INVESTIGATION IN TO THE IMPACTS OF REFURBISHMENT PROJECTS ON BUSINESS OPERATIONS OF OFFICE BUILDINGS IN SRI LANKA

Jagoda Arachchige Don Sahanjalee Jagodaarachchi

(158813 F)

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Department of Building Economics

University of Moratuwa
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DECLARATION

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ABSTRACT

Investigation in to the impacts of refurbishment projects on business operations of office buildings in Sri Lanka

Building refurbishment is the performance of re-styling or modifying an existing building. Buildings will not necessarily need a full refurbishment very often, but it is beneficial to carry out some work often, either to the interior or exterior. Nowadays refurbishments are common due to many reasons.

Discontinuing business operations for the reason of refurbishment is not a good proposal. Hence, business owners tend to start new refurbishment projects while normal operation is continuing. Nevertheless, it should be with the minimal effect to the current operation. Thus, this study was aimed at investigating the impacts of refurbishment projects on business operations of Sri Lankan office buildings.

This research problem was approached through case studies of two organisations, which have undertaken refurbishment projects while the business operations are in process. Semi-structured interviews were conducted with ten participants which included managers and occupants for data collection. The data was analysed using manual content analysis and cross-case analysis.

The findings revealed that refurbishment projects have a significant impact on business operations such as separate accesses, noise, dust, reduced facilities, loss of productivity, risk of health and safety, additional financial requirements etc. Business operations could be categorized according to various business processes such as Marketing, Customer services, Logistics, Operations, Financial planning, Human Resources etc. Moreover, the results disclosed that Managers in selected cases have taken actions like health and safety measures, rescheduling, backup services, temporary workstations etc. to minimize those impacts. Based on those findings, a set of strategies were developed. The proposed strategies indicate the effective practices that could be used to minimize the impacts of refurbishment projects on business operations. The findings of this research will be useful for the industry practitioners for better management of business operations during refurbishment projects.

Keywords: *Refurbishment projects, Impacts, Business operations, Office buildings.*

DEDICATION

I DEDICATE THIS PIECE OF WORK TO MY BELOVED FAMILY.....

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ABREVIATIONS

AFM	-	Assistant Facilities Manager
AOM	-	Assistant Operations Manager
CF	-	Complexity Factors
CIRIA	-	Construction Industry Research and Information Association
CSF	-	Critical Success Factors
FM	-	Facilities Manager
LCA	-	Life Cycle Assessment
OM	-	Operations Manager
UK	-	United Kingdom
USA	-	United States of America

1.0 INTRODUCTION

1.1 Background

Building construction works can be categorized as either new built or other types of activities such as refurbishment, upgrading, renovation, repair, expansion or maintenance (Olanrewaju & Abdul-Aziz, 2014). New build is totally a new project where as the refurbishment is works done to an existing building. According to Premachandra, Francis, and Dewagoda, (2019) refurbishment includes variety of works initiating from decoration to conversion. Thus, refurbishments could be referred to several terms such as renovations / retrofit / conversion / replacement (Mike & Alison, 2011; Premachandra et al.; Yacob, Saruwona, & Ismail, 2018). Construction Industry Research and Information Association (CIRIA, 1994) mentioned that refurbishment could be even to accommodate new technology by the owner not only something associated with deterioration which is common.

Ekanayake, Sandanayake, and Ramachandra, (2018) acknowledged the refurbishment as an avenue to deliver profound solutions to overcome the issues of a building by upgrading, altering, extending, renovating and improving facilities and prolonging building lifespan. Nevertheless, during the life cycle of a building, undergo several refurbishments. However, the main purpose of building refurbishment is to enhance the building performance and to overcome the building deterioration over time (CIRIA, 1994). Buildings are being physically deteriorated over time while subjecting to different forms of obsolescence (Babangida, 2014). However to prolong the life of the buildings, maintenance and refurbishment works are done to the existing buildings which are getting old (Ali, 2009).

Liang, Shen, and Guo (2015) contended that, refurbishment existing buildings is considered as one of the key to achieve energy reduction targets and Ma, Cooper, Daly, and Ledo, (2012) further added sustainability in the built environment as another reason for refurbish of buildings. Jensen et al. (2013) added, modernising of buildings and enabling energy saving measures as further benefits of refurbishment. Further,

refurbished buildings produce fewer carbon emissions than new constructions (Egbu, Marino, Anumba, Gottfried, & Neale, 2002). Thus, to enhance energy efficiency and reducing adverse environmental impacts, refurbishment improves the noise insulation conditions, external appearance, user comfort and assures healthy working and living environment, whilst prolonging the building life span and increasing the value (Egbu et al.; Mickaityte, Zavadskas, Kaklauskas, & Tupenaite, 2008). Even though there is a large number of benefits that can be achieved through refurbishment projects, these projects are arduous to manage (Egbu et al.; Ekanayake, et al., 2018; Fasna & Gunatilake, 2019) especially in the design and construction phase (Premachandra et al., 2019).

Design phase of a refurbishment projects is often problematic due to the fact that the parties involved take individual decisions instead of taking collaborative decisions. Studies have identified that the lack of knowledge, experience and best-practice examples as barriers in refurbishment projects (Konstantinou & Knaack, 2011). Ekanayake et al. (2018) further confirmed that, the refurbishment projects are uncertain and sophisticated with many challenges.

Moreover, the unavailability of proper strategies have worsen the good practice of refurbishment projects and also the business mostly. Thus, there is a need of investigating of refurbishment for forecasting, planning and risk analysis (Egbu, 1995). Even though Bystedt et al. (2016) argued that the refurbishment process must be conducted with limited disturbance to the users/tenants in the operation. The effectiveness of the building refurbishment depends on many factors such as costs, annual fuel savings, the time taken the retrofit to complete, the tentative payback period, harm to human health caused by the materials used, aesthetics, maintenance, functionality, comfort, sound reduction and longevity of structures (Zavadskas, Raslanas, & Kaklauskas, 2008; Ekanayake, et al., 2018).

While the existing buildings turn older, the maintenance and refurbishment work need to be carried out in order to extend the life of the building (Bystedt et al., 2016; Konstantinou & Knaack, 2011; Liang et al., 2015). In Sri Lankan context, the

construction industry is in par with the conventional methods of construction as followed by many developing countries. This was further highlighted by many researchers in the construction lexicon. Yet, recent Sri Lankan researchers (Fasna & Gunatilake, 2019; Ekanayake et al., 2018) have confirmed that, the refurbishment sector will expand in Sri Lanka mainly due to business expansions, increasing number of ageing buildings which were constructed during colonial or post world war periods, limited vacant land for new development and technological change and the boom of Information Communication Technology. Hence, the refurbishment sector is likely to become an important segment in the Sri Lankan construction industry. However, the researchers (Fasna & Gunatilake, 2019; Fasna & Gunatilake, 2018; Ekanayake et al., 2018) further confirmed that, many industries paying their attention to refurbish the building and thus, the area is remain vigilant to many research areas.

Even though Ekanayake et al. (2018) specified that, the refurbishment projects in Sri Lanka are dominated by hotel buildings compared to other types of buildings, Fasna and Gunatilake (2018) argued that there is a growing trend to refurbish the office buildings in Sri Lanka comparing to other types of buildings. Therefore, considering the office buildings, it is evident that upgrading the existing buildings is common in order to provide a better working environment for the occupants. Meantime, business owners try to maintain a minimum impact on business operation for anything as they have invested a large sum of money on business process (Premachandra et al., 2019). The duration of refurbishment may depend upon the type and magnitude of the project. However, it is not possible to cease the business operation due to refurbishment in buildings. Nevertheless, still the refurbishment projects faced an unavoidable circumstances when managing the office environment during the business operations (Zavadskas et al., 2008; Liang et al., 2015; Liang et al., 2016). Thus, there is a need to investigate the impact of the refurbishment projects to business operations. Accordingly, a need arise for identification of impacts and propose strategies through proper research study to overcome the impact of the refurbishment projects to business operations.

1.2 Research Problem

Nowadays refurbishments are common than ever before. This is due to the high and growing expectation of building occupants. Employees expect not only a comfortable workstation but also a pleasant environment particularly in high remunerated working sectors. Thus, business owners tend to refurbish their properties due to various reasons such as expansions, merges, up gradations (CIRIA, 1994; Fasna & Gunatilake, 2019; Ekanayake et al., 2018). Considering the office buildings, it is evident that upgrading the existing office buildings is common in order to provide a better working environment for the occupants. Terminating business operations for the refurbishment is not acceptable as it will directly affect the turnover of the organisation. Hence, business owners tend to start new projects while normal operation is continuing. Therefore, it is very important to plan the refurbishment project without compromising the business function. Yet, the refurbishment should be with the minimal effect to the operation. Egbu (1995) argued that understanding of management task face by refurbishment managers is necessary and Kemmer and Koskela (2012) indicated the scarcity of literature on management of refurbishment projects. Moreover, Ekanayake et al. (2018) discussed about managing refurbishment of hotel buildings in Sri Lanka, there is lack of research in the area of managing the refurbishment of office buildings in Sri Lanka. Further, several problems are encountered in refurbishment projects together business operations and also the industry lacks in-depth investigations on strategies to minimise such problems associated (Premachandra et al., 2019). Accordingly, a need arises for identification of impact of refurbishment projects to business operations through a proper research study. Thus, this research attempts to investigate the impact of refurbishment project on business operations in Sri Lankan office buildings.

1.3 Aim

The Aim of this research is to investigate the impacts of refurbishment projects on business operations in office buildings in Sri Lanka.

1.4 Objectives

1. To review refurbishment projects, their associated challenges and their impacts on business operations
2. To identify the impacts of refurbishment projects on business operations in office buildings in Sri Lanka
3. To propose strategies to minimize the impacts of refurbishment projects on business operations in office buildings in Sri Lanka

1.5 Research Methodology

A comprehensive literature survey was carried out to understand the refurbishment project management and to understand the business operation of office building, with reference to books, journals, electronic sources and other publications. By adopting the case study approach, empirical study was conducted among Two (2) cases as office buildings which have gone through refurbishment projects within last Five (5) years. The data collection methods adopted within the case were semi structured face-to-face interviews to explore the issues related with refurbishment projects and their impact on business operation and the strategies to minimise the impact. The semi-structured interviews were carried out among Three (3) managers and Two (2) occupants from each organisation. Cross case analysis was carried out using manual content analysis. This research process clearly drafted in Figure 1.1.

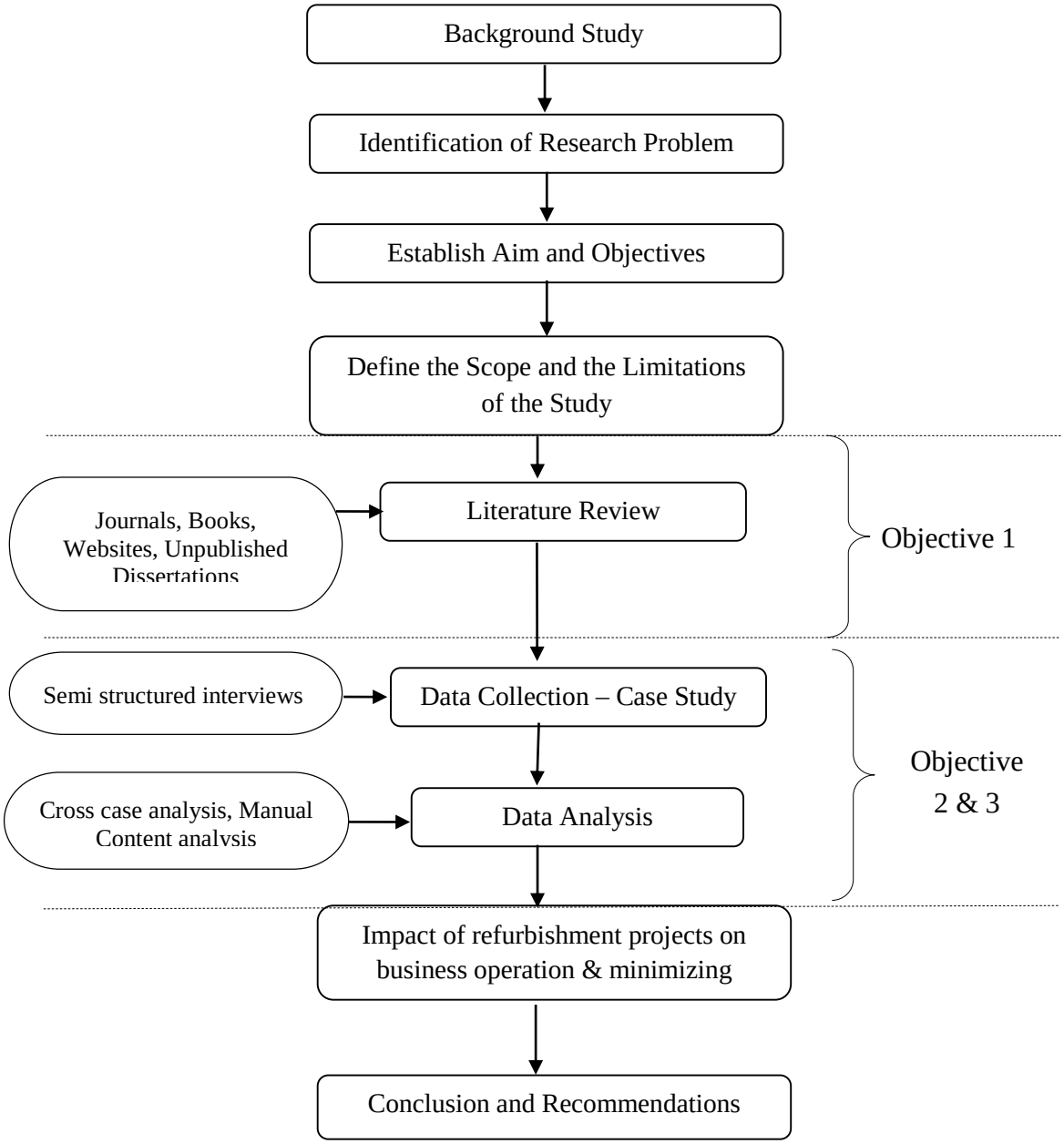

Figure 1.1 : Research Process

1.6 Scope and Limitation

This study was limited to the Sri Lankan context only. The research focused on office buildings in Colombo that have been refurbished recently for the purpose of identifying how it affected the occupied buildings' operation during refurbishment project. The researcher able to select only Two (2) cases due to many reasons such as resistant of sharing information by managers, how old the project was etc.

1.7 Chapter Breakdown

The following Figure 1.2 presents the chapter breakdown for the research study. This consist of Five Chapters starting from Introduction, Literature Review, Research Methodology, Research Findings and Conclusions and Recommendations.

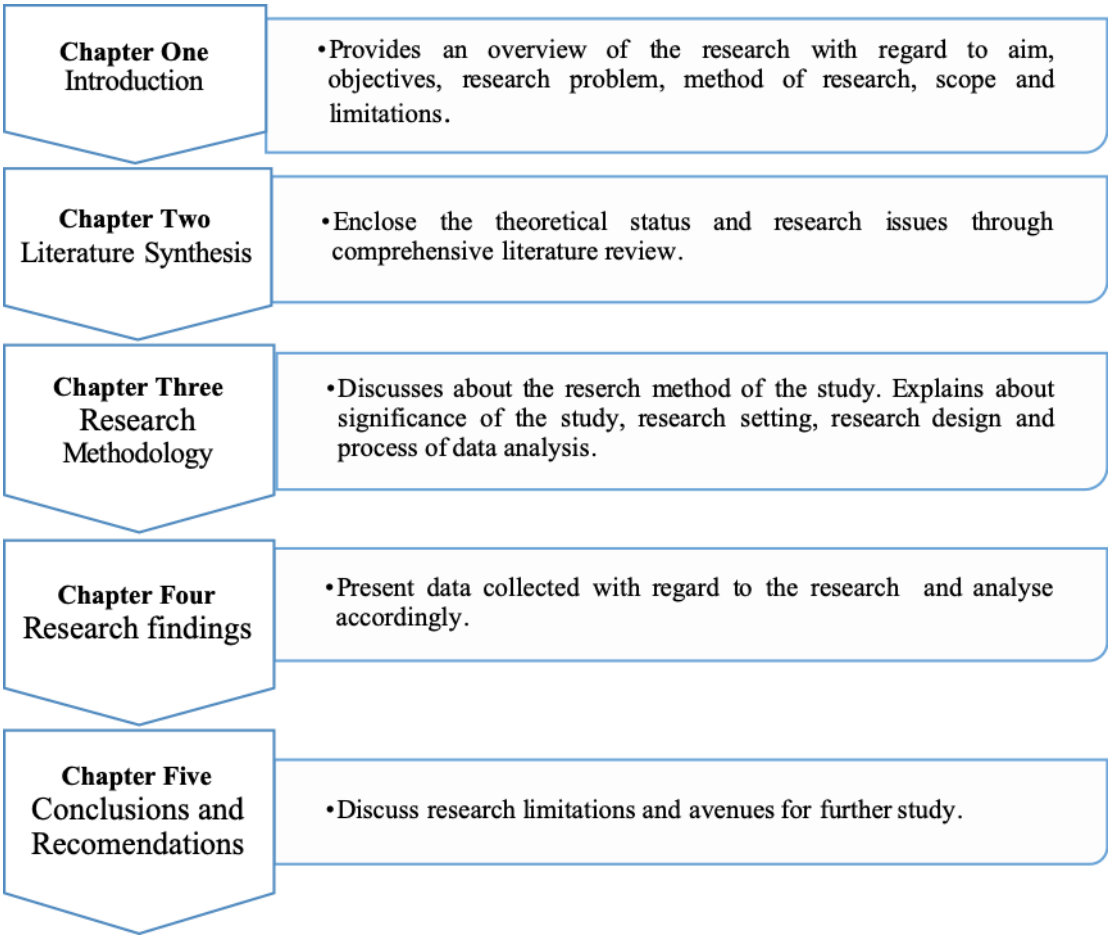

Figure 1.2 : Chapter Breakdown

2.0 LITERATURE REVIEW

2.1 Introduction

This chapter contains the Literature review of the research where it brings the findings of research already undertaken. Initially, it describes about refurbishment, how refurbishment differs from a new build, scales of refurbishment projects challenges of refurbishment projects and business operations are also described to gather appropriate literature. Finally, this chapter introduces impact of refurbishment projects on Business Operations. Hence Objective 1 of this research is achieved in this Chapter.

2.2 Refurbishment

With the passage of time, deterioration in the performance of the building is certain. However, deterioration could be reduced by maintenance while repairs taking place from time to time (CIRIA, 1994). Major repairs or refurbishments bring the intended performance of the building back. Refurbishment must be carried out when performance tend to reduce (CIRIA).

As per Fawette and Palmer (2004), most refurbishment projects are concerning about a building with good condition, but owners want a refurbishment to accommodate new technology or a change in business operation. When completed the project, it should considerably increase the performance or provide new performance level required.

A broad definition of the term refurbishment could be inferred as “works undertaken to existing buildings” in more expand way “extending the useful life of existing buildings through the adaptation of their basic forms to provide a new or updated version of the original structure” (Mike & Alison, 2011, p.21) Different terms for this refurbishment has led to some confusions (Fasna & Gunatilake, 2019)

According to Mike and Alison (2011) terms that are often used instead of or in conjunction with refurbishment are conversion, renovation and retrofit.

A Conversion implies that the main use of the building will be altered, but that the main structure will not be changed

A Renovation and restoration imply that the work consists of renewal and repair only, and that the works carried out will simply address dilapidations to avoid further degradation of the building

A Retrofit essentially means fitting new and more modern systems into an existing building. The term is commonly associated with building services because a common phenomenon in buildings is that the life of the building structure and fabric will be considerably longer than that of the installed services. (p.22)

Kolokotsa, Diakaki, Grigoroudis, Stavrakakis, and Kalaitzakis, (2009) have defined both terms ‘refurbishment’ and ‘retrofit’ clearly. Explaining that they expressed that term ‘refurbishment’ indicates the necessary modifications needed to return a building to its original state, while ‘retrofit’ contains the necessary actions that will improve the building’s energy and/or environmental performance.

Fasna and Gunatilake (2019) stated further different terms have been used by several authors such as, existing building commissioning, shallow retrofits, retro commissioning, lite retrofits, and quick wins where all are interchangeable with one another. Standard or staged retrofits, medium scale retrofits, partial retrofits, rational paybacks, and conventional retrofits are ascertained as the substitutable to medium retrofits according to Fasna and Gunatilake (2019). Further, whole building retrofit, comprehensive scale retrofits, integrated design, substantial retrofits, comprehensive retrofits, deep measures and deep energy retrofits are found to be identical with deep retrofits are identified by them. Raimondia, Santuccib, Bevilacquaa, and Corsoa, (2016) stated retrofit activities have increased steadily during last Two (2) decades.

Further, Ekanayake et al. (2018) and Vilches, Garcia-Martinez, and Sanchez-Montanes (2016) also stressed that the terminology “refurbishment”, encompasses renovation, retrofitting, modifications, repairing, upgrading, restoration and extension

to the existing building to deliver the ultimate anticipated functionality of the building with enhanced performance. However, the term refurbishment will be used in this research as it is the most commonly used term as well as it is the most widespread term to be used for such similar words.

2.2.1 Refurbishment vs new builds

CIRIA (1994) distinguished refurbishment projects from new build as below.

- The approach to design must focus on detection and analysis
- Discovery of unforeseen conditions is possible for almost all the construction period
- Data on the building may be difficult to locate and may require several different types of investigation
- Interaction between the old building, temporary works, existing services, and new construction will affect construction methods, planning and programming throughout most of the construction period, as well interaction with neighboring assets, processes, activities or people
- The existing building will be in many cases be occupied, and if occupancy continues during refurbishment this will almost certainly constrain options of planning and programming, increase the costs and lengthen the time required
- Statutory restraints such as planning legislation, building regulations and fire regulations often have special application to old buildings and materials and existing assets
- Hazardous and unpleasant materials and conditions, such as asbestos, infestation, are liable to be encountered requiring special measures and making the project an unattractive one for operatives
- Temporary weather protection may be required, sometimes involving the construction of a temporary roof structure
- Some designers and contractors appear to give a low status to refurbishment work compared with new build. This can be reflected in the quality of staff and in the attitude of organizations to refurbishment projects. (p.7)

According to Vilches et al. (2016), in general, the life time of the building is extended and the intensity of use is also improved when the refurbishment is carried out. Additionally environmental impact of existing buildings could be reduced by the refurbishments. Gaspar and Santos (2015) in the study carried out regarding refurbishment and new build, addressed that refurbishing existing buildings produce less environmental impact than constructing new buildings. Further, explored refurbishment as a more sustainable approach compared to new construction as it represented less material and embodied energy consumption, and less demolition waste.

2.2.2 Magnitude of Refurbishment projects

Refurbishment is most of the time economical but depends on scenario. The amount of work that will involve in refurbishment will be different in each projects and will depend on several factors which are shown below (Mike & Alison, 2011 p.31).

- The condition of the existing structure
- The shape and size of the existing structure
- The location of the structure
- The amount of work required to the existing structure to enable compliance with current building regulations
- Whether the building is listed either wholly or partly
- Adequate funding being available
- Whether the work can be carried out safely

In the context of a refurbishment project, the very first phase is the most important as it does an overall diagnosis which has to systematically include the whole building and lead to a definition of the refurbishment project (Genre, Flourentzos & Stockli, 2000). Fawette and Palmer (2004) distinguish simple refurbishment projects such as renewing finishes, coat of paint and new carpeting with larger refurbishment project like structural changes and renewal of building services. According to Mike and Alison (2011), refurbishment can be categorized as below,

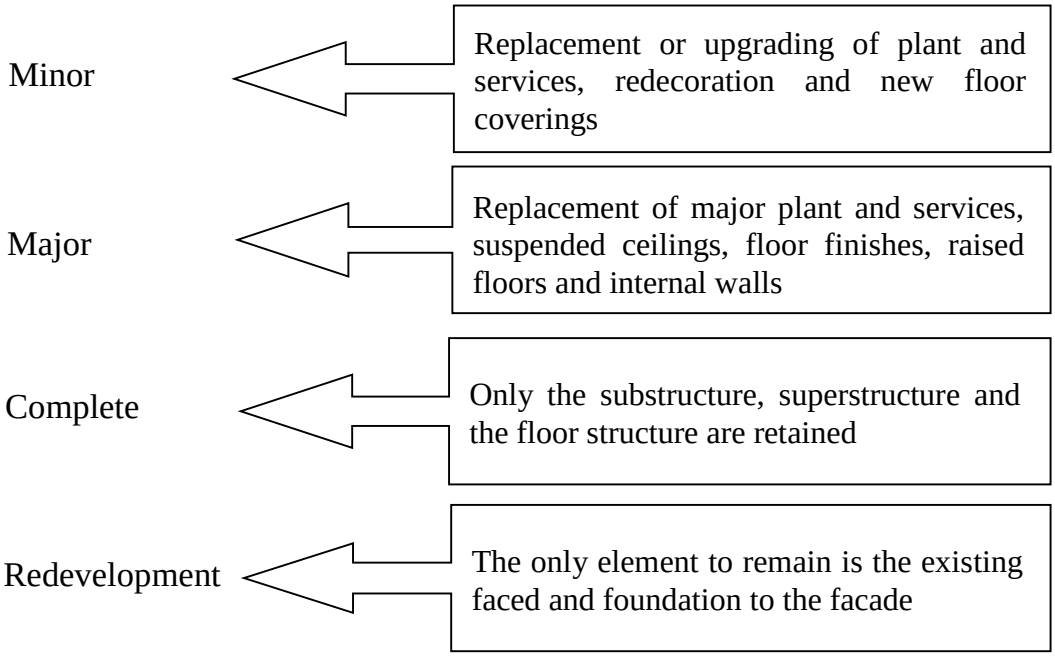

Figure 2.1 : Refurbishment schemes

Above Figure 2.1 explains Minor, Major, Complete and Redevelopment as Refurbishment schemes. Minor contains Replacement or upgrading of plant and services, redecoration and new floor coverings of a building. Yet, Major describes Replacement of major plant and services, suspended ceilings, floor finishes, raised floors and internal walls of a building. Also Complete is only the substructure, superstructure and the floor structure are retained balance get changed. Final and the largest scheme is Redevelopment in which only element to remain is the existing faced and foundation to the façade. In Redevelopment occupancy is impossible accordingly all occupants have to vacate the building. However, magnitude of the refurbishment project could be decided based on many factors as stated in this section.

2.2.3 Refurbishment of office buildings

Nowadays, a large number of buildings are being refurbished for various reasons, especially to increase indoor comfort conditions (air quality, visual environment, etc.), to reduce energy consumption, to counteract a poor state of repair, or to redefine the floor layout (Raimondia et al., 2016). Yang and Lim (2007) express why office building refurbishment has grown compared to demolish or new build as below.

- User requirements have changed considerably during the last decade in terms of office equipment, communications, automation, quality of use and comfort
- The past property crisis, which has affected many European countries, has amplified the stock of not rented office spaces: buildings that do not offer amenities for comfort and flexibility, are difficult to sell or rent
- Costs of retrofitting a building is half to one third of the cost of demolition and reconstruction

Further, Yang and Lim (2007) highlighted office buildings are classified amongst the buildings with highest energy consumption which has directed for refurbishment.

2.3 Refurbishment project management

Uncertainty is inherent in refurbishment projects due to unclear or evolving client requirements, the continuing finding of the building's physical condition during the work or the relations of the two (Yacob et al., 2018). CIRIA (1994) also highlighted that such work sometimes have to be carried out during building operation in restricted areas even.

The management more difficult of refurbishment work is complex, highly specialized, risky and uncertain therefore manage compared to new build (Kemmer & Koskela, 2012). In spite of the benefits presented by refurbishment, these refurbishment projects are complicated and uncertain to manage (Egbu et al., 2002).

However, management of refurbishment projects has not been addressed properly. Studies on practices applied to the management of this complex environment are scarce (Kemmer & Koskela, 2012). According to Rahmat, Torrance, and Young, (1998) refurbishment projects are characterized by high degrees of complexity and uncertainty as in the majority of refurbishment projects, the work commenced on site with incomplete design.

Further, Rahmat et al. (1998) in their study has found that 50% of refurbishment projects commenced work on site with only 60% of design being complete thus client have to be actively involved in decision making during the stage of construction.

People engaged in refurbishment projects can be categorized as follows (Fawcett & Palmer, 2004)

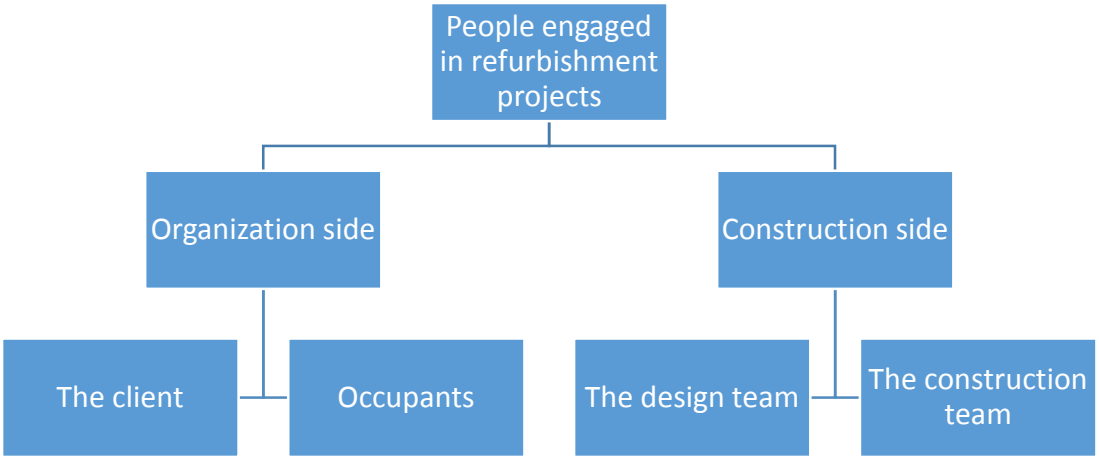

Figure 2.2 : People engaged in refurbishment projects

People engaged in refurbishment projects can be divided in to Two (02) basically. As above Figure 2.2 describes they are Organisation side and Construction side. From Organisation side, the Client and Occupants are there whereas from Construction side the Design team and the Construction team are there. Success of the refurbishment project depends on those people as well (Fawcett & Palmer, 2004). Since, both parties have their own responsibilities to make the project successful. If the either side did not support the other side, both will fail to achieve their own targets.

However, building refurbishment mainly concerns about physical and functional building components including various topics such as energy consumption, pollutant emission, and operational waste reduction as well as air quality and spatial comfort (Genre et al., 2000). Further, tight time and cost control of the project become

impossible in refurbishment projects if occupied (Mike & Alison, 2011) which mostly affect to the Organisation side compared to construction side in Figure 2.2. Further, Bruce, Zuo, Rameezdeen and Pullen, (2015) explained regarding the research of office retrofits, to achieve the maximum benefit from a retrofitting project need to approach in a systematic manner which finally benefitted to owner. And only owner or the client have invested on this.

As illustrate in CIRIA (1994), various types of refurbishment works, types of funding and types of building are on upper side and issues related to refurbishment are on bottom side.

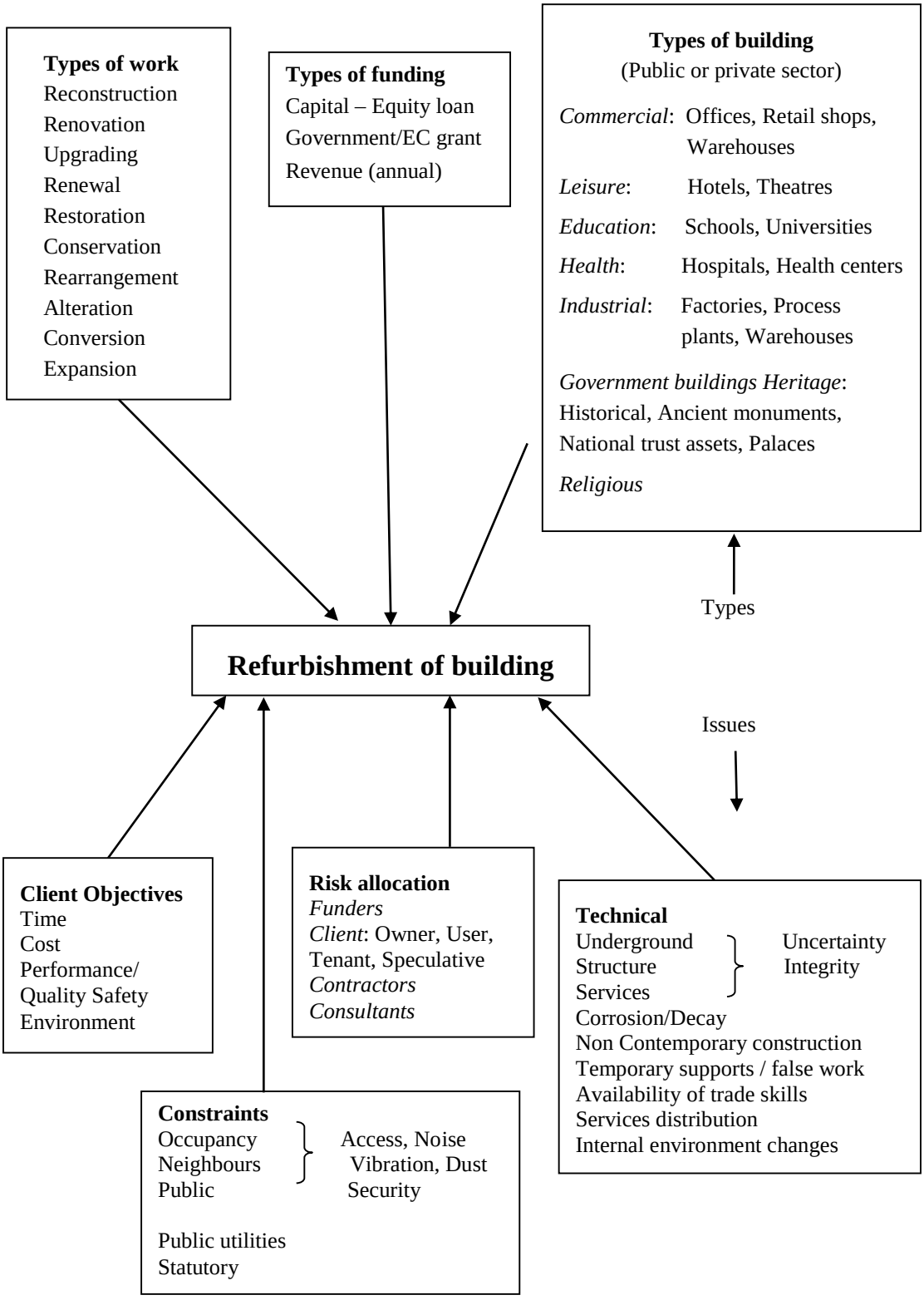

Figure 2.3 : Classification of refurbishment project management

Source: CIRIA (1994)

Above Figure 2.3 Classification of refurbishment project management's upper part contains types of refurbishments in Three (03) categories. First category is Type of work. Hence has to select which type of work is this. And also it depends on the type of funding. Further it could be categorized as types of buildings base on their job. Other below part is the issues associated with the client's objectives, risk allocation, technical and constraints. However all of these come on the head of the organisation as they are the ultimate affecting party.

2.3.1 Challenges of Refurbishment Projects

Regardless of the benefits and importance, the refurbishment process is full of challenges (Chileshe, Khatib, & Farah, 2013). Following Table 1.1 presents the challenges of refurbishment projects as identified by Ekanayake et al. (2018) for the Sri Lankan context.

Table 1.1 : Challenges of refurbishment projects

Challenges resulted by the existing building	Challenges resulted by the project team
▪ Time overruns due to refining designs to cater unanticipated building conditions ▪ Limitations to introduce changes to the existing building structures ▪ Lack of as built drawings and site information ▪ Lack of secured places in the site to store construction equipment ▪ Existing buildings are subjected to legislative constraints ▪ The difficulty of reusing existing material and equipment due to damages and non-suitability	▪ Budget overruns due to superficial designs and construction activities ▪ Interruptions to building occupants due to simultaneous operations ▪ Lack of coordination, communication of project participants and lack of supervision ▪ Insufficient safety precautions on site ▪ Lack of standardised testing and commissioning of the building services and equipment ▪ Traditional procurement method restrained the contractor's input to design alternatives ▪ Inadequate identification of client's requirements ▪ Absence of a proper isolation strategy to systematically assign the areas in the building for the refurbishment, while the other areas are in operation simultaneously

Source: Ekanayake et al. (2018)

According to the above Table 1, the refurbishment projects faced numerous challenges which will ultimately affect largely to day today business operations of the office building. Majority of challenges are resulted by project team. In the study of hotel refurbishment project Premachandra et al. (2019) found that percentage of services work and obstruction by occupancy are the topmost challenging problems. Further, in

Figure 2.3 challenges have classified to Client objectives such as time, cost, performance, safety and environment, secondly risk allocation consist of funders, client, contractor and consultants. Thirdly technical challenges such as underground, structure, services, corrosion, non contemporary construction, temporary supports / false work, availability of trade skills, services distribution and internal environment changes. Finally other constraints such as access, noice, vibration, dust and security to occupancy, neighbours and public (CIRIA, 1994).

Thus, there is a need to look into detail about the specific problems of refurbishment projects in office buildings in Sri Lanka in order to minimize the impact to the business operations from refurbishment projects.

2.3.2 Factors affecting the success of refurbishment project

Figure 2.4 describes the relationship between critical success factors (CSFs) and complexity factors (CFs) which were used during managing the project in relation to delivering success on project performance. This conceptual framework has been developed by Ishak, Ibrahim, and Azizan, (2017) in their study.

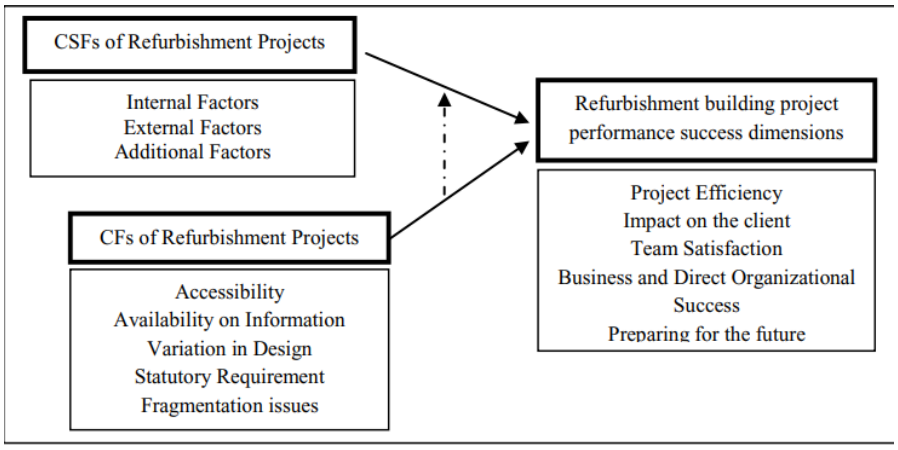

Figure 2.4: Framework for factors affecting success of refurbishment project

Source : Ishak et al. (2017)

Above framework summarized CSF such as Internal Factors, External Factors and Additional Factors and CF such as Accessibility, Availability on Information, Variation in design, Statutory requirement and Fragmentation issues. Those affect performance of refurbishment project in several success dimensions such as Project Efficiency, Impact on the client, Team satisfaction, Business and Direct Organisational success and Preparing for the future.

2.4 Business Operations

Term Business operation depends and cannot be specifically explained. In Citibank small business information guide (2006) they have categorized business operation as below.

1. Business Legal Structure
2. Business Physical Operation
3. Business regulations and guidelines
4. Business financial operations
5. Day-today operations management

Business legal structure is an essential part of the organisation in order to fulfil their legal requirements whereas the physical operation is the production or the service that particular organisation is producing. Regulations and guidelines are internal rules or procedures which should be followed by the employees. Financial operations are major type of operation within the organisation. In addition day to day operations are also a significant operation consisting minor operations. Umit and Muir (1997) also identified business operations as Marketing, Customer services, Logistics, Financial planning and Analysis, Financial Accounting and Data Administration. Further, Sharon (2008) stated core business processes and supporting business operations are as below in any firm.

Core business processes

Procurement, logistics, and distribution

Operations.

Product or service development.

Marketing, sales, and customer accounts.

Customer and aftersales services.

Supporting business operations

General management and firm infrastructure.

Human resource management

Technology and process development.

Those routine operations could be affected by the new refurbishment project at any time at any level. Hence, managing both business operations and refurbishment project parallel is challenging.

2.5 Impact of Refurbishment projects on Business Operations

Premachandra et al. (2019) in their study stated that procurement phase, execution / construction phase, which are considered to constitute a higher effect on successful completion of refurbishment project thus much attention is needed on them. Building refurbishment mainly concerns about physical and functional building components, but should also take into account various topics such as energy consumption, pollutant emission, and operational waste reduction as well as air quality and spatial comfort (Genre et al., 2000). Thus, the refurbishment of buildings has a high capability of affecting the environmental impacts and global objectives of climate change mitigation Vilches et al. (2016).

The sequence of refurbishment work is difficult to determine when the ownership of building needs to be shared by the occupants with project team which creates difficulties especially during design development whereby the designers need to decide jointing of the new installation parts especially for services items (Ali, Rahmat, & Noordin, 2009). As per Fawcette and Palmer (2004) in most cases, it take longer to refurbish a building if it is occupied than if it can be vacated. CIRIA (1994) reported, Time, Cost & Quality which are basic objectives of projects are supplemented by other

considerations such as minimum disruption to the operation of the building or safety in refurbishment projects. If the building is occupied during the refurbishment, then the considerable amount of money may require to keep aside (Mike & Alison, 2011). Fawcette and Palmer assumes that generally it is required the occupants of the area under refurbishment need to move away temporarily allowing builders to carry out refurbishment work.

Tight time and cost control of the project become impossible in refurbishment projects if occupied (Mike & Alison, 2011). And also it has adverse effect on staff and customers. Perhaps occupancy is unavoidable but it must be thoroughly questioned. CIRIA (1994) In any refurbishment project, some demolition is usually required. Restrictions may arise regarding the noise control and work may have to undertake during afternoon hours as well (Mike & Alison)

Time to time health and safety requirements may arise and money has to be spent on them (Mike & Alison, 2011). When refurbishing occupied buildings attention should be drawn to health and safety of building users and also risk (Fawcette and Palmer, 2004). According to Premachandra, et al. (2019), it is required to work with the existing structure and already running services in a refurbishment hence, much care is critical otherwise, will affect the whole operation of the hotel. Further Ali et al. (2009) stated design of services works for refurbishment could become highly complicated which would affect other parts.

Additionally, the designers of refurbishment need to do extra work in order to ensure proper building services (Ali et al., 2009). All of them may finally increase the contract duration as well (Mike & Alison, 2011). Further, the responsibility concerning safety of refurbishment projects is higher when compared to newly built, and also the existence of client's personnel creates complicated safety problems in the progress of refurbishment project (CIRIA, 1994). Hence, occupancy involves much more than noise and dust which add cost and time to the project. In Table 1.2 some impacts due to refurbishment are listed down during occupation as identified by several Authors.

Economic, social, political, technical, environment related events can interrupt core business where as the natural disasters, diseases, terrorist attacks, strikes, financial crises, unreliable systems, logistics, supply chain failures as well as unexpected lack of essential production inputs can severely impact growth and performance of the business (Faertes, 2015). However, environmental, economic and social consequences resulting from the refurbishment process is shortage in previous studies therefore Vilches et al. (2016) suggested to do further research in this regard.

And when assessing impacts of refurbishment, the organization should consider those that relate to its business aims and objectives and its stakeholders. These may include, (Faertes, 2015; Cabinet Office, Government of Japan, 2005; Genre et al., 2000).

- the impact on staff or public **wellbeing**; Disruption to the day today work of public and own staff
- the impact of damage to, or loss of, **premises, technology or information**; Damage of buildings and data
- the impact of breaches of **statutory duties or regulatory requirements**; A collection of rules and regulations adopted by authorities having appropriate jurisdiction to control the design and construction of buildings, alteration, repair, quality of materials, use and occupancy, and related factors of buildings within their jurisdiction; contains minimum architectural, structural, and mechanical standards for sanitation, public health, welfare, safety, and the provision of light and air.
- damage to **reputation**; Damage to the image or good will of the organization
- damage to **financial viability**; Damage to the cash flows and assets
- deterioration of **product or service quality**; Weakening the quality of the output
- **environmental damage.** Possible adverse effects caused by a development, industrial, or infrastructural project or by the release of a substance in the environment.

According to above discussion, pointed out business impacts were taken for data analysis in Chapter 4. However, all the impacts of refurbishment that were found in the literature are summarized in below Table 1.2. According to Vilches et al. (2016) impacts of refurbishment on business operations are significant irrespective of impact type. Hence, Organisations are the most affected party compared to construction.

Table 1.2 : Impact of refurbishment

Impacts of Refurbishment	Identified by
Need of separate means of access for people and goods	CIRIA (1994), Fawcette and Palmer (2004), HO and Fischer (2009)
Hoists passing the windows of occupied rooms	CIRIA (1994)
Construction access corridors through occupied areas / presence of builders inside / reduced security	CIRIA (1994), Fawcette and Palmer (2004), HO and Fischer (2009)
Noise / Pervasive sounds of mechanical hammers	CIRIA (1994), Fawcette and Palmer (2004)
Continued presence of dust, dirt and odours	CIRIA (1994), Fawcette and Palmer (2004)
Significant breaks in the roof or other vulnerable parts of the building envelope	CIRIA (1994)
Occupants have to work with lower conditions and disruptions / obstructions / Relocate / Reduced facilities	CIRIA (1994), Fawcette and Palmer (2004), HO and Fischer (2009) (Ali, 2009) (Babangida, 2014), (Rahmat, 1997),
Customers have accept inconvenience coming in to building / Restricted access	CIRIA (1994), Fawcette and Palmer (2004), Ali (2009), Babangida (2014), Ikpe, Potts, Proverbs and Oloke (2006)
Potential consequences of temporary or permanent customer loss / productivity loss of occupants	CIRIA (1994), HO and Fischer (2009)

Impacts of Refurbishment	Identified by
Need to keep heating, air-conditioning, electrical and plumbing work in operation / Temporary disruptions to services	CIRIA (1994), Fawcette and Palmer (2004), Premachandra, et al. (2019)
Additional cleaning and unproductive time may occur in moving and covering furniture	CIRIA (1994)
Increase risk to health and safety	CIRIA (1994), Fawcette and Palmer (2004), Babangida (2014), Ekanayake et al. (2018), Ikpe (2006)
Systematically dispose of waste	CIRIA (1994)
Visual impact of building work, externally and internally	Fawcette and Palmer (2004)
May have to lease / rent extra space	HO and Fischer (2009)
Productivity loss of construction crews	HO and Fischer (2009)

As some impacts have been identified by several authors, it emphasizes that those problems are generally observed in refurbishment projects and further they are accurate according to their frequency of identification by the Authors (Premachandra et al., 2019).

These are negative impacts of refurbishing occupied building. They stress that occupancy during refurbishment is not a viable option. However, owners tend to choose refurbishment instead of demolition and new build. Suitable approaches should be adopted to minimize adverse effects of the problems in refurbishment projects to the cost, time and quality targets (Premachandra et al., 2019).

2.6 Summary

Chapter Two Literature Review consist of literature already studied about refurbishment, challenges of refurbishment, how refurbishment differs from new build, office building refurbishment, business operations and impacts of refurbishment on business operations. Next Chapter describes the methodology of the research.

3.0 RESEARCH METHODOLOGY

3.1 Introduction

Chapter Two discussed the key research issues through a review and synthesis of the existing literature. The aim of this chapter is to discuss the research methodology adopted by the study, "Impact of refurbishment projects on business operation of occupied office buildings in Sri Lanka." It include research design, research process including data collection and data analysis further validity of this research is also explained at the end of this chapter.

3.2 Research Design

Shajahan (2004) defined research design as the specification of methods and procedures for acquiring the required information needed to structure or solve a problem. Punch (2005) mentioned that the research design is the intermediate connector between research question and data. A research design must contain following aspects (Shajahan, 2004);

- A clear statement of the research problem
- Procedures and techniques to be used for gathering information
- The population to be studied
- Methods to be used in processing and analyzing data.

These aspects with regard to the research will be explained in detail in the next section under the research process.

3.3 Research Process

The logical sequence of this research design consists of number of major steps: background study; literature review; research problem statement; case study design, data collection, data analysis and conclusions and recommendations. These stages and how the objectives achieved are shown in Chapter 1.

3.3.1 Background Study

The researcher carried out a background study on a broader perspective to familiarise with the subject area of refurbishment projects referring books, journal articles and unpublished dissertations. This study emphasises the impact of refurbishment projects on business operation of office buildings in Sri Lanka that has not been openly addressed in the extant literature. Therefore, this background study was extended to a literature review in order to synthesise the prevailing knowledge level regarding the research area and to establish the research problem. Hence, next section discusses on the literature synthesis.

3.3.2 Literature synthesis

After the initial foundation set from the background study, literature synthesis was been gradually extended while holding the focus on research problem. The comprehensive literature synthesis was conducted to explore the refurbishment projects and its impact on business operation while building being occupied. This was done through mainly by referring books, journal articles and unpublished dissertations. According to the findings of the literature, research problem was established as "how refurbishment projects impact on business operation while building is being occupied" in a comprehensive manner. The next section discusses the research approach selected.

3.3.3 Research Approach

As illustrated by Creswell (2013), most appropriate Three (03) types of research approaches are qualitative, quantitative and mixed approach. It is necessary to identify the most appropriate research approach to address the research problem in order to conduct a successful research. Thus to achieve the objective Two and objective Three mentioned in Chapter 1, comprehensive and in depth information was required with the involvement of industry professionals. According to the nature of the data to be collected, it was recognized that qualitative approach is the most sensible approach for the purpose of addressing aim and objectives of this research.

3.3.4 Research Strategy

By selecting qualitative approach, cases were to be selected as the strategy of the research. Case study method is a paramount approach involving in gathering meaningful, in depth explanations and holistic information through a practical scenario (Zainal, 2007). According to Yin (1981), case study method enables to examine and understand data within a required specific context and further the information can generate through observations, archival records, fieldwork, verbal reports or combination of those. According to this research problem, cases related to office refurbishment projects were considered.

3.3.5 Case study design

Yin (2003) suggested that the case study research approach for the researches should have research problems like "how" and "why" types as shown in Table 2.1 below.

Table 2.1 : Relevant situations for different research strategies

Strategy	Form of research question	Requires control of behavioural events?	Focuses on contemporary
Experiment	How, Why?	Yes	Yes
Survey	Who, What, Where, How many, How much?	No	Yes
Archival analysis	Who, What, Where, How many, How much?	No	Yes/No
Case study	How, Why?	No	No
History	How, Why?	No	Yes

Source: COSMOS Corporation (1981 cited in Yin 2003 p.5)

Author further stated that, a case study is an empirical inquiry that investigates a contemporary phenomenon within a real-life context. Since the research problem includes "how", researcher selected the case study method as approach to the research.

Feagin et al. (1991 cited in Tellis, 1997) views that case study is an ideal methodology when a holistic, in-depth investigation is needed. The case study designing procedure which is emphasised next, including the identification of unit of analysis, defining the number of cases and selection of cases.

- **Identification of Unit of Analysis**

Identification of 'unit of analysis' or the 'case' is of foremost importance to any research design and it is linked with the way the research problem is created (Yin, 2003). This study aims to explore the impact of refurbishment projects on business operation in Sri Lankan context. Therefore, the unit of analysis or the case in this research was the organisations which have already carried out refurbishment projects while being occupied within last Five (05) years.

- **Defining Number of Cases**

After identifying the unit of analysis of the case, the defining of number of cases is important. Yin (2003) declared that case studies can be broadly divided into Two (02), as multiple case studies and single case studies. Where single case study is used to confirm or challenge a theory relating to a unique or an extreme case and multiple case studies can be used to increase the validity and reliability of findings through replication logic. According to Perry (1998), when the study area is too broad in a qualitative research, it is advisable to use only one or two and utmost four. Romano (1989 cited Perry, 1998) stressed that; "the literature recommending the use of case studies rarely specifies how many cases should be developed. This decision is left to the researcher." Hence, there is no precise guide to the number of cases to be included.

Accordingly, multiple case studies with two cases was selected for the research while giving consideration to the time constraints prevailing on the study and available cases also. The criteria used for selecting the cases are discussed in the following section.

- **Selecting the Cases**

The cases were selected from the organisations which had already gone through a refurbishment within last Five (05) years and which are office buildings located in Colombo, Sri Lanka. Hence two office buildings which had undergone refurbishment during the last Five (05) years were selected as the Two (02) cases for this research.

Before moving into the empirical study, details of two organisations that were accessible were gathered. After explaining about the case study designing stage, the data collection stage is illustrated in the next section.

3.3.6 Data Collection

This section briefly explains the technique adopted for data collection and about the interview process that carried out to gather qualitative data for the research.

Data collection techniques

Table 2.2 : Methods of data collection under case study

Author	Data collection method
Yin (2003)	Documents, Archival records, Interviews, Direct observation, Participant observation and Physical artefacts.
Neergaard and Uihoi (2007)	Ethnographic field work, Interviews, Discourse analysis
Gillham (2005)	Observation, Interviews
Weinberg (2002)	Observational field work, Interviews, Discourse analysis, Artifacts.
Travers (2001)	Observation, Interviewing, Ethnographic field work, Discourse analysis and Textual analysis

According to Table 2.2 most authors explained about interviews and observation as data collection tools for case study researches. Among those techniques, interviews can help to gather valid and reliable data that are relevant to research objectives (Shajahan, 2004). Sekaran (2003) stated that, when interviews are conducted in semi-structured manner, it enables to adapt the questions necessary, clarify doubts and ensure that the response is properly understood by repeating and rephrasing the questions. Same author further emphasised that, if the interviews are carried out face-to-face manner, researcher can pick up the nonverbal cues from the respondent. The facts required to be collected from the organisations in this research is mostly qualitative and lengthy; hence it is difficult to collect it using a standard questionnaire. Therefore, semi-structured interviews were the most appropriate method of data collection for this study. There were some problems occurred when using other methods such as company documents and archival records in getting permission and considering expensiveness. Consequently, the interviews were carried out face-to-face in semi structured manner. The structure of the interview and the interview process are explained in next section.

- **Interview Process**

The interview structure was developed by using the interview guidelines for Operational Managers (OM) and Occupants. These guidelines were formed to capture data around the research problem. Hence, these guidelines were established with reference to the literature synthesis and objectives of the study. In a study Chileshe et al. (2013) also suggested that, contractor's representative should work with occupants as they are the ultimate beneficial and affected party. Hence, the contractor's actions will indirectly affect to the Client or the organization.

Two (02) organisations were identified for data collection. To investigate the nature of the refurbishment projects in selected organisations, it is important to identify key professionals who are directly engaged to refurbishment project management. Therefore, this study was expecting to select interviewees who often have direct connection with refurbishment project management.

From the selected organizations, minimum Three (03) interviewees from operation management field was selected to gather data as finding managers in same level is difficult. In absence of such criterion, interviews was conducted between different other roles of each organisation who were considered as most appropriate. The interview guidelines were sent to the interviewees prior to the interview and appointments made thereafter over the phone.

Altogether, minimum Ten (10) interviews were conducted and each was normally lasted for 30 to 45 minutes. During interviews, a brief theoretical explanation about issues such as 'refurbishment projects, 'project management' and 'business operation' was given.

While interviewing, note taking and tape recording (with permission of the interviewee) was done to maintain the accuracy of data collection. Ultimately, interview transcripts will be developed to generate a sensible adaptation of interview data.

3.3.7 Data Analysis

Data collected for this research were analysed using the approaches of manual content analysis which will be further discussed in this section.

Leech and Onwuegbuzie (2007) described of various qualitative data analysis techniques such as componential analysis, classical content analysis, methods of constant comparison, taxonomic analysis, keywords-in-context, domain analysis and word count. Accordingly, "content analysis" technique was used to analyse collected qualitative data obtained from case studies. Content analysis is a method which is useful for classification or summarisation or tabulation of data collected through verbally or behaviorally.

Content analysis can be used in an inductive or deductive way which of these is used is determined by the purpose of the study (Elo, Kynga, & Kyngas, 2008). If there is

not adequate previous literature about the phenomenon or if literature is fragmented, the inductive approach is recommended (Lauri & Kyngas, 2005). Deductive content analysis is used when the structure of analysis is operationalized on the basis of literature and the purpose of the study is theory testing (Kyngas & Vanhanen, 1999). In this research it is a combine approach of inductive and deductive analysis as the literature findings have been checked in the data collected as well as additional impacts have been found from the data.

The collected data were cross checked with the data that were found in the literature. That is the impacts that were found in the literature were checked in the interviews whether they have faced same impacts and whether they have faced additional impacts other that the impacts found in the literature. Thus a combination of deductive and inductive approaches was used.

The drawing conclusions was done as the last step of the data analysis. Detailed cross-case analysis write-ups were developed. During write-ups, key findings were cross-referred with the related literature findings.

3.3.7.1 Conclusion Drawing

Conclusion drawing is the final stage of data analysis. The findings from the empirical study; their interrelationship with existing literature; and, the propositions from this study to both the theory and to the practice were emphasised under conclusions. Further, new research directions that appeared from this research were also illustrated in the conclusions.

3.3.7.2 Research Validity

Research validity deals with the quality of the research. As declared by the U.S. General Accounting Office (1999 cited Yin, 2003), there are four tests identified to measure the quality of any empirical social research which gives the opportunity to check the quality of the research in terms of the trustworthiness, credibility,

conformability and data dependability. These tests are commonly named as ‘construct validity’, ‘internal validity’, ‘external validity’ and ‘reliability’ (Yin 2003). The tests can be summarized as follows,

- ***Construct Validity-*** Establishing correct operational measures for the concepts being studied
- ***Internal Validity-*** Establishing casual relationships, whereby certain conditions are shown to lead the other conditions, as distinguishes from spurious relationships
- ***External Validity-*** Establishing a domain to which study’s findings can be generalised
- ***Reliability-*** Demonstrating that the operations of a study such as data collection procedures can be repeated with the same results

Throughout this research, following steps were taken to increase the validity of research via the tests introduced by Yin.

A. Construct Validity

- Interviewing Five (05) people from the same unit of analysis including Three (03) from operations management and Two (02) from occupants
- Use of Two (02) separate interview guidelines to capture their ideas clearly and as a proof of other interviewees. For an example, Impacts were asked from OM and Occupants as well
- Conducting semi-structured and face-to-face interviews while adapting the questions necessary, clarify doubts, picking up the nonverbal cues from the respondent for greater understanding

B. Internal Validity

- Developing the research problem and the model in a logical manner based on the comprehensive literature review
- Pattern matching during cross case analysis

C. External Validity

- Selection of two case studies
- Adopting logical criteria for selecting cases

D. Reliability

- Interviewing all interviewees based on the same defined interview guidelines for both categories of interviewees
- Tape-recording and note-taking during interview and developing interview transcripts to ensure accurate data capture

3.4 Summary

This chapter has presented the research design, research process including data collection and data analysis procedures in this research study. Case study research methodology was selected, since this better facilitates to study the refurbishment projects. Hence, unit of analysis of the study is ‘organisation’. Two organisations that have already faced refurbishment projects while occupied was selected for the study based on access and time limitations. Interviews were the data collection technique in this study.

4.0 DATA ANALYSIS AND RESEARCH FINDINGS

4.1 Introduction

Chapter three discussed the method of study adapted in this research. The purpose of this chapter is to explain the findings of the empirical study in a detail manner.

After overlooking number of cases researcher could gather data from only Two (02) numbers of cases due to the resistance of data sharing. Therefore, said Two (02) office buildings were selected to evaluate.

First, a brief description of the selected Two (02) cases is given in this Chapter. Then, the cross-case analysis which explains the similarities and differences across the case is explained. While explaining the cross-case analysis, the main differences and similarities between the empirical study and the literature review are also highlighted. Next the strategies each case has implemented in order to minimize impacts are also been highlighted at the end.

4.2 Description of cases

The empirical study focused on Two (02) numbers of commercial sector organisations out of few organisations. Those Two organisations had already been gone through a refurbishment project while the buildings are being occupied during last Five (05) years. Selected Two (02) cases helped to collect data related to achieving aim and the objectives of the research. All the interviews were already executed and necessary data were collected from qualified participants, who had actively involved in refurbishment. A brief description on selected Two (02) cases is given in Table 3.1.

Table 3.1 : Cases

	CASE 1	CASE 2
Organisation	Organisation A	Organisation B
Type of Business	IT Service	Administrative Service
Business Commencement year	2005	2000
Number of Staff members	Approx : 1500	Approx : 1000
Nature of refurbishment project	Refurbishment of linked building	Refurbishment of same building
Year of the project and Duration	2016 (8 months)	2016 (10 months)
Respondents	3 nos. of Managers and 2 nos. of Occupants	3 nos. of Managers and 2 nos. of Occupants

Case 1

Case 1 which is Organisation A is an IT company in Colombo that is functioning on a building and has commenced their operations in year 2005. Refurbishment project was carried in year 2016 after 11 years of commencement. Number of occupants are approximately 1500. The refurbishment project has been carried in the building which is linked to the main building. In Case 1, Three (03) nos. of managers and Two (02) nos. of occupants were selected to get information related to this research. The researcher has gathered data related to refurbishment project and negative impacts of same.

Case 2

Case 2, is the Organisation B which is also an office building operating administrative works in Colombo which started operations in year 2000. Refurbishment project was carried out in year 2016 after 16 years of commencement. The project was carried out in the same building. Number of occupants are approximately One Thousand (1000) currently. To gather the data related to the research, Three (03) nos. of managers and Two (02) nos. of occupants were selected.

4.3 Description of respondents

Table 3.2 : Description of Respondents

Case	Respondent	Designation	Role
Case 1	Organisation A Manager 1	Operations Manager (OM)	Overseas Operations
	Organisation A Manager 2	Assistant Operations Manager (AOM)	Oversees daily Operations
	Organisation A Manager 3	Facilities Manager (FM)	Managing the Facility
	Organisation A Occupant 1	Team Leader	Guiding the projects
	Organisation A Occupant 2	Executive	Developing IT projects
Case 2	Organisation B Manager 1	Facilities Manager	Managing Facilities
	Organisation B Manager 2	Facilities Manager	Managing Facilities
	Organisation B Manager 3	Assistant Facilities Manager (AFM)	Assisting the Facilities Manager
	Organisation B Occupant 1	Head of Planning	Planning
	Organisation B Occupant 2	Engineer	Developing solutions for problems

Details that researcher could gathered about the respondents are summarized in Table 3.2. Since case 1 is an IT Industry base organisation, Managers dealing with refurbishment were OM and FM. All most all the occupants were IT employees. Out of which a Team Leader and an Executive were able to interview to gather data for the research. Whereas the case 2 is an Administrative Organisation. Managers who were dealing with refurbishment are FM. Occupants of the same organisation are employees in Administration field. Interview persons were Head of Planning and Engineer.

4.4 Results of Cross-Case analysis

The cross case analysis is consist of similarities and differences between Two (02) cases. The impacts of refurbishment projects based on the literature findings are checked across the cases. Yet, few more impacts have been identified by the each case.

4.4.1 Reasons for undertaking refurbishment

In Case 1, Manager 1 and Manager 2 stated that **Expanding** is the reason for the refurbishment where the Manager 3 also agreed. But in Case 2, both organisations said to **create right impression** and **to smooth the operations** as the reasons for refurbishment. Assistant Manager of the same also stated that **to improve** themselves as the reason for refurbishment.

Though both Cases had different reasons, their intention was to carry out a successful renovation project while operating business. Personnel involved in refurbishment project management were the management, staff of contractor, staff of consultant, government authorities etc. in both organisations. Managers of both cases, further stated that as their existing buildings are in good conditions, not necessary to **rebuilt or demolish** as it is very **costly** to do so.

4.4.2 Impacts of Refurbishment Projects on Business operations of cases

The similarities and differences across the two cases under the findings of literature are summarized in below Table 3.3. Each impact has been checked with both organisations whether they have faced it or not. Then in which background these impacts are affected on the business operations are stated further. This business impacts were identified from the literature in Section 2.5. Given in **Bold** are the new impacts found from the cases at the bottom of the Table 3.3.

Table 3.3 : Comparison of Cases

Impact of refurbishment project	Case 1		Case 2	
	Yes/No	**Impact on Business**	**Yes/No**	**Impact on Business**
Need of separate means of access for people and goods	Yes	Premises, Staff wellbeing	Yes	Premises and reputation
Hoists passing the windows of occupied rooms	No		No	
Construction access corridors through occupied areas / presence of builders inside / reduced security	Yes	Service and productivity	Yes	Service quality
Noise / Pervasive sounds of mechanical hammers	Yes	Staff wellbeing and service quality	Yes	Staff wellbeing and service quality
Continued presence of dust, dirt and odours	Yes	Staff wellbeing and service quality	Yes	Staff wellbeing and service quality
Significant breaks in the roof or other vulnerable parts of the building envelope	No		No	
Occupants have to work with lower conditions and disruptions / Relocate / Reduced facilities	Yes	Staff wellbeing and service quality	Yes	Staff wellbeing and service quality
Customers have accept inconvenience coming in to building / Restricted access	Yes	Service quality and reputation	Yes	Service quality, reputation and financial viability
Potential consequences of temporary or permanent customer loss / productivity loss of occupants	Yes	Service quality and reputation	Yes	Service quality and reputation

Impact of refurbishment project	Case 1		Case 2	
	Yes/No	**Impact on Business**	**Yes/No**	**Impact on Business**
Need to keep heating, air-conditioning, electrical and plumbing work in operation / Temporary disruptions to services	Yes	Financial viability and service quality	Yes	Financial viability and service quality
Additional cleaning and unproductive time may occur in moving and covering furniture	Yes	Service quality, financial viability	Yes	Service quality, financial viability
Increase risk to health and safety	Yes	Staff wellbeing	Yes	Staff wellbeing, Productivity
Systematically dispose of waste	Yes	Environmental damage	Yes	Environmental damage
Visual impact of building work, externally and internally	Yes	Premises and service quality	Yes	Premises and service quality
May have to lease / rent extra space	No		Yes	Financial Viability, Service quality
Productivity loss of construction crews	Yes	Premises and service quality	Yes	Financial viability
Need to find additional parking facilities and security personnel	**No**		**Yes**	**Financial viability**
Increase of financial requirements	**Yes**	**Financial viability**	**Yes**	**Financial viability**
Absenteeism & Turnover	**Yes**	**Productivity & Financial viability**	**No**	
Communicating issues	**Yes**	**Productivity**	**No**	
Slippery floors	**Yes**	**Staff wellbeing**	**No**	

4.4.2.1 Impacts of refurbishment projects

In above Table 3.3, first column has impacts of refurbishment projects. Those impacts were identified in the literature except the highlighted impacts at the bottom which have been identified by the cases. Below analysis explain how those impacts were experienced by the both cases whether the both cases have experienced or not.

Both cases have identified "*need of separate means of access for the people and goods*" as an impact of refurbishment during the project. Though Literature has found "*hoist passing the occupied window*" as an impact, neither Case 1 nor Case 2 has not experience so. "*Presence of builders inside the building"* is definitely an impact which affect to the business operations according to literature as well as the Two (02) cases.

Both Cases have experienced *"Noise / Pervasive sounds of mechanical hammers*" which they think as an impact to the business. Moreover in the same way both Cases have experienced *"Continued presence of dust, dirt and odors inside the building"* thus it had become a big impact to their businesses. Both Organisations have not experienced *"Significant breaks in the roof or other vulnerable parts of the building envelope".* Hence, occupancy during the project was possible. *"Occupants have to work with lower conditions and disruptions / Relocate / Reduced facilities"* was an impact faced both Cases.

"Customers have accept inconvenience coming in to building / restricted access" was been an impact of refurbishment project which affected on the business Case 1 and 2. As per both Cases, *"Potential consequences of temporary or permanent customer loss / productivity loss of occupants"* was an experience of the relevant project**.**

Regarding the services, both Cases expressed *"Need to keep heating, air-conditioning, electrical and plumbing work in operation / Temporary disruptions to services" were* impacts of the refurbishment project. Further, both Cases have experience from *"Additional cleaning and unproductive time may occur in moving and covering furniture"* also.

"Increase risk to health and safety" is a significant impact for Case 2 whereas light impact to Case 1. *"Systematically dispose of waste"* was an impact for both Cases**.** Operations of both Cases have been impacted from *"Visual impact of building work, externally and internally"*. Further, only Case 1 had to *"lease / rent extra space"* whereas Case 2 did not.

Apparently, due to the occupied building refurbishment, *"Productivity loss of construction crews"* is a big impact to the normal operation to both Cases. *"Need to find additional parking facilities and security personnel"* was an impact for Case 2 only as they had limited parking facility not like Case 1. *"Increase of financial requirements"* is a common thing for both Cases.

In addition to the Literature findings, Case 1's managers and occupants have brought few impacts they faced by the refurbishment project. Those are *"Absenteeism & Turnover of employees", "Communicating issues"* and *"Slippery floors".*

4.4.2.2 The impacts on identified business operations

Table 3.3 summarizes all the identified impacts of refurbishment as well as the relevant impacts on businesses. Each case expresses how the relevant impact of refurbishment affect their business operations. Impacts that were found from the literature and highlighted new impacts found from the cases were checked with the cases how they categorized in the area of business operations which are analyse below.

Both cases have identified "*need of separate means of access for the people and goods*" impacting on business operations in the way of **premises**. Additionally, by **staff wellbeing** and **reputation** respectively by Case 1 and Case 2. "*Presence of builders inside the building"* is definitely an impact which affect to the **productivity** and **service quality** of occupants as expressed by Case 1. According to Case 2, its only **service quality**.

Both cases have experienced *"Noise / Pervasive sounds of mechanical hammers*" which cases think impact on business in the same way that is **staff wellbeing** and **service quality**. Moreover in the same way both cases have experienced *"Continued presence of dust, dirt and odors inside the building"*. *"Occupants have to work with lower conditions and disruptions / Relocate / Reduced facilities"* affect **staff wellbeing** and **service quality** as stated by both cases.

"Customers have accept inconvenience coming in to building / Restricted access" was been an impact of refurbishment project which affected on the business in the ways of **service quality** and **reputation** to Case 1 and 2. Further Case 2 has identified it as a **financial viability** also. As per both cases, *"Potential consequences of temporary or permanent customer loss / productivity loss of occupants"* has been affected on business by **Service quality** and **Reputation.** Regarding the services, both cases expressed *"Need to keep heating, air-conditioning, electrical and plumbing work in operation / Temporary disruptions to services"* impacted on business operations from **financial viability** and **service quality**. Same impacts both cases have experience from *"Additional cleaning and unproductive time may occur in moving and covering furniture"* also.

"Increase risk to health and safety" is a significant impact on business in the way of **staff wellbeing** and **productivity** for the Case 2. Thus for Case 1, only from **staff wellbeing**. *"Systematically dispose of waste"* was an impact for both cases which both cases assumes as an **environmental damage.**

Operations of both cases have been impacted related to **Premises** and **service quality** by refurbishment project from *"Visual impact of building work, externally and internally"*. Further, only Case 1 had to *"lease / rent extra space"* which impacted on operations in **financial viability** and **service quality** ways.

Apparently, due to the occupied building refurbishment, *"Productivity loss of construction crews"* is a big impact to the normal operations from **premises** and **service quality** to Case 1 but **financial viability** for Case 2. *"Need to find additional*

parking facilities and security personnel" was an impact for Case 2 only as they had limited parking facility not like Case 1. Case 2 expressed it as a **financial viability** to the business operations. *"Increase of financial requirements"* is a common thing for both Cases which creates the **financial viability**.

In addition to the Literature findings, Case 1's managers and occupants have brought few impacts they faced by the refurbishment project. Those are *"Absenteeism & Turnover of employees", "Communicating issues"* and *"Slippery floors".* Respondents of Case 1 highlighted Absenteeism and Turnover as a **Productivity** & **Financial viability** impact to the business where communicating issues are **productivity** impacts. Also slippery floors affects **staff wellbeing**.

4.4.3 Strategies to minimize the identified impacts of refurbishment projects

Table 3.4 presents the practices adopted by the two cases to minimise the impacts of refurbishment projects.

Table 3.4 : Practices to minimize the impacts

Actions	**Case 1**	**Case 2**
Health and Safety measures	X	X
Record management	X	X
Good relationship	X	X
Back up services	-	X
Rescheduling	X	X
Temporary workstations	X	-
Educate employees	X	-
Feedback from employees	X	-

Following discussion is the strategies that each case has taken to minimize the impacts of refurbishment projects.

Both cases have carried out successful refurbishment projects while operating. In order to do so, Case 1's OM have **allocated staff to other vacant spaces, rescheduled works** and **taken many reactive measures** as and when required. Case 2 also have **rescheduled works**. Case 1's Managers expressed that project was affecting the normal operation in many ways like, **financial requirements**, **delays in functions**, **health and safety issues** etc. Case 2's FMs said the impact was manageable but everything got **delayed**. Other Assistant FM of Case 2 said that all required **temporary service connections** were given thus no such big affects to normal operation.

Case 1's occupant 1 stated that they had to share meeting rooms and there were rush when booking common facilities for our team meetings. He further said that there was a risk of exposing to falling objects.

Both cases have taken actions to minimize those impacts on business. Both cases have taken **health and safety measures**, have kept **good relationship** among all stake holders, have kept all **records** and have **reschedule** as and when required. **Backup services** have not been kept by Case 1 but by Case 2. **Temporary work stations** and **education about the refurbishment** have been arranged for the employees by Case 1 only. Further, Case 1 has taken **feedback from employees** to minimize impacts of refurbishment projects. Further both cases have confirmed their success on the refurbishment project during normal operation.

Considering the findings of the research, following can be recommended as strategies to minimize impacts. Both cases have taken some valuable strategies to minimize the impacts on business operation due to refurbishment project.

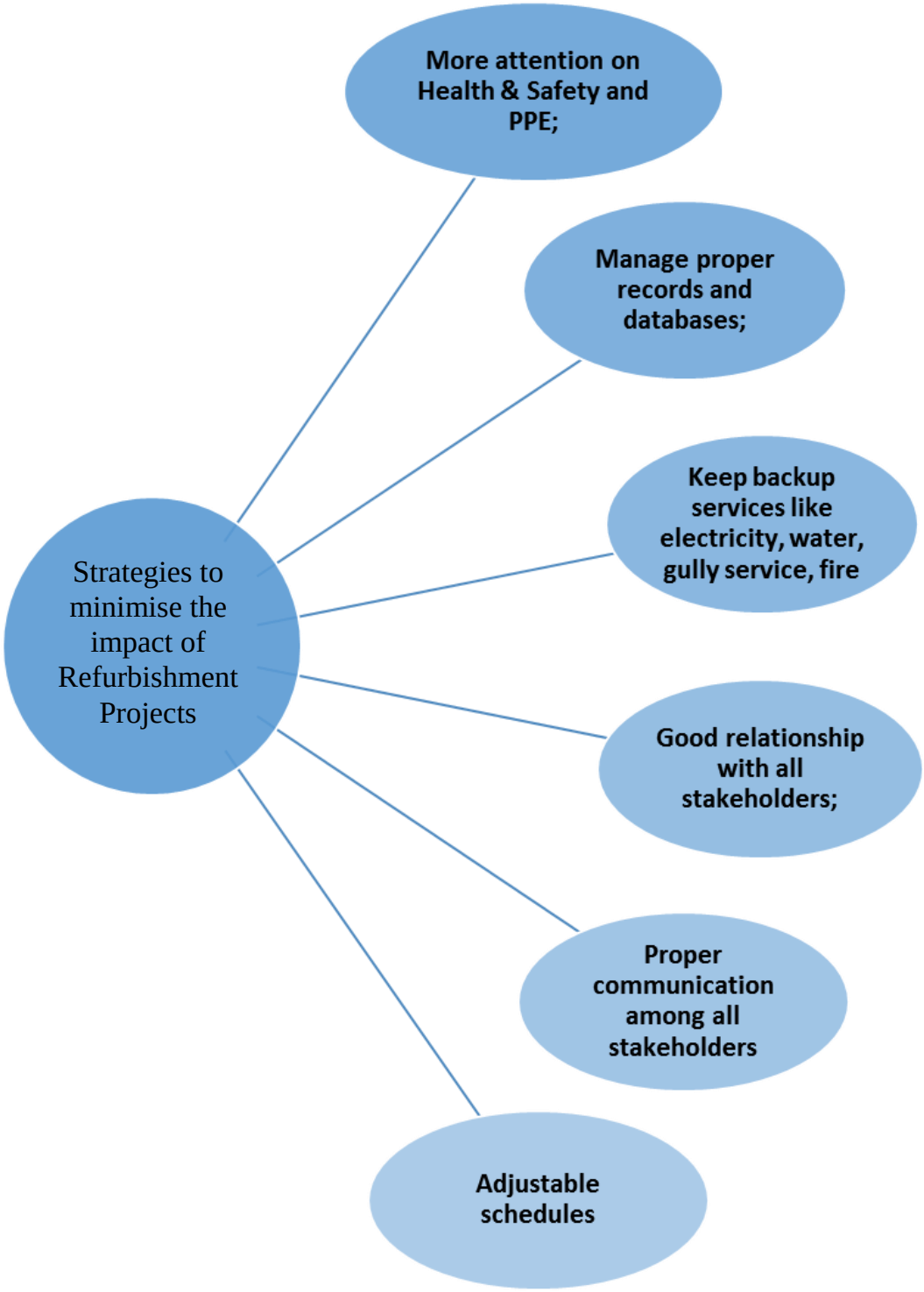

Figure 3.1 : Strategies to minimize the impacts

Identified above strategies from both cases would be valuable to all organisations when they are operating at a time of a refurbishment project is in progress.

More attention on health and safety is required. Because it is recommended to improve health & safety management practices for refurbishment, with targeted education and training and effective best practices to avoid premature or unplanned collapse. Unfortunately, more accidents and fatalities tend to occur during refurbishment than during total demolition works. The effect of an unplanned collapse impacts on workers' safety as well as the building being refurbished specially when the building is being occupied. The effects of an accident can impact upon the client, the contractor and their construction businesses.

Manage proper records and data bases are challenging though beneficial. A systematic records management adds value to the daily functions of the organisation and it will help the refurbishment contractor as well. Retrieving information for any purpose is very easy when managing proper records. Thus time and resource wasting to analyze an incident will be minimal.

Keeping backup services like electricity, water, gully services are normal. But during a refurbishment project on an occupied building, it is needed to face unplanned or unexpected situations. Therefore, it is good practice for both contractors and managers to keep backup services alert.

Stakeholders include owners and facility users, project management team members, facilities managers, designers, shareholders, public administration, workers, contractors, subcontractors, services suppliers competitors, banks insurance companies, media, community representative, neighbors, general public, clients, government authorities etc. Each person of these stakeholders could influence in the course of the refurbishment project at times. Some stakeholders influence in the project often. The refurbishment manager should be skillful in the management of the different stakeholders during the whole process of the project, to achieve a more successful project result.

A regular and proper communication with all stakeholders makes the project prepared or updated. A good stakeholder relationship and communication lead the organization

to understand in a better way their stakeholders, manage in a better way their expectations, and improve the business opportunities as well.

Rescheduling a common incident that construction companies experience. For refurbishment projects, it is better to have a second plan or an adjustable schedules in order to face expectancy. Especially in occupied buildings, refurbishment projects are at high risk of facing unforeseen conditions. So as to face them refurbishment team should be able to adjust their schedules at any time.

4.5 Summary

This chapter explained the research findings of case studies and content analysis on them. Content Analysis technique was carried out to analyse data and to enhance research objectives, which not covered under literature review in Chapter 3. Research aims have enlightened upon the findings of literature as well as the respondents of the Two (02) cases. Totally Twenty One (21) nos of impacts were found from the literature as well as from the data collected. Further strategies to minimize the impacts were developed from the finding of the cases. As a final point, by finalising this chapter, it was cleared up the pathway to accomplish the research aim effectively.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The previous chapter analysed the findings through the empirical study. This chapter is focused on drawing out conclusions and recommendations based on the analysis performed in the previous chapter.

5.2 Conclusions

The prime aim of this study was to investigate the impacts of refurbishment projects on business operations in office buildings in Sri Lanka. In reaching this aim, several objectives were achieved.

First objective of this research was to review refurbishment projects, their associated challenges and their impacts on business operations. Literature findings revealed that refurbishment of office buildings have grown compared to the rebuild and also with more challenges still refurbishment is common even while continuing the business functions nowadays. Business functions may vary business to business but basically have functions like Finance, Operations, Marketing, Legal and Logistics. It was evident that businesses do not stop these functions due to a refurbishment project.

However, review of impacts of refurbishment projects on business operations while being occupied was also carried out. Out of the Sixteen (16) nos of impacts found from the literature, some were identified by more than Three (03) nos of authors. They were summarized in Table 1.2. In addition to the identified business operations it was required to recognise how the impacts of refurbishment affects on business operations. Accordingly, possible behaviours of business impacts were highlighted. This was further used to analyse data collected. Chapter 1 and 2 clearly illustrated objective 1.

Second objective was to identify the impacts of refurbishment projects on business operations in office buildings in Sri Lanka. In terms of this objective, the results of the empirical study revealed that in Sri Lankan context also, refurbishment projects affect

on business operations of office buildings. Thus, with Five (05) new impacts identified by the selected cases altogether there were Twenty One (21) nos of impacts. However, there were Two (02) impacts out of Sixteen (16) that cases did not experience and also One (01) impact only Case 2 experienced.

In addition, out of Five (05) new impacts found from the cases, Four (04) impacts were identified in Case 1 where as the only Two (02) in Case 2. Further, respondents of the cases expressed the impacts on their businesses by the refurbishment in different ways. The cross-case analysis explains the similarities and differences across the case is in Chapter 4.

Finally the last objective was to propose strategies to minimize the impacts of refurbishment projects on business operations in office buildings in Sri Lanka. In terms of this objective, key strategies found from the Data collection are summarized in Table 3.4 in Chapter 4. Out of Eight (08) strategies identified Four (04) are common to both cases where as the balance are not. However, case 1 has properly managed the impacts by following more strategies than Case 2. Last Two (02) strategies i.e. 'Educating employees' and 'getting feedback from employees' are combined in 'good relationship with all stake holders' and 'proper communication among all stakeholders' respectively in Figure 3.1 in Chapter 4.

Research aim, which was to investigate the impacts of refurbishment projects on business operations of office buildings in Sri Lanka was effectively accomplished, where upon achieving the research objectives as described above.

5.3 Recommendations

Recommendations includes the analysis of data collected and strategies developed from the gathered data based on Literature findings. The impacts of refurbishment projects that were found from the literature were compared with the Two (02) cases and also new impacts were identified from the cases. How those impacts effect on the normal operations of the organisation is a separate thing that need attention. Strategies

in order to minimize those negative impacts were the recommendations of this research.

It was revealed that having a proper health and safety programme during the refurbishment project will definitely minimize the negative impacts that may occur during the project. Thus minimizing the interruption to the business operations. Managing proper records and databases will enhance the refurbishment project management and will help refurbishment managers to manage it easily. Keeping of backup services like electricity, water, gully services is a must as extra services may require at any time during the project and failure to do so will put operations at risk.

Maintaining good relationship among all stakeholders is a key thing as succeeding the management of project also depends on that. Moreover, it will help to run both refurbishment project as well as normal operation of the Organisation smoothly. Similarly proper communication is essential to minimize interferences. Fast and reliable communication will direct the organisation to their expected level.

Adjustable schedules are applied for all stake holders. Stakeholders are having their own targets which are different from one another. To achieve those targets stakeholders must be having their own works of schedules. Those works of schedules get disturbed at the addition of another stakeholder. Hence, when a refurbishment project is in progress all the stakeholders must be flexible enough to adjust their own schedules of work. This will result all the stakeholders achieving their targets with minimum interferences. The findings of this study could help industry practitioners to have a better understanding of minimizing the impacts of refurbishment projects while the building is occupied or the normal operation is in progress.

5.4 Limitations of the Research

This research had targeted to conduct all the interviews in English language and interview guidelines were also prepared in English language. But a few interviews had to conduct in Sinhalese language and it was difficult in translating the idea of those

interviews into English language. Therefore, there was a little bit effect in translating Sinhalese language into English and it sometimes misleads the researcher. So language barriers can be considered one of the main limitations that were faced by this research. Another limitation was some of the interviewees were not able to fully understand the theoretical background of the research. Therefore, it was difficult to make an understanding among them the objectives of the research. Therefore, some of their answers were not satisfied with the question of interview guidelines. Moreover it was very difficult to approach the top management, therefore interviewees were selected from the middle level of the management and occupant were from different capacities.

5.5 Further Research Directions

After carrying out this research, it seemed appropriate that further research may focus on the following areas.

- A study on the nature of refurbishment projects and their effect level on business operations
- A study on how a refurbishment project affect each stakeholder's responsibility during the construction
- A study on the decision to demolish or rebuild

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APPENDIX

INTERVIEW GUIDELINES – MANAGERS

The information from this interview will only be used in fulfilling the requirements of dissertation for the award of Master of Science Honors degree in Project Management. The interview guidelines were structured in three main headings as given below.

- General introduction on both organisations and the respondents
- Recent Refurbishment projects carried out while business in operation
- How did the particular refurbishment project affected the operation

During interviews, a brief theoretical explanation about issues such as ‘refurbishment project’ and ‘business operation’ will be given to the interviewee. Note taking and tape recording (with permission of the interviewee) will be done while interviewing to collect data accurately. However, to maintain confidentiality, the actual names of the organisation and the interviewees will be not revealed in this report or any other document relating to this study. The selected persons will be interviewed based on the following guidelines.

Organisation (introduction, type of business etc.):
Name (Optional):
Designation:
Role of your position:
Date:
Venue:
Duration:

For Managers

Refurbishment projects carried out

1. What was the reason for refurbishment?
2. Who were the parties involved in the refurbishment project?
3. Why didn't you go for a rebuilt or demolition?
4. Do you think it is necessary to refurbish? Why?
5. Was the project successfully completed? How?

Impact of refurbishment project on business operation

6. Was the area being occupied during the refurbishment project?
7. How did you manage it?
8. How did it affect the normal operation?
9. Were you need a separate means of access for people and goods during refurbishment? How do you think it impacted on your business operations?
10. Were you experienced a hoist passing the windows? How do you think it impacted on your business operations?
11. Did your office areas were used by the contractor? How do you think it impacted on your business operations?
12. Did it make noise? How do you think it impacted on your business operations?
13. Did it present dust, dirt and odour during refurbishment? How do you think it impacted on your business operations?

14. Were there any significant breaks of building envelope? How do you think it impacted on your business operations?

15. Did occupants had to work with reduced facilities? How do you think it impacted on your business operations?

16. Did your customers had to accept inconvenience coming in to the building? How do you think it impacted on your business operations?

17. Were there a potential consequences of temporary or permanent customer loss / productivity loss of occupants? How do you think it impacted on your business operations?

18. What sort of temporary disruptions you had to your building services? How do you think it impacted on your business operations?

19. Any additional cleaning and unproductive time occured in moving and covering furniture? How do you think it impacted on your business operations?

20. How did you manage construction waste? How do you think it impacted on your business operations?

21. What was the visual impact of building? How do you think it impacted on your business operations?

22. Did you lease or rent extra space during the project? How do you think it impacted on your business operations?

23. Did you think there was a productivity loss of construction crew? How do you think it impacted on your business operations?

24. What were the other impacts you faced? How do you think it impacted on your business operations?

25. What were the health and safety risks you faced? How do you think it impacted on your business operations?

26. What were the provisions you took to avoid those impacts on business operation?

27. Were they successful?

I would like to thank you for the information given and time you have dedicated to this research. If you are interested to know the outcome of this research, it would be my pleasure to share it with you.

Jagodaarachchi J.A.D.S.

INTERVIEW GUIDELINES – OCCUPANTS

The information from this interview will only be used in fulfilling the requirements of dissertation for the award of Master of Science Honors degree in Project Management. The interview guidelines were structured in three main headings as given below.

- General introduction on both organisations and the respondents
- Recent Refurbishment projects carried out while business in operation
- How did the particular refurbishment project affected the operation

During interviews, a brief theoretical explanation about issues such as 'refurbishment project' and 'business operation' will be given to the interviewee. Note taking and tape recording (with permission of the interviewee) will be done while interviewing to collect data accurately. However, to maintain confidentiality, the actual names of the organisation and the interviewees will be not revealed in this report or any other document relating to this study. The selected persons will be interviewed based on the following guidelines.

Organisation (introduction, type of business etc.):
Name (Optional):
Designation:
Role of your position:
Date:
Venue:
Duration:

For Occupants

Impact of refurbishment project on business operation

1. Was the area being occupied during the refurbishment project?
2. How did you manage it?
3. How did it affect the normal operation?
4. Were you need a separate means of access for people and goods during refurbishment?
5. Were you experienced a hoist passing the windows?
6. Did your office areas were used by the contractor?
7. Did it make noise?
8. Did it present dust, dirt and odour during refurbishment?
9. Were there any significant breaks of building envelope?
10. Did occupants had to work with reduced facilities?
11. Did your customers had to accept inconvenience coming in to the building?
12. Were there a potential consequences of temporary or permanent customer loss / productivity loss of occupants?
13. What sort of temporary disruptions you had to your building services?
14. Any additional cleaning and unproductive time occurred in moving and covering furniture?
15. What was the visual impact of building?
16. What were the other impacts you faced due to the refurbishment?

17. What were the health and safety risks you faced?

18. What were the provisions you took to avoid those impacts on business operation?

19. Were they successful?

I would like to thank you for the information given and time you have dedicated to this research. If you are interested to know the outcome of this research, it would be my pleasure to share it with you.

Jagodaarachchi J.A.D.S.