

**Cost Benefit Analysis of Urban Regeneration Projects:
A Case Study of Mihindusenpura Housing Scheme
Dematagoda**

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Degree of Master of Science in Project Management

Department of Building Economics

University of Moratuwa

Sri Lanka

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Thesis/Dissertation submitted in partial fulfilment of the requirements for the degree
of Master of Science in Project Management

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DECLARATION

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Date

The above candidate has carried out this research for the Masters Dissertation under my supervision

.....
Dr (Mrs.) Thanuja Ramachandra

...../...../
Date

ABSTRACT

Economic appraisal is an important step in any investment project. Although various appraisal techniques are adopted in decision making related to investment projects, it is found in many instances that expected outcomes at the initial project planning have not been achieved at the completion of the project due to unforeseen changes. Various appraisal tools are used in investment projects to assess the feasibility of a project. Cost Benefit Analysis is an appraisal tool used to evaluate a decision related to investment of projects specially with social costs and social benefits.

Urban regeneration in underserved settlement areas is a major investment project initiated by the Urban Development Authority (UDA). This project is initially developed with an expectation of liberating 450 acres of valuable urban lands for commercial developments. Hence the project seems to be a financially feasible project. However proper economic feasibility is yet to be done to evaluate this nationally important project. In the view of foregoing, this research is aimed to assess the economic feasibility of the urban regeneration project done by the UDA, using Cost Benefit Analysis (CBA) technique and thereby identify the cost and benefit components of the project and evaluate the issues related to economic feasibility of urban regeneration projects implemented in Sri Lanka.

Mixed method approach was adopted in this research where qualitative and quantitative data were gathered through semi-structured interviews and document review were used for the final appraisal. Quantitative data was basically used for financial and economic appraisal of the project and qualitative data was used for sensitivity analysis and risk assessments. The research was carried out in two steps. The first step involved comprehensive literature review which provided the base for the primary data collection and guidance for subsequent procedure of inquiry. During the step two primary data was collected through Key Informant Interviews (KIIs) and documentary review. The data analysis and economic appraisal were done using the CBA Guide developed by European Union and NPV and ENP techniques.

The case study revealed that although the project is financially feasible, its financial and economic feasibility is highly sensitive to the income and expenditure predictions. A marginal change in the cost of the project severely affects the overall feasibility of the project. Therefore, if the proper economic appraisal was done using CBA technique for this project possible project risks could be identified beforehand and proper risk management plan would have been adopted to this project.

Thus, this research recommends the incorporation of CBA technique in evaluating urban regeneration projects and other investment projects implemented by the government to properly appraise the investment decisions.

Key Words: Cost Benefit Analysis, Urban Regeneration, Sensitivity Analysis, Financial Appraisal, Economic Appraisal

DEDICATION

*I dedicate this piece of work to my beloved
parents, husband and all teachers...*

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This research is achieved with the encouragement, ideas and readily support from all the devoted people whom I have met. Sincere gratitude must acknowledge them for the remarkable support given.

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LIST OF ABBREVIATIONS

ADB	Asian Development Bank
B/C Ratio	Benefit /Cost Ratio
CBA	Cost Benefit Analysis
CMC	Colombo Municipal Council
DRR	Disaster Risk Reduction
EC	European Commission
EIA	Environment Impact Assessment
ENPV	Economic Net Present Value
ERR	Economic Rate of Return
EU	European Union
FM	Facility Management
FNPV	Financial Net Present Value
FNPV (C)	Financial Net Present Value on National Capital
FNPV (K)	Financial Net Present Value of Investment
FRR (C)	Financial Rate of Return of the Investment
FRR (K)	Financial Rate of Return on National Capital
GDP	Gross Domestic Product
LKR	Sri Lankan Rupees
MOSAIC	Measurement of Social and Asset Investments in Communities
NPV	Net Present Value
NRW	Non-Revenue Water
NSW	New South Wales
NWS&DB	National Water Supply & Drainage Board
OP	Operational Programme
PMU	Project Management Unit
PPP	Private Public Partnership
REEL	Real Estate Exchange Private Limited
SDR	Social Discount Rate
UDA	Urban Development Authority
UK	United Kingdom
US	United State
VAT	Value Added Tax

1 INTRODUCTION

1.1 Background

Urbanization is a social process which leads to evolve cities today (Hussain & Imitiyaz, 2018). With the process of urbanization most of cities face challenges related to shortage of quality housing, solid waste management, increasing traffic congestion, poor quality of infrastructure facilities, maintain safety and security of the cities, urban flooding and etc. Apart from these increased demands related to urban services including, housing, education, public health, public open spaces create issue related to exceeding carrying capacities of urban systems, loss of biodiversity, urban heat island effects, desertification, conversion and degradation of agricultural lands, pollution of urban environment, overcrowding, urban slums, safety and security etc. (Egolum & Emoh, 2017).

The immergence of new urban areas caused for progressive deterioration of unattended old urban areas. This created new set of social and economic problems related to old urban areas. (Bianchini, 1999; Law, 2000; Balsas, 2001; Balsas, 2004). Many cities face the widespread problem of physical and social degradation resulted in abandoned pockets with minimum investment potential (Urbeviva, 2007). This created the background for urban regeneration initiatives in most of the European cities to attract people and investments back to the cities. Most of these initiatives were implemented as public interventions. (Bianchini, 1999; Law, 2000; Balsas, 2001; Balsas, 2004). The urban regeneration has now become a central urban policy across many part of the world as it is used to address various urban issues related to rapid population growth, changes in city economy, provision of affordable urban housing, climate change, shortfall in transport and other infrastructure, resource depletion, social and environmental issues, etc. (Newton & Thompson, 2017).

Roberts (2000) in his practical guide handbook defines urban regeneration as a

“comprehensive and integrated vision and action which leads to the resolution of urban problems and which seeks to bring about a lasting improvement in the

economic, physical, social and environmental condition of an area that has been subject to change” (p.17).

Urban regeneration projects should have longer term visions and strategic purposes to tackle the problems encountered in towns and cities. The urban regeneration process should aim at upgrading of physical fabric, social structures, economic systems and environmental condition of an urban area to harness the highest and best use the urban land including natural, economic and other resources associated with it.

However, there were some issues observed in relation to urban regeneration projects regarding created spaces/ houses compared with the ones had prior to regeneration, where the poor condition houses become worse and houses with better conditions became less good as a result (Anderson, 1964). Further, number of issues were observed ranging from disruption of existing economic activities and social relationships, increased pressure on infrastructure and congestion due to displacement of squatters (Ibeakuzie, 2002; Dimuna & Omatsone, 2010).

The issues raised with urban regeneration initiatives emphasized the need of proper evaluation of urban regeneration project with proper evaluation tool which capture all aspects associated with urban regeneration projects. The literature review revealed that three basic techniques have been frequently adopted for the economic appraisal of urban regeneration projects. Those are: cost- effective analysis; weighted cost- effectiveness analysis and cost benefit analysis. The technique to be used for the appraisal of a project to be selected based on the nature of the project, time constraints and the information availability. (Ribeiro, 2010).

This study is focused on assessing the applicability of cost benefit analysis in evaluating urban regeneration projects in Sri Lanka.

Cost benefit analysis has been widely used and recognized framework for assessing costs and benefits of prospective actions or policies. It allows the decision maker to identify and evaluate the alternative economic implications of actions or policies. (Arrow et al., 1996).

Sri Lankan cities also experienced a similar nature of issues because of the urbanization. More than 50 % of population in city of Colombo are living in underserved settlements. Colombo Commercial City Development Plan 2019-2030 (CCCDP 2019-2030) also identified urban regeneration as a key strategy to transform the underutilized urban lands in the heart of Colombo. In this background the Urban Development Authority (UDA) has initiated urban regeneration project for city of Colombo in 2010.

The main concept of the project was to liberate 900 acres of lands covered with 1500 underserved settlements including around 68,000 households and to allocate 150 acres of lands for reservations, landscaping and open spaces for improvement of city environment, 300 acres of lands for rehousing (for resettlements) and 450 acres of lands for investment purposes.

As per the current status review of the project, around 4,900 housing units have been already completed and 13,200 housing units have been commenced with construction accounting for around 18,100 housing units in total (CCCDP 2019-2030).

1.2 Problem statement

The current urban regeneration project in the City of Colombo is based on the financial analysis where the total project cost is expected to recover through the releasing of 450 acres of lands for investment purposes. However, no post implantation review has been done in relation to this project to evaluate the project has achieved its expected benefits.

Various studies carried out by the researchers and the nongovernmental organizations revealed that the current urban regeneration initiative has created new set of challenges related to restoration of lost livelihoods of the relocated peoples, reestablishing the disturbed social linkages, ensure to maintain steady household income to bear the newly added rentals and service charges, addressing maintenance issues related to new housing schemes, issues related to demographic profile of the relocated communities, attitude and behavior of the people to accept to accept the new housing and adopt to new life styles, etc. (Chularathna, 2014). Therefore, it is important to evaluate to which

extent those aspects are covered under existing urban regeneration project for City of Colombo.

Further, attracting investments for the liberated lands has also become a challenge for the project. As discussed in the CCCDP 2019-2030, the relocation is not the ultimate or the sole solution for the current issue related to underserved settlements. Therefore, it highlights the need of planning intervention where city development strategies also integrate with the current regeneration initiatives to get the optimum benefits of the liberated lands.

In the view of foregoing it is important to carry out a proper economic appraisal of this project to get a better understanding on project risks and sensitive aspects of the project.

Previous studies on the urban regeneration project have identified various aspects related to its socio-economic and physical implications. However, a comprehensive study on its feasibility with costs and benefits associated is yet to be performed. Therefore, this research aims to fill this gap. Basically, this research is focused on the quantification of the advantages (benefits) and disadvantages (costs) associated with a project and evaluate the decisions in relation to sensitivity analysis.

1.3 Aim and objectives of the study

This study aims to assess the economic feasibility of urban regeneration projects in Sri Lanka with special reference to case study of Mihidusenpura housing scheme Dematagoda in Sri Lanka.

In achieving the above aim, following objectives are outlined.

1.3.1 Research objectives

The objectives of the research can be listed as follows.

- To review features, challenges, factors influencing urban regeneration and the application of cost benefit analysis to regeneration projects
- To identify the components of costs and benefits of regeneration projects

- To evaluate the cost and benefits of an urban regeneration project implemented under the Urban Regeneration Project of City of Colombo as a case study.
- To identify the issues in urban regeneration projects in Sri Lanka.

An initial literature review has been carried out by referring published and published reports on urban problems, urban regeneration and its appraisal methods and set up background for the study.

This was followed by the primary data collection. Key Informant Interviews (KIIs) and documentary review are the key tools used for primary data collection. Semi structured KII was carried out with officials of relevant government organizations, and the apartment dwellers.

Urban rehousing project of Mihindusenpura housing scheme was selected as the case study for the CBA and the quantitative data required for CBA was basically obtained from the secondary data sources, i.e. UDA budget reports, BOQ, Progress reports etc.

The graphical representation of the research process adopted for the study is shown in figure.1

The chapter 03 provides a comprehensive explanation on the research methodology adopted for this study.

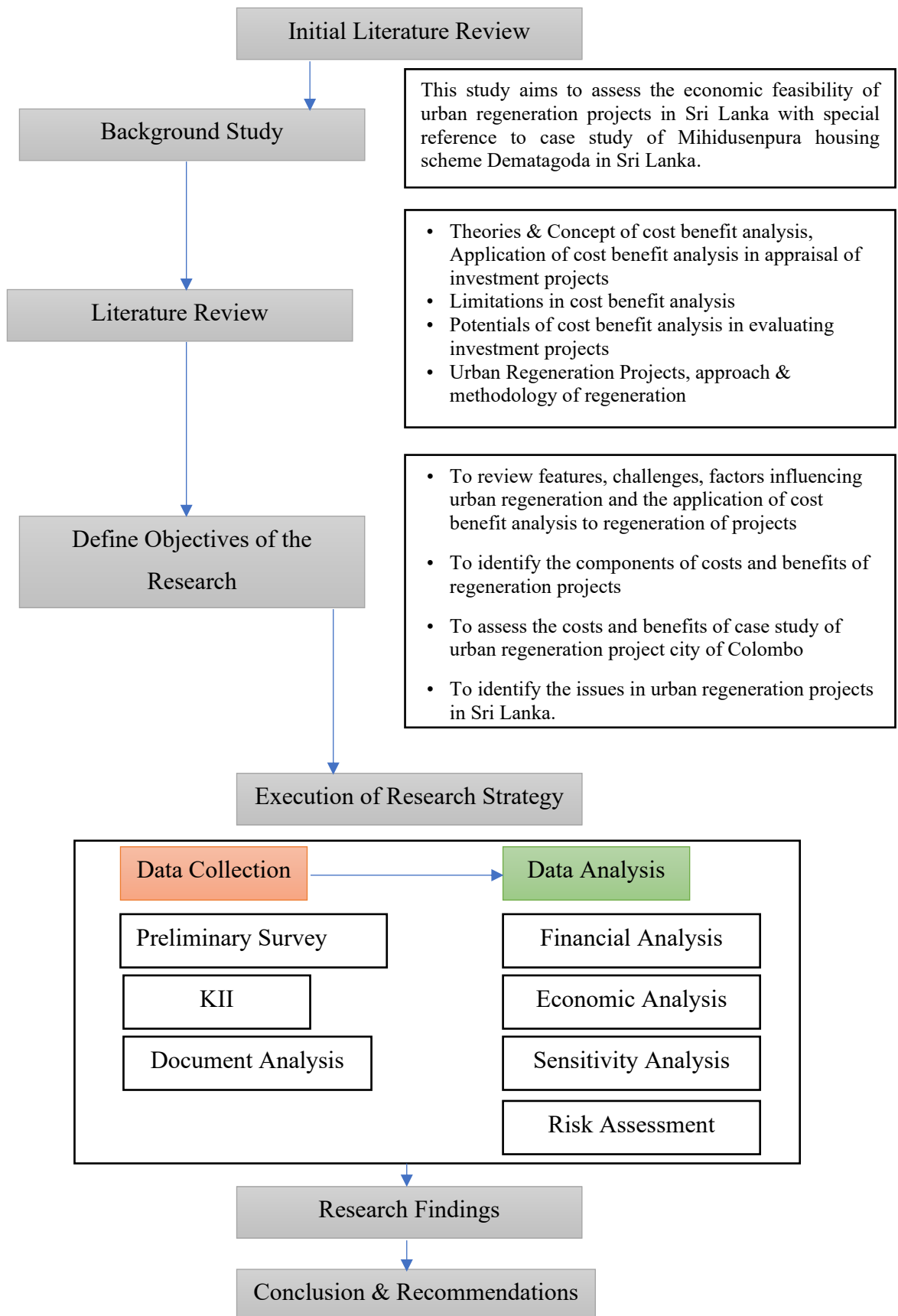


Figure 1-1: Research Methodology

1.4 Scope and limitations

There are different reasons shown by different researchers for the success or failure of urban regeneration projects; i.e.: regulatory frameworks, socio economic conditions, physical form and location specific matters, etc. In this research, it is only evaluated based on the outcomes of the cost benefits analysis of the project.

Certain costs and benefits which cannot be quantified due to the non-availability of quantifiable data was not considered under this analysis, i.e.: value addition due to social mobilization, improved environmental conditions, costs due to loss of livelihoods, etc.

1.5 Chapter breakdown

Chapter 01- This Chapter provides an overview of research background, problem statement, aim and objectives, along with the brief outline of the research methodology employed for the study, and also chapter provides the scope and limitations of the study together with chapter breakdown.

Chapter 02 – The second chapter is literature review of the research: Particularly, this chapter provides a comprehensive review on the urban regeneration definitions of different researchers and authors, urban regeneration process, urban regeneration key features identified by different authors and researchers. And also provide brief description how urban regeneration projects evaluations in global context. The later part of the chapter, provides literature analysis on description economic evaluation tools using for analyze urban regenerations projects. Further chapter provide comprehensive literature on definitions of cost benefit analysis, and steps which conduct the cost benefits analysis.

Chapter 03 - Research methodology: This chapter explains the methodology adopted for the research. Further, details of approach and tools deployed in the executing the methodology and the reasons for using those to achieve the research objectives are discussed under this chapter.

Chapter 04 - Data analysis and discussion: This chapter consist of the details of case study and the data analysis. The CBA process found through the literature review has adopted for the analysis of the data under this chapter. The analysis includes financial analysis, economic analysis and the risk analysis of the identified case study.

Chapter 05 - Conclusions and recommendations: This chapter concludes the research findings relating to aim and objectives of the research, and further it provides recommendation on this topic.

2 LITERATURE REVIEW

2.1 Introduction

This chapter presents the literature review initially on definition of urban regeneration, features of urban regeneration, urban regeneration process, factors requiring regeneration how urban regeneration projects evaluations in global context and local context and also challenges in urban regeneration. Latter part of literature review will be focused on economic evaluation techniques followed by definitions, principles and key steps of cost benefit analysis in detail.

2.2 Urban regeneration

The urban regeneration is a process which involves comprehensive and combined vision and action that leads to the resolving existing urban problems and bring lasting improvements in the economic, physical, social and environmental condition of an area as consequence of the actions taken. (Roberts, 2000) This process reverses the physical, socioeconomic and the environmental degradation of an area subject to urban regeneration. (Treasury, 2007)

The literature identified urban regeneration initiatives as an interactive process which focuses on the development of structures attached to users of the space, thus human being is considered as an integral part of this process. Therefore, the urban regeneration provides the potentials that have a far-reaching impact on the society (Barrie, 2009; Yau & Chan, 2008).

According to the above definitions and descriptions it can be concluded that urban regeneration initiates for solve or remedy measurement of urban problems and it is a process of economic social, physical environmental change.

Urban regeneration process has key features. The various authors and researchers have identified those features as discussed below.

As per the Roberts (2000) the key features of the urban regeneration project as follows

- an interventionist activity.
- an activity that straddles the public, private and voluntary and community sectors.
- an activity that is likely to experience considerable changes in its institutional structures over time in response to changing economic, social, environmental and political circumstances;
- a means of mobilising collective effort and providing the basis for the negotiation of appropriate solutions;
- a means of determining policies and actions designed to improve the condition of urban areas and developing institutional structures necessary to support the preparation of specific proposals.

Apart from the above Turok (2005) also identified three typical features of modern-day urban regeneration initiatives;

- It is a participatory process where each stakeholder has a stake in the in the transformed space.
- Urban regeneration process embraces numerous objectives and activities which falls within the main functional responsibilities of the central government, depending on the area's particular problems and potential.
- it usually includes some form of partnership among different stakeholders.

2.2.1 Factors requiring regeneration projects

The need of an urban regeneration project can be evaluated based on various factors. This section identifies the factors imply the need of urban regeneration initiatives. The literature revealed that these factors can be vary with the geographical location and the context. (Çamlıbel, Alhanlıoğlu & Uğurlu, 2015).

According to Çamlıbel, Alhanlıoğlu and Uğurlu, (2015) these influential factors for urban regeneration projects can be broadly categorized as factors relevant to developed countries and the factors relevant to developing countries. *Table 2-1*

Table 2-1: Factors requiring regeneration projects

Developed countries such as western European countries and the US	Developing Countries
<ul style="list-style-type: none"> • Globalization and therefore the necessity to be a global city. • Urbanization and metropolization dynamics. • Decentralization of industrial areas (deindustrialization) (Loures, 2015) • Down turn of the specific city functions & reconversion of industrial areas, adaptation of particularly old and non-functional industrial and logistics areas (port, train station, storage areas, etc.) to the modern city with different functions. • Changing structure of industry, and technology, media, ICTs sectors becoming the main focus of business life (Gullino, 2009) • Change in the regions whose function needs to be modified as a result of the changing economic and technological conditions in the city; (Özden, 2008) • Creating new attraction centres inside the city through creating new commercial areas (e.g. Paddington Project and Potsdamer Platz); • Areas excluded from the remaining city centre developments, enrichment & city revitalization, making the city a centre of attraction, revival of the regions whose social and economic value are intended to be enhanced inside the city mostly through art, sports and cultural events. • Revival of the local economy, social integration, sustainable community development. 	<ul style="list-style-type: none"> • Rapid population growth, economic development and disorderly urbanization;(Özden, 2008) • Immigration and development of squatter areas and shanty settlements caused by immigration (Hassan, 2012; Güzey, 2009; Dündar, 2001) • The requirement to transform the squatter areas into quality living spaces. (Hassan, 2012) • Shortages in the urban infrastructure and social infrastructure (Alpopi & Manole, 2013) • The need to increase the quality of living; (Alpopi & Manole, 2013; Zhai & Ng,2013) • The requirement for new modern city developments as a result of political sociocultural and socioeconomic changes (Grazuleviciute-Vileniske & Urbonas, 2014) • The need for physical improvement because of non-durable, unreliable and aging building stocks; (Güzey, 2009) • Risks of natural disaster (flood, land slide, earthquake, etc.); • Crime & security; Unemployment and the need to create employment opportunities; (Dündar, 2001) • Provision of public services. (Güzey, 2009) • Regeneration of historical areas and refurbishment of historic buildings (Said et al., 2013)

2.2.2 Urban regeneration process

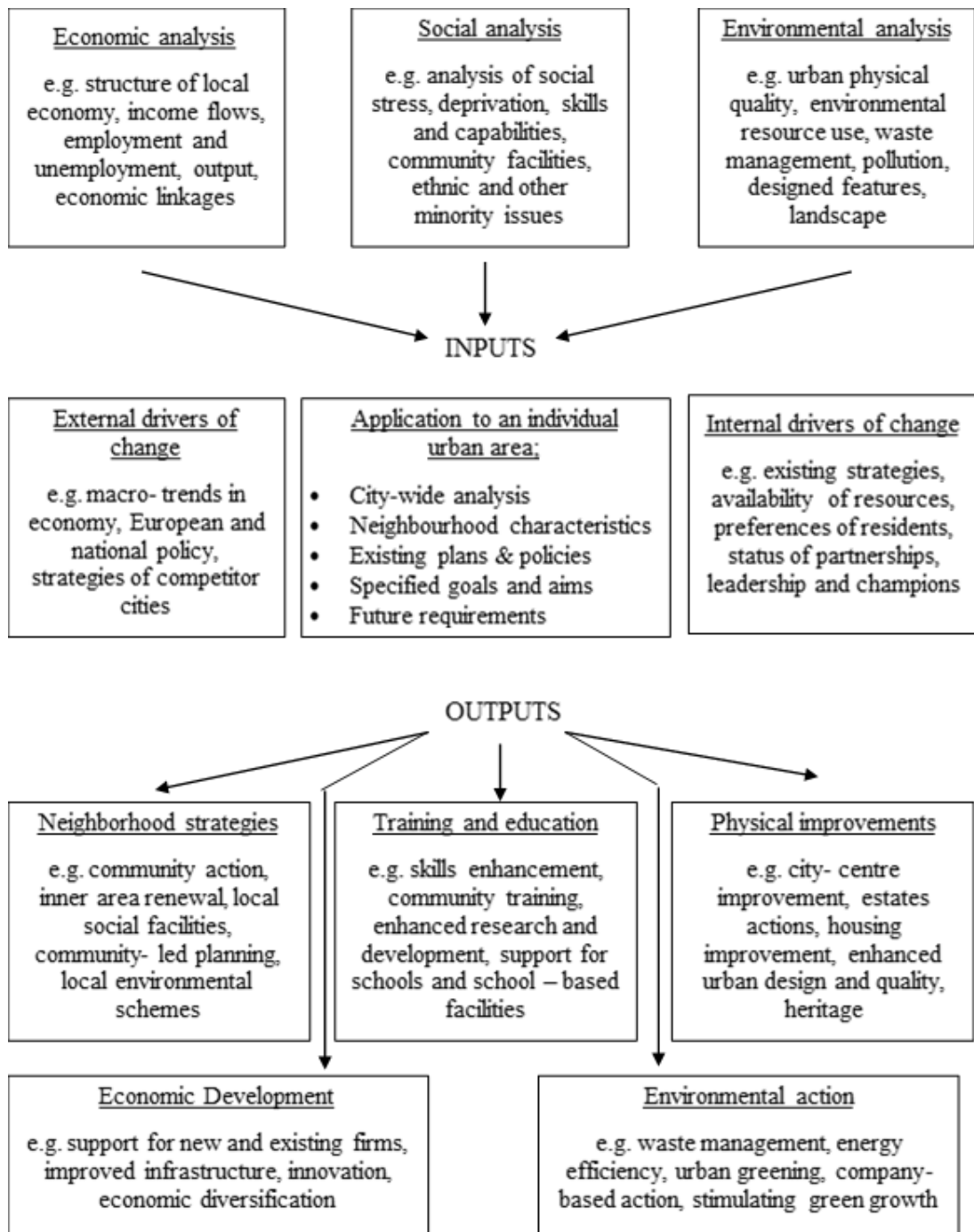


Figure 2-1: Urban Regeneration Process

According to the Robert (2000) the urban regeneration process includes not only economic analysis but also various other analysis related to socio economic and environmental condition of the area under investigation. These includes

comprehensive social analysis, environmental analysis, analysis of external drivers of change, detailed site analysis and analysis of internal drivers of change. These inputs allow the decision makers to get a comprehensive understanding of an area under consideration.

The outputs of the urban regeneration process include neighborhood strategies, training & education, physical improvements of the area, economic development and environmental actions (Robert, 2000). Accordingly, urban regeneration process also covered all the steps involved in urban area development.

Therefore, proper economic appraisal of an urban regeneration project will allow the decision makers to identify strategies in relation to the outputs of the urban regeneration project.

2.2.3 Challenges in regeneration projects.

Challenges of urban regeneration project may vary from project by project, country to country but follow are common challenges identified.

Land ownership

Land ownership can be identified as a key challenge for implementation of urban regeneration projects. Although the public land ownership is desirable for the effective implementation of the urban regeneration projects, the lengthy processes involved in alienation of lands for the development delays the development. Alternatively, private lands can be purchased at the development value, however due to the unseasonable expectation from land owners in respect of land values create difficulties to make in feasible for the investors interested in urban regeneration initiative. Further higher initial cost in land acquisitions will constraint the improvement of social value through the urban regeneration, i.e.; provide affordable housing, social infrastructure developments, etc. Furthermore, brownfield land brings its own issues where it requires decontamination, potentially causing the value of the land to depreciate immediately.

Environmental quality and sustainable development

Achieving the environmental quality and sustainable development is also an important aspect of an urban regeneration project. However, cost associated with improving the

environmental quality and sustainable development are not matched by benefits. These costs excessive consumption of energy, the inefficient use of raw materials, the neglect of open space, and the pollution of land, water and the atmosphere. (Ache, Bremm and Kunzmann, 1990). The to avoid these costs remedial measures needs to take by utilizing public funds. Therefore, the achieving the environmental quality and the sustainability development is a challenge in relation to the urban regeneration initiatives.

Contribute to the achievement of sustainable development. `

As discussed above another main challenge faced during the implementation of urban regeneration initiatives is its contribution to the achievement of sustainable development. As the world's economic system is increasingly an urban one' and this system `provides the backbone for natural development' (World Commission on Environment and Development, 1987, p. 235), new strategies needs to identify for urbanization without depleting natural resources. (Roberts, 1997). As this is a complex process it is difficult to assign responsibility of measures related to achievement of sustainable development and to whom such cost components should be attributed.

Social and community issues

Economic transition of an urban areas creates new set of social problems in urban areas. However, economic transition is not the only factor affect for the social and community issues associated with the urban regeneration projects. The specific social and community issues related to urban regeneration projects involved changes in socio demographic trends, breakdown of family and community structures, changing social perception and values, etc. Addressing all these issues during an urban regeneration process is a challenging task.

Economic transition and employment change

The urban regeneration involves the economic transition and the employment of changes of the existing occupiers of lands. These changes need to be addressed during the urban regeneration process and proper strategies should be in placed to overcome any difficulties faced by most vulnerable groups of urban regeneration initiatives.

Physical obsolescence and new requirements

Physical obsolescence and new requirement are a common challenge face in many urban regeneration initiatives. This is caused due to the in-situ decay, the functional obsolescence of buildings, dilapidated lands, outdated infrastructure, changed accessibility and etc. Physical obsolescence of areas creates major task for the urban regeneration. Physical decline of a city can be identified through various factors related to economic, social and institutional systems of the urban areas and ultimately provide foundation for the urban regeneration.

Physical problems arise due to changes in the requirements of the users of urban land and premises, because of the deterioration of the stock of urban buildings and infrastructure, and as a consequence of market failures in the system of land ownership and control.

Accordingly, the main challenges faced by the urban regeneration can be identified as issues occur on social and community, economic change and employment change, physical oldness of context and new desires of society. Ownership of lands, quality assurance of environment and sustainability as well as achievement of sustainability. Therefore, during the implementation of an urban regeneration project due recognition should be given to the above explained challenges to overcome possible project issues.

2.2.4 Urban regeneration projects in global context

In order to get the better understanding on how the urban regeneration projects operate in other countries, a literature review was carried out on best practices in urban regeneration projects implemented worldwide.

The literature revealed that the physical and social degradation of the central urban areas is a common phenomenon in most of the developed cities. This is caused due to the abandoning of old urban spaces and the reduction of investments in the assets in those areas (Urbeviva, 2007). New set of social and economic problems has been created as a consequence of the progressive deterioration of the old urban centers. Therefore, in many European cities urban regeneration principles have been adopted to create better urban spaces to attract people back to cities. Most of these interventions have been implemented as public interventions (Bianchini, 1999; Law, 2000; Balsas,

2001; Balsas, 2004). In most of the regeneration projects the prominence was given to the restoration of deteriorated architectural heritage and its public interest was justified based on that. (Couch et al., 2002) It is assumed that these architectural elements in the restored sites, confer the prestige and a the imageability of the city. (Orueta, 2007)

During the literature review it was found that UK and Australia have adopted urban regeneration as a technic for continuous upgrading of urban areas in those countries.

UK Case Studies

Amongst these two countries the UK has been one of the first developed nation to produce a national strategy on the sustainable development and regeneration concept (Department for Environment, Food and Rural Affairs (DEFRA), (Dixon, 2006). They have adopted the sustainable development and regeneration principles in both theoretical and practical terms (DEFRA, 2011).

Although various sustainable initiatives have been developed in UK with various frameworks and indicators, regeneration projects are yet to make serious impact on improvements social and economic wellbeing of the communities where these projects have been implemented (Lombardi et al., 2011; Audit Commission Report 2007). Therefore, in more recent times, there have been a number of researches works which sought to study and analyze how the UK built environment was responding to the challenges of integrating sustainability into regeneration projects (Dixon, 2006)

This stress the importance of proper economic evaluation of regeneration projects rather than simple financial feasibility of projects. Therefore, the UK government has invested over £13bn during the period of 2007- 2011 for promotion and delivery of socio-economic regeneration benefits. (CLG, 2008)

Liverpool regeneration project can be identified as one of urban regeneration example in UK discussed above. Liver pool was a neglected city long years ago, but in 2004 with the change of leadership of UK, developers motivated to invest in liver pool, £1 billion invested to Liverpool all the projects initiated in 2008 and many projects were initiated and implemented such as Baltic triangle project, Liverpool ONE project, Rope walks and Echo Arena liver pool and some projects are in pipe.

Liverpool ONE project

One of the main highlighted projects of Liverpool regeneration is the Liverpool ONE project. The aim of the particular redevelopment scheme, also known as the Paradise project, aimed to regenerate 42 acres of underutilized land in Liverpool city center and the vision was to create a mixed-use development with retail, food, leisure, public space, office and residential accommodation, a place where people could live, travel, play and work.

Once the Liverpool city center project was completed, the impact it had on the economy of Liverpool city was announced. It made Liverpool one of the top five most popular shopping destinations in the UK.

New businesses are booming and more than 40% of Liverpool One retailers are newcomers to the Liverpool area. By the end of 2008, Liverpool One's total footfall had surpassed 13 million. Liverpool eventually became a major shopping destination in the UK. Not only has the retail district increased its footfall, but Albert Pool has seen an increase of about 100,000 visitors per week, an increase of 46% overall. Now one decade has passed the project.

Urban regeneration City of Manchester -Castlefield

A partnership between Manchester Urban Council and the central Manchester Development Corporation was formed for the purpose of implementation of an urban regeneration programme for the Castlefield area as a result of the decline in rail and canal transportation due to changes in industry in the 1950's and 1960's the Castlefield area became a decline.

The major regeneration projects completed through the partnership. Especially housing and leisure development mentioned in the following paragraphs.

- Redevelopment of the Middle warehouse
- Housing Development of Slate wharf
- Merchants' warehouse
- Merchants Bridge

All above project has support to improve all aspects such as economic, social, physical and environment.

The Sao Paulo Community

The Sao Paulo community is located in center of Lisbon's downtown area. All-inclusive with historical buildings, narrow streets, square, heterogeneous and different space.

The location itself is hard hit by occupancy rate in certain buildings, loss of residents, population aging and economic and social problems. These circumstances created physical degradation of this area and this leads to social and economic degradation.

To despite the degradation problems of this area the municipally focuses for urban regeneration intervention in year 2005 and the regeneration programme aimed to attracting people and business as the location already owned with historical buildings and architectural heritages. After the regeneration it leads improve all aspects such as economic, social, physical and environment.

All these UK examples stress the importance of urban regeneration projects to achieve the sustainable development goals. However, most cases identify the importance of proper framework and tools for evaluations of projects to make sure the socio-economic benefits of the regeneration projects distribute among all stakeholders of the projects.

Australian Case Studies

The Australian examples has more similarities to the Sri Lankan context where most of the urban regeneration projects was focused on regeneration of urban areas and development of social housing schemes.

In Australian context, State Housing Authorities (SHA's) had allocated funds in 1990s, for urban regeneration projects to overcome the disadvantaged groups in housing estates in Australia (Parry and Strommen, 2001). The emergence of regeneration projects has gained its prominence with the introduction of the social housing policies in Australia during the past decade (Randolph & Judd, 2006). From the early 1980s to present, hundreds of millions of dollars of public and private funds have been spent on regenerating disadvantaged Australian public housing neighborhoods (Hughes, 2004). Achieving a balanced social mix to create more diverse community was the aim of the

most of the contemporary Australian regeneration policies. Different development typologies were adopted in most of these renewal programs such as outright physical development and stock replacement for sale, to community developments (Randolph & Judd, 2006).

Within the Australia the NSW has the longest history of evaluation of urban regeneration policies. Most of these studies were carried out as a part of studies carried out by the New South Wales Department of Housing (NSWDoH) with the support of various consultants and academic groups. Although various studies were carried out in relation to the urban regeneration project NSW is also yet to develop a coherent evaluation framework for evaluate the urban regeneration projects (Randolph & Wood, 2003; Randolph & Judd, 2006).

In the above context it's important to look in to the some of the cases related to NSW renewal programs. The case study discussed below is a regeneration project implemented in Sydney.

Since the early 1900 Sydney experienced urban renewal till today. Barangaroo, the bays precinct and green square are recent urban reservation project in Sydney.

The Barangaroo is located in north-western fringe of Sydney central business district function as harbor related activities early today 22 hectares has used for major regeneration project utilizing \$6 billion for accommodate urban commercial and residential activities 50% area purposely utilize for open public activities. The project directly contributes to generate over 24000 jobs and accommodate 3500 residents for the area. The project concern on

- Relocation of the proposed hotel within land and original site boundaries
- Affordable housing for at least 10% of households
- The gross floor area of the proposed buildings will not increase
- Building designs that increase sunlight in the winter and reduce the effect of wind tunnels
- Better public parks, wide streets and improved public access
- Build height adjustments to reduce the bottom right corner of the site

This case study exemplifies the importance of involvement of government entities in urban regeneration projects and the having proper policies and frameworks for execution of project as these projects has large components which is attributed to the social costs. In this background the projects cannot justify simply with financial feasibility of the projects. Therefore, comprehensive economic analysis needs to be carried out in evaluation of these type of projects.

Apart from the above UK and Australian examples several other cases in America and Nigeria were studied during this study and following common issues could be identified during this research. In line objective 04 of current study, herewith discuss the issues identified through literature review, related to urban regeneration projects in global context.

- Social relationship breaking ups

The urban regeneration projects have caused to breaking up of important social relationships due to both in site and off-site relocations. Most of these social relationships were important in their daily routine of the life.

- Interruption of the existing economic systems and opportunities

Although regeneration activities open up new economic and employment opportunities in most of the cases it interrupts the existing economic systems and the opportunities in particularly to the most disadvantaged groups of the community.

- Pressure on existing infrastructure systems

The urban regeneration projects attract displaced squatters and new communities back to urban areas and create congestion and increasing demand on the existing infrastructure systems of the cities. This create additional pressures on the infrastructure providing agencies in cities.

- Increase and or development of other squatter settlements elsewhere in the city

Although urban regeneration projects create new social housing schemes with better facilities for the marginalized groups. They did not stay in those locations in the long

run due to not having proper social mobilizations, loss of livelihood opportunities and increasing costs. Therefore, they tend to create new squatter settlements elsewhere in the city.

- Unaffordability of the spaces created

The rent of the building created through the urban regeneration projects were comparatively high and therefore the most of the communities were unable to afford the increased costs. The retail services offered in these spaces were also comparatively expensive than the prices were before the regeneration

- Housing conditions were made worse for those whose housing conditions were good.

The most of the social housing schemes and low-cost housing schemes were developed based on the average quality of the existing housing schemes. Therefore, for those whose housing conditions were better than the average had to own worst houses than their previous houses.

The above difference experience in the global context gives insights about advantages and disadvantages about various urban regeneration projects. It allows to understand the lessons learnt through urban regeneration practices.

2.2.5 Urban regeneration projects in Sri Lanka.

Various urban regeneration projects have been implemented in Sri Lanka from the past. This literature review is focused on two major urban regeneration projects implementing in Sri Lanka. Both projects are located within the city of Colombo which is the most urbanized city in Sri Lanka. The two projects identified for this literature review are;

1. Beira Lake Intervention Area Development
2. Urban Regeneration Project for City of Colombo

Beira Lake Intervention Area Development Project

This project is a part of Beira Lake Restoration Study conducted in year 1993 with the consultation of Sri Lankan and Canadian professionals. The outcome of the above

study was the Master Plan of Beira Lake and surrounding areas and 15 sites were identified under this master plan with the intention of creating waterfront as an investment epicenter.

Accordingly, key sites identified for regeneration under this project were:

- Lands occupied by the Army Headquarters, Colombo 01 (Baladaksha Mawatha)
- Lands at Sir James Peris Mawatha, Colombo 01 known as Colombo Commercial Land
- Redevelopment project by UDA at Slave Island (Colombo 02)project

Then the development density around the Beira Lake was low compared to other parts of the City of Colombo. Most of the lands around the Beira Lake are owned by the government and lands were occupied by the various government organizations and armed forces. Most of lands were underutilized and then land uses were not compatible with the proposed Master Plan for Beira Lake Intervention Area Development Plan. The proposed development activities by the Beira Lake Intervention Area Development Plan were related to commercial, tourism, recreational and residential development. This project needs to be supported with the other infrastructure development projects.

To connect the water front to the city center almost all the streets should be improved with considering the new developments. The Beira Lake waterfront can offer historical, economic and cultural important places close proximity and it can take full advantage of the attractiveness of the water front for working, living, walking and shopping etc. At present, significant public interest and enthusiasm can be seen about the city's urban water front. Hence, there is a considerable demand for large scale developments as well as recreational activities in and around the Lake.

The components of the Beira Lake Development Project include

1. Construction of Linear Park (Stage III) 1km 130 –completed project
2. Construction of Bank Protection of Western Bank of East Lake 600m – completed project

3. Construction of Bank Protection of Western Bank of East Lake 800m-ongoing project
4. Dredging of East and West Beira Lakes – 150- proposed project
5. Construction of Linear Park Access 600m proposed project
6. Relocation of 150 Houses –proposed project
7. Construction of Linear Park- proposed project

Some of components of the projects have been already implemented and the some are yet to be implemented.

However, the project has created a significant impact on the physical development of the City of Colombo. It has attracted lots of investments for the lands around the lake and both private sector and public sector has played a key role in the implementation of this project. Although proper economic evaluation not been carried out in relation to this project this project can be identified as a one of the strategic/ catalyst regeneration projects carried out in Sri Lanka. The effects and outcomes of this project can be already seen on ground. All new development attracted around the Beira South Lake and Beira West Lake are identified as outcomes of this regeneration initiative.

Urban Regeneration Project - City of Colombo (URPCC)

URPCC is the largest urban regeneration program implemented in Sri Lanka. The project is aimed to provide decent housing for all the communities living in Under Served Settlements in Colombo and liberate underutilized lands in city of Colombo for the investment purposes.

As per the survey carried out by the Real Estate Exchange (Pvt) Ltd in 1998/9 the Under Served Settlements (USS) in Colombo Municipal Council area was reported as, 1506 whilst SEVANATHA's survey in 2001 estimate the USS number to 1,615 in 2002. (CCCDP, 2019). The number of housing units in 1998/9 survey was 66,324, whilst the Sevanatha survey in 2001 found the number of housing units to be 53,659 (77,532 households) with a population of 336,000, which then accounted for approximately 50 percent of Colombo's population. The most recent survey carried out by UDA in 2011 finds the household numbers to be 68,812 and the number of settlements to be 1499. As per the survey, the population living in these underserved

settlements accounts for 53% of the total population of City of Colombo. The highest concentration of underserved settlements is within northern and central parts of Colombo Municipal Council area. 900 acres accounting for 9% of the total land extent of Colombo Municipal Council area are found to be covered with underserved settlements. The population of the settlements are often third or fourth generation residents, hence, a very low level of in-migration is prevalent.

57% of USS(Underserved settlement) occupants not having freehold rights to the land, as most of these settlements were built up as unauthorized constructions mostly within state lands or privately-owned estates, they often do not have legal basis and are categorized as illegal housing that do not meet the housing regulations and/or do not have the right to the land they occupied (CCCDP 2019-2030).

As a result of the existence of these settlements for over two adults' generations, no significant state intervention has not been given to solve the residents right for residence although they were considered as illegal settlements. Most of these illegal settlements are located along railway reservations, canal banks and other government owned reserved lands.

As per the survey conducted by Sevanatha in 2012, it has been found that 43% of occupants living in underserved settlements own freehold rights of their properties while 57% do not possess security of tenure. However, 23% of the occupants are issued with user permits (enumerator cards) which grant temporary rights to the lands they occupy and also describes about problems due to existence of underserved settlements. Problems caused due to existence of underserved settlements can be viewed in three aspects such as social, environment and economic. All the impact considered as negative.

1. Negative **social impacts** due to existence of underserved settlements

- a) Poor living conditions of underserved settlement community
- b) Relatively high probability of spreading diseases among underserved settlement communities
- c) Relatively high occurrence of illegal activities within underserved settlements associated areas

2. Negative **environment impacts** due to existence of underserved settlements.

- a) Pollution of water bodies linked with underserved settlements

- b) Flood occurrences due to blockage of natural drainages by unauthorized constructions
- c) Degradation of city visual quality due to existence of underserved settlements

3. Negative **economic impacts** due to existence of underserved settlements

Associated with the above discussed issue of deteriorating environmental visual quality due to underserved settlements, emerges another issue which is the reluctance of investors to invest in new developments in the areas in vicinity of underserved settlements. Also, as most of these underserved settlements are located in prime locations of the city, these lands are of high value and have the potential to be developed with high economic returns. However, when considering the present land values of City of Colombo, it can be observed that there is a large disparity between values of lands located at a same radius from the city center.

It has been found out that the land values of north Colombo, where relatively high concentration of underserved settlements can be observed is around LKR 3,000,000 per perch whereas the land values of areas towards south of Colombo located at a similar radius from central business district are above LKR 6,000,000 per perch. It shows the significant impacts of underserved settlements on city land values.

Project was launched with the intention of relocating underserved settlement dwellers of City of Colombo into modern houses in new housing schemes (mainly high-rise apartments) with standard facilities. The main concept of the project is to liberate 900 acres of lands covered with 1500 underserved settlements including around 68,000 households and to allocate 150 acres of lands for reservations, landscaping and open spaces for improvement of city environment, 300 acres of lands for rehousing (for resettlements) and 450 acres of lands for investment purposes.

As per the current status review of the project, around 4,900 housing units have been already completed and 13,200 housing units have been commenced with construction accounting for around 18,100 housing units in total. Even though, this project attempts to relocate majority of underserved settlements, with practical limitations, it has been revealed that relocation is not the ultimate or the sole solution. a planning intervention is required to view the issue of underserved settlements with a different perspective

and propose innovative solutions. At the same time, it is required to integrate the Urban Regeneration Project with the city development by incorporating the rehousing projects and proposing programs to get the optimum benefits of liberated lands.

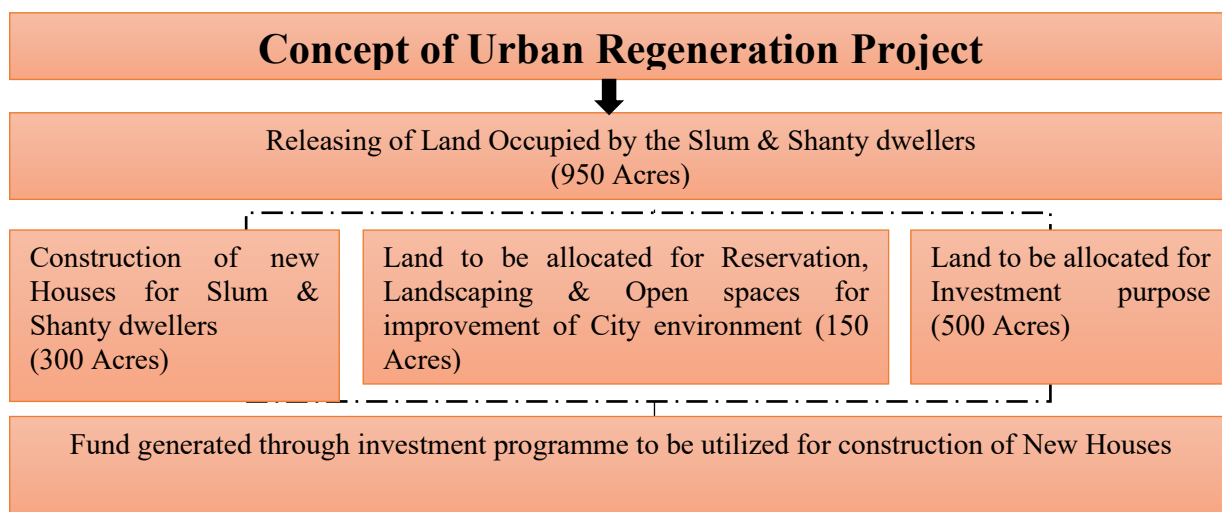


Figure 2.3 Concept of Colombo Urban Regeneration Project

This project is still implemented on the basis of above discussed simple justification of the project in terms of financial feasibility of the project. However detailed economic feasibility of the project yet to be carried out for this program.

2.2.6 Components of cost and benefit of urban regeneration project

In line with objective 02 herewith identify the components of costs and benefits of urban regeneration projects.

Before identify cost and benefits of regeneration projects, it is important to identify typical cost and benefits of a project. CEEU (2013) explains following typical cost and benefit of a project. Table 2.2

Table 2.2 Typical costs and benefit arising in projects

Costs	Benefits
Staff	Reduction in loss of life
Investment costs e.g. construction costs, materials etc	Reduction in health care costs
IT costs	Accident savings

Fixed assets	Travel time savings
Equipment	Reduced environmental emissions
Overheads	Lower operating and maintenance costs
Operating costs	Job creation
Maintenance costs	Increased water quality
Negative externalities (e.g. water/noise pollution)	Scenic benefits

Cost and benefits are somewhat unique to project to project but there are common cost and benefits in all of the projects.

Ribeiro (2008) identified major cost and benefits of regeneration project the case of Lisbon's Old Downtown

Cost	Benefits
Opportunity costs of property	Asset sales and rentals
Improvement costs	Lower social cost
Tenants relocation costs	Better living environment
Forgone revenue	

According SGS (2000) direct and indirect cost and benefits of public housing renewal (regeneration) projects can be identified as follows:

Costs	Benefits
Opportunity Costs on Land and Improvements	Sale of Surplus Assets Up-front
Capital Costs – Housing and Infrastructure	Sale of Residual Assets on Wind-up
Recurrent Costs – Housing and Infrastructure	Better Living Environment for Public Rental Dwellings. - Higher standard dwellings - Better neighbourhood amenity - Reduced Stigma
Tenant Relocation	Better Living Environment for Other Dwellings in the Neighbourhood. - Higher standard dwellings - Better neighbourhood amenity

	- Reduced Stigma
Compensation Paid	Reduced Social Dysfunction Generally - Possible Society wide benefits as reflected in social indicators
Extra Tenant Costs	
Tenant Dislocation - Possible loss of support networks	
Reduced Housing Opportunities	

Cost and benefits are somewhat unique with project to project but there are common cost and benefits identified in regeneration projects such as land acquisition cost, land development cost, compensation payments ,relocation of tenants cost ,investment cost, cost for staff , maintenance cost ,insurance payments etc.as costs and up lift living condition, (better living environment),assets sales rentals, creation of new job opportunities, better common facilities.

2.3 Economic evaluation techniques

Economic evaluation techniques are mandatory requirement of decision making on investment projects. Following paragraphs describes on economic evaluation techniques which can be used for evaluate urban regeneration projects.

Urban regeneration projects have many components, and also can be divided in to two categories. some with benefits measurable in monetary terms and some with single or multiples benefits that are not measurable in monetary terms (Schofi eld, 1987; Rosenfeld & Shohet, 1999; ODPM, 2004; CMHC, 2005).

Ribeiro (2008) described about three basic techniques that can be used for economic analysis of urban regeneration programmes. Those are cost effective analysis; weighted cost-effective analysis and cost benefit analysis, further he explains the main difference between the techniques is in the measurement of benefits. The techniques to be used for the evaluation of a project is depend on the nature of the project, information availability and time constraints.

Accordingly, the Cost-benefit analysis is a tool that can be used evaluate a project with costs and benefits which can be measure using monitory terms and whose output has a market price that is relatively easy to assess (EU, 2002)

Cost-effectiveness analysis and weighted cost-effectiveness analysis can be used for comparing projects whose benefits are not readily measurable in monetary terms (Levin, 1983).

Cost-effectiveness analysis and weighted cost-effectiveness analysis are used to evaluate two alternative action which can deliver same stated goal, and this technique is used to compare the most effective action among two alternatives under evaluation. (Needleman 1969; Ruegg & Marshal, 1990; Balchin et al., 1992; Levin, 1993; Fukahori and Kubota, 2003; Kirk et al., 2004). Both analyses concentrate on the minimization of cost subject to the provision of a given goal or standard.

According to above descriptions out of three main analysis methods cost benefit analysis is most appropriate tool for programs which has measurable benefits in monetary terms. Therefore, this literature review focusses more details on cost benefit analysis.

2.4 Cost Benefit Analysis (CBA)

The literature identifies the use of CBA from the early 19th century. It had been used by the governmental agencies in US in environmental management (Hanley & Spash, 1993).

CBA commonly used to support the decision-making process in urban projects (Tudela et al., 2006) It is a model used to assess the best policy decisions. (Bichou, 2004)

CBA has limitations to measure the efficiency of the proposed, therefore it is difficult to evaluate the performance of a project using CBA technic (Bichou, 2004). Further results of uncertainty also cannot evaluate only with CBA technique (Bichou et al., 2009). CBA can be used for organizing information required for the decision-making process as both costs and benefits are gathered in monetary terms. As cost and benefits are gathered in monetary terms it can be easily comparable and the values are transparent as it can be identified for any party involved in the decision making (CWoA, 2006). CBA has been widely used for decision making related to evaluating decisions of investment projects.

In order to comprehend on the CBA process and procedure it is required to understand the basic concepts, variables and features of the Cost Benefit Analysis. Based on the following concepts a detail analytical frame work has been developed by the European Union to evaluate the investment projects using CBA technique. (EC, 2014)

2.4.1 Types of cost benefit Analysis.

Boardman et al. (2005) described four types of cost benefit analysis.

- 1) Ex ante CBA – conducted prior to the intervention. Useful to show whether resources should be used on a program or project.
- 2) Ex post CBA – conducted at the end of the intervention. Provides information about the particular class of intervention.
- 3) In medias res CBA- conducted during the intervention.
- 4) Comparative CBA – compares the ex ante predictions to ex post results for the same project (very few of these comparisons have been conducted because the clients of ex post analyses are different from the clients of ex ante analyses).

2.4.2 Cost Benefit Appraisal steps

There are essential steps which should be followed once conduct a Cost Benefit Analysis. Different entities of world-wide, describe on essential steps of cost benefit analysis. Below given paragraphs describes on essential steps which should carry out once conduct a cost benefit analysis.

Follow are the standard appraisal steps introduced by CEEU (2013).

- i. Define the objective
- ii. Explore options taking account of constraints
- iii. Quantify the costs of viable options and specify sources of funding
- iv. Analyse the main options
- v. Identify the risks associated with each viable option

- vi. Decide on a preferred option
- vii. Make a recommendation to the sanctioning authority

European Commission introduced guide to cost-benefit analysis for investment projects, described about following steps (EC, 2014) (from page 33 up to page 42 describe on guideline steps and Appendix 01 provide comprehensive description of guideline steps)

Standard Cost benefit analysis is comprised of seven steps:

1. Context details
2. Objectives with definitions
3. Project description
4. Technical feasibility & environmental sustainability
5. Financial assessment
6. Economic assessment
7. Risk analysis

2.4.2.1 Description of the context

Initially it is mandatory requirement to describe about economic, social institutional and political context of proposed project.

Briefly follow are the areas (features) which needs to describe under this step.

Socio economic data (specific region or country the project going to be implemented), Related policy framework or institutional aspect (National plan/Development plan initiations, institutional capacity and quality of involved work, etc.), level of service provision and infrastructure availability, statistic and other information related to quality life (presence of environmental issues), the insight and outlook population vs service to provided.

Basically, this step contained back ground of the project. Simply the steps provide answer for question of how the project initiated and also give good rational for project initiation.

2.4.2.2 Definition of objectives

Objectives the project should defines according to needs assessment build upon the step one of cost benefit.

A clearly defined objectives should be identified for the effectiveness of the project.

- Identify the effects of the project
- Identification and verification of relevance and rationale of respective project outcomes with the given priorities

2.4.2.3 Identification of the project

Project identification is considered completed if there are two conditions met. Firstly, the objectives of the project should be achieved through justified analysis in the provision of goods or services when fulfilling the physical features of the project. Secondly, the agency or body responsible for the tasks should recognize its resource strength in terms of technical and financial assessments. Identification of the project boundary with its impact area, key stakeholders and beneficiaries must be pre requisite for accurate identification of the project.

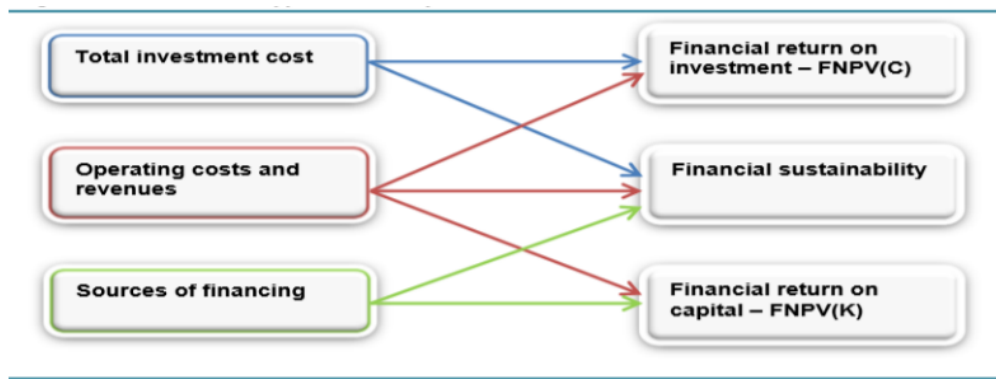
2.4.2.4 Technical feasibility and environmental sustainability

Although both analyses are not formally part of the CBA, their results must be briefly reported and used as a main data source within the CBA. Detailed information should be provided on:

- demand analysis;
- options analysis;
- environment and climate change considerations;
- technical design, cost estimates and implementation schedule.

2.4.2.5 Financial analysis

A financial analysis must be included in the Cost benefit analysis to calculate the project's financial performance indicators.



Source: EC CBA Guide 2008

Figure 2-2: Structure of Financial Analysis

	FNPV(C)	SUSTAINABILITY	FNPV(K)
Investment costs			
Start-up and technical costs	-	-	
Land	-	-	
Buildings	-	-	
Equipment	-	-	
Machinery	-	-	
Replacement costs	-	-	_*
Residual value	+		+
Operating costs			
Personnel	-	-	-
Energy	-	-	-
General expenditure	-	-	-
Intermediate services	-	-	-
Raw materials	-	-	-
Other outflows			
Loan repayments		-	-
Interests		-	-
Taxes		-	
Inflows			
Revenues	+	+	+
Operating subsidies		+	
Sources of financing			
Union assistance		+	
Public contribution		+	_**
Private equity		+	-
Private loan		+	

Source: Adapted from EC CBA Guide 2008.

Components of Financial Analysis can be identifying as follows

- a) Investment cost, replacement costs and residual value
- b) Operating costs and revenues
- c) Sources of financing
- d) Financial profitability
- e) Financial sustainability

2.4.2.6 Economic analysis

One of important analysis of come under cost benefit analysis is economic analysis. Because this analysis looks upon social welfare perspective. Economic analysis intends to assess the contribution to social welfare and use shadow prices to highlight the opportunity costs involved in social benefits.

The standard approach suggested in this guide, consistent with international practice, is to move from financial to economic analysis. Starting from the account for the return on investment calculation, the following three adjustments should be:

- fiscal corrections;
- conversion from market to shadow prices;
- evaluation of non-market impacts and correction for externalities.

After market prices adjustment and non-market impacts estimation, costs and benefits occurring at different times must be discounted. The discount rate in the economic analysis of investment projects, the Social Discount Rate (SDR), reflects the social view on how future benefits and costs should be valued against present ones. General principle is to reject projects with an ERR less than social discount rate.

2.4.2.7 Risk assessment

Uncertainty of various inputs within the project life cycle will be assessed through risk analysis which include the climate change impacts as well. Key steps involved in this process include the following:

- sensitivity analysis;
- qualitative risk analysis;
- probabilistic risk analysis;
- risk prevention and mitigation.
- **Sensitivity analysis**

The analysis is carried out by varying one variable at a time and determining the effect of that change on the NPV. As a guiding criterion, the recommendation is to consider 'critical' those variables for which a variation of ± 1 % of the value adopted in the base

case gives rise to a variation of more than 1 % in the value of the NPV. The tested variables should be deterministically independent and as disaggregated as possible.

A particularly relevant component of the sensitivity analysis is the calculation of the switching values. This is the value that the analyzed variable would have to take in order for the NPV of the project to become zero, or more generally, for the outcome of the project to fall below the minimum level of acceptability. The use of switching values in sensitivity analysis allows making some judgements on the risk of the project and the opportunity of undertaking risk-preventing actions.

Switching Value is the value that the analyses variable would have to take in order for the NPV of the project to become zero, or more generally, for the outcome of the project to fall below the minimum level of acceptability.

- **Qualitative risk analysis**

To undertake the qualitative risk analysis, initially it is needed to identify the adverse events that the project may face.

Once the potential adverse events have been identified, the corresponding risk matrix may be built. The adverse event occurrence or probability can have 5 scale classification from highly unlikely (0-10% probability) to very likely (90-100% probability).

Similarly, Severity (S) of impact based on the overall negative impact for social welfare of the project can have classification of I to VI where I represent no effect while VI represent catastrophic impact. Table 2-2 shows the classification details associated with the occurrence probability.

Risk severity classification

Table 2-2: Risk Severity Classification

Rating	Meaning
I	No relevant effect on social welfare, even without remedial actions.
II	Minor loss of the social welfare generated by the project, minimally affecting the project long run effects. However, remedial or corrective actions are needed.
III	Moderate: Social Welfare loss generated by the project, mostly financial damage, even in the medium-long run remedial actions may correct the problem
IV	Critical: High Social welfare loss generated by the project; the occurrences of the risk cause a loss of the preliminary function(s) of the project, Remedial Actions, even large in scope are not enough to avoid serious damage.
V	Catastrophic: Project failure that may result serious or even total loss of the project functions, main project effects in the medium- long term do not materialise.

Overall Risk is the product of Probability and Severity (P*S). Accordingly, four levels of risk can be identified as depicted in Table 2-3 in color codes.

Table 2-3: Risk Level Identification

Risk Level	Colour
Low	
Moderate	
High	
Unacceptable	

Severity /Probability	I	II	III	IV	V
A	Low	Low	Low	Low	Moderate
B	Low	Low	Moderate	Moderate	High
C	Low	Moderate	Moderate	High	High
D	Low	Moderate	High	Very High	Very High
E	Moderate	High	Very High	Very High	Very High

Once the level of the remaining risks (P and S) is established, it is important to identify the mitigation and/or prevention measures foreseen. The Table 2-4 shows, in a qualitative way, the kinds of measures or combinations of measures to reduce the project risk prevailing in the various areas of the above defined risk matrix.

Table 2-4: Prevention & Mitigation Measure Matrix

Severity/Probability	I	II	III	IV	V
A	Prevention or				
B	Mitigation		Mitigation		
C					
D	Prevention		Prevention and Mitigation		
E					

Level of risk is proportionate to the intensity of the output value. If the risk is high, the project management team should be critical in responding to the changes immediately while low level risk should be handled by using close monitoring of outcomes.

Probabilistic risk analysis

Probabilistic risk analysis should be undertaken based on the scale of the project and availability of data.

Risk prevention and mitigation

All the aforesaid steps define the level of risk prevention and management strategy of the project. The project management team must be neutral towards risks of the project as recommended strategy.

2.5 Summary

Basically, the chapter gives comprehensive description, initially on urban regeneration definitions, principals, features and challenges once conduct urban regeneration projects.

Urban regeneration is response to opportunities and challenges that presented by urban degradation and has its own key features and principals. Urban regeneration projects and the factors necessitating them generally vary from country to country, city to city and region to region. That means it depend on the location.

This chapter reviews on two main categories, such as factors requiring urban regeneration and the reasons for urban regeneration projects in developed countries and developing countries. Urban regeneration process figure 2.1 illustration of the interaction between these and many other factors. Also, there certain challenges in urban regeneration projects, such as, social and community issues, economic transition and employment change, physical obsolescence and new requirements, land ownership, environmental quality and sustainable development contribute to the achievement of sustainable development. `

The chapter explore the practices on global and local context briefly as well as local context. United Kingdom has been one of the first developed nations to produce a national strategy on the sustainable development and regeneration concept. This chapter reviews, regeneration experiences on United Kingdom as well as Australia. Sri Lanka has only two urban regeneration interventions those are Beira lake intervention development and urban regeneration project city of Colombo.

Further the chapter describe about economic evaluation techniques. There are three basic techniques that can be used for the economic analysis of urban regeneration and renewal programs. In increasing order of complexity, they are: cost-effectiveness analysis; weighted cost-effectiveness analysis (sometimes referred as to cost-utility analysis); and cost-benefit t analysis. The choice of technique depends on the nature of the project, time constraints and the information available. There are several institutes describe on cost application of cost benefit analysis CEEU and European

Commission are the main organization provide guideline to conduct cost benefit analysis for investment project

However, this chapter reviews on project appraisal steps broadly based on guide to cost-benefit analysis of investment projects, economic appraisal tool for cohesion policy 2014-2020 by European Commission which has seven steps can be described in the chapter.

3 RESEARCH METHODOLOGY

3.1 Introduction

The purpose of this chapter is to outline the methodology to be followed in order to achieve the aim and objectives of the study. Accordingly, this chapter includes the process of the research, including research approach, data collection, and data analysis techniques. Further it gives a basic diagram of the research process (figure 3.1) for easy reference.

3.2 Research process

Research design is the basic plan for the study and it includes four main concepts, such as what strategy to follow, in which framework, collect data from whom, and how to collect and analyze data (Punch, 2005). In this study, the design of the research process is shown in Figure 3.1.

3.2.1 Background study

As illustrated in Figure 3.1 with in the back ground study, an initial literature survey has done on the selected subject area. There are different reasons shown by different research for the success or failure of regeneration projects such as physical form, socio economic conditions, regulatory framework and location specific matters, etc. limited researches focus on the cost- benefit of urban regeneration projects. Therefore, this research is focus on practical application of cost benefit analysis for urban regeneration projects.

3.2.1.1 Identification of research problem

Identifying the research question may be the most important step in the study, Yin (2009). The current urban regeneration project in the city of Colombo is merely based on the financial analysis that the total project cost can be recovered through the releasing of 450 acres of lands for investment purposes and further there is no post evaluation of success or failure of the project. Therefore, this research is aimed to assess the economic feasibility the urban regeneration project done by the urban development authority, using Cost Benefit Analysis technique and thereby identify the

components of costs and benefits, assess the costs and benefits, issues in urban regeneration projects.

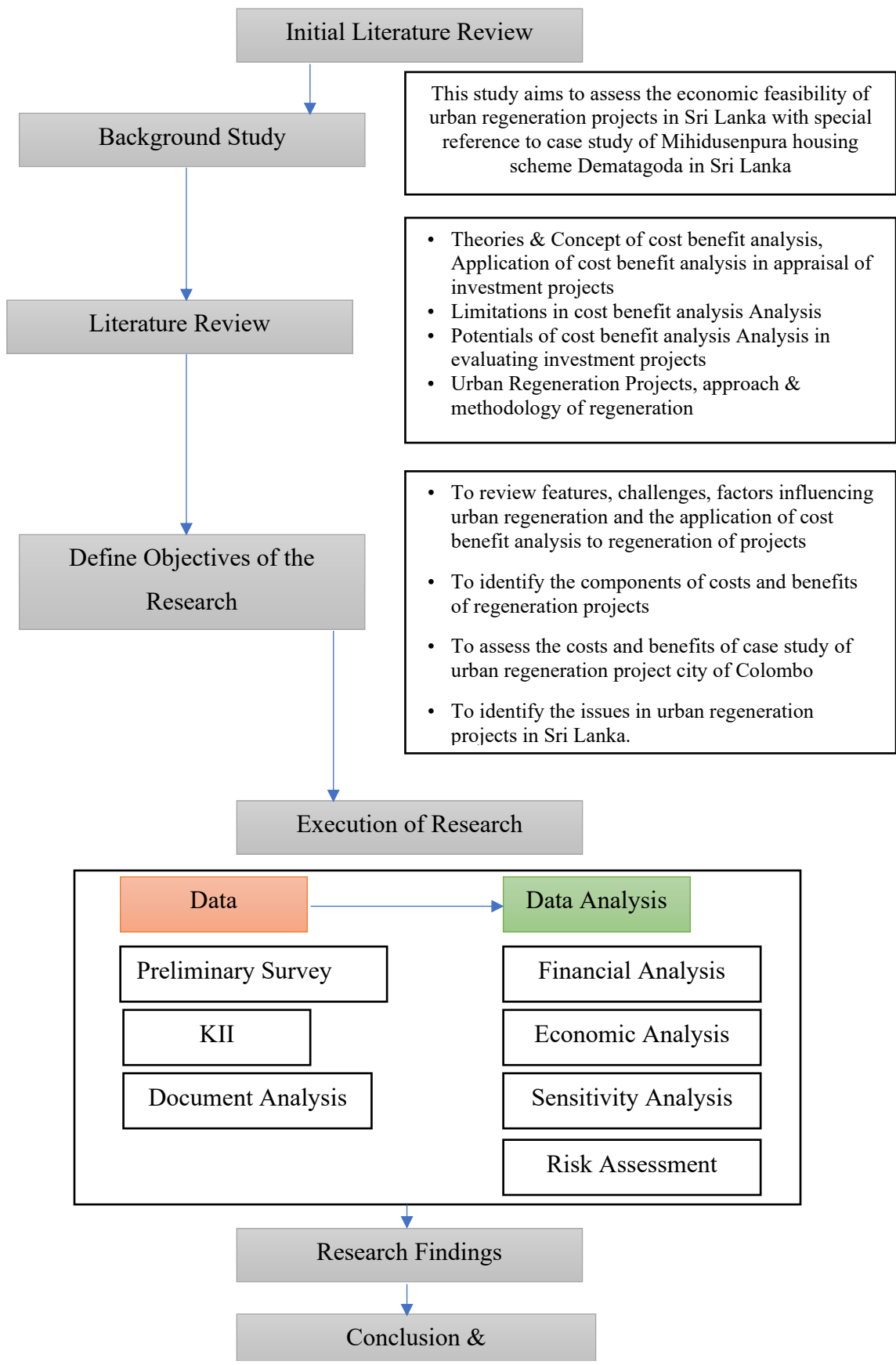


Figure 3-1: Research Process

3.2.1.2 Literature synthesis

Under the literature synthesis basically identified the components of urban regenerations and cost benefit analysis.

The research was carried out in two steps. The first step involved comprehensive literature review which provided the base for the primary data collection and guidance for subsequent procedure of inquiry. During the step two primary data was collected through documentary review as well. The data analysis and economic appraisal were done using the cost benefit analysis guide developed by European Union and net present value and economic net present value techniques.

3.2.2 Research approach

The mixed methods approach, in recent times, has increasingly been assuming prominence and acceptance as a feasible and viable alternative research method to the traditional single qualitative-quantitative research approach (Hanson et al., 2005). Mixed method approach was adopted as the research approach of this research where both qualitative and quantitative data gathered. through semi-structured interviews and document review were used for final appraisal. Quantitative data was basically used for financial and economic appraisal of the project and qualitative data was useful for sensitivity analysis and risk assessments.

3.2.2.1 Key informant interviews

Personal interviews are major data collection techniques commonly used to elicit data mainly for qualitative based studies (Bryman, 2001). The best data collection option in situations where the objective of the research is concerned with the exploration of feelings and attitudes of participants, in attempt to gain a deeper appreciation and greater understanding of a particular phenomenon (Denzin & Lincoln, 2008; Gray, 2006). The research was carried out in two steps. The first step involved comprehensive literature review discussed in chapter two as well as summarized in 3.3. During the step two primary data was collected through Key Informant Interviews (KIIs). Here urban development authority officials and dwellers are the key personals. For the interview 50 numbers dwellers covering of each floors of both buildings and

10 numbers officials participated including Deputy Director General (Projects), Project Director, Deputy Project Director, Director Technical, Assistant Directors and other officials.

3.3 Data analysis

After the data collected through comprehensive literature survey, Key Informant Interviews (KII) & documentary review all the Analysis done by using, Financial analysis, Economic Analysis, Sensitivity analysis & Risk Assessment. By end of the analysis urban regeneration project's issues has identified. As stated by Kelly et al. (2003), the reason behind the analysis of data is to review collected data, to make it easy to understand and provide answers to the original research questions.

3.4 Chapter summary

This chapter summarizes the detailed research design including approach, methodology, and tools used for executing the research work. For easy guide research process of this research drawn in figure 3.1.

Mixed method approach was adopted as the research approach for this research where both qualitative and quantitative data gathered through semi-structured interviews and documentary review were used for final appraisal. Quantitative data was basically used for financial and economic appraisal of the project from documents and qualitative data was useful for sensitivity analysis and risk assessments and also there are non-financial benefits listed as well. Further end of the analysis urban regeneration project's issues was identified.

Basically, the research was carried out in two steps. The first step involved comprehensive literature review which provided the base for the primary data collection and guidance for subsequent procedure of inquiry. During the step two primary data was collected through Key Informant Interviews (KIIs) and documentary review. The data analysis and economic appraisal were done using the cost benefit analysis guide developed by European union and net present value and economic net present value techniques.

4 ANALYSIS AND RESEARCH FINDINGS

4.1 Introduction

This chapter presents the analysis of the research findings, according to the research methodology explained in the previous chapter. The chapter mainly focuses on the costs benefit analysis performed on the selected case study project as per the European union guidelines, where the analysis involves seven main steps in performing cost benefit analysis. The following sections present the application of seven main steps to the selected case study in detail.

Steps involved in cost benefit analysis as per the European union guideline.

1. Description of the context
2. Definition of objectives
3. Identification of the project
4. Technical feasibility & Environmental sustainability
5. Financial analysis
6. Economic analysis
7. Risk assessment.

Apart from above captioned steps implementation, this chapter describes about issues of urban regeneration projects which has identified based on the above analysis.

4.2 Description of the context

Urban regeneration project City of Colombo (URPCC) is the largest urban regeneration program implemented in Sri Lanka. The project is aimed to provide decent housing for all the communities living in Under Served Settlements in Colombo and liberate underutilized lands in city of Colombo for the investment purposes.

Project Vision

To eliminate shanties, slums and other dilapidated housing from the city of Colombo by relocating dwellers in modern houses.

Project Mission

The mission targeted on constructing 70,000 housing units in a span of 6 years (30,000 in first 3 years followed by 40,000 in next 3 years) for underserved communities in Colombo. Identifying all households located in undeserved settlements in order to plan and implement a relocation program with better living conditions. Relocation of 70,000 households in the newly built houses through a community development and marketing program.

The prominent features in this process are

- To increase the housing stock in the city as well country
- Legal right and prestige of being an owner of a house, entrepreneurship development among people, recognized job opportunities.
- To liberate valuable lands for city development purpose
- Social recognition, a permanent address, better living society, elimination of illegal activities.
- Good sanitary facilities, healthier pollution free environment easy access to places in the city.

Mihindusenpura housing project is a part of urban regeneration project for City of Colombo discussed under the literature review also. Figure 2.3 of literature analysis explained the basic concept of main project. Mihidusenpura project was selected as the case study for the cost benefit analysis.

Further the quantitative data required cost benefit analysis was basically obtained from the secondary data sources; i.e.: UDA Budget, BOQ, Progress Reports etc.

4.3 Definition of objective

The project objective of main project (Urban regeneration project City of Colombo) objective can be identified as follows;

- To improve the housing conditions of low-income communities and increase land use efficiency in Colombo through investments in the construction of

affordable housing and redevelopment of land, along with the associated enhancement of systems and policies.

As Mihindusenpura housing project is a sub project of main project, it should have separate sub objective.

Therefore Objective of Mihindusenpura housing project define as ;

- To relocate people of 04 identified underserved settlements to newly constructed houses at Mihindusenpura housing project at Dematagoda.

In descriptively, the objective of Mihindusenpura housing project was to relocate underserved settlement dwellers who lived in lands identified for future projects of urban regeneration projects of UDA. Therefore, as the kick off project this was an important rehousing project for overall project execution.

4.4 Case Study- Mihindusenpura Rehousing Project

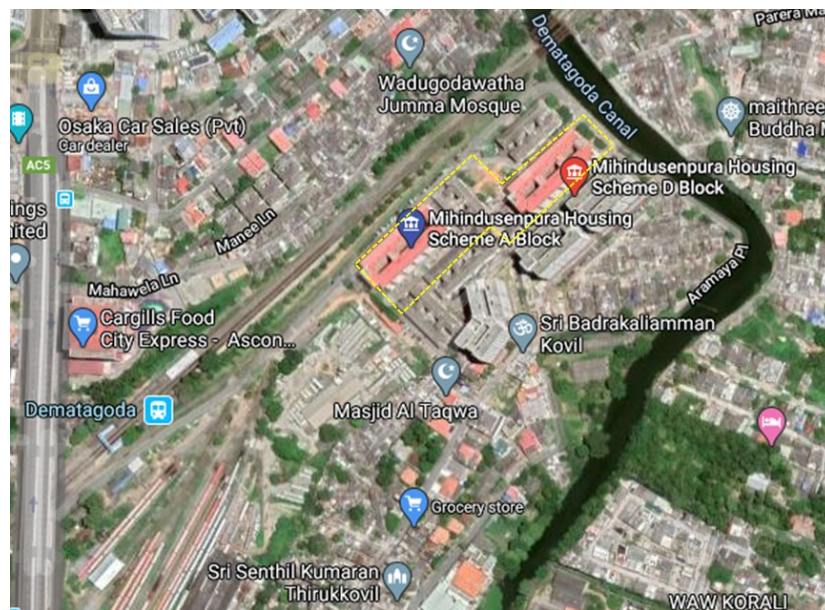
Mihindusenpura housing scheme is first housing scheme constructed under urban regeneration housing programme conduct by urban development authority, which located at Dematagoda. The construction started on year 2010. Mihidusenpura housing complex consist with two apartment buildings with 500 housing units. Both two building comprised with G + 9 stories, each floor consists of 25 housing units. This housing complex was completed in 2013 on an urban development authority owned land. The total project cost of the housing project was Rs 1066 Mn and which was funded by the urban development authority.

The housing complex extend over 28,000 sq.m (including 2 complexes of G+9 housing , car park area, basketball court and community hall) land extent and average size of a housing unit was 450 sq. ft. The project initiated in 2010 and was declared to open in the year 2013. The Project provide shelter for 500 families who were lived in underserved settlements.

Figure 4-1: Birds eye view of the relocation houses



Figure 4-2: Location Plan of Mihindusenpura Housing Scheme



4.4.1. Infrastructure availability

(a) Accessibility:

The location has direct access to Baseline road and Dematagoda station.

(b) Special Accessibility

The housing scheme is located close proximity to popular schools in Colombo, i.e.; Nalanda Vidyalaya, Gotami Balika Vidyalaya, Veluwana Vidyalaya and Wesley

College. Also, it is located close proximity to Lady Ridgeway Children's Hospital and the General Hospital of Colombo. Above described location consist of all the religious places close proximity as well. Such as temple, Hindu Kovil and Muslim Mosque

(c) Social Infrastructure

The urban development authority has provided social infrastructure facilities, i.e.; community halls, play areas, recreational spaces to the current inhabitants of the housing complex. All the common areas are comprising with essential amenities which need function the area properly.

(d) Water Supply & Sanitation

National water supply and drainage board provides pipe born water supply for this project and as per the National water supply and drainage board present water supply scheme has a capacity to cater the additional demand arose from the proposed development.

(e) Electricity

Three phase electricity from the national grid is available to the site and less interrupted power supply can be observed in the area. The existing grid has a capacity to serve the demand generated through the exiting development.

f) Surface drainage Water & Sewage disposal

The sewer network is connected to the existing sewer collection network of the City of Colombo. All the maintenance doing by Colombo municipal council collaborate with national water supply and drainage board.

g) Solid Waste Disposal System

Colombo Municipal Council is handling the solid waste management in the Colombo municipal council area and they are collecting generated waste three times on week.

h) Components of Each Housing Units

Housing unit consist of 450 Sq. ft. Following component included for each housing unit. (please see appendix 4 as well)

-Living Room

-Two Bed Rooms

- Kitchen

-Wash Room/Toilet

- Balcony

4.4.1 Beneficiary profile

The beneficiaries of this project were selected based on the priority list prepared by the urban development authority for land liberation. All the locations are close proximity to the relocation land of Dematagoda. Underserved Settlements which were identified for future rehousing program and commercially valuable lands have been given priority during the selection of beneficiaries of the project. This list of beneficiaries under this rehousing project is shown in the *Table 4-1*. Altogether 500 beneficiaries were identified for relocation purpose.

Table 4-1: Beneficiary Profile

Name of Underserved Settlement	No of Beneficiary
Location 1(L1)	123
Location 2 (L2)	163
Location 3 (L3)	112
Location 4 (L4)	102
Total	500

4.5 Technical feasibility & environmental sustainability

4.5.1 Demand analysis

The demand analysis done for the main project (Urban regeneration project City of Colombo) as explained below.

Various attempts have been made to identify the needs assessment and demand for the rehousing project. The most recent survey had been carried out by the urban development authority in year 2010. During this survey all the household's lives in underserved settlements were surveyed and a data base had been developed.

The basic concept of the project was to provide house to house for those who are evacuated under this programme. Therefore, based on the survey data the total houses requirement has been calculated.

During the relocation process the consent of the underserved settlement dwellers had been obtained for relocations. All the beneficiaries under this project had provide their consent to relocate into this location.

Demand identification on investment point of view,

In real situation three of land parcels (L1, L2, L4) utilized for certain uses. therefore, L3 only can use for investments. Pls refer table 4.4

With Assuming that all lands are vacant in present use and proceed to analyses demand for the lands on investment purpose.

Demand identification on investment point of view,

In real situation three of land parcels (L1, L2, L4) utilized for certain uses. therefore, L3 only can use for investments. Pls refer table 4.4

With Assuming that all lands are vacant in present use and proceed to analyses demand for the lands on investment purpose.

Table 4-2 Locational compatibility with planning and building regulations of Commercial City Development Plan 2019-2030 (CCCDP 2019-2030) compiled by Author

Location	Extent of land (Ha)	Surrounding uses	Development according to the planning and building regulations (No of Floors)	Zoning according to the CCCDP 2019-2030	Permissible uses according to the CCCDP 2019-2030 (Extracts)
L1	1.7415	Mixed use	Unlimited	Commercial Zone	Refer Appendix 2
L2		Mixed use	5 Floors + 1 Parking	Special Primary	

				Residential Zone	
L3	0.2996	Mixed use	20 Floors + 4 Parking	Mixed Development Zone	Refer Appendix 2
L4	1.2130	Mixed use	8 Floors + 2 Parking	Commercial Zone	

4.5.2 Technical feasibility

The most of the existing underserved settlement are located in unauthorized reclaimed marshy lands. Therefore, the pilling cost of the project had increase during the construction stage. This has caused to increase the unit cost of each housing unit.

4.6 Financial analysis

The financial analysis of this project was carried out based on the actual costs incurred during the project execution and the initial estimates were not considered during the analysis.

Following assumption and justification made for before conduct financial analysis.

Assumptions and justifications for financial analysis

Assumptions	Justification
Financial Discount Rate- 8.8%	This is a government a project. Treasury bills rate + 0.5 risk margin Considered fixed deposit rate as well
Operation and maintenance cost were estimated based on the assumption that the current annual operation and	Inflation

maintenance cost will be increased by 10% in each five years.	
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4.6.1 Costs and benefits of regeneration projects

In line with objective 02 herewith assess the costs and benefits in detail of case study, (Mihidusenpura Housing project) of urban regeneration project city of Colombo

The costs and benefits identified for this project are listed in the table 4.2. The table give summary of cost and benefit of project and later part of the paragraphs explain in details of cost and benefits. Initial investment costs and the incremental operating costs were obtained from relevant authorities based on actual figures.

Revenue sources identified for financial analysis was obtained based on actual figures and the revenues from indirect benefits were calculated based on assumptions and the data obtained from Key Informant Interviews.

Table 4-3 Costs and Benefits of Regeneration Projects

Initial investment costs	Incremental operating cost	Incremental revenue/benefits
1. Functioning of PMU	1. Water- common area	1.Instalment of housing loan/monthly rental
2. Construction cost	2.Electricity- common area	2.Sinking fund
3. Cost for land	3.Maintanance cost	3.Land sale income
4. Supervision consultant	4.Management cost (FM)	4.Saving from free/NRW
5. Land clearance cost	5 insurance payments	5.Reduction of cost for DRR
		6.Assets value increase from released land

a) Initial investment cost

The total initial investment cost was derived from the actual costs incurred during the project execution. The major cost items and the costs are listed in the table 4.3. Accordingly, the preliminary activities carried out under this urban regeneration

project for City of Colombo was not considered in this analysis and considered as sunk cost, i.e.: Pre- feasibility studies, household surveys, etc.

Table 4-4 : Total Investment Cost

Items	Total (Rs. Mn)	2010	2011	2012
Functioning of PMU	180.0	60.0	60.0	60.0
Construction cost	1,067.0	213.4	533.5	320.1
Land	1,079.4	1,079.4		
Supervision consultant	64.0	12.8	32.0	19.2
Land clearance cost	10.0			10.0
Initial investment	2,400.3	1,365.5	625.5	409.3

Source: Extracted from UDA Budget 2010, 2011, and 2012

b) Operation & maintenance cost

Operation & Maintenance Cost for the Mihindusenpura Housing Complex for year 2013 to year 2020 is obtained from Annual Budget of Urban Development Authority (actual figures). For year 2021 to year 2033, operation and maintenance cost was estimated based on the assumption that the current annual operation and maintenance cost will be increased by 10% in each five years.

Operation and maintenance cost include anticipated replacement costs related to lifts, water pumps and sumps, generators, plumbing, electrical equipment, etc.

In addition, utility bills for common area and insurance costs which are paid by Urban Development Authority also considered as operational costs.

c) Incremental revenue sources

The main revenue sources identified under the financial analysis are the monthly installment paid by the dwellers, sinking fund and the income generated from alienation of lands for commercial purposes. Apart from the above the indirect benefits of reductions of non-revenue water, reduction in disaster risk reduction programs incremental land value increase was identified and revenue sources related to Economic Analysis.

- Monthly instalments

Monthly installment for each housing unit is Rs. 3,000.00 per unit. They have to pay it over a period of 20 years to get the freehold interest of the housing unit. Monthly rental decides based on floor area of obtained house. The housing policy of urban development authority provide guideline for monthly rental of a house.

- Sinking fund

According to the regulations published under the Condominium Act, urban development authority charged Rs. 50,000.00 per tenant to establish a Sinking Fund. Residents were charged this fee in two instalments. 75% were paid by a resident in the first year and the rest was charged in the second year.

- Assets revenue

By relocating underserved settlement dwellers to Mihindusenpura housing scheme, four lands were liberated in year 2013. The asset value of above land plots is shown in the table 4.5 all the value are market values of the area.

Table 4-5 Assest Value of Lands Released from Relocation compiled by author

Location	Extent of released land (Ha)	Present use	Released year	Value today (2020) (Rs Mn)
L1	1.7415	Vacant up to 2018 Dec. (Presently Construction work in progress for proposed convention hall.)	2013	2,409.87
L2	Donated to Devi Balika Vidyalaya	Educational	2013	-
L3	0.2996	Vacant	2013	592.26
L4	1.213	Rehousing	2013	354.66

Location	Extent of released land (Ha)	Present use	Released year	Value today (2020) (Rs Mn)
Total land value (Approx.)				3356.79

Non Financial Benefits

Apart from the above benefits the inhabitants were received following indirect or non-financial benefits also. But not considered in the assessment. By these non-financial benefits improve the quality of life the people who lives in Mihindusenpura housing complex.

1. Social recognition (When serching for employment & marriages, no more waththa related background)
2. Upgrade living standards
3. Prevention illegal activities
4. Changing attitudes of residents
5. Create an environment which support education of recidants' children
6. Educational Opportunities
7. Create an environment,which will protect the privacy of the residents
8. Standard day care with qualified teachers
9. Propoer spaces for communal gathering
10. Prevention of communicable diseases as improvement of the hygiene. (Such As, Cholera, Viral Diseases as separate family has separate house)

But above benifits are not considered for this analysis as cost benefit analysis only considered monitory terms.

4.6.2 Assessment of costs and benefits of regeneration projects

In line with objective 03 herewith assess the costs and benefits of case study of urban regeneration projects. Base year for appraisal is year 2010.

The total costs and benefits used for the financial analysis are tabulated in the table 4.5 given below.

The detailed breakdown of operating cost and revenue is given in the Appendix 03

Table 4-6 Operating Costs and Revenue

Item	Total (Rs. Mn.)
Revenues	
Instalment of Housing Loan	306.0
Sinking Fund	25.0
Assets Value Increase from Released Land	4,249.0
Total Revenues	4,580.0
Operating Cost	
Water- Common Area	1.0
Electricity - Common Area	92.3
Maintenance Cost	104.3
Management Cost (FM)	184.4
Insurance	4.6
Total Operating Cost	386.62
Net Revenue	4,193.4

Financial profitability

By using the knowledge obtained by literature synthesis, Calculated the project financial net present value. And according to the calculations FNPV (C) of the project is 23.79 million rupees and Financial Rate of Return (FRR) on the investment is 8.98 %.

The above calculations indicated that the project is a viable option to invest in or in other words investment decision. Whether the calculations provide green light, However, above values indicate marginal financial profitability on the project. Therefore, it is worth to analyze the project costs and benefits in details as per the cost benefit analysis guideline.

For the calculation purposes, In the above calculations + 0.5 risk margin of the treasury bill rates were used for the discount rate calculations. Accordingly, 8.8% interest rate was used for this financial analysis.

A summary of financial analysis is given in the table 4.6 Financial profitability of project. The detailed cash flow of the financial analysis is given in the Appendix 04.

Table 4-7 Financial Profitability of the Project

Item	Total
Total Revenue	4,580.00
Residual Value	-
Total Inflows	4,580.00
Total Outflows	2,786.94
Net Cash Flows	1,793.06
PV Rate (Interest Rate 8.8%)	
FNPV (C)	23.79
FRR	8.98%

4.7 Economic analysis

In line with objective 03, under the economic analysis also assess benefits and costs. quantifiable socio-economic benefits were also considered for this economic analysis. Accordingly, the following variables were considered for in additions to the costs and benefits considered in the financial analysis.

- Savings from Non-Revenue Water (NRW)

- Cost savings from disaster risk reduction measures.
- Savings from medical expenses and house hold damages.
- Revenue obtained from new job opportunities

Medical Expenses And Household damage Due to floods

Expenditure Category	Medical Expense		Damage t to the House and/or contents	
	No HH	%	No HH	%
Rs 25,000 or more	6	0.4%	72	4%
Between Rs 25,000 - Rs 5,000	28	2%	193	12%
Less than Rs 5,000	271	16%	381	24%
None	1316	81%	975	60%
Total	1621		1621	

- Source: Colombo City – Livelihood Assessment of Flood-Prone Low-Income Settlements by UN-HABITAT, CEPA & Sevanatha

The study has done by collaboration with un-habitat, CEPA and sevanatha urban resource center and all the four-location research incorporated covered under this assessment. Therefore, the medical expenses and damaged to house and content due to flood can be taken as savings of medical expenses and damaged due to contents by flood for economic analysis because all the house hold now has been relocated. Following assumption and justification made for before conduct Economic analysis

Income of new job opportunities created because of the project

UDA has done a training programmes for initiate new jobs for unemployed tenants who has capacity to initiate as entrepreneur or self-employee. Jobs categories such as food production, swing, production of incense sticks, training teachers for kindergarten under the supervision of ministry of women and child development-schools & primary education, school infrastructure & education services, candle production, shoes production, beauty salon. Therefore, semi structured interview has carried out of selected group of beneficiaries who has started jobs after completed the training

programme and incorporated to the economic analysis. there are 100 beneficiaries. but sample is 10% of beneficiary list.

Assumptions and Justifications for Economic analysis

Assumptions	Justification
Social discounted rate: 12%	World Bank and the Asian Development Bank, typically apply a real discount rate in the range of 10 percent to 12 percent when evaluating projects in developing countries (Zhuang et al., 2007, and Harrison, 2010). Therefore, many government agencies in these countries follow such guidelines and apply a similar discount rate when evaluating public projects. (Warusawitharanana ,2014)

Social Discount Rate was assumed as 12.0% according to the World Bank and ADB applications.

According to the economic indicators of the analysis the ENPV of the project is 41.58 million rupees, ERR is 12.32 % and benefits to cost Ratio of 2.09.

All these figures are positive indicators of the project feasibility. However, since above calculations are based on the various assumptions detailed risk analysis was carried out to identify possible project risks and sensitivity.

A summary of economic analysis is given in the Table 4.8. The detailed cash flow of the economic analysis is given in the Appendix 05.

Table 4-8 Economic Feasibility

Item	Total
Project Investment Cost	2,400.32
Project O&M Cost	386.62
Total Economic Cost	2,786.94
Savings from Free/NRW	24.92
Reduction cost of DRR	17.00
Savings of Medical expenses and House damage by Flooding	1,134.00
Income with new job opportunities	68.00

Total Revenue	4,580.00
Total Economic Benefit	5,823.92
Net Economic Benefits	3,036.98
ENPV (SDR- 12%)	41.58
ERR	12.32%
B/C Ratio	2.09

Social Discount Rate	12.00%
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4.8 Risk assessment

As knowledge obtained from literature analysis under the risk assessment there are four recommended steps conducted. those are sensitivity analysis, qualitative analysis probabilistic risk analysis, risk prevention and mitigation.

Table 4-9: Sensitivity Analysis

Variable	Variation of the FNPV due to a ± 1 % variation	Criticality judgement	Variation of the ENPV due to a ± 1 % variation	Criticality judgement
Construction Cost	-41%	Critical	-22.7%	Critical
Operating Cost	-7%	Critical	-3.0%	Critical
Total Revenue	104%	Critical	48.7%	Critical

Table 4-9: Sensitivity Analysis -Switching Values

Variable	Switching Value	
Construction Cost	Minimum increase before the FNPV equals 0	2.40%
	Minimum increase before the ENPV equals 0	4.4%
Operating Cost	Minimum increase before the FNPV equals 0	14.8%
	Minimum increase before the ENPV equals 0	33.65%
Total Revenue	Minimum decrease before the FNPV equals 0	0.96%
	Maximum decrease before the ENPV equals 0	-2.05%

Switching value is the value that the analyses variable would have to take in order for the NPV of the project to become zero, or more generally, for the outcome of the project to fall below the minimum level of acceptability. Since FNPV and ENPV of

this project has positive values, minimum increase of cost (construction cost, operating cost) variables and minimum decrease of revenue variable has been given in the table. According to that construction cost changing in 2.4% or more value cause overall FNPV value to become zero or less which becomes construction cost more sensitive to the project. Even though ENPV of construction cost seems like not fine due to 4.4% value still it is dependent on many assumption and external factor cause that it is unpredictable that construction cost is risk less based on that. operating cost seems like fine with both FNPV and ENPV yet the impact for the project with operating cost is around 14.8% and 33.65% , so that operating cost being risk is uncountable. When it comes to revenue, small percentage of revenue change impact FNPV become to zero. So that, in the sense of revenue has become risk factor. with other fields all together revenue need to -2.05 change in order to ENPV become zero is also not much good. So that finally overall assumption is that overall projects too much sensitive and need to have a risk management plan.

4.8.1 Risk prevention and mitigation

4.8.1.1 Risk prevention matrix

The qualitative risk analysis is presented in the table 4-10.

Table 4-10 Risk Prevention Matrix

Adverse Event	Variable	Causes	Effect	Timing	Effect on cash flow	Probability	Severity	Risk Level	Prevention & Mitigation measures	Residual Risk
Construction delay	Investment cost	Low contractor capacity, weather condition.	Delay in service starting.	Medium	Delay in gaining income from project.	C	III	Moderate	Selecting trustworthy and responsible contractor. Continuous project monitoring. Set up construction task flow against to whether forecast.	Low
Exceeding project budget	Investment cost	Inadequate design cost estimate. Omit the price escalation in feasibility study.	Investment cost higher than expected.	Short	Higher	D	V	Very high	Price escalation need to be considered in feasibility study. Proper design cost estimation.	Moderate
Natural Disaster while construction (such as Continuous raining)	Not applicable	Inadequate site investigation	Interruption of the development	Long	No impact	A	III	Low	-	Low
Management authority not being assigned	Not applicable	Delay- obtaining of permits from Condominium Development Authority, Not met with the Authority s' criteria, In capabilities of tenants in functioning of management corporation	UDA has to take responsibility of management and maintenance of the condominium. UDA has to take care of replacement cost.	Long	Extra cash outflow. (UDA has to pay extra cost for maintenance and common area management)	D	IV	Very High	Get the authority permission and appoint suitable management committee. Held skill development programs. While UDA running the management, they need to find out a recovery method to earn the replacement cost from the tenants	Low
Rejecting monthly rent payment	Income	Tenant's' income level	Delay in achieving expected profit	Medium	Delay in gaining income from the project	C	V	High	Force tenants to pay rental by disrupting the service.	Low

Evaluation Scale: Probability: A- Very Un likely, B- Un likely -About as likely as not D-likely E-Very Likely
Severity: I – No effect, II-Minor, III -Moderate, IV-Critical , V -Catastrophic
Risk Level: Low, Moderate, High, Unacceptable

4.9 Issues in regeneration projects

In line objective 04 herewith describe issues related to case study identified based on the above analysis following issues were identified in relation to the implementation of urban regeneration and housing projects by the urban development authority.

- Investments have not been attracted to the lands liberated through urban regeneration project. Therefore, lands liberated through this project still remain underutilized.
- As the project had marginal financial feasibility, proper risk mitigation plan is required to execute the project with in projected budgetary allocations.
- Land liberation process through this project needs to be evaluated in detail to identify the most valuable and potential lands for investments.
- City development plans needs to be aligned with the urban regenerations project to attract investments for the liberated lands.
- The urban development authority has to bear the burden of operation and maintenance of common areas and the major replacement works related to M&E related equipment as Management Corporations have not been established so far.
- Registration of condominium deeds and establishment management corporations had been delayed due to not having proper approvals in the initial stage. These kind of issues needs to identified during the initial planning stages.
- Current employment pattern of the inhabitants needs to be considered during resettlement process and proper social mobilization strategies needs to be adopted during and after relocation.

4.10 Chapter summary

This chapter summarize cost benefit analysis standard steps in relation to the Mihindusenpura housing project implemented by the urban development authority. EU guideline was used as the base for the CBA and seven step process was adopted during the analysis.

Basic details of the project including context, project objectives, project details and technical and environment feasibility of the project was discussed and evaluated in the first part of the chapter.

A detailed financial analysis was carried out for the project based on costs and revenue generated through the project and it was identified that project had only marginal financial profitability.

As this project creates many social benefits, a detailed economic analysis was also carried out to evaluate the economic benefits of the project. Some of the social costs and benefits could not be captured during this economic appraisal as those could not convert in to monetary figures. However, those costs and benefits were identified during the survey and listed for further references. The economic feasibility indicators revealed that the project is an economically feasible investment project.

Finally, a risk assessment was carried out including sensitivity analysis, risk prevention and mitigation measures. This step can be identified as one of important step in the CBA process as it allows to plan and take precautionary measures for related project risks during the initial planning stage.

The analysis allows to identify the issues related to existing regeneration plan implementation and it shows the importance of structured economic appraisal of a project i.e.CBA during the investment project execution. Further by this analysis it covers objective two, three and four by this chapter.

5 CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

Over fifty percent of the Colombo city's population lives in shanties, slums or dilapidated old housing schemes, which occupied nine percent of the total land extent of the city, which do not have a healthy environment for human habitation and access to basic infrastructure facilities such as clean water, electricity, sanitation etc. Relocation of these families in new housing schemes with acceptable standards will be one major step towards transformation of Colombo into a world class city as per the objectives of the development plan.

Many government institutions-initiated housing programs to upgrade low income housing problem in city of Colombo, but none of the institution was unable solve the issue with a sustainable solution. The UDA also vested with powers to clearance of slums and shanty areas and formulation of housing schemes by UDA Act. Hence in 2010 UDA also started urban regeneration project for City of Colombo for clearance of slums and shanties and rehousing of existing slum dwellers in new housing complexes. Up to now 15,000 houses are constructed under this project and 55,000 housing units to be constructed. This project has cleared commercially valuable lands for the investment purposes.

Although this project was initiated since 2010, a comprehensive appraisal has not been performed to evaluate this project. In this background CBA was adopted in this research to evaluate a sub project implemented under this programme.

5.2 Conclusions

This Study mainly focus on applicability of cost benefit analysis to urban regeneration projects by using implemented project as a case study. In this background the study established four objectives which were indicated in chapter one. An initial literature review has been carried out by referring published and published reports on urban problems, urban regeneration and its appraisal methods and set up background for the study. Key Informant Interviews (KIIs) and documentary review are the key tools used for primary data collection. Semi structured KII was carried out with officials of

relevant government organizations, and the apartment dwellers. Further this study has identified significant basics of urban regeneration and practical application of cost benefit analysis.

Following subsections presents the way in which each objective was achieved in detail.

Objective 1: To review urban regeneration basics and the application of cost benefit analysis to regeneration projects.

The first objective is to review features, challenges, factors influencing urban regeneration and application of regeneration projects. Under the literature findings it has been identified urban regeneration initiates is to solve or remedy measurement of urban problems and it is a process of economic social, physical environmental change. (see section 2.2) Further CBA comprehensive process introduced by European Union for evaluation of investment projects was adopted for this research (see section 2.4.2.1, 2.4.2.2, 2.4.2.3, 2.4.2.4, 2.3.2.5, 2.4.2.6, 2.4.2.7) With the application of cost benefit analysis according to the European Union guideline, the analysis (seven steps) revealed that the evaluation parameters used in the simple financial evaluations gives the information regarding financial profitability of the project, CBA process allows for in depth appraisal of the project. It allows the decision maker to prioritize decision based on the results of the CBA. (see section 4.6) Demand analysis on different perspectives provides idea on highest and best use for released lands by relocating people and provide hint for prioritization land selection for relocation. (see section 4.5.1)

Further, it gives pre alert on projects risks such as, construction delay, exceeding project budget, natural disaster while construction (such as continuous raining), management authority not being assigned, rejecting monthly rent payment through the analysis made by risk assessment and sensitivity analysis. It allows decision makers to formulate a proper risk management plan and take necessary precautions in the project implementation. (see section 4.8,4.8.1 4.8.2, 4.8.2.1)

Objective 2: To identify the components of costs and benefits of regeneration projects

The second objective investigate components of costs and benefits of regeneration projects. Under literature synthesis recognized several common cost and benefits of urban regeneration projects such as construction cost, acquisition cost, maintenance cost, opportunity costs on land and improvements, capital costs – infrastructure, recurrent costs –infrastructure, tenant relocation, compensation paid, extra tenant costs, tenant dislocation, possible loss of support networks costs. Mostly cost and benefits are unique to the project but there are certain common cost and benefits as well.

Under initiation financial of the case study separately identified cost and benefits. (see section 4.6.1, 4.6.2) Accordingly, functioning of PMU, construction cost, cost for land, cost for supervision consultant, land clearance cost are the costs. And incremental operating cost can be identified as water- common area, electricity- common area. maintenance cost. Benefits can be noted as Instalment of housing loan/monthly rental, sinking fund, land sale income, management cost (FM), saving from free/NRW, insurance payments, reduction of cost for DRR, income of new job opportunities created, saving of health and house damaged repair cost, Assets value increase from released lands. (see section 4.7)

Objective 3: To evaluate the cost and benefits of an urban regeneration project implemented under the Urban Regeneration Project of City of Colombo as a case study.

As an extension to objective two, objective three was to evaluate the cost and benefits of an urban regeneration project implemented under the Urban Regeneration Project of City of Colombo-case study-Mihindusenpura housing project. According to the guideline of introduced by European union by flowing seven steps especially under step four -financial analysis and step five- economic analysis all the cost and benefits evaluated and revealed the feasibility level of the project. And also, this objective connected to aim of the research as well. (see section 4.6 Appendix 2 and section 4.7 and appendix 3)

The project is financially feasible indeed. the economic feasibility of the case study reveals that the project is economical viable and feasible as all the figures means positive. (see section 4.7). But as the lack of data economic analysis based on certain assumptions. Once the analysis done on much assumptions inevitability of results can be reduce.

When consider the sensitivity analysis construction cost, total revenue and operating cost are critical variables. (see section 4.8.1)

Objective 4: To identify the issues in urban regeneration projects in Sri Lanka.

Under literature review revealed several issues occurred in regeneration projects global context such as Social relationship breaking ups, interruption of the existing economic systems and opportunities ,Pressure on existing infrastructure systems, increase and or development of other squatter settlements elsewhere in the city, unaffordability of the spaces created, those whose housing conditions were good were better than the average had to own worst houses than their previous houses. (see section 2.2.4) And also, under the analysis section several issues such as investments have not been attracted to the lands liberated through urban regeneration project and lands liberated through this project still remain underutilized, As the project had marginal financial feasibility, proper risk mitigation plan is required to execute the project with in projected budgetary allocations, land liberation process through this project needs to be evaluated in detail to identify the most valuable and potential lands for investments, city development plans needs to be aligned with the urban regenerations project to attract investments for the liberated lands, The urban development authority has to bear the burden of operation and maintenance of common areas and the major replacement works related to M&E related equipment as Management Corporations have not been established so far, registration of condominium deeds and establishment management corporations had been delayed due to not having proper approvals in the initial stage and current employment pattern of the inhabitants needs to be considered during resettlement process and proper social mobilization strategies needs to be adopted during and after relocation. (see section 4.9) Most of the issues occurred on

project owners point. Less issues occur on household. As UDA proposed to continue this programme, it is proposed to mitigate above issues and proceed further.

5.3 Recommendation

Considering the results obtained from the study, it is recommended to adopt cost benefit analysis for this kind of regeneration projects not only Sri Lanka but also other countries as well.

5.4 Limitations

However, this study includes following limitations as well.

The first limitation is this study particularly based on one case study therefore it is difficult to generalize the research findings to all regeneration projects.

Second limitation is; it is difficult to gather data for conduct economic analysis as lack of data availability.

Further, there are limitations in measuring some of the social benefits of regeneration projects for the appraisal purposes. Costs and benefits can only be compared if they are expressed in the same measurement units. Money values are the most convenient for this purpose. While some costs or benefits are difficult to measure in money terms, economists have developed a number of techniques to indirectly infer their value in money terms. One consequence of measuring costs and benefits in money terms is that it doesn't take into account the fact that money itself is worth more to some people than to others. Such 'equity' issues are difficult for CBA to take into account.

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5. APPENDICES

Appendix 1

Cost benefit analysis steps -comprehensive description according to EU guideline

Description of Context -Step 1

The first step of Cost benefit analysis is to describe on social, economic, political and institutional context which project going to be implemented.

Follow are the key features:

- the socio-economic data related to the particular region or the country which should relevant for the project need to describe
- the policy and institutional aspects, such as existing economic policies, development plans, organisation and management of services to be provided/developed by the project, as well as capacity and quality of the institutions involved;
- the current infrastructure endowment and service provision.
- other information and statistics that are relevant to better qualify the context. Such as, presence of environmental issues.
 - the insight and outlooks of the population with relation to the service to be provided.

Basically, this step contained back ground of the project. Simply the steps provide answer for question of how the project initiated and also give good rational for project initiation.

Definition of Objectives -Step 2

Objectives the project should defines according to needs assessment build upon the step one of cost benefit.

A clearly defined objectives of a project should be:

- Identify the effects of the project to be further evaluated in the CBA. The identification of effects should be linked to the project's objectives in order to measure the impact on welfare.

- Verify the project's relevance. Evidence should be provided that the project's rationale responds to a priority for the territory. This is achieved by checking that the project contributes to reaching the country policy goals and national/regional long-term development plans in the specific sector of assistance.

Identification of the Project -Step 3

In particular, a project is clearly identified when:

- the physical elements and the activities that will be implemented to provide a given good or service, and to achieve a well-defined set of objectives, consist of a self-sufficient unit of analysis;
- the body responsible for implementation is identified and its technical, financial and institutional capacities analysed; and the impact area, the final beneficiaries and all relevant stakeholders are duly identified (who has standing?)

Technical feasibility and environmental sustainability- step 4

Although both analyses are not formally part of the CBA, their results must be concisely reported and used as a main data source within the CBA. Detailed information should be provided on:

- Demand analysis; demand analysis identifies the need for an investment by assessing:
 - current demand** (based on statistics provided by service suppliers/ regulators/ ministries/national and regional statistical offices for the various types of users);
 - future demand** (based on reliable demand forecasting models that take into consideration macro- and socio-economic forecasts, alternative sources of supply, elasticity of demand to relevant prices and income, etc.) in both the scenarios with- and without-the-project. Both quantifications are essential to formulate demand projections, including generated/induced demand where relevant²¹, and to

design a project with the appropriate productive capacity. For example, it is necessary to investigate which share of the demand for public services, rail transport, or disposal of waste material can be expected to be satisfied by the project. Demand hypotheses should be tested by analysing the conditions of both the present and future supply, which may be affected by actions that are independent from the project.

- Options analysis; Undertaking a project entails the simultaneous decision of not undertaking any of the other feasible options. Therefore, in order to assess the technical, economic and environmental convenience of a project, an adequate range of options should be considered for comparison. Thus, it is recommended to undertake, as a first step, a strategic options analysis, typically carried out at pre-feasibility stage and which may require multiple criteria analysis. The approach for option selection should be as follows:
 - establish a list of alternative strategies to achieve the intended objectives;
 - screen the identified list against some qualitative criteria, e.g. multi-criteria analysis based on a set of scores and identify the most suitable strategy.

Once the strategic option is identified, **a comparison of the specific technological solutions** is typically carried out at feasibility stage. In some circumstances, it is useful to consider, as a first technological option, a ‘dominimum’ solution.

- environment and climate change considerations;
- technical design, cost estimates and implementation schedule.

A summary of the proposed project solution shall be presented with the following headings.

- **Location:** description of the location of the project including a graphical illustration (map). Availability of land is a key aspect: evidence should be provided that the land is owned (or can be

accessed) by the beneficiary, who has the full title to use it, or has to be purchased through an acquisition process. In the latter case, the conditions of acquisition should be described. The administrative process and the availability of the relevant permits to carry out the works should also be explained.

- **Technical design:** description of the main works components, technology adopted, design standards and specifications. Key output indicators, defined as the main physical quantities produced (e.g. kilometres of pipeline, number of overpasses, number of trees planted, etc.), should be provided.
- **Production plan:** description of the infrastructure capacity and the expected utilization rate. These elements describe the service provision from the supply side. Project scope and size should be justified in the context of the forecasted demand.
- **Costs estimates:** estimation of the financial needs for project realization and operations are imported in the CBA as a key input for the financial analysis. Evidence should be provided as to whether cost estimations are investor estimates, tender prices or out-turn costs.
- **Implementation timing:** a realistic project timetable together with the implementation schedule should be provided including, for example, a Gantt chart (or equivalent) with the works planned. A reasonable degree of detail is needed in order to enable an assessment of the proposed schedule.

Financial analysis -Step 5

A financial analysis must be included in the Cost benefit analysis to calculate the project's financial performance indicators. Follow are purposes of financial analysis conduct for a project.

- assess the consolidated project profitability;

- assess the project profitability for the project owner and some key stakeholders;
- verify the project financial sustainability, a key feasibility condition for any typology of project;
- outline the cash flows which underpin the calculation of the socio-economic costs and benefits.

The cash inflows and outflows to be considered are described in detail below.

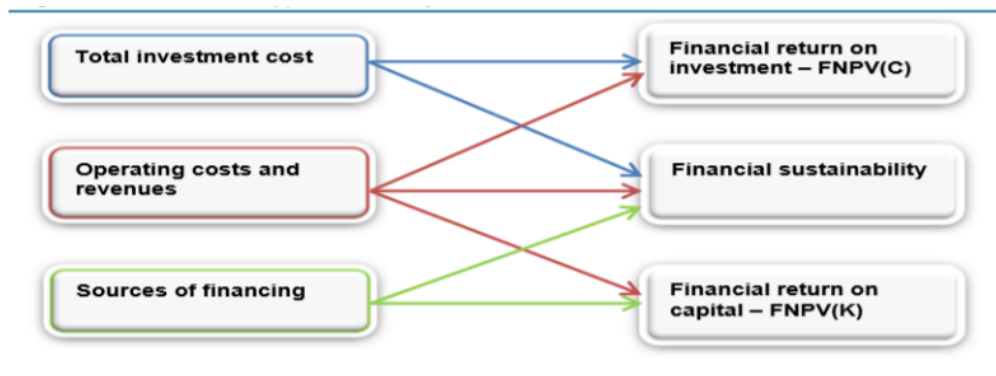
Methodology

The financial analysis methodology used is the Discounted Cash Flow (DCF) method.

Follow are the basic rules should adopted once do a financial analysis.

- Only cash inflows and outflows are considered in the analysis.
- Financial analysis should, as a general rule, be carried out from the point of view of the infrastructure owner. If, in the provision of a general interest service, owner and operator are not the same entity, a consolidated financial analysis, which excludes the cash flows between the owner and the operator, should be carried out to assess the actual profitability of the investment, independent of the internal payments. This is particularly feasible when there is only one operator, which provides the service on behalf of the owner usually by means of a concession contract.
- A suitable Financial Discount Rate (FDR) is adopted in order to calculate the present value of the future cash flows. The financial discount rate reflects the opportunity cost of capital.
- Project cash-flow forecasts should cover a period appropriate to the project's economically useful life and its likely long-term impacts. The number of years for which forecasts are provided should correspond to the project's time horizon (or reference period). The choice of time horizon affects the appraisal results.

- Values should be considered as including the implementation period. In the case of unusually long construction periods, longer values can be adopted.
- The financial analysis should usually be carried out in constant (real) prices, i.e. with prices fixed at a base-year. The use of current (nominal) prices [i.e. prices adjusted by the Consumer Price Index (CPI)] would involve a forecast of CPI that does not seem always necessary. When a different rate of change of relative prices is envisaged for specific key items, this differential should be taken into account in the corresponding cash flow forecasts.
- When the analysis is carried out at constant prices, the financial discount rate will be expressed in real terms. When the analysis is carried out at current prices, a nominal financial discount rate will be used.
- The analysis should be carried out net of VAT, both on purchase (cost) and sales (revenues), if this is recoverable by the project promoter. On the contrary, when VAT is not recoverable, it must be included.
- Direct taxes (on capital, income or other) are considered only for the financial sustainability verification and not for the calculation of the financial profitability, which is calculated before such tax deductions. The rationale is to avoid capital income tax rules complexity and variability across time and countries.



Source: EC CBA Guide 2008

Structure of Financial Analysis

	FNPV(C)	SUSTAINABILITY	FNPV(K)
Investment costs			
Start-up and technical costs	-	-	
Land	-	-	
Buildings	-	-	
Equipment	-	-	
Machinery	-	-	
Replacement costs	-	-	_*
Residual value	+		+
Operating costs			
Personnel	-	-	-
Energy	-	-	-
General expenditure	-	-	-
Intermediate services	-	-	-
Raw materials	-	-	-
Other outflows			
Loan repayments		-	-
Interests		-	-
Taxes		-	
Inflows			
Revenues	+	+	+
Operating subsidies		+	
Sources of financing			
Union assistance		+	
Public contribution		+	_**
Private equity		+	-
Private loan		+	

Source: Adapted from EC CBA Guide 2008.

a). Investment cost, replacement costs and residual value

The first step in the financial analysis is the analysis of the amount and breakdown over the years of the total investment costs. Investment costs are classified by:

- Initial investment:

Initial investment cost comprises all the capital costs of every fixed assets such as land, construction cost of the buildings, plant and machinery. And also considered non-fixed assets such as start-up and technical costs including planning and design, project management and technical assistance, supervision and marketing

- Replacement costs:

All the recurrent cost can be including for this. Such as replacement of short life machinery, instruments, furniture, vehicles, office related equipment

shorten the reference period to match the end of the design lifetime of the large asset that needs replacing and postpone the replacement until after the end of the reference period and assume an increase of the annual maintenance and repair cost for the specific asset until the end of the reference period.

- A residual value of the fixed investments must be included within the investment costs account for the end-year. The residual value reflects the capacity of the remaining service potential of fixed assets whose economic life is not yet completely exhausted. The latter will be zero or negligible if a time horizon equal to the economic lifetime of the asset has been selected.

b). Operating costs and revenues

The second step in financial analysis is the calculation of the total operating costs and revenues. Operating costs comprise all the costs to operate and maintain (O&M) the new or upgraded service. Cost forecasts can be based on historic unit costs, when patterns of expenditures on operations and maintenance ensured adequate quality standards.

Project revenue can be identified as cash inflows. Revenues will be determined by the quantities forecasts of goods/services provided and by their prices. Incremental revenues may come from increases in quantities sold, in the level of prices, or both. Transfers or subsidies, such as transfers from government. Other financial income

shall not be included within the operating revenues for the calculations of financial profitability because they are not directly attributable to the project operations.

c) Sources of financing

Identification of the different sources of financing that cover the investment costs is the third step of financial analysis.

- National public contribution.
- Project sponsor's contribution (loans or equity), if any;
- Private contribution under a PPP, (equity and loans) if any. Here, the loan is an inflow and it is treated as a financial resource coming from third parties.

d) Financial profitability

Determination of investment costs, operating costs, revenues and sources of financing enables the assessment of the project profitability, which is measured by the following key indicators:

- Financial Net Present Value – FNPV(C) - and Financial Rate of Return – FRR(C) - on investment;
- Financial Net present Value – FNPV (K) - and the Financial Rate of Return - FRR (K) - on national capital

Return on investment

The financial net present value of investment (FNPV(C)) and the financial rate of return of the investment (FRR(C)) compare investment costs to net revenues and measure the extent to which the project net revenues are able to repay the investment, regardless of the sources or methods of financing.

The Financial net present value on investment is defined as the sum that results when the expected investment and operating costs of the project (discounted) are deducted from the discounted value of the expected revenues:

$$FNPV(C) = \sum_{t=0}^n a_t S_t = \frac{S_0}{(1+i)^0} + \frac{S_1}{(1+i)^1} + \dots + \frac{S_n}{(1+i)^n}$$

where: S_t is the balance of cash flow at time t , a_t is the financial discount factor chosen for discounting at time t and i is the financial discount rate. The financial rate of return on investment is defined as the discount rate that produces a zero FNPV, i.e. FRR is given by the solution of the following equation.

$$0 = \sum \frac{S_t}{(1 + FRR)^t}$$

The FNPV(C) is expressed in money terms, and must be related to the scale of the project. The FRR(C) is a pure number, and is scale-invariant. Mainly, the examiner uses the FRR(C) in order to judge the future performance of the investment in comparison to other projects, or to a benchmark required rate of return.

when the FRR(C) is lower than the applied discount rate (or the FNPV(C) is negative), then the revenues generated will not cover the costs.

The return on investment is calculated considering:

- (incremental) investment costs and operating costs as outflows;
- (incremental) revenues and residual value as inflows. Thus, cost of financing is not included in the calculation of the performance of the investment FNPV(C). Moreover, as mentioned above, capital, income or other direct taxes are included only in the financial sustainability table and not considered for the calculation of the financial profitability, which is calculated before deductions.

Return on national capital

The objective of the return on national capital calculation is to examine the project performance from the perspective of the assisted public, and possibly private. The

return on national capital is calculated considering as outflows: the operating costs; the national (public and private) capital contributions to the project; the financial resources from loans at the time in which they are reimbursed; the related interest on loans. As far as replacement costs are concerned, if they are self-financed with the project revenues, they will be treated as operating costs

e). Financial sustainability

The project is financially sustainable when the risk of running out of cash in the future, both during the investment and the operational stages, is expected to be nil. Project promoters should show how the sources of financing available (both internal and external) will consistently match disbursements year by-year. In the case of non-revenue generating projects or whenever negative-cash-flows are projected in the future, a clear long-term commitment to cover these negative cash flows must be provided.

Economic analysis -Step 6

One of important analysis of come under cost benefit analysis is economic analysis. Because this analysis looks upon social welfare perspective. An economic analysis must be carried out to appraise the project's contribution to welfare. The key concept is the use of shadow prices to reflect the social opportunity cost of goods and services, instead of prices observed in the market, which may be distorted.

- non-efficient markets where the public sector and/or operators exercise their power.
- administered tariffs for utilities may fail to reflect the opportunity cost of inputs due to affordability and equity reasons;
- some prices include fiscal requirements.
- for some effects no market (and prices) are available.

The standard approach suggested in this guide, consistent with international practice, is to move from financial to economic analysis. Starting from the account for the return on investment calculation, the following three adjustments should be:

- fiscal corrections;
- conversion from market to shadow prices;
- evaluation of non-market impacts and correction for externalities.

After market prices adjustment and non-market impacts estimation, costs and benefits occurring at different times must be discounted. The discount rate in the economic analysis of investment projects, the Social Discount Rate (SDR), reflects the social view on how future benefits and costs should be valued against present ones. In principle, every project with an ERR lower than the social discount rate or a negative ENPV should be rejected. A project with a negative economic return uses too many socially valuable resources to achieve too modest benefits for all citizens.

Risk Assessment -Step 7

A risk assessment must be included in the cost benefit analysis. This is required to deal with the uncertainty that always permeates investment projects, including the risk that the adverse impacts of climate change may have on the project. The recommended steps for assessing the project risks are as follows:

- sensitivity analysis;
 - qualitative risk analysis;
 - probabilistic risk analysis;
 - risk prevention and mitigation.
- **Sensitivity analysis**

Sensitivity analysis enables the identification of the critical variables of the project. Such variables are those whose variations, be they positive or negative, have the largest impact on the project's financial and/or economic performance. The analysis is carried out by varying one variable at a time and determining the effect of that change on the NPV. As a guiding criterion, the recommendation is to consider 'critical' those variables for which a variation of ± 1 % of the value adopted in the base case gives rise to a variation of more than 1 % in the value of the NPV. The tested variables should be deterministically independent and as disaggregated as possible. Correlated

variables would give rise to distortions in the results and double-counting. Therefore, before proceeding to the sensitivity analysis, the CBA model should be reviewed with the aim of isolating the independent variables and eliminating the deterministic interdependencies (e.g. splitting a variable in its independent components). For example, 'revenue' is a compound variable, which depends on the two independent items quantity and tariff, both of which should be analyzed.

A particularly relevant component of the sensitivity analysis is the calculation of the switching values. This is the value that the analyzed variable would have to take in order for the NPV of the project to become zero, or more generally, for the outcome of the project to fall below the minimum level of acceptability. The use of switching values in sensitivity analysis allows making some judgements on the risk of the project and the opportunity of undertaking risk-preventing actions

Switching Value is the value that the analyses variable would have to take in order for the NPV of the project to become zero, or more generally, for the outcome of the project to fall below the minimum level of acceptability.

- **Qualitative risk analysis**

Follow are the elements should include in qualitative risk analysis.

- a list of adverse events to which the project is exposed;
- a risk matrix for each adverse event representative:
 - the possible causes of occurrence;
 - the link with the sensitivity analysis, where applicable;
 - the negative effects generated on the project;
 - the (ranked) levels of probability of occurrence and of the severity of impact;
 - the risk levels.
- an interpretation of the risk matrix including the assessment of acceptable levels of risk;

- a description of mitigation and/or prevention measures for the main risks, indicating who is responsible for the applicable measures to reduce risk exposure, when they are considered necessary.

To undertake the qualitative risk analysis, initially it is needed to identify the adverse events that the project may face. Then Structure a list of potential adverse events definitely describes about the complexities of the project.

Once the potential adverse events have been identified, the corresponding risk matrix may be built.

Initially, it is necessary to look at the possible causes of the risk materializing. The primary perils that could occur during the life of the project. All causes of each adverse event must be identified and analyzed, taking into account that numerous defects of predicting, planning and management may have similar consequences over the project. The identification of the causes of potential dangers can be founded on ad hoc analyses or looking at similar problems that have been documented in the past. In general, the occurrence of a disaster is looked upon as a design weakness, in the broadest possible sense, and therefore it is expected that all the potential causes of failure are properly identified and documented.

When appropriate, the link with the results of the sensitivity analysis should be made explicit by showing which critical variables are affected by the adverse events. However, depending on the nature of the event considered this is not always applicable

For each adverse event, the general effect(s) generated on the project and the relative consequences on the cash flows should be described.

It is convenient to describe these effects in terms of what the project sponsor might experience in terms of functional or business impacts. Each effect should also be characterized by its consequences over the project calendar (short vs. long term implications), relevant for both the prediction of the effect on the cash flows and the determination of appropriate risk mitigation measures.

A Probability (P) or likelihood of occurrence is attributed to each adverse event. Below, a recommended classification is given, although in principle other classifications are possible:

- A. Very unlikely (0–10 % probability)
- B. Unlikely (10–33 % probability)
- C. About as likely as not (33–66 % probability)
- D. Likely (66–90 % probability)
- E. Very likely (90–100 % probability)

To each effect a Severity (S) impact from, say, I (no effect) to VI (catastrophic), based on cost and/or loss of social welfare generated by the project, is given. These numbers enable a classification of risks, associated with their probability of occurrence. Below a typical classification is given.

Risk severity classification

Table 5-1: Risk Severity Classification

Rating	Meaning
I	No relevant effect on social welfare, even without remedial actions.
II	Minor loss of the social welfare generated by the project, minimally affecting the project long run effects. However, remedial or corrective actions are needed.
III	Moderate: Social Welfare loss generated by the project, mostly financial damage, even in the medium-long run remedial actions may correct the problem
IV	Critical: High Social welfare loss generated by the project; the occurrences of the risk cause a loss of the preliminary function(s) of the project, Remedial Actions, even large in scope are not enough to avoid serious damage.

V	Catastrophic: Project failure that may result serious or even total loss of the project functions, main project effects in the medium- long term do not materialise.
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The Risk level is the combination of Probability and Severity (P*S). Four risk levels can be defined as shown in Table 2-3 with the associated colors.

Table 5-2: Risk Level Identification

Risk Level	Colour
Low	Green
Moderate	Yellow
High	Red
Unacceptable	Dark Purple

Severity /Probability	I	II	III	IV	V
A	Low	Low	Low	Low	Moderate
B	Low	Low	Moderate	Moderate	High
C	Low	Moderate	Moderate	High	High
D	Low	Moderate	High	Very High	Very High
E	Moderate	High	Very High	Very High	Very High

Once the level of the remaining risks (P and S) is established, it is important to identify the mitigation and/or prevention measures foreseen. The Table 2-4 shows, in a qualitative way, the kinds of measures or combinations of measures to reduce the project risk prevailing in the various areas of the above defined risk matrix. The identification of these measures requires a thorough knowledge of the causes of risk and of the nature and the timing of the end effects.

Table 5-3: Prevention & Mitigation Measure Matrix

Severity/Probability	I	II	III	IV	V
A	Prevention or				
B	Mitigation			Mitigation	
C					
D	Prevention		Prevention and Mitigation		
E					

The intensity of the measure should be commensurate to the level of risk. For risks with high level of impact and probability, a stronger response and a higher level of commitment to managing them shall be implemented. On the other hand, for low level risks, close monitoring could be sufficient. When the risk level becomes unacceptable (a situation that should never materialize, in principle) the entire project design and preparation must be revised. When identifying measures to mitigate existing risks, it is mandatory to define who is responsible for their execution and in what stage of the project cycle this will happen (planning, tendering, implementation, operation)

- **Probabilistic risk analysis**

It may be carried out where appropriate, depending on project size and data availability. This type of analysis assigns a probability distribution to each of the critical variables of the sensitivity analysis, defined in a precise range of values around the best estimate, used as the base case, in order to recalculate the expected values of financial and economic performance indicators. The probability distribution for each variable may be derived from different sources, such as experimental data, distributions found in the literature for similar cases, consultation with experts. Obviously, if the process of generating the distributions is unreliable, the risk assessment is unreliable as well. However, in its simplest design this step is always feasible and represents an important improvement in the understanding of the project's strengths and weaknesses as compared with the base case.

- **Risk prevention and mitigation**

The implementation of the steps described above defines the risk prevention and mitigation strategy of the project. Generally, a neutral attitude towards risks is recommended because the public sector might be able to pool the risks of a large number of projects. In such cases, the assessment of the switching values and of the scenario analysis results, followed by a well-established risk matrix (plus, a probabilistic risk analysis if necessary) will summarize the risk assessment. In some cases, however, the evaluator or the project promoter can deviate from neutrality and prefer to risk more (risk-taker) or less (risk-adverse) for the expected rate of return. However, there must be a clear justification for this choice. Risk assessment should be

the basis for risk management, which is the identification of strategies to reduce risks, including how to allocate them to the parties involved and which risks to transfer to professional risk management institutions such as insurance companies. Risk management is a complex function, requiring a variety of competences and resources, and it can be considered as a role for professionals, under the responsibility of the managing authority and the beneficiary. The project promoter should, however, following the risk assessment, at least identify specific measures (including responsibilities for their application) for the mitigation and/or prevention of the identified risks, according to international good practice.

Appendix 2

Permissible uses according to the CCCDP 2019-2030(Extracts)

Zoning according to the CCCDP 2019-2030	Permissible uses according to the CCCDP 2019-2030 (Extracts)
Commercial Zone (L1)	<p>4.7(a) i. Diplomatic Embassies (Chanceries)</p> <p>ii. Banks and Offices, Departmental Stores, Wholesale Shops, Supermarket and Retail Shops.</p> <p>iii. Customer Care Services – Barber Shops, Beauty Salons and allied activities.</p> <p>iv. Service Activities – Bakeries, Laundries, Automobile Repair, Printing Presses, Vehicle Service Stations and allied Activities, subject to regulatory requirements of Central Environmental Authority, where necessary.</p> <p>v. Hotels and Restaurants</p> <p>vi. Dwelling House/Units, Apartment Buildings</p> <p>vii. Health Institutions</p> <p>viii. Educational Institutions</p> <p>ix. Warehouses each up to 1000 sq.m.</p> <p>x. Non-polluting light industries subject to regulatory requirement of Central Environmental Authority</p> <p>xi. Open Air Trading</p> <p>xii. Indoor Amusement and Entertainment Establishments</p> <p>xiii. Places of Public Worship – each within sites of extent exceeding 500 sq.m.</p> <p>xiv. Places of public Assembly</p> <p>xv. Socio – Cultural Institutions</p>

	<p>xvi. Public Outdoor Recreational Space</p> <p>xvii. Vehicle Parking</p> <p>xviii. Petrol Filling Stations</p> <p>4.7(b) Specification for Educational Institutions</p> <p>i. Preschools minimum site extent – 1000 sq.m.</p> <p>ii. Primary schools minimum site extent – 0.5 ha</p> <p>iii. Secondary schools minimum site extent – 1.5 ha</p> <p>iv. Service charges in lieu of required regulatory Vehicle parking will not be accepted</p> <p>v. The minimum width of the street shall be 12 m</p> <p>4.7(c)</p> <p>4.7(d)</p> <p>Minimum Plot Size - As per From C1 & C2</p> <p>Maximum Plot Coverage - As per From C1 & C2</p> <p>4.7(e) Maximum Floor Area Ratio (FAR) – As per From C1 & C2S</p>
<p>Special Primary Residential Zone (L2)</p>	<p>4.1(a) i. Dwelling Houses/Units, Apartment Buildings</p> <p>ii. Hotels - each having not more than 10 bed rooms within a site extent exceeding 1000 sq.m.</p> <p>iii. Restaurant, Banks – each within a site extent exceeding 1000 sq.m.</p> <p>iv. Professional offices – each having a net floor area not exceeding 500 sq.m. and each within sites of extent exceeding 500 sq.m.</p> <p>v. Educational Institutions – Pre-School and Primary Schools each within sites of extent exceeding 1000sq.m. and 0.5 ha. Respectively.</p> <p>vi. Customer Care Services – Barber shops, Beauty</p>

	<p>salons and allied activities, each have a net floor area not exceeding 100 sq.m.</p> <p>vii. Retail shops – each having a net floor area not exceeding 50 sq.m.</p> <p>viii. Places of Religious Worship – each within sites of extent, exceeding 500 sq.m.</p> <p>ix. Socio Cultural and other Institutions – each within sites of extent, exceeding 500 sq.m.</p> <p>x. Petrol Filling Stations</p> <p>xi. Vehicle Parks</p> <p>xii. Outdoor Recreational Spaces</p> <p>4.1(b) i. Minimum Plot Size – 500 sq.m.</p> <p>ii. Maximum number of floors – five Storeys, provided the access road is not less than 9.0m. in width.</p> <p>iii. Specifications of site extents and number of floors for existing lots (sub divided and approved prior to August 1999) are as follows: -</p> <p>Plot size – 150 - 299 sq.m .- three storey - (G+2)</p> <p>Plot size – 300 - 499 sq.m. - four storey - (G+3)</p> <p>4.1(c) Maximum Plot Coverage - 65%</p> <p>4.1(d) Other Specifications: -</p> <p>Subdivision of a lot having an extent of 500 sq.m. or more, may be permitted for the construction of a Terrace house subject to the following conditions: -</p> <p>i. The building shall be divided among the owners by common internal walls based on the ownership of the land.</p> <p>ii. Each sub-divided lot among the owners should not be less than 150 sq.m.</p>
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	<p>iii. The building in extent appearance to remain as a single entity.</p> <p>iv. A building plan depicting proposed development with three dimensional views shall be submitted to the Authority to obtain planning clearance prior to submitting plans for approval to the Local Authority.</p> <p>v. Adherence to all other regulations of the Authority.</p> <p>4.1(e) i. If the site extent is 2500 sq.m. or more the maximum plot coverage shall be 50% of such lot & the specifications for development given in from C1 & C2 may be applicable for such development.</p> <p>ii.</p> <p>a) A preliminary planning clearance shall be obtained from the Authority prior to any such development activity is carried out.</p> <p>b) A survey plan shall accompany the preliminary planning clearance applications marking all the large trees with an indication of species within the site, in order to preserve as many trees as possible.</p> <p>c) A subcommittee of the Planning Committee, consisting of a Qualified Town Planner, Chartered Architect, Landscape Architect and a Civil Engineer to be appointed to recommend such application to the Planning Committee of the Local Authority.</p> <p>4.1(f) Service charges in lieu of the Vehicle Parking</p> <p>Service charges shall not be accepted in lieu of vehicle parking for any of the permissible uses or for any change of use of residential buildings.</p> <p>4.1(g) Masonry Boundary Walls</p>
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	<p>Heights of Masonry Boundary Walls facing access roads are permitted to a maximum height of 1.0m from the ground level. Fences or hedges may be permitted, above the masonry boundary wall.</p> <p>Permissible uses in Primary Residential Zone</p> <p>4.2(a) i. Dwelling House/Units, Apartment Buildings ii. Banks, Professional Offices – each of net floor area not exceeding 200 sq.m. each within sites of extent exceeding 500 sq.m. iii. Retail shops not exceeding a floor area of 100 sq.m. iv. Customer Care Service – Barber shops, Barber shops, Beauty Salons, health & fitness centers and allied activities; each having a net floor area not exceeding 200 sq.m. each within sites of extent exceeding 500 sq.m. v. Places of Religious Worship – each within a site extent exceeding 500 sq.m. vi. Educational Institution – Preschool and Primary Schools, each within sites of extent exceeding 500sq.m. and 0.5 ha, respectively. vii. Socio Cultural Institutions viii. Public Outdoor Recreational Spaces ix. Vehicle Parks x. Petrol Filling Stations</p> <p>4.2(b) Minimum Plot Size - As per From C1 & C2</p>
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	<p>4.2(c) Maximum Plot coverage - As per From C1 & C2</p> <p>4.2(d) Maximum Floor Area Ratio (FAR) - As per From C1 & C2</p> <p>4.2(e) Service Charges In lieu of Vehicle Parking</p> <p>Service charges shall not be accepted in lieu of car parking for any of the permissible uses or for any change of use of residential buildings within this Zone.</p> <p>4.2(f) Masonry Boundary Walls</p> <p>Heights of Masonry Boundary Walls facing access roads are permitted to a maximum height of 1.0m from the ground level. Fences or hedges may be permitted, above the masonry boundary wall.</p>
Mixed Development Zone (L3)	<p>4.5(a) i. Diplomatic Embassies (Chanceries)</p> <p>ii. Banks, Commercial Offices, Professional Offices and Retail Shops</p> <p>iii. Hotels and Restaurants</p> <p>iv. Dwelling House/Units, Apartment Buildings</p> <p>v. Health Institutions</p> <p>vi. Educational Institutions</p> <p>vii. Open Air Trading Areas</p> <p>viii. Customer Care Services – Barber Shops, Beauty Salons and allied activities.</p> <p>ix. Indoor Amusement and Entertainment Establishments</p> <p>x. Places of Public Worship – each within sites of extent</p>

	<p>exceeding 500 sq.m.</p> <p>xi. Socio – Cultural Institutions</p> <p>xii. Service Industries – Bakeries, Laundries, Printing Presses, Computer Repair and allied activities subject to regulatory requirements of Central Environmental Authority, where necessary.</p> <p>xiii. Public Outdoor Recreational Spaces</p> <p>xiv. Vehicle Parks</p> <p>xv. Petrol Filling Stations</p> <p>4.5(b) Specification for Educational Institutions</p> <p>i. Preschools minimum site extent – 1000 sq.m.</p> <p>ii. Primary schools minimum site extent – 0.5 ha</p> <p>iii. Secondary schools minimum site extent – 1.5 ha & above</p> <p>iv. Service charges in lieu of required regulatory car parking will not be accepted</p> <p>v. The minimum width of the street shall be 12 m</p> <p>4.5(c) Minimum Plot coverage - As per From C1 & C2</p> <p>4.5(d) Maximum Plot Coverage - As per From C1 & C2</p> <p>4.5(e) Maximum Floor Area Ratio (FAR) - As per From C1 & C2</p> <p>4.5(f) Masonry Boundary Walls</p> <p>Heights of Masonry Boundary Walls along roads running perpendicular to Galle Road shall not be more than 1.0 m from the ground Level. Fences or hedges are permitted, above the masonry boundary wall.</p>
Commercial Zone (L4)	<p>4.7(a) i. Diplomatic Embassies (Chanceries)</p> <p>ii. Banks and Offices, Departmental Stores, Wholesale Shops, Supermarket and Retail Shops.</p>

	<p>iii. Customer Care Services – Barber Shops, Beauty Salons and allied activities.</p> <p>iv. Service Activities – Bakeries, Laundries, Automobile Repair, Printing Presses, Vehicle Service Stations and allied Activities, subject to regulatory requirements of Central Environmental Authority, where necessary.</p> <p>v. Hotels and Restaurants</p> <p>vi. Dwelling House/Units, Apartment Buildings</p> <p>vii. Health Institutions</p> <p>viii. Educational Institutions</p> <p>ix. Warehouses each up to 1000 sq.m.</p> <p>x. Non-polluting light industries subject to regulatory requirement of Central Environmental Authority</p> <p>xi. Open Air Trading</p> <p>xii. Indoor Amusement and Entertainment Establishments</p> <p>xiii. Places of Public Worship – each within sites of extent exceeding 500 sq.m.</p> <p>xiv. Places of public Assembly</p> <p>xv. Socio – Cultural Institutions</p> <p>xvi. Public Outdoor Recreational Space</p> <p>xvii. Vehicle Parking</p> <p>xviii. Petrol Filling Stations</p> <p>4.7(b) Specification for Educational Institutions</p> <p>i. Preschools minimum site extent – 1000 sq.m.</p> <p>ii. Primary schools minimum site extent – 0.5 ha</p>
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	<p>iii. Secondary schools minimum site extent – 1.5 ha</p> <p>iv. Service charges in lieu of required regulatory Vehicle parking will not be accepted</p> <p>v. The minimum width of the street shall be 12 m</p> <p>4.7(c)</p> <p>4.7(d)</p> <p>Minimum Plot Size - As per From C1 & C2</p> <p>Maximum Plot Coverage - As per From C1 & C2</p> <p>4.7(e) Maximum Floor Area Ratio (FAR) – As per From C1 & C2</p>
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Appendix 3

Operating Revenue and Costs

Item	Total	2010-12	2013	2014	2015	2016	2017	2018-20	2021	2022	2023-27	2028-29
Revenues												
Instalment of Housing Loan	306.0		18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00
Sinking Fund	25.0		18.75	6.25								
Assets Value Increase from Released Land	4,249.0			450.00	26.00	2435.00	26.00	26.00	1026.00	26.00	26.00	26.00
Total Revenues	4,580.00	-	36.75	474.25	44.00	2,453.00	44.00	44.00	1,044.00	44.00	44.00	44.00
Operating Cost												
Water- Common Area	1.0		0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
Electricity - Common Area	92.3		5.11	5.11	5.11	5.11	5.11	5.36	5.36	5.36	5.63	5.91
Maintenance Cost	104.3		4	4	6.64	1	6.3	6.62	6.62	6.62	6.95	7.29
Management Cost (FM)	184.4		10.2	10.20	10.20	10.20	10.20	10.71	10.71	10.71	11.25	11.81
Insurance	4.6		0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27
Total Operating Cost	386.62		19.63	19.63	22.27	16.63	21.93	23.01	23.01	23.01	24.15	25.35
Net Revenue	4,193.38	-	17.12	454.62	21.73	2,436.37	22.07	20.99	1,020.99	20.99	19.85	18.65

Appendix 4

Financial Profitability of the Project

Item	Total	2010	2011	2012	2013	2014	2015	2016	2017	2018-20	2021	2022	2023-27	2028-29
Total Revenue	4,580.00	-	-	-	36.75	474.25	44.00	2,453.00	44.00	44.00	1,044.00	44.00	44.00	44.00
Residual Value	-													
Total Inflows	4,580.00	-	-	-	36.75	474.25	44.00	2,453.00	44.00	44.00	1,044.00	44.00	44.00	44.00
Total Outflows	2,786.94	1,365.55	625.48	409.29	19.63	19.63	22.27	16.63	21.93	23.01	23.01	23.01	24.15	25.35
Net Cash Flows	1,793.06	-1,365.55	-625.48	-409.29	17.12	454.62	21.73	2,436.37	22.07	20.99	1,020.99	20.99	19.85	18.65
PV Rate (Interest Rate 8.8%)														
FNPV (C)	23.79													
FRR	8.98%													

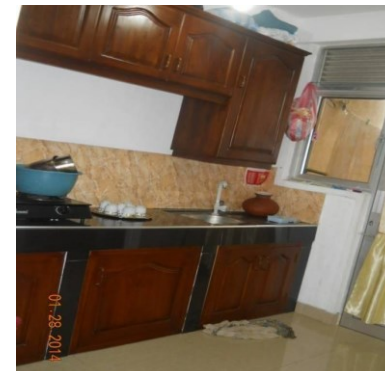
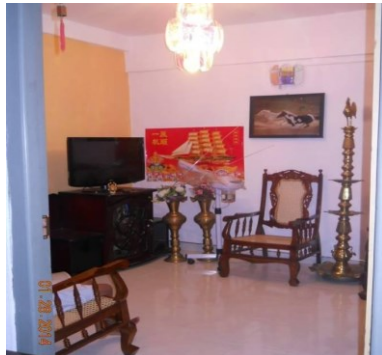
Appendix 5

Economic feasibility

Item	Total	2010	2011	2012	2013	2014	2015	2025	2026	2027	2028	2029
Project Investment Cost	2,400.32	1,365.55	625.48	409.29								
Project O&M Cost	386.62	-	-	-	19.63	19.63	24.15	24.15	24.15	24.15	25.35	25.35
Total Economic Cost	2,786.94	1,365.55	625.48	409.29	19.63	19.63	24.15	24.15	24.15	24.15	25.35	25.35
Savings from Free/NRW	24.92				1.4	1.4	1.5	1.5	1.5	1.5	1.6	1.6
Reduction cost of DRR	17.00				1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Savings of Medical expenses and House damage by Flooding	1,134.00				21.0	21.0	76.5	76.5	76.5	76.5	76.5	21.0
Income Variance with New Job opportunities	68.00				4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Total Revenue	4,580.00	-	-	-	36.8	474.3	44.0	44.0	44.0	44.0	44.0	44.0
Total Economic Benefit	5,823.92	0.00	0.00	0.00	64.13	501.63	127.02	127.02	127.02	127.02	127.10	71.60
Net Economic Benefits	3,036.98	-1365.55	-625.48	-409.29	44.50	482.00	102.87	102.87	102.87	102.87	101.75	46.25
ENPV	41.58											
ERR	12.32%											
B/C Ratio	2.09											

Appendix 6

photo graphs analysis 2014 mihidusenpura housing scheme inside of houses



Using Common Places -2014



Components of Each Housing Units



- Living Room
- Two Bed Rooms
- Kitchen
- Wash Room/Toilet
- Balcony

Typical Unit View.

Appendix 7

Semi structured interview guideline for officials

For conduct research on Cost benefit analysis for regeneration projects

Case study: Mihindusenpura Housing Scheme

1. What are the costs identified for the project?

.....
.....

2. What are the financial /non-financial benefits of the organization by conducting of this project?

.....
.....

3. What are the financial/non-financial benefits for people?

.....
.....
.....

4. What are the risks identified for the project?

.....
.....

5. What are the types of investments identified for release lands?

.....
.....
.....

6. What is the current process practicing liberate lands?

.....
.....

7. Is management cooperation established for this particular project?

.....
.....

Appendix 8

Semi structured interview guideline for beneficiaries of training programme

For conduct research on Cost befit analysis for regeneration projects

Case study: Mihindusenpura Housing Scheme

1. Name of original location or waththa.....

2. What is new job opportunity obtain after training?.....
.....

3. What is monthly gain from the new job.

Below Rs.5000 Rs. 5000-Rs. 10000 Rs.10000-Rs.20000

4. What are other benefits obtain from the project?.....

