure of recycling implementation success between the three groups of shopping centre formats was analysed via the ANOVA test procedures. Hypothesis two was tested and perceived differences of implementation success rate (as shown in Figure 8.1 and detailed in Section 7.5) indicated the implementation trends between the three shopping centre groups ranged between 65.5 per cent and 70.6 per cent of implementation success. Third assessment was carried out to identify variations across the three groups of shopping centre scheme format where studied using the MANOVA procedure. The third hypothesis was tested and revealed training program, Green lease, EMS certification and making recycling mandatory are among the four CSFs perceived

differently across the three groups of shopping centre formats. Forth analysis using the hierarchical regression has identified the combination of two recycling factors, i.e. *recycling facilities proximity for separate storage* and *making recycling mandatory* were considered to have significant effect of overall recycling performance by the three respondent groups (according to shopping centres scheme formats). These results entirely reflect current implementation trends practised by UK shopping centre managers.

8.2.2 Developing performance measurement framework for recycling implementations

The third research question: *What type of assessment model should be considered to identify these factors by the adoption of a robust and replicable methodology?* Priority was given to the first objective of this research to determine the theoretical framework underpinning this research in order to present a preferred approach in determining the elements of study anticipated, and the statistical relationships to expect for this research in relation to the set of research questions. Essentially the function of this theory is to inform the rest of the research design and to help the researcher to assess and refine the research aim, develop realistic and relevant research questions, select appropriate research methods and identify potential validity threats towards the conclusions of the study.

In regard to this research question, the methodology first developed by Rockart (1979) has been adapted in order to provide a basis for the investigations. Following from this theory, this research has taken a triangulation process which combined the outcomes emanating from an extensive literature review, interviews with the key informants from the industry and the application of a macro level questionnaire survey in order to grasp the implementation trend. It adopts an integrative approach and has reviewed a large body of literature relevant to recycling concerning many issues that shopping centre management encounters throughout such initiatives (as detailed in Section 3.5). Based on this review, factors that constitute recycling performance from FM in UK shopping centres were empirically identified and self-reported of implementation success is

measured (as illustrated in Figure 8.1). Most importantly, the performance measurement framework for recycling implementations used for this research has sought to contribute to this area of research and practice.

8.3 Research Contributions

The researcher believes that this research closes the gap in existing knowledge, with specific contributions to theoretical development and management practise which will be further elaborated in the following sub sections.

8.3.1 Theoretical contribution

From the theoretical side the research is concentrated on the conceptualisation of the CSFs framework which was guided by an extensive review of literature and relevant theoretical construct. The empirical studies developed based on the CSFs framework justified the conjectures of this research. Most importantly, the set of seventeen recycling factors for this recycling community were generalised. These features have contributed to the novelty of this research. The researcher also hopes that the findings from this research can serve as a useful guide and as a catalyst for future progress of research in this area.

Also, the research has introduced an important measurement technique through which a proxy (or self-reported) measure of implementation success was used as a fair representation to report the success of the recycling programs studied herein that could lead to future research in assessing performance of any recycling program as well for other management studies.

8.3.2 Contribution to management practise

The findings of this research echoes valuable information to shopping centre managers, in their pursuit of managing the environmental aspect of solid waste management that centred on recycling. The identification of the set of CSFs for recycling may guide these

practitioners to focus on the particular actions necessary to aid the development of recycling services. Several statistically significant relationships between CSFs and their implementations are identified, and this could prove useful to practitioners in analysing a particular factor in detail. More to the point, the development of the performance measurement framework for shopping centres recycling defined in this study can also be utilised and adapted as a decision making tool by waste administrators or local authorities to gauge other recycling sectors, i.e. municipal and commercial.

Today, more and more managers consider quality to be the most important objective. Quality can be assured by identifying and eliminating the factors that cause poor recycling program performance. Thus, in-house FM at shopping centres need better understanding of CSFs and how to measure them. In this thesis, the researcher has emphasised the importance of understanding the factors and interactions between them, as well as the developed framework.

8.4 Limitations of study

In recognising the contributions this research makes, it is important, as with any research, to acknowledge key limitations. Earlier discussions, namely those in Chapter Four, considered these limitations which include the subjectivity of the data collection methods used, the sample size (particularly the interview sample and the subsequent survey sample of shopping centres above 20,000 m² of leasable area) and the self-reported measures for implementation success rates. While some limitations have the potential to affect the generalisability of the results they were not found to significantly hinder the research or the interpretation of the results.

In addition, the research model applied in this analysis is at a macro level, providing results only for the UK shopping centre perspective as a whole. As such, the analysis masks what might be happening on the precise micro level.

To conclude, several caveats regarding interpretation of the results warrant discussion. Primarily, the critical success factor framework applied in this study has been based on historical data. Hence, conclusions drawn from the analysis are accurate only to the extent that the variables not explicitly modelled do not change dramatically in the future. For instance, the analysis assumes that current shopping centres recycling CSFs approximate future initiatives accurately.

Obviously, the results will not remain valid if the success factors change rapidly in the near future; rapid changes are now occurring in the business environment. These changes will certainly affect the recycling program attributes and the way recycling is managed by them. And recycling coordinators or facilities managers, furthermore, affect the criticality of the factors. Some critical factors might be disappearing due to new technological advancements, new policy reviews and taxation, whereas factors related to other recycling program attributes might become more critical. Future values of the CSFs framework may fall out of the range observed historically, limiting the applicability of the framework parameters for the future.

8.5 Direction for future research

This research has introduced a performance measurement framework to measure the implementation success for shopping centres recycling. This framework can be measured and shed light on some key issues related to UK shopping centre recycling initiatives. Despite the 18 recycling variables identified, at this juncture, the study has generalised that only two recycling variables i.e. proximity of recycling facilities for separate storage and making recycling mandatory have significant effect to the overall recycling performance in regard to the three respondent groups. In this regard, further investigations on these variables from FM tactical and operational point of view is of importance.

However, with one points of time to include in this study, no description of the adaption pattern over time can be made. If a longer time series was available, it would be possible

to study the implementation pattern and see how long it takes for shopping centres to increase their performance in recycling.

Moreover, given the cross-sectional investigations were reported in this study, but a number of questions remain unanswered. The researcher believes that it is important that future research explores other characteristics of shopping centre schemes such as retail outlets, smaller centres and other types which have not been covered in the present research sample. This will enable much clearer and more robust conclusions to be drawn but will depend upon significant investment in research resources. This should set the impetus for future research through which knowledge can be generated by understanding the approach on how they are coping with the existing challenges.

As a result of resource and time limitations, it was not possible to complete several potential lines of investigation related to this study. To fully understand the character of the shopping centre waste stream composition however, further in-depth case studies are essential to allow for detailed observation. Future research in this area must endeavour to investigate detailed waste streams compositions from shopping centres to fully understand the character of waste and to increase the precision of the analysis and to enable firmer conclusions to be drawn.

The use of the triangulation method of data sources and data collection enabled the research to be performed without compromise on either the quality of the data or the findings. The robustness of the methodologies that have been adopted in the overall study suggests that the methodology used could be repeated especially by waste administrators to study CSFs on recycling at other times or in other countries. Therefore, it is significant that an updated CSFs from the assessment framework developed is carried out to enable accurate scope for future performance of shopping centre recycling.

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Appendix A: Interview questions and covering letter



Faculty of Technology
and Environment

Date: DD-May-2009

Dear Centre Manager/Facilities Manager,

RE: APPOINTMENT FOR INTERVIEW: "SHOPPING CENTRE RECYCLING SUCCESS"

This interview is designed to develop an understanding of what combination of factors constitute best practise in shopping centre recycling. It is part of a major research program undertaken at the University and I am writing to invite you to participate, as it is very important for us to receive your input. You may be assured that the confidentiality of your responses will be respected.

Kindly inform us if you are available for the interview sometime between June and July 2009. I will be in touch with you shortly to arrange an appointment. Together with this letter I attached the list of interview questions for your perusal.

1. What is the rationale behind recycling at your organisation?
2. What is your organisational aim by undertaking recycling?
3. How does this contribute to overall aims of your shopping centre business?
4. How successful were you in implementing recycling program?
5. What factors make your recycling a success?
6. What obstacles do you face in pursuing recycling?
7. Can you please indicate any resources do you think could be required?

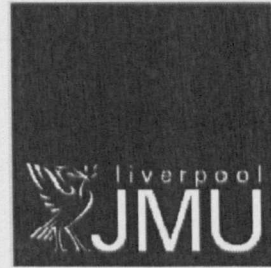
Thank you.

Kind regards,

.....
Mohamad Rizal Baharum

School of Built Environment
Peter Jost Enterprise Centre, Byrom Street, L3 3AF Liverpool
E-mail: m.r.baharum@2008.ljmu.ac.uk

Appendix B: Copy of questionnaire and covering letter



Faculty of Technology
and Environment

Dear Centre Manager,

Sustainability through recycling is ultimately a creative act that involves thought and dedication to extend the life and usefulness of the waste stream. Recycling has become a central component of many business operations, and valued for the cost-savings associated with some programs as well as its general environment-friendly aspects.

If you are involved in, or aware of your retail centre recycling programs, I would be grateful if you would spare a few minutes to complete a questionnaire. Access to the questionnaire and further information is provided in the following weblink:

<http://www.survey.ljmu.ac.uk/retailcentrerecycling>

This questionnaire intends to assess the current shopping centres recycling implementation trends, and its success factors. Participation is voluntary but highly appreciated, as the results from this survey will be used in an on-going doctoral research project. Report on my findings will be notified to you on completion.

All responses and details received will be treated in confidence and information collated will only be used for the purpose of this doctoral research. If you have any questions regarding this questionnaire, please do not hesitate to email.

Thank you for filling in this questionnaire.

Yours Sincerely,

Mohamad R. Baharum

email: m.r.baharum@2008.ljmu.ac.uk

Retail Shopping Centres Recycling Initiatives Survey



A) Introduction

This questionnaire is designed to facilitate the assessment of retail shopping centres recycling initiatives. The information collected by this questionnaire for retail shopping centres in the UK, in turn, can be used to identify the elements of recycling strategy decision-making process and to clarify what are the factors that lead to successful recycling initiatives.

The questionnaire will take approximately 15 - 20 minutes to complete. To enable an accurate assessment, it is important that all information requested in the questionnaire should be provided as accurately as possible. If any question requests information that you feel uncomfortable with releasing, please skip on to the next question.

Your response is essential to the study. Please complete and return this questionnaire in the free post envelop provided or via e-mail by 31st August 2010. If you have any queries, please email Baharum at M.R.Baharum@2008.ljmu.ac.uk

B) Section One: General Information

1. Which of the following best describe the role you undertake?

- General Manager
- Deputy General Manager
- Centre Manager
- Assistance Centre Manager
- Facilities/Operations Manager
- Waste Hauler
- Property Manager

- East Midlands
- East Anglia
- Greater London
- South East
- South West
- Scotland
- Wales
- Northern Ireland

2. In which region is your shopping centre located? Please tick where apply.

- North West
- North East
- Yorkshire & Humberside
- West Midland

3. Can you provide the *Gross Leasable Area* of your shopping centre?

- _____ Square Meters
- Between 20,000 – 39,999 meter square
 - Between 39,999 – 79,999 meter square
 - Above 80,000 meter square

C) Section Two: Recycling Practise

4. When the recycling initiative started?

_____ (Years)

5. Does your centre management have a Recycling Policy in place?

Yes No

6. Where the sorting of co-mingled recyclables take place?

Off-site

On-site

Other (please specify): _____

7. Does your shopping centre equipped with the following recovery/recycling facilities? Please tick where apply.

Compactor

Baler

In-vessel composting (IVC) Facility

Incinerator

Material/Resource Recovery Facility

Other (please specify): _____

8. What is your preferred indicator(s) to measure your recycling rate? Please tick where apply.

Diversion rate - *the percentage weight of total solid waste that was not landfilled or not incinerated*

Participation rate - *the percent of tenants that set-out recyclables*

Quantity recovered - *the quantity of recyclables collected per tenant per unit of time*

Benefit/Cost ratio - *Revenue from sales of recyclables, disposal cost savings, Operation & Maintenance costs*

Net cost per tonne - *Net recycling program costs per ton recycled*

Other (please specify): _____

9. Does your establishment implements Environmental Management System (EMS) programme?

Yes No

If yes, please tick where apply

PAS 99 (Integrated Management)

EMAS (Eco Management and Audit Scheme)

ISO14001

BS8555

Other (please specify): _____

10. Does a contracted hauler, broker or other entity pick up the recyclables from the centre?

Yes No Some (please specify): _____

If yes, which contracted service do you use?

Single source contracts Multiple service contract

Other (please specify): _____

11. Can you estimate the annual cost for this service? £ _____ Not to be disclosed

12. Can you provide an actual data or estimates of which materials comprise the largest percentage of recyclables collected from the centre? Not to be disclosed

| Recyclables List | Percentage Recycled |
|--|---------------------|
| <i>Corrugated cardboard</i> | % |
| <i>Paper</i> | % |
| <i>Plastic</i> | % |
| <i>Glass</i> | % |
| <i>Metals</i> | % |
| <i>Waste electrical & electronic equipment</i> | % |
| <i>Other (please specify)</i> | |
| | % |
| | % |
| | % |
| | % |
| | % |

13. Can you provide the actual or estimated total of solid waste (by weight) generated and percentage recycled by this centre in the last five (5) years if available? Not to be disclosed

| Year | Waste Generated | Percentage Recycled |
|------|-----------------|---------------------|
| 2005 | <i>tonnes</i> | % |
| 2006 | <i>tonnes</i> | % |
| 2007 | <i>tonnes</i> | % |
| 2008 | <i>tonnes</i> | % |
| 2009 | <i>tonnes</i> | % |

14. Are there solid waste materials generated that you would like to have recycled but are not currently being collected?

Yes

No

If yes, please specify.

D) Section Three: Recycling Success Factors

The table below contains a list of success factors essential for recycling implementation in shopping centre recycling program. Please complete the two scales below for the level of importance and implementation effectiveness of the factors listed. Based on your experience, please indicate the level of importance of each factor, and then specify the level of actual implementation made in your centre.

| | Not Important | Less Important | Important | Very Important | Extremely Important | | Not Implemented | Slightly Implemented | Moderately Implemented | Quite A Lot Implemented | Effectively Implemented |
|---------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| | 1 | 2 | 3 | 4 | 5 | | 1 | 2 | 3 | 4 | 5 |
| i. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Goal-setting policy | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ii. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Making recycling mandatory | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| iii. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Program champion | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| iv. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Training program | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| v. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Prioritised source separation | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| vi. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Service provider contract provision | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| vii. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Proximity of recycling facilities for separate storage | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| viii. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Provision for alternative recovery methods for residual waste | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ix. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Environmental Management System certification | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| x. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Materials collection methods | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| xi. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Awareness-raising | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| xii. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Manage recycling program through partnerships | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| xiii. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Monitoring and reporting of recycling performance | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| xiv. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Green Leases | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| xv. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Marketing recyclable materials for exchange | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| xvi. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Retailers monetary incentives or rewards | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| xvii. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Recycling Construction & Demolition waste during fit-out works | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| xviii. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Provision for Materials Recycling Facility (MRF) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <i>Others (please specify):</i> | | | | | | | | | | | |
| xix. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| xx. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

E) Section Four: Views and Opinions *(optional)*

15. What do you think is the greatest obstacle to implement recycling initiative at this centre (regardless of whether or not your centre management is currently recycling)?

16. Could the obstacle(s) you cited may cause your centre management to discontinue recycling in the future?

- Yes
 No

17. What specific resources and/or assistance would be required to help your centre management overcome these obstacles? Please specify.

18. Please feel free to add any information that your feel is vital for recycling success at this centre.

E) Respondent Contact

Individual responses to the survey will remain confidential. For further analysis of the data available, we might require to contact you for further discussion. This discussion will be structured before-hand to minimise the time of the discussion and to maintain a standard format for the information required. We hope it will not take much of your time. To proceed with this, please let us know the person that we can contact together with her/his email or telephone number.

Name : _____
Position : _____
Tel : _____
Mobile : _____
Email : _____

Preferred mode : *Face-to-face interview (researcher visit)*
 Telephone interview
 E-mail

Thank you very much for your kind cooperation

Appendix C: Items in each constructs

1. Items in recycling partnerships

| |
|--|
| <i>We believe the success of our initiative depends not only on the management but also on retailers, employees and customers understanding and supporting our proposals.</i> |
| <i>We are ready to share our knowledge on sustainable operations with other businesses."</i> |
| <i>Building on a partnerships with the Council, environment agency and corporate sector to offer further support to our recycling program</i> |
| <i>You need the community behind you otherwise you won't do the things you want to do, you won't be able to we try to adopt the team approach that it's everyone's responsibility to keep (the centre) clean, tidy and safe</i> |
| <i>We value this partnerships is vital where we able to learn some best practise at no cost</i> |
| <i>We engaged with both in house and the service provider</i> |
| <i>We are constantly working with the staff achieving the objectives</i> |
| <i>I would work more effectively with people that have passion on this</i> |
| <i>willingness to share their best practise with other shopping centres and landlords</i> |
| <i>We really feel that we have developed a working partnership with (service provider) understanding not only the needs of the centre, but of the business too. They have worked closely with the our management team in considerably improving recycling levels and producing ongoing initiatives for sustainability. This is one of the many reasons that (service provider) contract was extended</i> |
| <i>By working with our retailers and shoppers to reduce amount of waste generated, we reduce all parties' costs.</i> |

2. Items in monitoring and reporting for recycling performances

| |
|---|
| <i>I mean most retailers want to know what happens to the materials they put into their recycling bins, and what they are doing is actually have some impact.</i> |
| <i>We do need to know this information, first of all to justify that we are actually diverting waste from the waste stream we had</i> |
| <i>Knowing the volume of the waste generated is the key for getting competitive bids.</i> |
| <i>Moreover, we need that to give feedback to the units about how we are going</i> |
| <i>Previously, we've made a review on waste minimisation opportunities within the centre community, a number of retailers mentioned that they wanted to be informed</i> |
| <i>We engaged our service provider for ongoing management, monitoring and performance reviews to improve our reporting, in accordance with the ISO14001 procedures</i> |
| <i>Who buys the various recyclable materials, what they use them for and how much the centre earns - maybe a summary placed in the annual report</i> |
| <i>The effectiveness of a campaign can only be determined through effective monitoring and review. This is where the key performance indicators detailed in the report come into play.</i> |
| <i>That's why we need these figures to show we are actually improving recycling performance, and the money is going to the right place"</i> |
| <i>evaluation and feedback help us to fine-tune the existing program</i> |
| <i>Our environmental activities and impacts are discussed and communicated internally and externally to both inform them about progress and offer opportunities for feedback and suggestions.</i> |
| <i>We recognise that we still have room to improve</i> |
| <i>I mean most retailers want to know what happens to the materials they put into their recycling bins, and what they are doing is actually have some impact.</i> |

3. Items in materials collection methods

| |
|---|
| <i>Retailers are becoming more aware and we have started to notice an increase in backhauling and that will have an detrimental effect on our abilities to get best value of recyclables based on volume</i> |
| <i>Once the materials are separated, they are compacted and baled, before sent off for recycling</i> |
| <i>We reduced our general waste skip collections by over 50% which has radically reduced rubbish going to landfill and increase its previous recycling levels including new waste streams which has also reduced our the carbon footprint through less frequent waste collections</i> |
| <i>This has been achieved by fine tuning the collections service offered to retailers and adapting methods to provide a first class service. Culminating into a 20 minute response time to any retailer requesting extra collections outside of their normal times. These advances and initiatives have been made against a background of limited storage space and the necessity to comply with the stringent requirements of the local fire officers, which can limit the ability, on occasions, to fully maximise all available techniques</i> |
| <i>Back hauling of material has been an efficient and effective way of collecting waste from the centre. We are very pleased to have made such a positive impact on site logistics...</i> |
| <i>That's why every cost decision we made, we must look at how much margin can we offset from the number of collections</i> |
| <i>...the amount of waste passed to landfill as a result of implementing backhauling drops by as much as 80% as the bulk of store waste is card and plastic</i> |
| <i>I'm pleased with the 'take-back' program made by some retailers</i> |
| <i>...a site management approach has been adopted to ensure that the process of collecting the materials is controlled, safe and minimises costs.... We recognised that this presented a huge recycling opportunity with 73% of all (the centre) shop-fit waste was recycled in (year).</i> |

4. Items in marketing recyclable materials for exchange

| |
|--|
| <i>we have problem in terms of who we go to, who would take our recyclables at a good price</i> |
| <i>For cardboard, we £3,500-4000 a months just sell on the cardboard.</i> |
| <i>the entire recycling take place there, there is revenue side to the waste. Everything that we handle on site, we baled on-site and we sell them</i> |
| <i>I mean, information exchange is absolutely vital for this kind of control while providing quality recyclables</i> |
| <i>we look for the best price, as where we can get the best price we will sell the materials to it.</i> |
| <i>Knowing the volume of the waste generated is the key for getting competitive bids.</i> |

5. Items in prioritise source separations

| |
|--|
| <i>Containers are shared so it is difficult to see who does and who doesn't put out recyclables.</i> |
| <i>We are grateful to retailers' staff for playing their part by sorting their waste</i> |
| <i>The easiest way to recycle is to sort out the different items which can be recycled from those that can't</i> |
| <i>Thanks to the savings on transport and disposal costs, combined with the revenue from the segregated materials.</i> |
| <i>By initiating a food segregation scheme, raw and packaged food can now be recycled into bio-fuel and renewable energy</i> |
| <i>I mean, providing quality recyclables that is greater segregation and less contamination</i> |

6. Items in awareness-raising

| |
|--|
| <i>We also work with neighbouring outlets around the area to address environmental issues</i> |
| <i>By building on our progress to date, further developing our education and training programmes, and sharing the benefits amongst all our stakeholders we will not only embed sustainability in the way we do business but assure our role as a partner of choice.</i> |
| <i>Educate retailers and customers, minimise waste leaving the shopping centre and to be more costs effective for our tenants in relation to their service charge.</i> |
| <i>Any obstacles in the infrastructure should be identified and remedied before the awareness campaign begins</i> |
| <i>awareness campaigns and exhibitions leads to greater recycling participation and drive for improvement among team</i> |
| <i>Throughout the year, we have calendar events such as the Compost day, Earth Day, Big Tidy-up. These events mainly focus on awareness raising campaigns among the units as well as for the local community</i> |
| <i>However, recycling services that we have provided alone are not sufficient to achieve our targets; we also need to market recycling to the each unit and the local community. This more difficult task challenges us to win their hearts and minds, to get them to change their habits and all without preaching, or finger-pointing.</i> |

7. Items in training program

| |
|--|
| <i>Educating of retailers due to staff turnover within units, and storage limitation</i> |
| <i>lack of training and management skills is also one of the major reasons in high disposal costs and poor diversion of recyclables</i> |
| <i>We have implemented a communication process including face to face, written documents and leaflets.... waste bins have to be altered to force retailers to recycle correctl</i> |

8. Items in program champion

| |
|---|
| <i>Staff in attendance to welcome and advise tenants, and facilities for additional recyclable materials</i> |
| <i>During the initial years since the initiative took place, a dedicated team was appointed to recycle cardboard and plastics. In line with this, four more machines (balers and compactors) were installed on site and 50% recycling was achieved.</i> |
| <i>I discussed it at management level first and then fill to down through the staff level</i> |
| <i>every projects that we investigates.... I discussed it at management level first and then fill to down through the staff level, because at the end of the day, they don't do the job and the project wont work.</i> |
| <i>As the local councils do not recycle most of the plastic products, however [the centre] does and we communicate this to our staff through our environmental training. Staff therefore have the opportunity to reduce the amount of waste going into their black bins by recycling all their plastic products at [the centre]</i> |
| <i>In 2005, Landlord invested £35,000 to develop the material resource recovery facility on site to sort, separate and send materials for recycling.</i> |
| <i>its all about team efforts at (centre name),</i> |
| <i>During the initial years since the initiative took place, a dedicated team was appointed to recycle cardboard and plastics.</i> |
| <i>Installation of balers and compactors on-site was backed up by landlord</i> |

9. Items in goal-setting policy

| |
|---|
| <i>separate collection systems together with waste-to-energy facility for processing food waste from the centre can significantly help us to reach 100% targets for diverting large volume of bio-degradable waste from landfill.</i> |
| <i>they are an excellent crew, they achieved excellent target by recycling around about 90% of waste that centre that facility</i> |
| <i>Understandably, it took some time for retailers to get used to the system, but we are extremely pleased that it is going so well. We are grateful to retailers' staff for playing their part by sorting their waste</i> |
| <i>we can avoid large financial penalties associated with landfill</i> |
| <i>achieved 73% recyclables recovered target in year 2009</i> |
| <i>but we are extremely pleased that it is going so well. We are grateful to retailers' staff for playing their part by sorting their waste</i> |
| <i>we have set annual benchmarks for the percentage of waste recycled in the centre</i> |

10. Items in service provider contract provision

| |
|---|
| <i>We need to establish clear reporting requirements, so that we can monitor the numbers and amount of materials collected, containers emptied, and complaints and improvements anticipated.</i> |
| <i>The engagement with both in house and service provider for ongoing management, monitoring and performance reviews essentially improve our environmental reporting.</i> |
| <i>They (service provider) have worked closely with the (shopping centre) management team in considerably improving recycling levels and producing ongoing initiatives for sustainability. This is one of the many reasons that (service provider) contract was extended.</i> |
| <i>We work with our contractor to provide up-to-date lists of acceptable materials to us.,</i> |
| <i>we believes that waste contractors can provide this additional service at no additional cost and in some cases at a reduced cost as all recovered waste is sold on for reuse</i> |
| <i>The contract allows them (hauler) to change their list of accepted recyclables as the market changes.</i> |

11. Items in Green lease

| |
|---|
| <i>Requiring tenant to develop and file recycling plans stops short of requiring recycling, but motivates some tenants to sign up for recycling"</i> |
| <i>All our retailers have signed up to an Environmental Charter, and a Green File of guidance on environmental issues was created. Since then, staff environmental training, a monthly Green Newsletter for retailers and bi-annual waste audits have been introduced</i> |
| <i>Following the introduction of a Green lease in 2007, we have now signed such agreements with all our retailers...</i> |
| <i>The success of this lease lies with its approach. It is not prescriptive, instead it seeks to build partnerships with occupiers and share solutions.</i> |
| <i>Retailers pressure with staffing levels and not having buy in to strategy... lease specify requirements</i> |
| <i>Require tenants to recycle as part of the tenancy lease</i> |

12. Items in provision for Materials Recovery Facilities (MRF)

| |
|---|
| <i>the facilities capable to sort, separate and send materials for recycling, including cardboard, glass, paper, aluminum cans, soft plastics, wooden pallets, plastic bottles, coat hangers, fluorescent tubes, hard plastics, metal, retailer cages, toner cartridges and electrical goods</i> |
| <i>One of our vital initiative was to develop an on-site Resource Recovery Centre</i> |
| <i>Acheivement made from the savings on transport and disposal costs, combined with the revenue from the segregated materials at the facility.</i> |
| <i>Most recent achievement that we have been working on is our resource recovery centre, we take all our general waste which normally goes to incinerators to the one facility that basically hands picked out and sent off to recycling. ...</i> |
| <i>The facility has created social as well as environmental and business benefits.</i> |
| <i>They are an excellent crew, they achieved excellent target by recycling around about 90% of waste from the facility.</i> |
| <i>the facilities capable to sort, separate and send materials for recycling, including cardboard, glass, paper, aluminum cans, soft plastics, wooden pallets, plastic bottles, coat hangers, fluorescent tubes, hard plastics, metal, retailer cages, toner cartridges and electrical goods.</i> |
| <i>By working in partnership with [employment organisation], adults with learning difficulties have benefited from job opportunities. With the support of the Resource Recovery Centre Manager, these adults have been developing their skills and sense of independence.</i> |
| <i>we take all our general waste which normally goes to incinerators to the one facility that basically hands picked out and sent off to recycling</i> |

13. Items in recycling C&D waste during fit-out works

| |
|---|
| <i>We also instigated Site Waste Management Plans on all fit out works on site</i> |
| <i>To meet our requirements, we also ask the contractors to produce waste forecasts for their projects</i> |
| <i>From the initiative we able to achieved C&D waste recycling target figure of 80%, achieving a recycled rate of 85-95% on our retail fit-out.</i> |
| <i>Maintain close working relationships with the building management</i> |
| <i>For all fit out projects which require CDM (Construction Design and Management) regulations 2007, we asked our tenants to let us know about their fit-out plans so that we can work together to coordinate waste management</i> |
| <i>There are multi-layered contractors activities are commonly occurred during the fit-out works</i> |
| <i>Minimise risks to safety, environment, systems and infrastructure</i> |
| <i>Fit out wastes presents another opportunities for more reduction, reuse and recycling of waste from the centre</i> |
| <i>It is important that we manage building access and egress whilst minimise disruption to other occupiers during the projects</i> |
| <i>in some cases we also encourages occupiers to appoint a waste management contractor who can undertake segregate all waste on site to enable effective re-use and recycling and to minimise waste to landfill, and provide waste data to the our construction team to communicate and monitor results”.</i> |

14. Items in alternative recovery methods for residual waste

| |
|---|
| <i>Fuel own vehicles from Biodiesel created from waste cooking oil.</i> |
| <i>63% of waste goes to the Waste to Energy plant, which heats small businesses and provides free electric car charging point.</i> |
| <i>there is no doubt that we will continue to produce waste that can not be practically recycled, so perhaps incineration isn't quite the scary monster it appears to be, if it generates electricity and safely gets rid of some nasty waste</i> |
| <i>waste that couldn't be recycled by our hauler will be incinerated to provide energy for local electricity</i> |
| <i>Our recent initiative was developing a small waste-to-energy plant on-site using contaminated waste and oil to generate electricity..... where we will turn the waste into bio fuel and produce electricity to the centre.</i> |

15. Items in monetary incentives or rewards

| |
|--|
| <i>With the revenue from the segregated materials, some of this is reinvested in additional recycling initiatives and some of it is passed on to retailers.</i> |
| <i>Our retailers currently pay for the service charge for all the waste management initiatives including recycling and for the energy</i> |
| <i>service charge structure should relate to a strategy whereby any incurred service charges collected could go towards a more environmental friendly program</i> |
| <i>because the initiative that we got in place we manage we able to reduce the service charge on a yearly basis by offsetting it with the revenue that we produced,</i> |
| <i>Some of this is reinvested in additional recycling initiatives and some of it is passed on to retailers.</i> |
| <i>Landlord backup the initiatives by investing in new balers and compactors</i> |
| <i>We provides an incentive to the hauler to become a more active agent in promoting the shopping centre recycling for increasing recycling and innovating new strategies.</i> |
| <i>What we have done one time, we gave bottle of wine and chocolate to whatever units recycle the most that day (Big Tidy-up event) in order to make competition sound good, but some units by nature of their business produce more waste compare to those.</i> |
| <i>How, can we use incentives when each units has different waste stream coming in... we look at it but difficult to implement. Containers are "shared" so it is difficult to see who does and who doesn't put out recyclables.</i> |
| <i>there is a lack of incentives for landlord to implement and support recycling programs.... and for haulers to provide comprehensive recycling services</i> |

Appendix D: Tests of Between-Subjects Effects

| Source | Dependent Variable | Type III Sum of Squares | df | Mean Square | F | Sig. |
|---------------------------------|--|---------------------------|----------|--------------|---------------|-------------|
| Corrected Model | Importance of Goal Setting Policy | .520 ^a | 2 | .260 | 1.447 | .241 |
| | Importance of Making Recycling mandatory | 2.879^b | 2 | 1.439 | 3.407 | .037 |
| | Importance of Program champion | .152 ^c | 2 | .076 | .302 | .740 |
| | Importance of Training Program | 2.354^d | 2 | 1.177 | 5.805 | .004 |
| | Importance of Prioritised source separation | .299 ^e | 2 | .149 | .220 | .803 |
| | Importance of Provision for service provider contract | 1.809 ^f | 2 | .904 | 3.001 | .055 |
| | Importance of Proximity of recycling facilities for separate storage | .651 ^g | 2 | .325 | .963 | .386 |
| | Importance of Alternative recovery methods for residual waste | .745 ^h | 2 | .372 | 1.234 | .296 |
| | Importance of Partnerships | .186 ⁱ | 2 | .093 | .345 | .709 |
| | Importance of Monitoring and reporting of recycling performance | .049 ^j | 2 | .024 | .061 | .941 |
| | Importance of Collection methods | .223 ^k | 2 | .112 | .229 | .796 |
| | Importance of Awareness raising | 1.806 ^l | 2 | .903 | 1.513 | .226 |
| | Importance of EMS certification | .092 ^m | 2 | .046 | .068 | .934 |
| | Importance of Green Lease | 5.494ⁿ | 2 | 2.747 | 5.359 | .006 |
| | Importance of Marketing recyclable materials for exchange | 19.320^o | 2 | 9.660 | 11.087 | .000 |
| | Importance of Monetary incentives or rewards | .935 ^p | 2 | .467 | .606 | .548 |
| | Importance of Recycling C&D waste during fit-out works | .313 ^q | 2 | .157 | .252 | .778 |
| Importance of Provision for MRF | 1.913 ^r | 2 | .957 | 1.805 | .170 | |

| | | | | | | |
|-----------|--|----------|---|----------|----------|------|
| Intercept | Importance of Goal Setting Policy | 1651.048 | 1 | 1651.048 | 9199.698 | .000 |
| | Importance of Making Recycling mandatory | 658.928 | 1 | 658.928 | 1559.872 | .000 |
| | Importance of Program champion | 1398.041 | 1 | 1398.041 | 5542.461 | .000 |
| | Importance of Training Program | 1392.219 | 1 | 1392.219 | 6865.278 | .000 |
| | Importance of Prioritised source separation | 1165.334 | 1 | 1165.334 | 1718.696 | .000 |
| | Importance of Service provider(s) contract | 1408.000 | 1 | 1408.000 | 4671.920 | .000 |
| | Importance of Proximity of recycling facilities for separate storage | 1456.812 | 1 | 1456.812 | 4310.728 | .000 |
| | Importance of Alternative recovery methods for residual waste | 1381.747 | 1 | 1381.747 | 4577.668 | .000 |
| | Importance of Partnerships | 1597.835 | 1 | 1597.835 | 5913.005 | .000 |
| | Importance of Monitoring and reporting of recycling performance | 1246.298 | 1 | 1246.298 | 3114.099 | .000 |
| | Importance of Collection methods | 1257.328 | 1 | 1257.328 | 2577.950 | .000 |
| | Importance of Awareness raising | 1200.018 | 1 | 1200.018 | 2009.892 | .000 |
| | Importance of EMS certification | 1104.083 | 1 | 1104.083 | 1644.106 | .000 |
| | Importance of Green Lease | 1309.995 | 1 | 1309.995 | 2555.711 | .000 |
| | Importance of Marketing recyclable materials for exchange | 687.234 | 1 | 687.234 | 788.767 | .000 |
| | Importance of Monetary incentives or rewards | 451.767 | 1 | 451.767 | 585.771 | .000 |
| | Importance of Recycling C&D waste during fit-out works | 1149.322 | 1 | 1149.322 | 1848.147 | .000 |
| | Importance of Provision for MRF | 1162.414 | 1 | 1162.414 | 2193.456 | .000 |

| | | | | | | |
|----------------|--|--------|---|-------|--------|------|
| Group_scheme_3 | Importance of Goal Setting Policy | .520 | 2 | .260 | 1.447 | .241 |
| | Importance of Making Recycling mandatory | 2.879 | 2 | 1.439 | 3.407 | .037 |
| | Importance of Program champion | .152 | 2 | .076 | .302 | .740 |
| | Importance of Training Program | 2.354 | 2 | 1.177 | 5.805 | .004 |
| | Importance of Prioritised source separation | .299 | 2 | .149 | .220 | .803 |
| | Importance of Service provider(s) contract | 1.809 | 2 | .904 | 3.001 | .055 |
| | Importance of Proximity of recycling facilities for separate storage | .651 | 2 | .325 | .963 | .386 |
| | Importance of Alternative recovery methods for residual waste | .745 | 2 | .372 | 1.234 | .296 |
| | Importance of Partnerships | .186 | 2 | .093 | .345 | .709 |
| | Importance of Monitoring and reporting of recycling performance | .049 | 2 | .024 | .061 | .941 |
| | Importance of Collection methods | .223 | 2 | .112 | .229 | .796 |
| | Importance of Awareness raising | 1.806 | 2 | .903 | 1.513 | .226 |
| | Importance of EMS certification | .092 | 2 | .046 | .068 | .934 |
| | Importance of Green Lease | 5.494 | 2 | 2.747 | 5.359 | .006 |
| | Importance of Marketing recyclable materials for exchange | 19.320 | 2 | 9.660 | 11.087 | .000 |
| | Importance of Monetary incentives or rewards | .935 | 2 | .467 | .606 | .548 |
| | Importance of Recycling C&D waste during fit-out works | .313 | 2 | .157 | .252 | .778 |
| | Importance of Provision for MRF | 1.913 | 2 | .957 | 1.805 | .170 |

| | | | | |
|-------|--|--------|----|------|
| Error | Importance of Goal Setting Policy | 16.332 | 91 | .179 |
| | Importance of Making Recycling mandatory | 38.441 | 91 | .422 |
| | Importance of Program champion | 22.954 | 91 | .252 |
| | Importance of Training Program | 18.454 | 91 | .203 |
| | Importance of Prioritised source separation | 61.701 | 91 | .678 |
| | Importance of Service provider(s) contract | 27.425 | 91 | .301 |
| | Importance of Proximity of recycling facilities for separate storage | 30.753 | 91 | .338 |
| | Importance of Alternative recovery methods for residual waste | 27.468 | 91 | .302 |
| | Importance of Partnerships | 24.590 | 91 | .270 |
| | Importance of Monitoring and reporting of recycling performance | 36.419 | 91 | .400 |
| | Importance of Collection methods | 44.383 | 91 | .488 |
| | Importance of Awareness raising | 54.332 | 91 | .597 |
| | Importance of EMS certification | 61.110 | 91 | .672 |
| | Importance of Green Lease | 46.644 | 91 | .513 |
| | Importance of Marketing recyclable materials for exchange | 79.286 | 91 | .871 |
| | Importance of Monetary incentives or rewards | 70.182 | 91 | .771 |
| | Importance of Recycling C&D waste during fit-out works | 56.591 | 91 | .622 |
| | Importance of Provision for MRF | 48.225 | 91 | .530 |

| | | | |
|-------|--|----------|----|
| Total | Importance of Goal Setting Policy | 2152.000 | 94 |
| | Importance of Making Recycling mandatory | 936.000 | 94 |
| | Importance of Program champion | 1794.000 | 94 |
| | Importance of Training Program | 1740.000 | 94 |
| | Importance of Prioritised source separation | 1566.000 | 94 |
| | Importance of Service provider(s) contract | 1888.000 | 94 |
| | Importance of Proximity of recycling facilities for separate storage | 1908.000 | 94 |
| | Importance of Alternative recovery methods for residual waste | 1834.000 | 94 |
| | Importance of Partnerships | 2075.000 | 94 |
| | Importance of Monitoring and reporting of recycling performance | 1638.000 | 94 |
| | Importance of Collection methods | 1671.000 | 94 |
| | Importance of Awareness raising | 1633.000 | 94 |
| | Importance of EMS certification | 1463.000 | 94 |
| | Importance of Green Lease | 1629.000 | 94 |
| | Importance of Marketing recyclable materials for exchange | 857.000 | 94 |
| | Importance of Monetary incentives or rewards | 629.000 | 94 |
| | Importance of Recycling C&D waste during fit-out works | 1537.000 | 94 |
| | Importance of Provision for MRF | 1483.000 | 94 |

| | | | |
|-----------------|--|--------|----|
| Corrected Total | Importance of Goal Setting Policy | 16.851 | 93 |
| | Importance of Making Recycling mandatory | 41.319 | 93 |
| | Importance of Program champion | 23.106 | 93 |
| | Importance of Training Program | 20.809 | 93 |
| | Importance of Prioritised source separation | 62.000 | 93 |
| | Importance of Service provider(s) contract | 29.234 | 93 |
| | Importance of Proximity of recycling facilities for separate storage | 31.404 | 93 |
| | Importance of Alternative recovery methods for residual waste | 28.213 | 93 |
| | Importance of Partnerships | 24.777 | 93 |
| | Importance of Monitoring and reporting of recycling performance | 36.468 | 93 |
| | Importance of Collection methods | 44.606 | 93 |
| | Importance of Awareness raising | 56.138 | 93 |
| | Importance of EMS certification | 61.202 | 93 |
| | Importance of Green Lease | 52.138 | 93 |
| | Importance of Marketing recyclable materials for exchange | 98.606 | 93 |
| | Importance of Monetary incentives or rewards | 71.117 | 93 |
| | Importance of Recycling C&D waste during fit-out works | 56.904 | 93 |
| | Importance of Provision for MRF | 50.138 | 93 |

- a. R Squared = .031 (Adjusted R Squared = .010)
- b. R Squared = .070 (Adjusted R Squared = .049)
- c. R Squared = .007 (Adjusted R Squared = -.015)
- d. R Squared = .113 (Adjusted R Squared = .094)
- e. R Squared = .005 (Adjusted R Squared = -.017)
- f. R Squared = .062 (Adjusted R Squared = .041)
- g. R Squared = .021 (Adjusted R Squared = -.001)
- h. R Squared = .026 (Adjusted R Squared = .005)
- i. R Squared = .008 (Adjusted R Squared = -.014)
- j. R Squared = .001 (Adjusted R Squared = -.021)
- k. R Squared = .005 (Adjusted R Squared = -.017)
- l. R Squared = .032 (Adjusted R Squared = .011)
- m. R Squared = .002 (Adjusted R Squared = -.020)
- n. R Squared = .105 (Adjusted R Squared = .086)
- o. R Squared = .196 (Adjusted R Squared = .178)
- p. R Squared = .013 (Adjusted R Squared = -.009)
- q. R Squared = .006 (Adjusted R Squared = -.016)
- r. R Squared = .038 (Adjusted R Squared = .017)

Appendix E: Test of Homogeneity of Variances

Levene's Test of Equality of Error Variances^a

| | F | df1 | df2 | Sig. |
|--|---------------|----------|-----------|-------------|
| Importance of Goal Setting Policy | 4.326 | 2 | 91 | .016 |
| Importance of Making Recycling mandatory | 2.942 | 2 | 91 | .058 |
| Importance of Program champion | 3.164 | 2 | 91 | .047 |
| Importance of Training Program | 18.334 | 2 | 91 | .000 |
| Importance of Prioritised source separation | .773 | 2 | 91 | .465 |
| Importance of Service provider(s) contract | .219 | 2 | 91 | .804 |
| Importance of Proximity of recycling facilities for separate storage | 2.030 | 2 | 91 | .137 |
| Importance of Alternative recovery methods for residual waste | 5.656 | 2 | 91 | .005 |
| Importance of Partnerships | 1.604 | 2 | 91 | .207 |
| Importance of Monitoring and reporting of recycling performance | 5.223 | 2 | 91 | .007 |
| Importance of Collection methods | .099 | 2 | 91 | .906 |
| Importance of Awareness raising | 1.851 | 2 | 91 | .163 |
| Importance of EMS certification | 6.197 | 2 | 91 | .003 |
| Importance of Green Lease | .572 | 2 | 91 | .566 |
| Importance of Marketing recyclable materials for exchange | 21.509 | 2 | 91 | .000 |
| Importance of Monetary incentives or rewards | 3.013 | 2 | 91 | .054 |
| Importance of Recycling C&D waste during fit-out works | .425 | 2 | 91 | .655 |
| Importance of Provision for MRF | 2.295 | 2 | 91 | .107 |

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept + Group_scheme_3

Appendix F: Homogenous Subset

Importance of Making Recycling mandatory

Tukey HSD^{a,b}

| Shopping centre scheme | N | Subset for alpha = 0.05 | |
|------------------------|----|-------------------------|------|
| | | 1 | 2 |
| Very Large | 17 | 2.76 | |
| Large | 22 | 3.00 | 3.00 |
| Medium | 55 | | 3.22 |
| Sig. | | .417 | .471 |

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 24.498.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

Importance of Green Lease

Tukey HSD^{a,b}

| Shopping centre scheme | N | Subset for alpha = 0.05 | |
|------------------------|----|-------------------------|------|
| | | 1 | 2 |
| Medium | 55 | 3.91 | |
| Large | 22 | 4.23 | 4.23 |
| Very Large | 17 | | 4.53 |
| Sig. | | .270 | .307 |

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 24.498.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.