The Barriers and Obstacles to Sustainable Refurbishment

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by

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DECLARATION

I, the undersigned, declare that this dissertation submitted to the University of Central Lancashire for the degree of Bachelor of Science in Construction Project Management in The Grenfell-Baines School of Architecture, Construction and Environment is my original work with exemption to the citations and that this work has not been submitted to any other university, either in part or in its entirety, for the award of any degree.

Signature:

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Date: 17th April 2015

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ABSTRACT

It is reported by Xing et al (2011) that 80% of the buildings which we will live in by the year 2050 have already been built and in addition to this, the UK Government (2010) confirmed that 'the amount of CO2 emissions that construction can influence is significant, accounting for almost 47% of total CO2 emissions of the UK' so it is clear to see why there is so much attention being placed on Sustainability at the moment and in recent times.

There has been extensive discussion over Sustainable Development and the need to use more Sustainable methods of construction, more Sustainable Materials and more Sustainable Technologies for many years since the issue of Climate Change was first introduced following the Earth Summit in Rio 1992, but the impact that this has on the design and construction issue is a topic which often divides opinion. Many people, included Baker (2009) report that 'the focus on sustainable development and its assessment has mainly been on new build construction because new build can provide full sustainable design without being compromised by existing features, such as thermal properties, acoustic properties, natural lighting levels and layout' so this study will aim to put more focus on the requirements associated with refurbishment projects and what potential problems are encountered when it comes to retaining the main features of these buildings and also providing like for like replacement for any items do that require replacement.

This study will provide an outline of the facts and opinions as reported in several forms of literature and will challenge these by comparing this against the views and opinions of industry professionals who have undertaken a number of these projects in the past, and have real life experiences to share on the topic.

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CHAPTER 1 – INTRODUCTION

1.1 Background

The concept of Sustainable Development has been high on the agenda of World Leaders and Governing Bodies since it was first introduced following the Earth Summit in Rio, 1992. At that meeting, the issue of Climate Change was discussed in great detail and it was agreed that action must be taken to prevent any further irreversible harm or damage being done to our environment. The meeting was high praised and as Dernbach (2001) states is 'widely recognised for its emphasis on environment, the nations of the world also endorsed sustainable development for the first time' and continues to say that 'if we do not make a transition toward this world within the next 50 years, the future will be painful and costly for both humans and the environment.'

Since the meeting there has been a big push towards more Sustainable ways of designing and building, the use of more Sustainable materials and technologies and a push towards a change in attitude towards a more Sustainable way of living. It is reported by Xing et al (2011) that 'buildings currently account for 45% of the carbon emissions in the UK and that 80% of the buildings which we will live in by the year 2050 have already been built.' This clearly highlights several areas which need to be addressed, mainly that the amount of carbon emissions being emitted needs to be reduced. And given that the UK Government (2010) confirmed that 'the amount of CO2 emissions that construction can influence is significant, accounting for almost 47% of total CO2 emissions of the UK' it is clear to see why there is so much attention being placed on Sustainability.

In 2008, the UK Government has made a commitment (UK Government, 2008) 'to ensure the net UK carbon account for the year 2050 is at least 80% lower than the 1990 baseline' and has subsequently placed an emphasis on controlling and reducing carbon emissions in the design and construction industry by inserting a number of targets and requirements in the Planning Policy, Building Regulations and Building Control. As Xing et al have already indicated, we already occupy the

majority of buildings we will occupy in 2050 so there needs to be more of an emphasis placed on Sustainable Refurbishment to achieve these targets. The refurbishment of buildings has often been a hot topic in the design and construction industry with many people having a preference to new build projects as indicated by Baker (2009) report that 'the focus on sustainable development and its assessment has mainly been on new build construction because new build can provide full sustainable design without being compromised by existing features, such as thermal properties, acoustic properties, natural lighting levels and layout' however, there is a counter argument by Shah (2012) who states that 'refurbishments are becoming increasingly recognised as a valid alternative to new build after many years of being seen as simply a way to cheaply extend the life of a building.' However, given the statistics provided by Xing et al (2011) that we currently occupy 80% of the buildings which we will occupy in 2050, there needs to be a change in attitude towards the refurbishment of buildings if we are to stand any chance of achievement the targets as set out by the UK Government and as have been identified as a crucial requirement for by the human race and the environment by Dernbach (2001).

As Davies & Osmani (2011) refer to the commitment by the UK Government and they have 'a legally binding commitment to reduce CO2 levels by 80% by 2050 relative to the 1990 emissions baseline and as is stated by Xing et al (2011) buildings presently account for some 45% of carbon emissions in the UK and it has been estimated that 80% of the buildings that we will occupy in 2050 have already been built so the importance of building refurbishment is becoming high on the agenda of all involved in the construction industry. Xing et al (2011) also goes on to say that the UK Government has set out a number of goals relating to the delivery of zero carbon buildings as follows:

- Zero carbon dwellings and schools from 2016
- Zero carbon public sector buildings from 2018, and
- Zero carbon commercial buildings from 2019.

This highlights the importance that is being placed on building refurbishment at the moment but also highlights one of the main constraints in undertaking such as project. The adaptations of Building Regulations and the commitments that have been made by the UK Government with regards to the improvement of building performance and the reduction in CO2 emissions are presenting greater difficulties for project teams in tackling such issues.

Shah (2012) argues that the 'refurbishing buildings in one sense can be said to be inherently sustainable, helping to reduce carbon emissions and resources through reusing, as a minimum, the shell, and upgrading the plant which in older buildings contributes disproportionately more carbon emissions' however there are a number of barriers and obstacles which must be negotiated in order to ensure project success. These are best assessed in line with the principles of sustainability as identified by Hussin et al (2013) who identified that 'to achieve sustainable construction, it is very important to balance the basic principles of sustainability i.e. environmental economic and social aspect together.'

This report will identify the Principles of Sustainability and will assess their impact on Sustainable Refurbishment, and will seek to identify the barrier and obstacles which are encountered when these projects are undertaken.

1.2 Aims & Objectives

The main intention of this report is to provide an overview of the barriers and obstacles which are faced when looking at the refurbishment of buildings by provided an oversight of all the issues which can impact upon a project rather than just focussing on one area.

In order for this report to provide sufficient information to satisfy the primary research topic of this report, it is important to concentrate on some specific areas which are

the most likely areas to produce the misconceptions by which many people often jump to before hearing all of the details.

As a result, this report will also look in to the following areas specifically:

Main Research Topic

- The Barriers and Obstacles to Sustainable Refurbishment

Supporting Information:

- What are the Principles of Sustainability?
- What barriers and obstacles do the Principles of Sustainability present to Sustainable Refurbishment?
- How can these barriers and obstacles be overcome?

1.3 Research Methodology

This study will identify the barriers and obstacles which are faced when dealing with Sustainable Refurbishment by identifying the Principles of Sustainability and how these affect industry professionals and end users of buildings. In order to do this, the study will use a number of different methods of research to ensure that every angle is covered and that all facts opinions are considered.

Firstly, a Literature Review will be undertaken which will form the basis of the study and will provide the initial opinions that will be considered and challenged later in the study. It is the intention to find a number of facts and opinions, both positive and negatives towards the subject matter so that these can then be used to prompt further research and to highlight the area of contention for further focus.

Secondly, a semi-structured interview will take place with industry professionals with a basic list of questions which will be formed following the Literature Review, and will form the basic agenda for each of the interviews, but as the interviews will be semi-

structured this will also allow for a degree of freedom for both the interviewer and interviewee to ask further questions and probe for further information on certain topics and opinions which may be raised during the interview.

Finally, the findings of the Literature Review and the interviews with industry professionals will be compared and contrasted to look for common themes or further arguments which may arise from the outcomes.

The proposed approach to conducting research is aimed to provide a holistic view of the barriers and obstacles which are faced when dealing with Sustainable Refurbishment. The proposed method of research along with the main and supporting research topics will also allow for research to be focussed in to specific areas and allows for a greater level of detail to be included in the findings.

1.4 Scope and Limitations

There has been discussion over Sustainable Development and the need to use more Sustainable methods of construction, more Sustainable Materials and more Sustainable Technologies for many years since the issue of Climate Change was first introduced, and the impact that this has on the design and construction industry often divides opinion in the industry. New build projects tend to be easier to work with as they provide a blank canvas to work with when it comes to Sustainability, so this study will aim to put more focus on the requirements associated with refurbishment projects and the problems that are encountered when undertaking projects like this.

1.5 Structure of the Dissertation

The structure of this study will be as follows:

Chapter 1 – Introduction

This will introduce the Main Research Topic and will highlight the reasons behind its choice. It will also identify the Aims and Objectives of the study and will identify the Scope and any limitation to its undertaking.

Chapter 2 – Literature Review

This section will review all current literature that is available on the Main Research Topic and will form the basis of the study going forward. It will identify the history, definitions, concepts and opinions associated with the topic both positive and negative to allow for further research to be undertaken.

Chapter 3 – Research Methodology

This section will identify the possible methods of further research available following the Literature Review and will also provide a method for continuing along with a justification for this choice.

Chapter 4 – Research Analysis

This section will explain the findings of the additional research will be undertaken and will provide links to correlation or discrepancies from the findings of the Literature Review.

Chapter 5 – Conclusion

Finally, this section will provide the main conclusions from the study, any limitations to the study and recommendations for further/future research.

CHAPTER 2 – LITERATURE REVIEW

2.1 Introduction

The idea of Sustainable Development first came to fruition following the meeting of the Earth Summit in Rio in 1992, which was convened to discuss (Brandon & Lombardi, 2010) 'the concerns on climate change and on pollution levels threatening the survival of the human species.' Elliott (2012) also commented on the Earth Summit stating that 'the commission had considered environmental concerns arising through development processes from an economic, social and political perspective rather than solely from a science base as in previous studies.' The outcomes of the Earth Summit where that it developed a number of (Elliott, 2012) 'recommendations focused on integrating development strategies and environmental policies and global partnerships to meet the interdependent environmental concerns and development opportunities North and South.'

Moving on from the comments made by Elliott (2012) regarding the environmental, social and economic perspectives, these are the topics which will form the basis of this Literature Review and using the principles of sustainability as outlined by Hussin et al (2013) who identified that 'to achieve sustainable construction, it is very important to balance the basic principles of sustainability i.e. environmental, economic and social aspect together.' Hussin et al (2013) outlined the principles of sustainability as in the following subsections:

2.1.1 Environmental Aspect

In environmental dimension the sustainable approaches are as follows:

- Increase material efficiency by reducing the material demand of non-renewable goods
- Reduce the material intensity via substitution technologies
- Enhance material recyclability
- Reduce and control the use and dispersion of toxic materials
- Reduce the energy required for transforming goods and supplying services

- Support the instruments of international conventions and agreements
- Maximise the sustainable use of biological and renewable resources
- Consider the impact of planned projects on air, soil, water, flora and fauna

2.1.2 Economic Aspect

In economic dimension the sustainable approaches are as follows:

- Consider life-cycle costs
- Internalise external costs
- Consider alternative financing mechanisms
- Develop appropriate economic instruments to promote sustainable consumption
- Consider the economic impact on local structures

2.1.3 Social Aspect

In social dimension the sustainable approaches are as follows:

- Enhance a participatory approach by involving stakeholders
- Promote public participation
- Promote the development of appropriate institutional frameworks
- Consider the influence on the existing social framework
- Assess the impact on health and the quality of life

The remainder of this section will analyse the barriers and obstacles to achieving the points outlined by Hussin et al as above by breaking each section down and reviewing available literature against each of these points.

2.2 Environmental

In reviewing the points outlined by Hussin et al, there appears to be a clear focus on increasing efficiency with regards to building performance whilst also reducing the impact upon the immediate and wider environment. By the time the Earth Summit

had taken place in 1992, steps were already being put in place to deal with the issues that were being discussed. The creation of Building Regulations and Building Control and the many alterations to this since its introduction had already started to address the issues, and more recently have been supported by Sustainability Assessment Tools such as BREEAM and the adaptation of Planning Policy to address matters of sustainability for all projects have all changed the way in which projects are handled, creating a number of opportunities but also a number of challenges and obstacles which project teams must now overcome. These are discussed further in this section.

2.2.1 Building Regulations

As stated by Stephenson (2004) 'building control in this country began in London as long ago as 1189 when regulations relating to party walls, rights of light, drainage and related matters were made' however, since then there have been numerous alterations which have placed more emphasis on the requirements for building performance. One of the most notable of these amendments came in 1984 when the Housing and Building Control Act was introduced and as is stated by Stephenson (2004) 'plans could be certified as complying with the building regulations by suitably qualified persons in private practice, this result in a greater emphasis being placed upon projects whether they be new build or refurbishment as it meant that plans for any proposed works were subject to sign-off by building control.

The legislation that was outlined in the Housing and Building Control Act 1984 only lasted a few months until it was superseded by the Building Act 1984. Stephenson (2004) described the Building Act 1984 a consolidation of 'various building control statutes enacted over the last 90 years' as it brought together all of the relevant legislation in to one Act and therefore replacing all past legislation. The Act was a fully comprehensive list consisting of 135 sections and 7 schedules and whilst it has been amended several times since 1984, it still remains the Act which is used by Building Control Officers when assessing the project plans and design. This set the precedent by which many projects are governed and controlled nowadays many years ago.

Since then, there have been many variations to include further legislation to Building Regulations, which have placed more emphasis on building performance and efficiency. Of all the legislation and guidelines contained within the Building Regulations, it is arguably Part L that poses the greatest challenge for refurbishment projects as this is the section which focuses on conservation of fuel and power. In particular, Part L references a number of insulation values which must be achieved by the building elements such as windows, doors, boiler efficiency, lighting efficiency, hot water storage etc. and as Polley (2014) states 'Part L continues to be a tool for government to reduce carbon emissions from buildings'.

This highlights the main constraint by which the project is bound by in undertaking a refurbishment project as they are already restricted by a number of factors as outline by Watson (2009) who states 'this can cause significant problems and a study carried out by Building Magazine found that the main areas, indicated by construction professionals were exclusion of moisture, thermal insulation, sound insulation, means of escape, fire protection and accessibility. These can add significant costs to the project' as it can lead to extensive works to replace building materials that are no longer compliant with the guidelines and legislation set out in Building Regulations Part L. Watson's argument is also supported by Mansfield (2009) who states that 'due to the restraints of the structure of the existing buildings, refurbishment/maintenance projects may not be able to achieve a concise sustainable design, and the fabric of older buildings can also be energy and resource inefficient, therefore affecting its ability to compete sustainably with new build development.' However, there is a counterargument that is put forward by Highfield & Gorse (2009) who argue that there has been 'a significant change in attitudes favouring the conservation and recycling of resources, especially in recent years with efforts to reduce the use of fuel and carbon dioxide emissions and develop a more sustainable way of existing'.

If a project team was working on a new build project rather than the refurbishment of older building, this would provide them with a blank canvas and allow them to select materials and methods of construction which would provide them with the values that they require with regards to the requirements as set out by Part L of the Building Regulations. It is also argued by some that the new build option is also a more viable option than refurbishment as argued by Burton (2012) who refers to the common argument 'that a new building will operate at higher energy performance than a refurbished one, and that during its lifetime, may have less environmental impact.' Burton's argument is supported by the earlier statement made by Watson as the project team has more control over any potential problem areas if they are proceeding with a new build as they can choose building materials that are already known to have been approved with regards to Building Control and Building Regulations. This is an argument that is also put forward by Baker (2009) who states 'The focus on sustainable development and its assessment has mainly been on new build construction because new build can provide full sustainable design without being compromised by existing features, such as thermal properties, acoustic properties, natural lighting levels and layout'

The need to achieve the requirements as set out in Building Regulations provides a considerable barrier to Sustainable Refurbishment, particularly with regards to the Environmental aspect as it highlights the difficulties which are experienced with the existing building fabric and also with the general perception with regards to refurbishment projects and the challenges they present over the new build option.

2.2.2 Building Research Establishment Environmental Assessment Method (BREEAM)

BRE (2014) defines BREEAM 'the world's foremost environmental assessment method and rating system for buildings, with 425,000 buildings with certified BREEAM assessment ratings and two million registered for assessment since it was first launched in 1990.' As more and more clients drive towards more sustainable operations and aim to lower carbon emissions, BREEAM has become more and more popular as can be seen from the figures shown above as Lee & Burnett (2008)

reported that ’15-20% of the new office building market in the UK’ had opted to use BREEAM as a benchmark for their project. BREEAM was initially created with new build projects in mind but in 2014 BRE (2014) announced that ‘After two years of piloting, industry consultation and development, the draft 2014 version of the BREEAM UK Refurbishment and Fit-Out scheme has now been published.’ This aimed to remove one of the main barriers to delivering Sustainable Refurbishment projects as it no longer means that designers are working towards the targets as set out for new build projects rather than refurbishment projects.

There are different levels which can be achieved with regards to accreditation relating to BREEAM, each of these can be achieved by accumulating credits for achieving a number of different criteria in a number of different categories such as energy and water use, health and wellbeing, pollution, transport, materials, waste, ecology and management processes. Dependant on the number of credits that are accumulated, an award on a scale as follows:

- Pass
- Good
- Very Good
- Excellent
- Outstanding

However, there is an argument by Jayne & Mackay (1999) that ‘with all the benefits they bring to sustainable construction, these sustainability assessment tools are criticised for being too expensive and time consuming and therefore have not been widely used in refurbishment projects.’ The assessment alone costs around £10,000 but there is also the added cost of a prolonged design and construction programme and also the additional costs associated with materials and construction methods in order to achieve the credits required for the desired rating. A table as produced by Faithfull & Gould (2012) found that the additional costs for the construction of schools were as follows:

Table 1: The Cost of BREEAM Compliance in Schools

Score (Credits)	BREEAM Rating	Costs
40	Good	Little or no extra cost
55	Very Good	£19/m2 additional cost
70+	Excellent	May cost an extra £60/m2

(Source: http://www.fgould.com/uk-europe/projects/the-cost-of-breeam-compliance-in-schools/ [Date Accessed: 14th January 2015])

The table above shows results for new build construction rather than refurbishment but provides an indication of the cost associated with BREEAM Accreditation and shows how it escalates as the desired rating increases. This has an impact on organisations operations as they seek to provide evidence that they are a 'green' company to improve their organisations reputation. The results of Faithfull & Gould study are also supported as by BDonline (2013) who undertook a study on more sectors than just schools:

Table 2: Capital Cost Uplift (%) to Achieve BREEAM

Building Type	Capital construction cost (£m)	Capital cost uplift (%) to achieve BREEAM		
		Very Good	Excellent	Outstanding
Warehouse	19.4	0.04	0.4	4.8
Supermarket	18.4	0.2	1.8	10.1
Secondary School	22.5	0.2	0.7	5.8
Office	61.7	0.2	0.8	9.8
Mixed Use	36.7	0.1	1.6	5.0

(Source: http://www.buildenergy.co.uk/wp-content/uploads/2013/05/BDonlineBREEAMcost1.jpg [Date Accessed: 14th January 2105])

Again the information provided by BDonline relates to new build construction as there is limited information on the cost uplift for refurbishment projects undertaken in accordance with BREEAM, but the uplift in cost follows the same trend as the

Faithfull & Gould survey as they show a steady increase in the uplift in cost relating the an increase in the desired BREEAM rating.

The increased cost is not the only factor which is deemed to be an obstacle when refurbishing an older property. The same problem as identified for Building Control and Building Regulation approval surfaces again when discussing the accruing of sufficient BREEAM Credits in order to achieve the desired accreditation, where project teams are restricted by the existing building structure. Leonard (n.d) reported that the credits available were split in to the following weighted categories:

Table 3: BREEAM Weightings

Category	**Weighting**
Energy	19.0
Health & Wellbeing	15.0
Land use and ecology	10.0
Management	12.0
Materials	12.5
Pollution	10.0
Transport	8.0
Waste	7.5
Water	6.0

(Source: http://www.shine-network.org.uk/downloads/6_BRE.pdf [Date Accessed: 14th January 2015])

This table shows that the majority of Credits that would be available for a refurbishment project are very limited as the project is already restricted with regards to Land use and Ecology (to a certain extent), Materials and Transport which totals 30.5% of the total credits available. On top of this, it is likely that the project will be unable to achieve the full 19% of Credits available for the Energy category due to the restrictions on the existing building structure.

It can be seen from the introduction of sustainability assessment tools such as BREEAM that there is an additional cost with using these tools, not only the cost of the assessment itself, but also the additional cost associated with increasing sustainability targets. The tables shown above indicate the increased cost associated with the refurbishment works but do not reference the overall benefits which can be achieved from undertaking such projects. It also highlights the difficulty in obtaining the required number of credits which can be achieved due to the nature of refurbishment projects and the limitations with regards to the existing structure and building fabric.

2.2.3 Planning Policy

In addition to the development of Building Control, Building Regulations and Sustainability Assessment Tools such as BREEAM, there are also requirements outlined in Central and Local Government Planning Policies. In 2006, new guidelines were released by the Local Government Association (2006) who reported that 'the development planning system in the UK is in the process of major change. Arrangements established under the Town and Country Planning Act 1990 are being replaced through the Planning and Compulsory Purchase Act 2004, which for the first time shows the duty of planning authorities to sustainability.' This creates another set of guidelines which project teams must adopt and adhere to in the design and construction of any project whether it is a refurbishment project or a new build project, which creates a lot of confusion over which standards should be followed. This argument is supported by Prior & Williams (2008) who state that there are 'potential conflicts with delivery of other policy targets' and also state that there could be 'conflict between Building Regulations minimum standards requirements and requirement through LDF of high performance requirements' which is creating a significant grey area within the industry as teams are unsure on what targets they are supposed to be working towards.

2.3 Social

The previous section in this report refers to the efforts that must now be made by professionals in the industry due to the law and legislation that is being placed upon

the construction industry and outlines some of the barriers that they face in doing so, but there is a fear that the efforts they are making could end up as wasted attempts due to the lack of knowledge of the subject matter by the end users of the facilities that they are providing. The principles of sustainability as outlined by Hussin et al (2013) refer to the follow indicators for the Social Aspect:

- Enhance a participatory approach by involving stakeholders
- Promote public participate
- Promote the development of appropriate institutional frameworks
- Consider the influence on existing social framework
- Assess the impact on health and the quality of life

Brulle (2000) identifies 'there is no plausible theory of translation to an ecologically sustainable society' which is an argument that is supported by the study undertaken by MacNaghten & Jacobs (1997) who found that members of the public in Lancashire provided 'very little support for the ideas that sustainability would be achieved through government and business initiatives' and also indicated that the intervention by the government 'was generating environmental and social problems' rather than aiming to solve them. Macnaghten & Jacobs (1997) also go on to 'argue that this mistrust in government and the lack of a sense of individual agency has serious implications for the political salience of sustainable development' which supports the earlier statement by Brulle (2000) that indicates 'there is no connection between the theory and an ecologically sustainable society.'

With Macnaghten & Jacobs (1997) also stating that 'initiatives to generate public participation, particularly by providing information through sustainability indicators are unlikely to succeed' it would suggest that the efforts and resources that are being pumped in to the changes in the way in which projects are governed and controlled with regards to the impact to the environment are being wasted given that they end users of these facilities and services are not educated enough to realise the benefit of this. One way in which support can be gained by the UK Government and by industry professionals is to relate to the issues which end users are experiencing as

indicated by Platt & Rosenow (2014) who report that ‘consumers are looking to politicians for long-term protection from rising energy prices’ which has been regularly reported in the national news as an issue consumers are experiencing during times of austerity and Platt & Rosenow (2014) continue by indicating a potential solution to this is to create ‘a greater focus on supporting energy efficiency, rather than on cutting ambition to grab short-term savings, is the only way to achieve this and simultaneously to reduce carbon pollution in line with the UK’s legal obligations as indicated earlier in this report.

Platt & Rosenow’s comments are also supported by Halliday (2008) who states that ‘cost is the primary aspect of discussion on sustainable building. The perceived additional cost is sustainable building and the low perceived value of environmental and social quality have largely prevented positive action except by the most committed.’ This leaves the question on whether or not the full benefits of sustainability in construction and refurbishment is being realised by consumers, as there is a recurring theme in opinion that the primary obstacle preventing wholesale support of the initiative in relation to the Social aspect is to educate consumers that the initial cost can be far outweighed by the overall benefits, a thought which is echoed by Halliday (2008) ‘There is an underlying criticism of traditional economic systems, which put the financial bottom line before environmental protection or quality of life.’

Shah (2012) believes that the barriers to sustainable refurbishment with regards to the Social aspect can be easily overcome by working in partnership with local communities but also believes that the refurbishment option should be preferred as (Shah, 2012) ‘importantly, it also preserves the character of our towns and cities, making them interesting places in which to live.’ Shah also provides a list of areas which can be used as a checklist in an attempt to overcome the barriers and obstacles experienced in tackling the Social aspect of sustainable refurbishment, as follows:

Contribute to the local environment and to the local infrastructure to improve safety and provide opportunities for people to become healthier

- Work in partnership with local communities:
- Promote and support community activity and volunteering:
  - Share resources e.g. equipment, knowledge, skills, and buildings, with community, voluntary, educational or charitable groups
  - Take part in schemes that utilise the potential contribution to society of people who might otherwise not be employed
  - Contribute to the prosperity of the wider local, regional or national economy

These are additional barriers which must be tackled through careful Stakeholder Management in order to ensure public support for the project, especially as Public Consultation is now a statutory part of the Planning Application process.

2.4 Economical

As indicated in the section above, it is believed that the main barrier in the Social aspect is that it is not linked to the problems which consumers are experiencing at the moment, and the main one that is being reported and discussed at the moment is rising energy prices as indicated by Platt & Rosenow (2014) who report that 'consumers are looking to politicians for long-term protection from rising energy prices.' There is also a belief from consumers that the initial cost relating to sustainability is too expensive as confirmed by BRE Trust (2005) who stated 'One of the principal barriers to the wider adoption of more sustainable design and construction solutions is the perception that these incur substantial additional costs.'

The UK Government has attempted to address this issue by creating incentives such as the Green Deal, although this is only targeted at households at the moment the UK Government (2014) describe it as a method that 'helps you make energy-saving improvements to your home and find the best way to pay for them.' Although there

are no incentive schemes at the moment that allow businesses to use the facility to fund sustainable projects, this creates another obstacle as the business itself is left to fund the project without any help. As a result of this, there has been a shift in recent times from new build construction towards refurbishment as the cost of refurbishment is much lower than a new build option as is confirmed by Bon & Hutchinson (2000) 'A related issue is the shift from new construction to maintenance and repair construction in later stages of economic development' and Kohler (1999) echoes this possibility when he argues that `one of the prerequisites in industrial countries is that we should stop constructing additional new buildings, limiting ourselves to improving the existing stock'.

However, there are schemes available to support the funding of projects that are working towards Sustainability targets such as the Heritage Lottery Fund which the UK Government (2013) is describe as a scheme 'Using money raised through the National Lottery, the Heritage Lottery Fund (HLF) gives grants to sustain and transform the UK's heritage. Museums, parks, historic places, archaeology, natural environment and cultural traditions all receive investment' but any project needs to meet the qualifying criteria to receive any funding, which can be difficult in itself. Part of the Heritage Lottery Fund is the Townscape Heritage Initiative which is explained by Heritage Lottery Fund as a 'programme that helps communities regenerate deprived towns and cities across the UK by improving their built historic environment. Grants range from £100,000 to £2million' which are aimed at the regeneration and refurbishment of derived communities and buildings in need of repair, in order to preserve the character and history of towns and cities across the UK.

Continuing from the thoughts above, Yudelson (2009) states that 'the biggest barrier to green buildings is the perception that they cost more' which is a theory supported by Halliday (2008) who expands on this to say 'the overriding assumption is that sustainable building inevitably costs more or is less profitable.' A survey undertaken by Building Design & Construction in 2007 found that '89 per cent of respondents, which comprised experienced executives and participants in the building design and construction industry, believed that green buildings cost more, with 41 per cent

believing that they cost more than 10 per cent more.' So it is apparent that the perception that sustainable or green construction and refurbishment is not just a problem with the end users and consumer market, it is also an obstacle within the design and construction industry itself.

When looking at refurbishment projects, one of the main obstacles that have been identified by many people is the initial cost of undertaking the work, but it is important to look beyond the initial cost and to think more about the life cycle of the building. This is something which Shah (2012) elaborates on 'when assessing the commercial viability of a potential refurbishment project, it is important to understand the costs, risks and benefits to the investor over the projected holding period' but as is stated by Bull (2003) 'it is important to consider that it already has a life cycle cost whether it is rebuilt or is left as it is' and it is the comparison between the two which will show the real benefit of undertaking a sustainable refurbishment by provided a more efficient building which is cheaper to maintain. This highlights a lack of education on the topic and highlights yet another barrier to wide scale acceptance of Sustainable Refurbishment.

2.5 Summary

The Literature Review has highlighted that there is significant information available on the topic of Sustainable Refurbishment that identify a number of barriers and obstacles which related to the Principles of Sustainable and relate to Refurbishment projects. Opinion on the research topic is very much divided with arguments both for and against the acceptance and embracement of Sustainable Refurbishment.

The Environmental section of this study highlights the confusion that is created over the various targets which are set by different legislation, which are further confused by the introduction of sustainability assessment tools such as BREEAM. Further to this, it also shows that some of the legislation and guidance notes, are not adapted to allow for refurbishment projects, particularly when there is repeated reference of the thermal performance of buildings and the need to create a better performing

building, which often leads to substantial works to the building fabric and structure being undertaken, leading to significant additional cost. The surveys and studies undertaken by Faithful & Gould and BD Online seem to indicate there is a correlation to the opinions of some that state there is additional costs associated with Sustainable Refurbishment projects, however, these studies tend to relate to new build projects, so whilst there is an abundance of literature to support these statements, there appears to be a shortage in evidence to confirm this.

The Social section of the Literature Review highlights the challenges that are currently being experienced with the perception that some people have on Sustainable Refurbishment projects, especially those who feel that the additional cost associated with projects is seem as wasted money, or money that could be better spent elsewhere, but there are people that argue this such as Halliday who refers to the lack of knowledge on the full benefits of these projects provides a big challenge in the industry. There are also arguments in favour of Sustainable Refurbishment as stated by Shah who believes that refurbishment projects help to preserve character and historic merit in communities, but in doing this it also highlights a number of additional challenges with regards to stakeholder engagement and providing projects which also contribute to the prosperity of local communities which presents further barriers and obstacles.

The Economic section of the Literature Review again refers to a lack of education in the principles of sustainable refurbishment and the wider benefits that can achieved, such as the reduced life cycle cost of the building and the increased lifespan. These theories are supported by Yudelson, Halliday and Shah who comment on the importance of considering the life cycle cost and not just the initial development or project costs. The primary issue which is raised here has also been raised in the other sections and that is the additional cost associated with these projects. The Literature Review shows there are funding mechanisms to support the funding of these projects, but this also provides another challenge as it provides an additional set of legislation and requirements that must be achieved in order to secure funding. It also highlights the lack of support and drive that is being given by the Government

as they seek to achieve quick wins with their political policies by lowering energy prices in the short term rather than providing wholehearted support to more sustainable technologies which would provide longer term benefits and savings.

The Literature Review has identified a number of opinions in literature and statistics which support some of the statements that have been made by various authors, but there is also a lack of information to support the specific topic of refurbishment, as a lot of information tends to refer to new build projects. Therefore, it is important to seek further information, specifically in relation to refurbishment projects, which will be done by undertaking additional research as outlined in the following sections of this report.

CHAPTER 3 – RESEARCH METHODOLOGY

3.1 Introduction

The previous sections in the study offer an overview of the background to how Sustainability has developed and the impact which it has upon refurbishment projects, and the Literature Review assesses the barriers and obstacles that are experienced in industry from various authors perspectives, but in order for these findings to be qualified there needs to be further evidence to support this. Therefore, further investigation is required to supplement that which has already been undertaken to further support the ideas previously suggested and to also provide further topics for comment and discussion. It is therefore necessary to seek the opinions of additional people to see if their thoughts and opinions on Sustainable Refurbishment coincide or differ from those that have been quoted previously in this study.

This chapter will look at the potential options for undertaking further research, ensuring that this is undertaken in the context of the overall research topic and in line with the aims and objectives as set out earlier in Chapter 1 of this report.

3.2 Possible Research Options

The main options for selection when looking at the most appropriate research method is either a Qualitative approach, a Quantitative approach or a mixed method which uses elements of both approaches, and this section will compare all of the methods and will identify the strengths and weaknesses of each of these so that will allow me to choose the most appropriate method for further research.

3.2.1 Qualitative Approach

Qualitative Research is an approach that is explained by Denzin & Lincoln (2011) as a method that ‘is a situated activity that locates the observer in the world’ but they also continue to explain that one of the main resistances to using a Qualitative Approach is that ‘politicians and hard scientists call qualitative researchers

journalists or ‘soft’ scientists’ as their work is often termed as unscientific. Primarily, Qualitative Research is undertaken in the form of interviews with professionals in the topic area or by surveys being completed by the same professionals. Another limitation that is often quoted is that the results of the research are only the opinion of the person being interviewed or completing the survey rather than hard fact. One of the main strengths of Qualitative Research is that it has the ability to offer freedom to the person being interviewed and as is stated by Barton and Lazarsfeld (1969) ‘like the nets of deep-sea explorers, qualitative studies may pull up unexpected and striking things for us to gaze upon’ which often provides even more research material to focus on.

3.2.2 Quantitative Approach

Quantitative Research is a scientific approach by which numerical data is gathered and transformed in to statistics to display the results and attempt to identify patterns and common themes in the results. The biggest limitation of Quantitative Research as explained by Burns (2000) is ‘because humans are not only acted on by a plethora of environmental forces, but can interpret and respond to these forces in an active way. A classroom may seem in all respects to be a standard context for all who are there, yet some students may react differently from others to the teacher, to the content of the lesson, and to many other subtle elements impinging on them’ and it is this reason why it is difficult to collect accurate data using a Quantitative Research Method. Burns (2011) also explains that ‘the main strengths lie in precision and control’ but this is obviously dependant on whether or not it is possible to provide a definitive list of choices or answers in line with the research topic.

3.2.3 Mixed Method

It is also possible to undertake a mixed method approach to the additional research, whereby elements of both Qualitative and Quantitative Research Methods are adopted to form one approach. But it is argued by some that this is not the best approach to take as it tends to favour one approach and not the other as is suggested by Denzin & Lincoln (2011) who states that ‘the traditional mixed methods

movement takes qualitative methods out of their natural home' and therefore does not provide accurate results.

3.3 Identification of Chosen Method

Looking at the methods of research that are available to undertake further research, it is clear that the only choice to progress with so that it adheres to the Main Research Topic and complies with the Aims and Objectives as set out earlier in this report, that the only research method which can be adopted is a Qualitative Approach. One of the main objectives of this study is to gather the thoughts and opinions from both literature and industry professionals and this can only be done through semi-structured interviews, whereby a list of questions will be prepared which will act as a main agenda, but the interviewees will also be allowed a degree of freedom should they wish to expand on some of the answers they have given to some of the questions. If this is the case, additional questions will be asked for them to expand on these points, and similarly, if there is a requirement for more information based on something that was included in one of the answers to the interview questions, then additional questions will be included to extract this information.

3.3.1 Profile of Interviewees & Interview

The interviews will be undertaken with professionals within the design consultancy industry who have had relatively recent experience in dealing with Sustainable Refurbishment projects. The preferred option would be to interview the lead designer for these projects as they are the ones who are most likely to have encountered difficulties, barriers and obstacles whilst undertaking this role. King & Horrocks (2010) 'suggest that the following are defined characteristics of the generic qualitative interview:

- It is flexible and open-ended in style.
- It tends to focus on people's actual experiences more than general beliefs and opinions.

- The relationship between interviewer and interviewee is crucial to the method.'

In line with King & Horrocks beliefs as indicated above, the interviewees will be undertaken with individuals who have previously met or worked with the interviewer and whilst some of the questions will be structured around the findings of the literature review and existing information, the interview will focus more on the personal experiences of each person being interviewed.

3.3.2 Questionnaire Format

The interview will be a semi-structured interview with a list of questions which will act as an agenda for the discussions and these questions will be asked of all interviewees as this will allow for any trends or themes in answers to be identified that will allow for greater analysis of the answers given. The interviews will also be semi-structured so that further questions can be asked if necessary in order to gather further information on a topic or part of an answer that has been given. As is suggested by King & Horrocks (1990) and also referred to by Patton (1990) and Rubin & Rubin (1995) there are 'three main types of probe. Elaboration probes encourage the participant to keep talking in order to gather more detail on the topic at hand. Clarification probes seek explanation – either of specific words and phrases or more substantial sections of the account that the interviewer has not fully understood. Completion probes ask the interviewee to finish a story or explanation that seems to the interviewer to have broken off before its 'natural' end.' The main questions which will be used to facilitate the interview are as follows:

1. In your experience of project delivery, and in particular refurbishment projects, what has been the greatest challenge with regards to sustainability?
2. When considering the Principles of Sustainability as outlined by Hussin et al, are you in agreement that the areas to focus on are Social, Environmental and Economic impacts?
3. What are the main barriers and/or obstacles with regards to Social acceptance or challenge to sustainable refurbishment projects?

4. What are the main barriers and/or obstacles to minimising Environmental impact of a sustainable refurbishment project?
5. What is the biggest challenge in managing the Economic impact to sustainable refurbishment projects?

CHAPTER 4 – RESEARCH ANALYSIS

4.1 Introduction

The previous sections in this report have highlighted a number of barriers and obstacles to sustainable refurbishment as found in many sources of literature and journals, but it is also important to review projects which have recently been completed (in the past 5 years) to identify the barriers and obstacles which were encountered by professionals in the industry to compare against those which have been identified in the first part of this literature review. In order to fulfil this, three structured interviews will be undertaken with professional consultants who have dealt with sustainable refurbishment projects within the past 5 years.

The questions that will be put forward to these professionals have been derived by the contradictions in the above literature review and also will focus on gathering more information on areas for which there does not appear to be extensive research or literature available to review. The question has been structured to follow the structure of this report and will cover the principles of sustainability as identified by Hussin et al, namely the social, economic and environmental impact of sustainable refurbishment and how this has affected the project in either a positive or negative manner. The questions which will be asked of the professional consultants are as follows:

1. For the purposes of this interview, please can you introduce yourself and provide a brief overview of your experience within the design consultancy industry?
2. In your experience of project delivery, and in particular refurbishment projects, what has been the greatest challenge with regards to sustainability?
3. When considering the Principles of Sustainability as outlined by Hussin et al, are you in agreement that the areas to focus on are Social, Environmental and Economic impacts?
4. What are the main barriers and/or obstacles to minimising Environmental impact of a sustainable refurbishment project?
5. What are the main barriers and/or obstacles with regards to Social acceptance or challenge to sustainable refurbishment projects?

6. What is the biggest challenge in managing the Economic impact to sustainable refurbishment projects?

The interviews will be undertaken with former colleagues and contacts I have previously worked with in my position within the Management Consultant industry, and will be performed with the following persons:

- Duncan Hammond, Associate Architect at Capita Property and Infrastructure
- Ross Whittaker, Senior Architect at Day Architecture
- Natalie Sarabia-Johnston, Director at Architecture ID Limited

4.2 Interview with Duncan Hammond

Duncan is an Associate Architect at Capita Property and Infrastructure with over 15 years' experience in project delivery within the design consultancy industry, and in that time has worked on a number of refurbishment projects which had a number of targets and objectives with regards to achieving sustainable project delivery. The project which Duncan referred to most often was the refurbishment of a vacant Council building located in Blackburn Town Centre, which he explained was a difficult undertaking given some of the requirements of the Council.

He stated that a minimum of 8m2 was required per person as outlined as best practice within Building Regulations which created a number of challenges as the existing structure of the building meant that a large number of alterations needed to be made to the internal layout of the building in order for this to be achieved. There were also issues with the size of the existing windows in the building as they were not sufficiently sized to allow for enough daylight to penetrate in to the building to achieve Building Control sign-off or BREEAM accreditation. In addition to this, Duncan reported that a number of surveys were undertaken that identified the building fabric was not in a sufficient condition to achieve the required thermal performance and that this would need to be completely replaced. These points support the statement which was made by Watson (2009) who stated the Building

Regulations ‘can cause significant problems and a study carried out by Building Magazine found that the main areas, indicated by construction professionals were exclusion of moisture, thermal insulation, sound insulation, means of escape, fire protection and accessibility. These can add significant costs to the project’ and Mansfield (2009) who agrees that ‘the restraints of the structure of the existing buildings, refurbishment/maintenance projects may not be able to achieve a concise sustainable design, and the fabric of older buildings can also be energy and resource inefficient, therefore affecting its ability to compete sustainably with new build development.’

Duncan explained that as a result of the findings of the issues with the building fabric and the fact that the internal layout was not able to allow for future proofing of the building in case there was a need to change the use of the building at any point in the future, the decision was taken by the Project Team and the Council to completely strip the building back to the structural frame rather than keep any of the existing features.

When I spoke with Duncan on the Social impacts of the project, he explained that the decision that was taken to completely strip the existing building back to its structural frame caused a number of issues in the local community as the building in its previous state was a prominent building in the community and had a lot of history surrounding it due to its previous uses, so the Project Team and the Council encountered a lot of opposition to the proposals to provide a modern facility in its place. This supports the argument put forward by (Shah, 2012) who states ‘importantly, it also preserves the character of our towns and cities, making them interesting places in which to live.’

Another point that Duncan mentioned is that the refurbishment or change of use of a building can have a positive or detrimental impact on communities as it can either increase or decrease footfall in areas or can attract a different demographic of

people to an areas, which is something that does not seem to have been considered or mentioned in the research that has been undertaken.

Duncan also commented further on the Economic impact that sustainability can have on a project, but also commented on how this can affect the local area both in a positive and negative manner. Duncan highlighted the additional cost that was associated with the project we were discussing, especially with the surveys that were undertaken to assess the building condition but predominantly with the demolition work that was required to strip the building back to its structural frame, which despite providing a greater opportunity to alter the existing layout and improve the performance of the building, resulted in significant additional cost to the original project estimate meaning that the overall cost to undertake the project was almost twice as much as originally estimated.

However, Duncan did also make comment that the life-cycle cost of the building had been dramatically reduced due to the work that had been completed in refurbishing the property given that the building was previously vacant, supporting the statement made by Bull (2003) who states ‘it is important to consider that it already has a life cycle cost whether it is rebuilt or is left as it is’.

Also on the Economic impact, Duncan commented that funding for refurbishment projects often provide a number of opportunities as there are initiative such as the Townscape Heritage Initiative that provide funding for projects to help support project delivery, but also commented that this can have further Environmental issues as it provides an additional set of criteria which must be achieved in addition to Building Regulations, Planning Policy and BREEAM Accreditation if it is being sought.

4.3 Interview with Ross Whittaker

Ross is a Senior Architect at Day Architecture and has over 15 years’ experience working in architecture included 5 years working with Norman Foster in his London

practice. Ross did not refer to an individual project that he wished to focus on, but did give his views and shared his experiences from a number of refurbishment projects that included a number of targets with regards to sustainability.

Ross believes that the greatest challenge that he faces when looking at refurbishment projects is the limitations of the existing fabric, something which was also mentioned by Duncan and is echoed by many in literature such as Watson, Mansfield and Shah. He stated that in his experience, he has come across issues such as staircases not being wide enough to accommodate the new use of the building, issues with building fabric not being efficient enough and issues with the new layout, such as not being able to include raised floors and in some cases suspended ceilings as the existing structure does not allow for this. At this point, Ross began to talk about the increased risk that is encountered when taking on a refurbishment projects due to the uncertainty in what may be unearthed during the project and the importance of ensuring that adequate allowances are made to try and cover the potential occurrence of risk. This highlights the importance of surveys being undertaken as we also mentioned by Duncan but also coincides with what is stated by Shah (2012) who comments that 'when assessing the commercial viability of a potential refurbishment project, it is important to understand the costs, risks and benefits to the investor over the projected holding period'.

When Ross was asked whether he was in agreement with Hussin et al on the Principles of Sustainability, he commented that it was important not to look at each of the Environmental, Social and Economic impacts individually, but rather to consider Sustainability as a whole otherwise the benefits in each of the categories will just be competing against each other and will ultimately cancel each out. Ross continued by saying that there are clearly aspects of Sustainability that will have an impact on the project or environment that will fall in to one of the categories listed by Hussin et al, but there is a wider picture that needs to be assessed which should also include for design/aesthetics, functionality and perception of the project.

Ross feels that some of the design/aesthetic freedom of architecture is lost on refurbishment projects as there is a requirement to maintain the existing building fabric where possible and to replace with like for like items where it is required. Although he does also argue that buildings should represent the time in which they are created and that a balance should be sought between the history of the building and the age in which it is being refurbished, this is an argument which is also made by Lee (2011) who states that 'Architecture, more than any other cultural medium, is an expression of its time. Once a new building has been erected, it is likely to last for generations; the sites we know today bear the hallmarks of the past in which they were created. If architecture is consciously or unconsciously a receptacle and expression of the culture of a society at a particular time, then each new concept or design for a building holds both its present and its futurepast'.

He also commented that the functionality of the building should be an important consideration in ensuring that the building is appropriate for its intended use whilst also providing an element of future proofing too. This is something that was also commented on by Duncan and has been identified as one of the main barriers and obstacles in sustainable refurbishment. The other point which Ross has suggested needs to be considered as part of Sustainable Refurbishment is perception, which he explained to me as the perception which refurbishing a building rather than demolishing an existing building, perhaps with some architectural or historical merit and building something new in its place. This correlates with the comments made by (Shah, 2012) who highlights how refurbishment projects 'preserves the character of our towns and cities, making them interesting places in which to live.'

On discussing the Environmental impact on Sustainable Refurbishment projects, Ross talked of the difficulties he had experienced with working towards BREEAM Accreditation and in achieving Building Control sign-off due to the strict requirements on thermal performance and maximising natural daylight in to buildings due to the existing building fabric providing a number of limitations on what work could be undertaken. The comments made by Ross were almost identical to the comments made by Duncan and coincide with the findings of the literature review which

highlighted the restrictions of the existing building fabric as one of the main barriers and obstacles when undertaking Sustainable Refurbishment projects.

Another point of worth that was made by Ross was in relation to the life-cycle cost of the building, as he pointed out that it is not only the maintenance to consider as part of the life-cycle cost of the building, but also the costs associated with the end of the buildings life once it has been refurbished. He points out that whilst you are extending the life of the building by undertaking the refurbishment, there is still a cost associated with whatever work is required at the end of the refurbished buildings life, whether that be another refurbishment project or the ultimate demolition of the building. Ross also pointed out the risk that the maintenance and any future work to the building would carry and points out the importance of ensuring there is an allowance set aside for these occurrences, this is not something which has been referenced in any depth in the current research material that is available.

4.4 Interview with Natalie Sarabia-Johnson

Natalie is a Director at Architecture ID Limited with 20 years' experience working in architecture and interior design. Similar to Ross, Natalie did not speak about a particular project during the interview but did refer to a number of occasions where she has dealt with refurbishment projects that have had a number of Sustainability targets to achieve.

Natalie was asked what she felt the biggest challenge was in undertaking a Sustainable Refurbishment project to which she answered that the main challenge was funding the project due to the increased costs of refurbishment projects. Natalie's opinion was that many Clients are put off refurbishment projects and tend to prefer new build options instead as they provide a blank canvas with regards to materials and technologies so are easier to achieve the targets that are set out in Building Regulations, Planning Policy, BREEAM, Code for Sustainable Homes etc. This statement by Natalie is as per the statement made by BRE Trust (2005) who stated 'one of the principal barriers to the wider adoption of more sustainable design

and construction solutions is the perception that these incur substantial additional costs'.

On the Environmental aspect of Sustainable Refurbishment, Natalie continued on from the point raised above relating to the cost of Sustainable Refurbishment by stating that it is often the case that renewable resources and materials are often limited which can provide problems when there are upgrades to the building fabric required and that the increased cost of the renewable resources and materials often make refurbishment projects unfeasible to deliver. Natalie did also comment at this point that there are funding initiatives available such as the Heritage Lottery Fund and in particular the Townscape Initiative Fund which can aid Clients and Project Teams in delivery such projects which supports the regeneration of towns and cities across the UK by providing grant funding, as is confirmed by the Heritage Lottery Fund who explain the scheme as a 'programme helps communities regenerate deprived towns and cities across the UK by improving their built historic environment. Grants range from £100,000 to £2million'.

Natalie also commented that the refurbishment of buildings helps to retain the local cultural values of communities which can have a positive impact when it comes to the Social aspect of Sustainability as it tends to lead to the retention of recognisable and landmark buildings which gains public support for the scheme. This is a comment which Duncan and Ross have also made during their interviews and is also referenced in numerous literatures such as Shah, Halliday and Platt & Rosenow. She also commented that the refurbishment of a building dramatically improves the environment within the building as it promotes the use of cleaner technologies and more efficient mechanical and electrical technologies, which coincides with the comments made by Halliday (2008) who states that 'there is an underlying criticism of traditional economic systems, which put the financial bottom line before environmental protection or quality of life.'

Natalie had mentioned early on in the interview that she felt the Economic barriers and obstacles to project delivery was the increased cost associated with sustainable technologies and methods, but also made comments later in the interview about the almost certainty that all mechanical and electrical equipment is usually required to be stripped out of the building in full and completely replaced which leads to increased project costs. Natalie also commented on the effect that projects can have on their surrounding communities by either increasing the number of people visiting an area, but also made comment that this can also be a detrimental impact if there is a change of use to the building which means that there is now less people visiting an area or a community as a result off the project being completed. This is something which was also commented on by Duncan and Ross and has been referenced several times in literature and professional opinion.

CHAPTER 5 – CONCLUSION

5.1 Introduction

The aim of this study was to provide an overview to individuals that are impacted or influenced by the obstacles which are faced when looking at the refurbishment of buildings by provided an oversight of all the issues which can impact upon a project rather than just focussing on one area. In order for this report to provide sufficient information to satisfy the primary intention of this report, it is important to concentrate on some specific areas which are the most likely areas to produce the misconceptions by which many people often jump to before hearing all of the details.

The main research topic of this study was chosen as follows:

- The Barriers and Obstacles faced when dealing with the Sustainable Refurbishment of Properties

In order to achieve the main research topic of this study, the following objectives were set:

- What are the Principles of Sustainability?
- What barriers and obstacles do the Principles of Sustainability present to Sustainable Refurbishment?
- How can these barriers and obstacles be overcome?

These Aims and Objectives have been successfully achieved from this study and the main barriers and obstacles which are faced when undertaking a project of this manner have been included in the Literature Review and in the majority of cases have been supported by the interviews with industry professionals. The remainder of this section compares the findings from each section of this report and discusses the correlations and discrepancies.

5.2 Findings from the Literature Review

The Principles of Sustainability as outlined by Hussin et al are included early in this document where he broke this down in to Environmental, Social and Economic aspects. All other relevant text which has been referenced in this study and all the literature that has been read and assessed as part of putting this report together all seem to coincide with what Hussin et al had found. When each of these aspects is looked at individually, it is clear to see that there is a divided opinion on the topic.

There can be argument that Sustainable Development is an item high on the agenda since the initiative was first introduced following the Earth Summit meeting in Rio and with the construction industry being a large offender in the war against climate change, there is little argument in literature that the construction industry needs to make more of an effort to tackle emissions. Governing Bodies all around the world have introduced more stringent guidelines and in particular in the UK, the amendments to Building Regulations, Planning Policy and the introduction of assessment tools such as BREEAM and LEED are the first step towards limiting and controlling this, however, there is significant literature as can be seen in this study that shows this is creating more barriers and obstacles to Sustainable Refurbishment projects rather than aiding it. The statistics by Xing et al (2011) included in this study show that we currently occupy 80% of the buildings which we will occupy in 2050, but there is evidence as shown by Watson, Mansfield and Burton that indicate the requirements included within the new legislation and policies is proving to make refurbishment projects more and more difficult to implement.

The introduction of BREEAM has provided another challenge as it also sets out further criteria which must be achieved in order to achieve the desired accreditation for which so many organisations want to be perceived as green companies. As referred to earlier in this study, the cost of undertaking these assessments is significant, but the survey completed by Faithful & Gould also show that the viability of Sustainable Refurbishment projects is also thrown in to question due to the significant additional building cost to implement more Sustainable technologies. Also, as the assessment tools specific to refurbishment were only released and put

in to practice in 2014, projects had previously been measured against criteria which had been developed and geared towards new build projects rather than refurbishment projects which has also presented additional challenges as the criteria that was required to be achieved was more in line with new build projects.

With regards to the Social aspect of Sustainable Refurbishment, the survey undertaken by MacNaughten & Jacobs which found there is very little support from the public to the initiative which the UK Government are trying to introduce. It is clear to see from the literature review that there is a distinct lack of knowledge on the subject and as Halliday reports, there tends to be too much of a focus on the initial cost of implementing Sustainable Systems and Technologies. It is also clear to see that one of the main barriers to the adoption of Sustainable concepts is the UK Governments lack of faith in Sustainable Technologies as they seek quick wins by dropping energy prices rather than putting their support wholeheartedly in to the adoption of a more Sustainable environment. This is something that Platt & Rosenow highlight in literature that one of the main barriers to full scale acceptance is the political merry-go-round which seeks quick wins in order to secure support to their political campaigns.

When looking at the Economic aspect of Sustainable Refurbishment, there can be little argument against the statistics which show that the more Sustainable you try and make a building, the more money that is going to cost. The figure previously quoted by Faithful & Gould and the statistics shown in Chapter 2 clearly support this. However, the comments that highlight one of the main barriers to Economic acceptance is those from BRE Trust (2005) who stated ‘One of the principal barriers to the wider adoption of more sustainable design and construction solutions is the perception that these incur substantial additional costs.’ Whilst it is hard to disagree that there is an additional cost related with greener buildings, this again shows a lack of understanding and knowledge of the topic as a whole. Chapter 3 clearly states the initiatives that are available to support Sustainable Refurbishment schemes which would help with any funding issues, but there is again a lack of understanding and knowledge of the whole life costs of Sustainability as is supported by Shah.

5.3 Findings of the Interview Process

The interviews which were undertaken with industry professionals provided a good insight in to what are perceived to be the barriers and obstacles to those who are working in the industry. In the main the thoughts and opinions that were put forward from the interviewees seemed to support the statements that had been made in literature and what had been found in previous research.

There was however, a number of occasions were discrepancies were found, as was the case when Ross disagreed with the Principles of Sustainability as quoted by Hussin et al as Ross was of the opinion that the Environmental, Social and Economic aspects were just a narrow minded view of the issue as a whole. Ross particularly made comment on the design/aesthetic impact that Sustainable Refurbishment projects can have on projects as it limits what work can be undertaken on such projects, but the fact that this limits the work that is done seems to support the statements made by (Shah, 2012) who states 'importantly, it also preserves the character of our towns and cities, making them interesting places in which to live.'

There were also comments from Natalie which seem to echo the thoughts of many that the increased cost associated with Sustainable Refurbishment projects makes them a less viable option. This seems to coincide with the common misconception which is referred to by Halliday (2008) who states that 'the overriding assumption is that sustainable building inevitably costs more or is less profitable' and ignores benefits which are achieved to the life cycle cost of the building following the alterations, as is indicated by Bull (2003) who points out 'it is important to consider that it already has a life cycle cost whether it is rebuilt or is left as it is'

5.4 Overall Summary

When looking at the responses to the interview questions, it is clear to see there is a correlation between the findings of the literature review and the thoughts and opinions of industry professionals. There have been a number of barriers and obstacles which have been consistent through both parts of this study, namely the restrictions and limitations relating to legislation such as Building Regulations, Planning Policy, BREEAM, Code for Sustainable Homes etc. and the constraints these place on projects, in particular the additional cost with the guidelines that state the required thermal performance of the building.

There is also the issue of the cost of implementation which is arguably the biggest obstacle to wide spread acceptance. This report shows that there is not currently enough education on the impact that carbon emissions has on the planet, and there is not enough education on the life cycle cost implications that Sustainable Refurbishment can have for buildings of all types, shapes and sizes. The savings which can be made over the whole life of the building appear not to be being communicated effectively enough and this is proving to be the biggest challenge in acceptance.

5.5 Limitations of Study

Whilst this report has achieved the Aims and Objectives set out at the start of this report as it has identified the main barriers and obstacles to Sustainable Refurbishment, the arguments which have been put forward regarding the increased cost of Sustainable Refurbishment could have been better supported with the inclusion of a number of case study projects to provide further evidence.

The findings of this study could also have been further supported if more interviews with industry professionals had taken place. The results would also have been more comprehensive if they had taken place with professionals from different industries rather than just with professionals in the architecture industry as that may have provided further topics for discussion.

5.6 Recommendations for Further Study

It is clear to see from this study that there is a lack of education reaching end users of buildings so there is an area of study to be undertaken to see how the benefits of adopting Sustainable Refurbishment and Sustainable Development are being communicated both within the industry to professionals and to member of the public, as there appears to be a large disconnect between the theory and the acceptance.

This report has referred to the Code for Sustainable Homes and has referred to the Green Deal, both of which are only available for domestic properties, and whilst there has been talk within the UK Government of rolling out more schemes which related to buildings rather than just for domestic properties, therefore a study could be undertaken on how this would impact upon the construction industry and what the impacts would be in terms of

The interviews undertaken with industry professionals also touches lightly on the impact that Sustainable Refurbishment can have on communities as a whole rather than just on the building itself. The Sustainable Refurbishment project can form the centrepiece of the regeneration of communities, towns and cities, so further study could be undertaken on the impact these projects can have on communities, towns and cities as a whole.

APPENDIX A – TRANSCRIPT OF INTERVIEWS

This section contains transcripts of the interviews that were undertaken with industry professionals as part of the additional research which was undertaken in Chapter 4 of this study.

Some inaccuracies may be present, however, the best efforts have been made to provide an accurate reflection of the discussions which took place and any responses referred to in Chapter 4 are taken from the text shown below:

INTERVIEW WITH DUNCAN HAMMOND

1. *For the purposes of this interview, please can you introduce yourself and provide a brief overview of your experience within the design consultancy industry?*

My name is Duncan Hammond and I am currently employed as an Associate Architect at Capita Property & Infrastructure. I have worked here for 15 years now after securing a position as a Graduate and have worked my way up the hierarchy to now be responsible for my own team of 4 architects and 2 architectural technicians. During my time in the industry I have worked on a wide variety of projects in various industries and would like to think that during that time I have worked on some significant landmark projects during that time.

2. *In your experience of project delivery, and in particular refurbishment projects, what has been the greatest challenge with regards to sustainability?*

I don't think it is possible to name just one thing as sustainability provides so many challenges in itself.

Sub question: Please can you share some of those challenges?

I would say that compliance with Building Regulations is big thing which presents a number of challenges, in particular the guidelines over working space (8m2) per person and the issues over items such as natural daylight provide the biggest challenges not only to me but also to the Quantity Survey as he is the one who needs to keep the budget down despite me telling them that there are so many items which need to be replaced in full. The existing structure gives you so many issues that carry challenge and risk, as it is often the case that you need to start ripping out all of the internal partitions so that you can provide enough working space and also to allow for the natural daylight to penetrate far enough through the building to achieve Building Regulations and BREEAM accreditation. Most of the time though it means that new windows are needed so that they are bigger to allow for enough light which also provides challenges with tying in to the existing structure and also challenges to the project budget.

The building fabric itself also provides a huge risk item, for example, I worked on a refurbishment project here in Blackburn that started off as a re-clad of a building with some changes to the internal layout, but after we did some point cloud surveys of the external facades and did some structural surveys internally, we soon found that it wasn't going to be as simple as we first though and ended up completely stripping the building back to its structural frame and basically starting again so that we could achieve the layout requirements and also the requirements of Part L of Building Regulations, otherwise we wouldn't have received sign-off on the building.

Sub question: I assume that this involved significant additional costs to the project?

It did cost significantly more, around twice as much as we originally estimated the project at, which gave us some interesting discussions with the Council as they were the client, but we were also able to provide reassurances that the building would have a much longer lifespan by stripping it back to the frame, would be much more sustainable with regards to thermal performance and also provided an element of flexibility over the future use of the building, something which was important to them as they were undergoing job cuts at the time and were unsure over what the future use of the building may be.

3. *When considering the Principles of Sustainability as outlined by Hussin et al, are you in agreement that the areas to focus on are Social, Environmental and Economic impacts?*

It seems a perfectly reasonable way of categorising them and I am sure that it covers everything that is expected of us as designers and builders. I notice that it takes in to account the wider impact of projects too which is very important as this is often a contentious point when we do things like public consultation or stakeholder engagement sessions.

4. *What are the main barriers and/or obstacles to minimising Environmental impact of a sustainable refurbishment project?*

Going back to the points that I made earlier on the challenges we often experience with Building Regulations, Planning Policy and BREEAM, they are the biggest barriers to the environmental aspects. In particular the issues that can be found with the existing building fabric because even if you do surveys at the start, there is still a huge risk that something can be found later in the project that will come back to bite you and that is quite often the case in this industry.

5. *What are the main barriers and/or obstacles with regards to Social acceptance or challenge to sustainable refurbishment projects?*

If I can refer back to the vacant Council building which we refurbished a couple of years ago, when we came to the decision that we needed to strip it back to the structural frame to basically start again we received a number of complaints and demonstrations against the project proposals as the building had stood there for over 50 years and had quite a lot of history surrounding it and its previous uses. There was actually a campaign a number of years ago by local residents for the Council to buy the building to protect it from demolition, which they did, so when we were looking to completely change the façade of the building, we had a number of negative comments during consultation and also had challenges to the planning application which we submitted as local historians believed that we were damaging the history of the community and were sending out the wrong message. That is the reason we only stripped the building back to its structural frame and didn't demolish it completely, as we and the Council were trying to gain back some of the support we had lost.

Sub question: Following the negative comments you received at consultation and the demonstrations you had against your proposals, did you change anything within the project scope to try and address this?

The only thing we changed in the project scope was to include a community room which the Council committed to letting out free of charge to local societies and ground such as Rainbow Guides etc. This helped to increase support a little bit and we also produced an article for the local newspaper to highlight how we were taking a vacant building, which had been the site of some antisocial behaviour and bringing it back in to use which would increase footfall in the area and provide a positive effect on the local community and would also boost the economy in that specific area as there would be so many more people passing through due to the new use of the building and would also prevent antisocial behaviour around the building as bringing

the building back in to use provides an element of security in itself due to the number of people that will be in and around the building. The principles that you showed me (Hussin et al Principles of Sustainability) refer to the wider impact of projects so it is important to note things like this.

6. *What is the biggest challenge in managing the Economic impact to sustainable refurbishment projects?*

If I am to use the same example project again, I suppose the greatest challenge is managing the budget. The surveys we did aren't cheap themselves, but the resulting demolition work which was required was a huge cost that we had not accounted for on this project, especially as some of the demolition work had to be done by hand so that we didn't damage the steel frame. Ultimately this provided us with better opportunities for rebuilding and made it a lot easier for us to achieve Building Regulations and BREEAM status as we could pick and choose the materials which would give us the best performance.

It is also important to note that the building was costing the Council money even when it was vacant, so we have now provided a newer building which can be fully utilised and is now cheaper to run because of the sustainable technology and better thermal performance of the building. We did try to gain funding for the project from the Heritage Lottery Fund's Townscape Heritage Fund but we didn't meet with the required criteria because we were changing too much of the existing materials, but this is a good initiative to support refurbishment projects.

Sub question: What kind of impact do you feel projects can have on communities, towns and cities?

Going back to the earlier point on increasing footfall in the area immediately surrounding the building, this automatically boosts the economy for the neighbouring businesses as there are so many more people passing through the area.

INTERVIEW WITH ROSS WHITTAKER

1. *For the purposes of this interview, please can you introduce yourself and provide a brief overview of your experience within the design consultancy industry?*

I am Ross Whittaker and I am a Senior Architect at Day Architecture where I have been working for the past 18 months. Previous to that I was working for Foster + Partners based in their London office where I worked for 13 years before deciding to move back up closer to my parents.

Sub question: Do you have experience of undertaking refurbishment projects with a large focus on sustainability?

Yes I have worked on a number of projects, mainly down in London, which have had differing levels of BREEAM targets where I have been the lead designer.

2. *In your experience of project delivery, and in particular refurbishment projects, what has been the greatest challenge with regards to sustainability?*

The fact that you are limited by what is already there is the biggest problem. You are limited to using the existing building fabric in most cases, because if you are not going to do that then you may as well just demolish it and build something else. I have had numerous occasions where the existing staircase is not wide enough to accommodate the new use of the building because of changes in legislation, and a

lot of the buildings we used to refurbish when I was in London were office buildings, and we used to have lots of problems with trying to install suspended ceilings and floors so that cabling and ducting can be hidden from view, but the existing structure doesn't allow for this, as you cannot gain the required clearances you need for headroom.

Other items which often cause problems are what you might find in the walls, floors or ceilings when you are taking them out, because depending on the age of the building there can be issues with asbestos and structural cracking which you cannot see by just going inside the building and having a look around. So it is important to make sure that the project has a risk contingency pot which is sufficient enough to deal with any problems that may occur.

3. *When considering the Principles of Sustainability as outlined by Hussin et al, are you in agreement that the areas to focus on are Social, Environmental and Economic impacts?*

I agree to a certain extent, but I don't think they are categories which should be looked at individually because if you do that then you will just end up cancelling advantages in one area out with the disadvantages in another area. Sustainability needs to be reviewed as one item and while I agree that there are specific items which will fall categories shown on this list (Hussin et al Principles of Sustainability) there are also things missing from the list too.

Sub question: Please can you elaborate on what you feel is missing?

There is no mention of design or aesthetics and there is no mention of functionality of the building.

Sub question: Can you clarify what you mean by design and aesthetics?

A lot of the freedom that we have as designers is lost when it comes to refurbishment projects as we are pressured in to maintaining the existing fabric of the building wherever possible especially the windows and brickwork as that is what gives the building its character and date stamp and whilst I agree that it is important to maintain the age and character of buildings as they have been built at a particular time with a particular style which was relevant to the industry at that time, it is also important to bring elements of the current day in to projects to show how they have evolved.

Sub question: Can you also clarify what you mean by functionality of the building?

Quite often, I have been asked to work on refurbishment projects where it feels like the building has been chosen for its availability rather than it being the correct building for its proposed function. The building has to be appropriate for what you are intending to do or else it is just going to cause more problems than solutions. You don't also just look at the use of the building as soon as it is to be opened, you also have to consider the full life time of the building and what its potential future use could be to provide a degree of flexibility in the design.

4. *What are the main barriers and/or obstacles to minimising Environmental impact of a sustainable refurbishment project?*

The most difficult thing is having to work towards the requirements for building performance and sustainability targets like BREEAM.

Sub question: Can you explain which elements of Building Regulations and BREEAM you feel provides the most barriers and obstacles?

There are the ones I mentioned earlier like the staircase widths and means of escape but other items relating to the building façade like windows not being large enough for daylight to penetrate deep enough in to the building and the thermal performance of the building façade as it is likely that it was constructed to different Building Regulation targets so would not be as efficient as what is required today.

It is the same thing with BREEAM as a lot of the credits that are available relate to energy performance and if you are restricted to using the existing building fabric, then it can be very difficult to achieve the required levels of performance.

5. *What are the main barriers and/or obstacles with regards to Social acceptance or challenge to sustainable refurbishment projects?*

The main barrier to Social acceptance of a project is people's attitudes towards refurbishment projects because some people just see a refurbishment project as a cheap and easy way of extending the life of a building by a few more years rather than providing proper investment in an area by providing new buildings and attracting bigger and better clientele. But there is also the counter argument which many people have against this where people appreciate that the refurbishment of buildings, and in particular older buildings as many see this as restoring a building or a community to its former glory and maintaining the historic merit of a building and its surrounding area.

It tends to be one of those situations where you can't win either way as you will please one group of people but anger another group of people at the same time, so it is difficult to have full scale acceptance of a building because of this.

6. *What is the biggest challenge in managing the Economic impact to sustainable refurbishment projects?*

I think the biggest challenge is with clients and end users not understanding that the upfront investment provides a much more sustainable building that will end up being a lot cheaper to operate. There is a reluctance to spend the additional cost to do the refurbishment work, but if people were to look at the life cycle cost of the building as a whole, they would see that it is a much more viable option to spend more money upfront as they will reap the rewards when it comes to maintenance costs.

Technically speaking, the client or building operator should set a pot of money to one side for any scheduled maintenance or future work that may be required but not many people do this and it ends up being a struggle to gather the money together to do any work required. There is also the costs associated with the end of the building life which need to be considered, whether that is another refurbishment project or demolition, these also need to be factored in to the life cycle cost and accounted for when looking at the feasibility of refurbishment projects.

INTERVIEW WITH NATALIE SARABIA-JOHNSON

1. *For the purposes of this interview, please can you introduce yourself and provide a brief overview of your experience within the design consultancy industry?*

Hello, I am Natalie and I am a Director of Architecture ID Limited where I have been working for the past 3 years, although I have over 20 years' experience working in architecture.

Sub question: Have you had much experience in dealing with Sustainable Refurbishment projects?

Yes I have plenty of experience in dealing with refurbishment projects and I have been through the BREEAM process numerous times on projects.

2. *In your experience of project delivery, and in particular refurbishment projects, what has been the greatest challenge with regards to sustainability?*

The main issue I have experienced and this has been the case on a number of projects I have worked on, has been funding the projects due to the increased cost that is associated with refurbishment projects in the first instance, but also the additional cost associated with the sustainability element of it too.

That is why I feel so many people tend to go with the new build option instead, as it is not only better value for the money you are spending, but it also gives you a blank canvas on which to design your building but also gives you a lot more options when it comes to ensuring that sustainable materials and technologies are selected and installed. This then means that any problems you may have had with adhering to legislation and achieved BREEAM targets is made so much easier.

3. *When considering the Principles of Sustainability as outlined by Hussin et al, are you in agreement that the areas to focus on are Social, Environmental and Economic impacts?*

Yes they are the basis on which we form some of our initial feasibility studies, and we use those as the headings in most of our Design & Access Statements when working through planning applications and bid submissions.

Sub question: Is there anything that you feel should be added to the list of principles?

I can't think of anything that I would add to it as it seems a pretty comprehensive list (Hussin et al Principles of Sustainability).

4. *What are the main barriers and/or obstacles to minimising Environmental impact of a sustainable refurbishment project?*

I have had a few occasions where we have struggled to find like for like replacement of materials so that it is still in keeping with the buildings original features.

Sub question: Please can you clarify what you mean by struggling to find like for like materials?

With some buildings there can be a particular style of window that is relevant to a building and is a feature that needs to be retained, but under Building Regulations or BREEAM they would not achieve the required level of performance and therefore need to be replaced as part of the project, but the same style of window is not always available as a like for like replacement and even if it is available, you have to pay a premium for this resulting in additional cost and ultimately making the project unfeasible to deliver.

There are funding initiatives available such as the Heritage Lottery Fund which can help to fund things like this but you need to qualify for funding which can be difficult as you are competing against a lot of other projects and is also time consuming as

there is only one submission a year which can have an impact on the project programme.

5. *What are the main barriers and/or obstacles with regards to Social acceptance or challenge to sustainable refurbishment projects?*

I think the greatest challenge is providing not only a building but a facility that compliments the surrounding area. There is a big focus now on contributing to local communities, town and cities so a big focus needs to be placed on how projects can provide a positive effect on this. It is also important to consider the impact that projects can have on surrounding areas as it may be that the refurbishment of a building can either bring more or less people to an area, particularly if there is a change of use of a building so it is important to understand the wider impacts of the project as it may be a positive or negative impact that it has on the community.

6. *What is the biggest challenge in managing the Economic impact to sustainable refurbishment projects?*

As I said at the start of the interview, the main impact economically is the increased project cost associated with refurbishment projects, especially when they have sustainability targets too. There is quite often the requirement to completely strip out all of the mechanical and electrical equipment due to the age of it and also because it is not efficient enough and this adds further additional cost to the project.

But the economic impact is not just the cost of the project in terms of delivering it, but also the impact it can have on a community. This can work in a positive or detrimental manner depending on the situation, as it is possible to increase the number of people passing through a community through the change of use of a building in to something like a supermarket which is likely to attract more people, but this can also work in a reverse manner where a supermarket could be refurbished in

to a warehouse or storage units which would mean that the number of people passing through an area decreases significantly so the impact on the local community is huge. There is planning policy in place to address issues like this, but it is not always considered by many.

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