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ETHIOPIAN INSTITUTE OF ARCHITECTURE BUILDING CONSTRUCTION AND CITY DEVELOPMENT (EiABC)

THE PRACTICE OF BUILDING DEMOLITION IN ADDIS ABABA CITY: CURRENT PRACTICE ASSESSMENT AND REGULATORY FRAMEWORK DEVELOPMENT

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CERTIFICATION

The undersigned have examined the thesis entitled **'The Practice of Building Demolition in Addis Ababa City; Current Practice Assessment and Regulatory Framework Development'** presented by Tirufat Mekuria Melese, a candidate for the degree of Masters of Science, and hereby certify that it is worthy of acceptance.

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DECLARATION

I declare that, this thesis prepared for the partial fulfillment of the requirements for the degree of **Master of Science in Construction Management** entitled '***The Practice of Building Demolition in Addis Ababa City; Current Practice Assessment and Regulatory Framework Development'*** is my original research work and has not been presented in any university.

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ABSTRACT

The Addis Ababa city Administration has been demolishing old buildings and clearing up slum areas for urban renewal purpose for quite some time now. This is being carried out either as part of a government development plan or due to strong interest of foreign investors to participate in the housing and hospitality sector. In addition, increased value of land invited local private property owners to upgrade existing structures in to more income generating spaces aiming at maximizing benefits. However, the practice is not coping up with the technological advancements in the area; rather it is highly dependent on the experience and skill of individuals involved. The fact that Ethiopia doesn't have a code of practice for building demolition has paved the way for the practice to be performed in non-structured manner. This research started aiming at achieving three objectives; the first being examining the current practice of building demolition in Addis Ababa city. This was done by using selected cases to detect the loop holes through direct observation and interviewing representatives of parties involved in a building demolition project. Furthermore, an in-depth document analysis was done on existing local protocols; ranging from policies to codes and regulations, that can serve as a starting point to develop the framework. As a result, the gaps were analyzed in five major categories related to stakeholders management, planning and methodologies, safety, environment and waste management, productivity and performance recording. The second objective goes on with examining the international trend of the sector through intensive review of literatures so as to derive key performance indicators to evaluate the local practice against later on. For this, it was necessary to benchmark certain countries with best practice, such as Kenya, India, Hong Kong and the Netherlands. Afterwards, standard factors extracted from the study were categorized under generic sections after critical adaptations are made. The third and final objective of this research was to develop a guiding regulatory framework aiming to serve as a milestone point for the regulatory authority. The developed framework describes the main actors of the building demolition ecosystem and states the major responsibility of each entity for the success of the cycle. Finally, it concludes by summarizing the findings of the research in such a way that the practice lacks proper emphasis from the regulatory body in terms of standardizing work items like contracts and safety protocol strictly to follow while performing the act. In addition, qualification of professional is another area which needs big work in order to rescue the system being reliant on personal skill. As far as the recommendation points are concerned, the study suggests for the upper regulatory body to draft a standard code of practice so as to set the minimum requirement of professionals and the other stakeholders. In addition, it was also recommended that regulatory body to have a distinct organ dedicated to keeping the performance record of the sector in order to make future plans and structure demolition acts in more coordinated manner. At last, studies related to waste management and recycling, pattern against city expansion and application of prefabricated elements vs demolition are suggested for further research.

Key Words: *Building demolition, Construction Industry, Building, Code of practice, Regulatory framework*

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ABBREVIATIONS

AACA – Addis Ababa City Administration

AACCB – Addis Ababa City Construction Bureau

AACRA – Addis Ababa City Roads Authority

BIS – Bureau of Indian Standards

CoM – Council of Ministers

COP – Code of practice

FDRE – Federal Democratic Republic of Ethiopia

FHC – Federal Housing Corporation

IHDP – Integrated Housing Development Program

HKBD – Hong Kong Building Department

KEBS – Kenya Bureau of Standards

KPI – Key Performance Indicator

LACDBS – Los Angeles City Department of Building and Safety

MoUDC – Ministry of Urban Development and Construction

MSE - Micro & Small Enterprise

NADC - National Association of Demolition Contractors

OSHA - Occupational Health and Safety Act

ROW – Right of Way

WHS – World Health and Safety

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

Starting from the era where the concept of shelter was first coined, the fashion of constructing it has been evolving significantly. Focusing on the modern-day living style, people continue to upgrade techniques and materials of construction based on cones and prone analysis made through experience. Today, the world has arrived at concrete structures as the leading technology in the construction industry. During the life cycle of structures, they often meet with some situations like disasters, changing functions, city reconstruction, or higher residence demand due to population, all these lead to demolition or re-construction of existing structures (Patel pranav, 2015). Demolition acts completely remove a building or cleans a site in order to release the potential value for redevelopment or use the land as an open space for recreational purposes. Buildings are changed in harmony with the needs of the age. As the complexity in construction increases, it is obviously critical to consider the overall demolition work is being as important as construction work (Yirgalem, 2016).

Before few decades ago, buildings were mostly dismantled by human hand at the end of their lives due to structural or functional obsolescence. Today various kinds of demolition methods are available, but the method of implementation for demolition work varies with the site condition, safety and cost (Patel pranav, 2015).

In developed countries, demolition is very essential for development of new structures for various residential and industrial purposes (luckyguyishere, October 14, 2017). On the other side, the issue of urban informal settlements, as observed in most urban centers of Africa, Asia, and Latin America is broad, complex and dynamic (Jemal, 2019). According to Kalugila (2013), Informal urbanization trends in sub-Saharan Africa show Tanzania to be one of the countries with highest population living in informal settlements followed by Mozambique and Ethiopia.

In the Ethiopian context these types of settlements are known as "*Chereka Bet*". The term *Chereka bet* can directly be defined as "house of the moon" implying the illegal construction of houses is done at nights without the consent of city government for construction permit (Jemal, 2019). In Addis Ababa (Bole, Yeka and Kolfe sub-cities) there were demolitions in 1994, which destroyed 13,440 informally constructed houses (Gondo, 2011).

The practice of demolition in Addis Ababa is commenced for plenty of new construction activities mainly for infrastructural development, investments and housing programs. However, the practice is criticized for being solely dependent on the skills of daily laborers not supported with proper training but rather gained through experience. Generally, the current practice lacks professionalism and it is difficult to access available documents that involve records, demolition code of practices, research papers regarding the trend of demolition work.

In most cases, countries amend their own guideline/ code of practice to follow during the practice based on the existing policies, rules and regulations regarding the construction industry.

They are largely based on existing codes and guidelines (if any) that support the previous legislation. In any work environment, a code of practice ensures that the activities of a particular professional or other project stakeholder to comply with required standards. This helps to identify and manage risks in order to ensure safety and proper work flow.

1.2 Purpose of Demolition

The era of demolition began centuries ago coupled with the start of construction. Nowadays, the industry brings a lot of potentials and become highly sophisticated business requiring expertise and competent persons across the world. People have demolished structures to make room for new structures, to rehabilitate the existing ones, and to create new buildings with materials taken from existing structures. When demolition occurs, it is usually a sign of new growth, expansions and inner-city urban renewals (Richard J. Diven, 2006).

1.2.1 Demolition Vs City Expansion

According to (UNHabitat, 2018), by the year 2025, close to half of the population of the world (68%) is estimated to live in cities and towns. The dense concentration of inhabitants in cities and towns implies that the economic contribution of urban regions to gross regional product (GRP) is becoming dominant (Asfaw, et al., 2011). On the other hand, rapid urbanization is creating mounting pressure on infrastructure, service provision and management capacity of governments. In line with this, existing city centers will be forced to accommodate more than they used to in which demolition of structures for efficient redevelopment will become mandatory.

1.3 Problem Statement

Any construction output has a limited life span during which it requires repair and maintenance works to the point where it is no more economical and/or there is a need to change the original purpose of the facility. As the built environment ages, demolition has become a fast-growing industry creating multiple employment opportunities. It has also become an increasingly complex business, requiring a unique combination of project management skills, legal and contractual knowledge, and engineering skills from its practitioners (Richard J. Diven, 2006). While it is typical to perform demolition works in the construction industry, the process of doing it is a critical point to give attention to. As cities get dense, the need for planned settlement becomes a critical issue which in return makes the application of controlled demolitions mandatory. During such conditions, it becomes difficult and time consuming to perform the activity unless there is a systematic way of approaching it.

Internationally, countries like Australia, New Zealand and England draft a code of practice; even at city levels, specific for demolition works with extensive details on how to conduct each and every procedure coupled with the role of responsibility of stake holders. On the contrary, Ethiopia does not have a guiding regulation towards the practice except for the fact that it is barely mentioned on other related proclamations such as the Ethiopian building proclamation (EthiopianBuildingProclamationNo.624/2009, 2009) and the urban planning proclamation (UrbanplanningproclamationNo.574/2008, 2008) at federal level. This setback in regulatory level can further be highlighted using two main aspects; licensing and professionalism. The

Ethiopian Construction Works Regulatory Authority; being the one responsible for issuing license for construction professionals in Ethiopia, does not include demolition to issue any form of specialization license in the list of specialty contractors in the newly drafted directive for certification and registration of construction professionals (MoUDC648/2021, 2021). At city level, even though the Addis Ababa City construction bureau entertains demolition acts as one type of construction activity and suggests that having a demolition permit is a mandatory step (AACCB, 2018), it lacks details in terms of describing specific requirements necessary at operation level. In addition, A previous study done by (Yirgalem, 2016), states that decisions related to demolition were made by non-qualified micro and small enterprises, individual temporary contractors as well as owners of the building; implying the execution of demolition is rather value oriented from deconstruction without concern of other effects like safety precautions to human and surrounding environment due to lack of forcing protocol to follow.

All the above boils down to emphasize the gap in lack of having strong regulatory framework and has led to a compromised performance of the practice in terms of many aspects; the ruling one being arbitrariness; failure to follow a systematic and structured procedure on how to perform the work and understand the logic behind structural components. Judging from preliminary study, the fact that the sector is lacking proper work guideline made it to be highly dependent on personal skills and previous experience of similar activities of daily laborers. Given most daily laborers are not professionally skilled, the work is always under risk for issues related to safety and health for both on-site workers and their immediate surroundings. Aside from this, falling behind on following up-to-date technology in the area is another area of concern; the use of traditional techniques results in inefficiency of the work in the dimensions of time, cost and quality. The fact that the sector is growing rapidly and is still solely dependent on existing experience of low rise building demolition shows the need to have a structured regulatory framework to implement in the near future.

After assessing current loopholes of the practice, this study will mainly focus on addressing the gaps in regulatory level by developing a framework to serve as an input for the regulatory body to strengthen and reframe the existing trend by which critical adaptations will be made from selected benchmarks to attain the goal.

1.4 General Objective

This research is aimed at developing a conceptual building demolition regulatory framework for the purpose of serving as an input and guiding the practice in regulatory level.

1.4.1 Specific Objective

- Assess the current practices of building demolition and identify key challenges
- Analyze the gap between current building demolition practice and international best practices by identifying key performance indicators (KPI).
- Formulate a conceptual building demolishing regulatory framework for middle-rise (Category-B) buildings.

1.5 Research Questions

- How is the work of building demolition performed on middle-rise (Category-B) buildings in Addis Ababa?
- What are the challenges faced and problems observed while performing building demolition works (in middle-rise buildings in Addis Ababa?)?
- What are the gaps in the current regulatory practice of building demolition in comparison with international practices?

1.6 Significance of the Study

As rapid urbanization is observed more than ever in the city of Addis Ababa, the need for mutating the purpose and existence of facilities is becoming a common scenario. In the process, dismantling of structures as per the intended purpose is required. Such critical activity needs to be accompanied with the suitable technique, technology and skill in order to achieve the desired goal without any further casualties both in terms of efficiency and quality of work.

There are only a hand-full of relevant studies made concerning the general area of building demolition projects in Addis Ababa in which none of them attempted to develop a practical regulatory framework; making this research a pioneer study for its kind. As a result, it will contribute towards improving the poor perception given to the importance of a coordinated demolition work procedure among regulatory authorities, contractors and clients. Furthermore, it will serve as a milestone for policy makers to come up with a synchronized code of practice with the necessary modifications.

1.7 Scope and Limitation of the study

Demolition works vary by nature and scope as partial and full demolition works. This study will focus on full demolition works of middle-rise building in the city of Addis Ababa. In addition, the scope of the investigation has been limited to selected private property demolition works and government-owned demolition sites where demolition activities are dominantly noticeable. As per the limitations, viable ongoing demolition cases might be limited in number which might be challenging to draw a pattern and lack of up-to-date published data sources on the local practice might be considered the major ones.

1.8 Research organization

The general outline of this thesis is as follows:

Chapter One: Introduction
This chapter gives a brief background of the study, presents the problem statement followed by research questions, aim and objectives of the study, significance, scope and limitation of the study.

Chapter Two: Literature review

This chapter gives an overview of basic terms definition, development and process of building demolition works. It goes further into presenting types, methods and techniques of demolition. It finishes up by comparing the local and the international practice.

Chapter Three: Research Methodology

This chapter articulates the research methods used by providing a description of the research approach, method and design employed. It further explains the analysis and validation techniques used.

Chapter Four: Result Analysis and Discussion

This chapter undertakes the systematic presentation of data gathered through the different mechanisms enclosed under the previous chapter in a manner to arrive at a sound conclusion of the existing trend.

Chapter Five: Framework Development and Validation

This chapters aims at deriving a conceptual regulatory frame work for the practice of building demolition using the outs collected from all the previous chapters as a baseline to come up with a workable and realistic guide.

Chapter Six: Conclusion and Recommendation

As the final chapter of this research, Chapter six presents a set of conclusive points accompanied by a set of recommendations depending on the result of the study.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

After a brief overview of demolition in the previous chapter, this section of the research is intended to examine different relevant literature to achieve a deep understanding about the industry practice. Section 2.2 starts by defining key terms and section 2.3 follows by describing the development of the practice. Consequently, sections 2.4 up to 2.8 goes in detail to discuss about the demolition processes, major procedures to follow as a baseline and method selection that will help in identifying the criteria for the selection of demolition techniques. Moving on, section 2.9 tries to come up with KPIs followed by a brief overlook at the international and the local practice to formulate a comparative analysis amongst each other. Finally, section 2.12 concludes by formulating a literature gap after careful examination of all the relevant literatures reviewed.

2.2 Definitions and key Terms

A. Demolition

The term 'demolition' has been defined in multiple sense on various literatures. Below are some of the common definitions selected in relation to the significance for research.

“Demolition work means to dismantle a structure or part of a structure that is load-bearing or otherwise related to the physical integrity of the structure, but does not include the removal of power, light or telecommunication poles and the dismantling of formwork, false work, scaffolding or other structures designed or used to provide support, access or containment during construction work” (Queensland, 2013).

“Demolition is an activity in which the construction process is reversed. It is an activity in which the structure or parts thereof are disassembled and removed. Sometimes the structure may be dismantled or deconstructed so that more materials can be reused and recycled” (Chimay J. Anumba, 2008).

“Demolition means the complete or partial dismantling of a building structure. It excludes refurbishment, provided the work does not involve the alteration of existing structural components” (Patel pranav, 2015).

“Demolition means dismantling, demolish, destroying or wrecking any building or structure or any part thereof by pre-planned and controlled methods” (HKBD, 2004) (United States Department of Labor; OSHA, 2021).

For this research purpose, demolition is defined as ‘*a partial or complete dismantling of a building’s parts with the guide of a regulatory plan without compromising the safety and minimum distraction to the immediate surroundings.’*

B. Building

According to (EthiopianBuildingProclamationNo.624/2009, 2009), *building* is a permanent or temporary construction used for the purpose of dwelling, office, factory or for any other

purpose. This same document defines dangerous building as a building that is structurally unsafe or constitutes a special fire hazard or health risk.

C. Structure

A *structure* is anything that is constructed, whether fixed or moveable, temporary or permanent, and includes buildings, sheds, towers, chimney stacks, silos, storage tanks.

D. Regulatory Framework

Regulation is intentional and systematic, that it is purposive and intended to solve problems and bring about desired social outcomes, that regulation may be both positively facilitative as well as restrictive (Hodge, 2007).

A *regulatory framework* is a model used for reforming and enacting regulations, decisions, directives, regulatory policies, guidelines, recommendations and procedures made by the authority from time to time including any revisions or amendments made to them in an effective and logical way. A framework can be developed with for a new specific area of interest or could use an existing model to work on a regulatory project.

2.3 Evolution of Demolition Works

The start of demolition work goes all the way back to the early eras when colonies tend to destroy an existing settlement to construct their own as a mark of their regime. During these days, buildings to be demolished were only limited to single story buildings (Abdullah, 2003). In the meantime, the essence of reusing parts and materials from the previous facility was not given thought; it was only focused on distraction by laymen who happen to have better knowledge through experience (Ibid). Through time, when material resources became scarce and the interest of learning new skills grew among people; they started sharing knowledge on how to perform it easily and safely. Today, as technology advances by the day, techniques of demolition have become very smart and efficient. Most demolitions undertaken are complex in nature and demanding great precision and skill than ever before.

According to (Çakici, 2005) demolition activity is set to have benefits as well; in environmental, social, economic and historical sense. The environmental benefits revolve around minimized solid waste generated in the process. The construction and demolition industry are responsible for the enormous quantities of generated and disposed waste, much of which is reusable or recyclable. Planned demolition/deconstruction helps reduce waste generation, thus lowers the amount of waste disposed in landfills (Ibid). The social benefit of demolition focuses the involvement of man power as the process requires disassembling, salvaging or recovering materials and components from the structure manually which helps create job opportunities. As far as the economic benefit is concerned, as infrastructure of cities gets older, and need for housing increase due to the population growth and migration to urban areas, there will be a greater requirement towards renovation and redevelopment for existing buildings in urban areas while attracting local businesses (Ibid). While the historic benefit is associated with thoughtful salvaging of valuable materials and components which contain craftsmanship that is no longer available at present time via selective dismantling or renovation. The trend during the 60's and

70's towards building in concrete and steel has made fresh demands on the skills and working techniques of demolition contractors (Abdullah, 2003). According to the same document, going forward, the Japanese took over in terms of innovation from 1967 on by introducing chemical expansive demolition agents as commercial products (Ibid). The removal of surface concrete by the rebar heating technique using alternating current was another Japanese development and after the initial experimental trials were complete in 1968, it was later used for the demolition of special structures (Abdullah, 2003).

The nature and change of demolition had been undergone through major transformation. Traditionally it was labor intensive, low skill, low technology, poorly regulated and mainly dealing with deconstruction of simply constructed buildings. Then it was developed to mechanization, replacing labor with machines (Abdullah, 2008). Other than cutting edge discoveries in machineries, the fact that the practice managed to incorporate trending concepts in the construction industry such as proper planning, waste management and recycling and safety and environmental concerns made it possible to transform with such noticeable pace apart from other factors such as increased complexity in building design, financial pressures from clients, health and safety issues, regulatory and legal requirements and advances in plant design.

2.4 Demolition Vs Urban Renewal

The term urban renewal emerged in the USA in the late 1940s as an attempt to revitalize city centers, and remained in practice until the 1960s. Urban renewal is of growing importance because urban areas are becoming larger and older and so more and more renewal of urban fabric has to take place. It is also needed because of the constant expansion of urban areas into agricultural hinterland, while large quantities of urban land and buildings are abandoned and left dilapidated (Asfaw, et al., 2011).

Building demolition UK (Acts, 1984) explains that, a building can be demolished when it is deemed to be of no further use, dangerous and in a disastrous or neglected state, especially in city centers or out of town shopping facilities. Demolition acts completely remove a building or cleans a site in order to release the potential value for redevelopment or use the land as an open space for recreational purposes. Buildings are changed in harmony with the needs of the age. Almost all of the residential and commercial buildings in developed countries nowadays are constructed with reinforced concrete. As the complexity in construction increases, it is obviously important to consider the overall demolition work is as being important as construction work.

As time passes the method of demolition changed. Most of the demolition projects undertaken nowadays are complex in nature, demanding greater skill and experience than ever before. In addition, growing commercial and environmental pressure has made a major impact on the selection of demolition techniques. Furthermore, various types of new demolition techniques are available in the demolition industry, which forces the selection process to be more cautious of diverse effects. Before selecting any type of demolition technique, the demolition engineer should consider a set of criteria and assess their relevance to the demolition work to be

undertaken in order to arrive at the most appropriate demolition technique (Chimay J. Anumba, 2008).

As (Thong, 2010) states, the selection of demolition techniques for structure is greatly affected by the structural forms like reinforced concrete, pre stressed concrete, plain concrete or masonry and the size of constructed structural members. Moreover, the location of the building, extent of demolition either the whole or partial demolition, grade of safety in work and the time taken to demolish the structure will greatly affect the evaluation or selection of demolition techniques. The evaluation of demolition method is a very complicated as parameters such as operation, application fields, nuisance, safety measurement, and performance of work are interacted with each other.

The 2007 Ethiopian Population and Housing Census conducted by the Ethiopian Statistics Services (ESS) indicated that at least 15 million (close to 15%) residents are living in the urban centers (ESS, 2007). The capital city, Addis Ababa, has a population of about 3 million (Ibid), close to one quarter of the urban population in the country. In recent years' urbanization has attained unprecedented levels of growth with the development and expansion of Addis Ababa and other cities.

The Urban Development Policy and the Plan for Accelerated and Sustainable Development to end Poverty (PASDEP) strategy of Ethiopia, have the objectives of promoting the role of urban areas in the overall national development. The policy and the strategy are further articulated in the Integrated Housing Development Program (IHDP) and the urban renewal program. These two initiatives have been implemented on a large scale in Addis Ababa and are being rolled out to major cities. The programs are normally accompanied by massive infrastructural developments, particularly in Addis Ababa, to link the developed areas to the inner city (Asfaw, et al., 2011).

2.5 Process of Demolition Work

Demolition is an activity in which the construction process is reversed. It is an activity in which the structure or parts thereof are disassembled and removed. Sometimes the structure may be dismantled or deconstructed so that more materials can be reused and recycled. The demolition of any type of structure is unique due to the different number of parameters that govern the demolition process (Chimay J. Anumba, 2008).

As any other project, demolition work is also a product of two major considerations; planning and cost. In conventional methods, implementation was entered directly from initial preparation stage without through investigation about existing factors that could affect the performance of the work. Through advancements made in time, Current building demolition is severely restricted by numerous factors, and its evolution by necessity must involve the demolition industry, regulations, economics, new technologies and management and so on. According to (Patel pranav, 2015) demolition regulations are rather observed to be separate, roughly-outlined and outdated when compared to construction regulations.

There is no specific methodology to perform a demolition activity as every construction project has a unique outcome. But, for the most part there are facts that the industry commonly agrees on to follow as a background framework. The British standard (BSI, 2011) and the Hong Kong code of practice (HKBD, 2004) tend to come up with a three-level categorization as illustrated in the Fig 2.1 below.

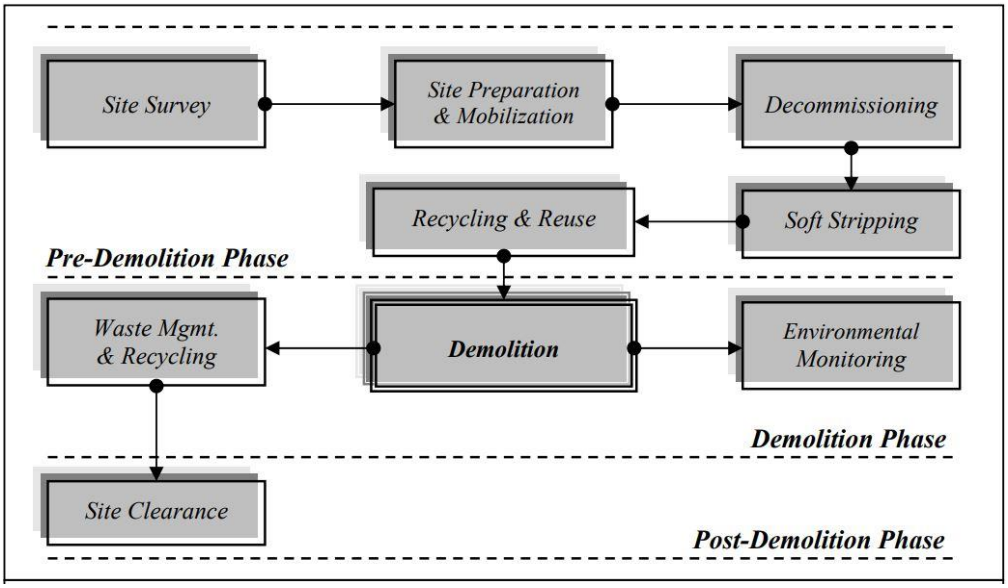


Fig 2.1 Three-phase demolition works flowchart, (HKBD, 2004)

While according to (Abdullah, 2003), the general execution of the demolition process is classified in to four main work phases namely; Tendering stage, Pre-demolition stage, Actual demolition stage and post-demolition stage. This categorization is more detailed in terms of describing the process stage by stage; allowing it to be easy to understand and follow in the manner of relation as illustrated in Figure 2.2 below.

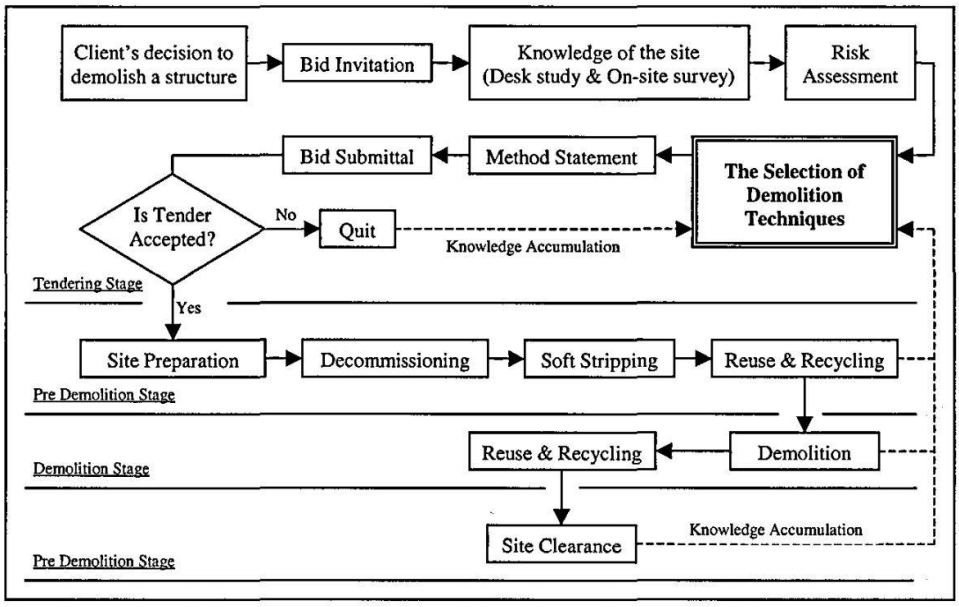


Fig 2.2 Four-phase demolition works flowchart (Abdullah, 2003)

The later one is observed to be more exhaustive and descriptive in explaining the steps involved in a typical building demolition activity. As a result, it is considered to be a benchmark for the purpose of this study.

2.5.1 Tendering Stage

The tendering stage in demolition process is outlined below:

- The demolition process starts with a clients' decision to demolish a structure partially or fully;
- In most cases, the number of contractors invited to bid their offer are limited in number. Preliminary screening is then done either by evaluating the contractor's previous performance, or on the basis of competitiveness of an estimated preliminary cost given by contractors;
- Next, site survey is conducted with the aim multi-level analysis report before any form of planning starts as it is critical to discover as many facts as possible about the given site. In the British standard code of practice for demolition, (BSI, 2011) section 7.1 states that knowledge of the site should be elicited by an initial desk study and followed by an on-site survey to augment the desk study. Off-site features that can affect work on site should also be determined (Abdullah, 2003);
- Following this is the risk assessment, which identifies the risks associated with the work and planning the removal or reduction of the risks before the work commences;
- After all considerations taken, the demolition engineer then needs to select the demolition technique based on available criteria and other contributing factors such as technical and economic aspects;
- Preparing a method statement will be the next step. This is a tailor-made document addressing site specific needs and details the planned sequences; and
- Finally, the tender document and the method statement will then be submitted to the client. It will then be the decision of the client to choose from the submitted bid documents according to the evaluation criteria he/she prioritizes. If a suitable contractor is selected, then he/she will proceed to the next stage; pre-demolition.

2.5.2 Pre-Demolition Stage

The pre-demolition stage involves the following process:

- Site preparation is the first process in the pre demolition stage. The process may include all the necessary facility preparation such as erection of security fencing, constructing site office, washing facilities and toilet etc.
- The second process is the decommissioning. It can be defined as the "process whereby an area is brought from its fully operational status to one where all live or charged systems are rendered dead or inert and reduced to the lowest possible hazard level" (BSI, 2011). The decommissioning activities include for example, removal of all asbestos, chemicals (e.g., battery acids, oils) and controlled release of stored energy in strong springs or suspended counterweights.

- The third process is soft stripping. It is the removal of non-structural items such as fixtures and fittings, windows, doors, frames, suspended ceilings and partitions.
- The fourth process in the pre-demolition stage is reuse and recycling. Some of the product from the soft stripping process can be reused and recycle. Materials such as wood from windows or door panels can be reused. However, this is rarely done. Aluminum and stainless-steel panels and copper are the typical recycled metals. Architectural artifacts such as sinks, doors, bathtubs and used building materials are usually resold. Even the industrial process equipment can be marketed both domestically and internationally.

2.5.3 Actual Demolition Stage

The actual demolition starts when the structural elements are demolished. There are three main types of structural demolitions, which include: Progressive demolition; deliberate collapse mechanisms and deconstruction. Those are the alternative techniques that can be selected by the contractor at the tendering stage. The reuse and recycling process can be done after or concurrently with the structural demolition process. With current technologies such as hydraulic excavators attached with pulverizes, concrete crushing and screening machines, contractors are able to separate demolition debris. This process can maximize the use of resalable materials and subsequently reducing waste disposal costs (Abdullah, 2003).

2.5.4 Post-Demolition Stage

The final process is the site clearance; the site should be left in a clean, safe and secure condition. Any pits, sumps, trenches, or voids must be left filled, securely covered and the site drainage system must be thoroughly cleaned and tested to ensure that it continues to operate. All contaminants must be left or removed in a condition such that they represent no hazard to health or the environment. Finally, the planning supervisor should ensure that the health and safety file has been compiled and handed to the client on completion of the work (Abdullah, 2003).

2.6 Types of Demolition

As defined previously, demolition is the process of dismantling a structure partly or completely in a pre-planned and organized manner. As far as structural demolition is concerned, there are three categories;

2.6.1 Progressive Demolition

The progressive collapse term is used to describe the spread of a local failure like a chain reaction, which lead to the partial or total collapse of the building. The main feature of progressive collapse is that the total damage is disproportionate to the original cause (M. Lupoae, 2009). Progressive demolition is particularly practical in confined and restricted areas and may be considered for the majority of sites. The progressive demolition includes progressive demolition by machine and progressive demolition by balling. In progressive demolition by machines, the excavator was attached with boom and hydraulic attachments such as pulverizes, crushers and shears. For progressive demolition by balling, a demolition ball is suspended from a lifting appliance and then released to knock the structure repeatedly in the

same or different locations. (Abdullah, 2003). Progressive collapse is a failure mode of great concern for tall buildings, and is also typical of building demolitions. The most infamous paradigm is the collapse of the World Trade Center towers (Bažant & Verdure, 2007).

2.6.2 Deliberate Collapse Mechanism

Demolition by deliberate collapse is the removal of key structural members to cause complete collapse of the whole or part of the building or structure (BSI, 2011). This technique usually employed on detached, isolated, fairly level sites where the whole structure is to be demolished. A sufficient space must be allocated to enable removal of equipment and personnel to a safe distance. The demolition by deliberate collapse includes deliberate collapse by explosive and deliberate collapse by wire rope pulling (Abdullah, 2003).

2.6.3 Deconstruction

This is the removal of selected parts of the structures by dismantling or deconstruction (BSI, 2011). Deconstruction is process reverses the sequence of construction, dismantling a structure that proceeds from roof to ground in a general trend. The structures are carefully dismantled in order to maximize the recovery of valuable building resources for reuse and recycling. This technique can be used, for example as part of renovation or modification work and prepare the way for deliberate collapse. The elements to be removed should be identified and the effects of removal on the remaining structure fully understood and included in the method statement, with the elements to be removed marked on site. If instability of any of the remainder might result in a possible risk to personnel on the site and to other people nearby, sections of the structure should not be removed. The deconstruction can be done by hand or machines.

2.7 Methods of Demolition

The choice of demolition method depends on the project conditions, site constraints, and sensitivity of the neighborhood and availability of equipment. Today there are various demolition methods available majorly categorized in to two; conventional and non-conventional methods (Patel pranav, 2015). In conventional method demolition process work is held by hand tools like a sledge hammer, chisel and jack hammer, etc. whereas in the non-conventional category the demolition is done by wrecking balls, high reach excavator and explosives.

According to the (Queensland, 2013), a building can be demolished mechanically, manually or by induced collapse. Manual demolition includes any technique where hand tools such as jackhammers, sledge hammers and picks are used. It has many of the hazards that are present in other major demolition activities including unexpected collapse, falls, falling objects, manual handling and exposure to noise, dust and hazardous chemicals. To manage the risk of unplanned collapses, the condition of roofs, walls and floors of the building should be assessed by a competent person before commencing demolition work (Queensland, 2013). Mechanical demolition involves the use of powered mobile plant, such as excavators, cranes, loaders and bulldozers. There may be a mix of hand and mechanical demolition methods applied (Ibid). Induced collapse involves the systematic/sequential removal of key structural members and the

application of a force to result in the controlled collapse of all or part of a building or structure. Expert advice should be sought from a competent person such as an appropriately experienced structural engineer, before this method is used (Ibid).

The following table summarizes the characteristics of different demolition methods.

Table 2.1 Summery of demolition methods Source: (HKBD, 2004)

Method	Principal	General condition	Remarks
Top down manual method with jack hammer and pneumatic hammer	Breaking away concrete be hand held jack or pneumatic hammer	-On floor by floor downward sequence -Need precautionary measure for restricted sites	-Broad scope of application Effective in narrow and localized place
Top down machine with hydraulic crusher	Breaking away concrete structure by machine mounted hydraulic crusher	-On floor by floor downward sequence -Adequate floor support for machine - Need precautionary measure for restricted sites	-Wide range of application -Good mobility -Ability to separate steel bars and frames
Hydraulic crusher with long boom	Breaking away the hydraulic structure by machine mounted hydraulic crusher with long arm extension	-Restrict entry to work area -Flat and firm working ground -Adequate clear space	-Wide range of application -Good mobility - Ability to separate steel bars and frames
Wrecking ball	Destruction by impact of steel ball suspended from a crane	-Restrict entry to work area -Flat and firm working ground -Adequate clear space	-Good efficiency -Poor application for underground columns and foundations
Implosion	Use of explosives	-Protection from noise, debris and vibration -Qualified blasters -Notification and evacuation of neighborhood -Check and cautionary handle if misfiring	-Excellent demolition strength -Could shorten the demolition period and reduce labor -Risk assessment required to be continued

2.8 Demolition Techniques

Progressively demolished structures or elements of structures should generally be demolished in the reverse order to that of their construction. The structures can be demolished by operatives using hand-held tools; however, in term of safety, the risk assessments will usually demonstrate that using remote demolition techniques; machine should be more appropriate. (Abdullah, 2003)

Demolition techniques vary greatly through time depending on the demand and technological advancement made in the area. Under each method stated above, there are many types of demolition techniques in the industry. The following table summarizes the relation between demolition types, methods and techniques.

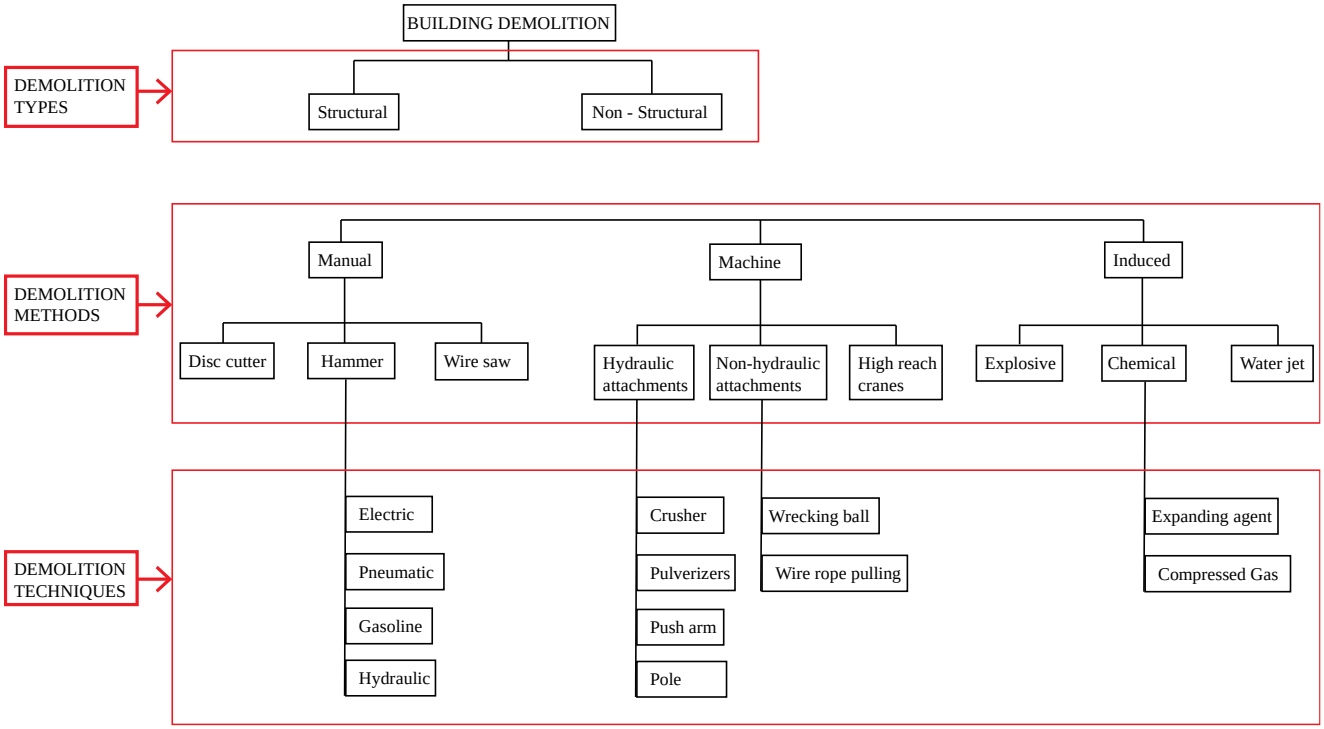


Fig 2.3 Demolition types breakdown

2.9 Technique Selection

For any form of demolition work, the demolition contractor needs to consider a set of criteria and assess their relevance in order to arrive at the most appropriate demolition technique. Criteria that are critical on a particular demolition project may not necessarily be so on another project. In practice, the decision arises from the experience, skills and knowledge of the demolition engineer. In past years, work of demolition was related with limited factors such as structural condition and site layout. But recent considerations give greater emphasis for efficient methods to carry out the work with minimal destruction to the surrounding and with a possibility of recycling/reusing of materials in light of sustainability. In different literatures, criteria for technique selection are categorized in to six and sometimes eight.

According to (Chimay J. Anumba, 2008), structural characteristics, site conditions, demolition cost, past experience, time, and potential for reuse and recycling are considered the most critical ones whereas in another research done by (Kasai, 2020) it states scale of construction and permitted level of nuisance need to be taken into account as well. The selection of the most appropriate demolition technique for any project will be subject to a unique combination of these criteria.

The following relationship matrix further illustrates a generic procedure to arrive at a sound selection of demolition techniques. It considers major governing factors such as site condition, structural status and time frame and goes forward with branching in to possible sub-considerations before suggestion is made about which technique shall be adopted.

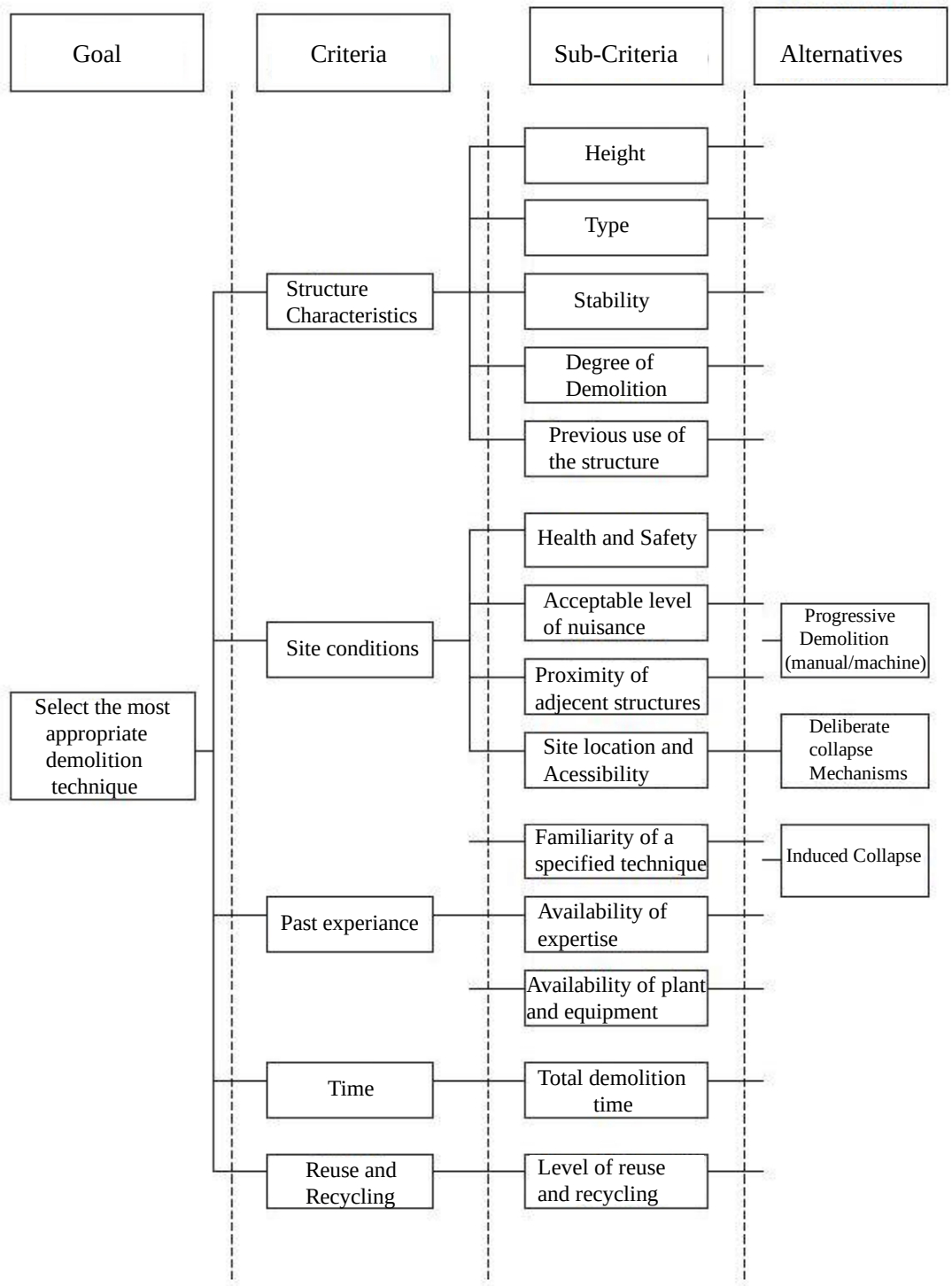


Fig 2.4 Sample demolition technique selection model source: (Chimay J. Anumba, 2008)

2.10 Key Performance Indicators

Oxford's dictionary (Oxford, et al., 2021) defines KPI as:

> *"A measure of achievement that can be attributed to an individual, team, or department in meeting objectives for performance."*

Furthermore, according to (Parmenter, 2015), key performance indicators (KPIs) are those indicators that focus on the aspects of organizational performance that are the most critical for the current and future success of the organization.

The following table summarizes selected key performance indicators for demolition work.

Table 2.2 key performance indicators for demolition work

Description of KPIs	Relevant literature
Pre demolition	
Client specification	(Yirgalem, 2016)
Minimum environmental disturbance	(Hilary Smith, 2021), (J. Pinheiro, 2011)
Professionals' involvement	(Osaily, et al., 2018)
Method selection and planning	(Osaily, et al., 2018)
Contractor selection process	(Hilary Smith, 2021), (Chimay J. Anumba, 2008)
Building inspection	(Hilary Smith, 2021), (Chimay J. Anumba, 2008)
Waste management planning	(United States Department of Labor; OSHA, 2021)
Cost control and contingency planning	(Hilary Smith, 2021), (Chimay J. Anumba, 2008)
Documentation	(Osaily, et al., 2018)
Training	(United States Department of Labor; OSHA, 2021)
Demolition	
Project size determination	(Chimay J. Anumba, 2008), (Yirgalem, 2016)
Complexity analysis	(Osaily, et al., 2018)
Effective communication	(Osaily, et al., 2018)
Site management and supervision	(Osaily, et al., 2018)
Hazardous material identification	(Yirgalem, 2016)
Work place safety management	(United States Department of Labor; OSHA, 2021), (J. Pinheiro, 2011)
Direct Labor Efficiency	(J. Pinheiro, 2011)
Predictability - Cost and Time	(J. Pinheiro, 2011)
Demonstrative skill of contractor	(Osaily, et al., 2018)
Productivity	(J. Pinheiro, 2011)
Post demolition	
Inventory (salvage and recycle)	(Hilary Smith, 2021), (Osaily, et al., 2018), (Chimay J. Anumba, 2008)
Waste - Construction Process	(Yirgalem, 2016)
Customer Satisfaction - Product and Service	(J. Pinheiro, 2011)
Tracking technologies	(Osaily, et al., 2018)

2.11 The Local Practice

As discussed in the previous sections, the building demolition sector in Ethiopia is observed to have major setbacks mainly in terms of strictly formulated protocol to follow. Rather the practice is slightly highlighted in some of the construction-related legislative documents from different levels as mentioned below.

The Urban Planning Proclamation (UrbanplanningproclamationNo.574/2008, 2008) differentiates between Redevelopment, Renewal and Upgrade as;

a) *Urban redevelopment shall, under this Proclamation, encompass urban renewal, upgrading and land reallocation with the view to alleviating urban problems, improving living standards and bringing about urban dynamism and efficient land utilization*

b) *Urban renewal shall, pursuant to this Proclamation, be construed as an undertaking aimed at improving the living and working environment in an urban center through fully or partly removing dilapidated, blighted or derelict structures in an urban center.*

c) *Urban upgrading shall, pursuant to this Proclamation, consist in an improvement of the living and working environment of slum areas by maintaining and partially removing of structures and through the provision of infrastructures and amenities. "*

The Urban Planning Proclamation (UrbanplanningproclamationNo.574/2008, 2008) further states the need for demolition at urban scale as 'Urban renewal shall be planned and executed depending on a specified spatial frame indicated in the structure and local development plans with sufficient justification. The residents in such areas shall be informed and consulted prior to the implementation of the renewal.'

According to the Public Procurement Agency improved directives (MoFED, 2015), buildings are classified into Four major categories under the article construction works procurement performance criteria decision based on their height as;

1. Low-Rise Building is the type where it has no kind of elevator or any other means of vertical circulation system with a story of less than five (5) above the ground

2. Middle-Rise Building is the type with a story more than five (5) and less than fifteen (15) above the ground

3. High-Rise Building is the type with a story of at least fifteen (15) floors and less than forty-five (45) above the ground

4. Mega-High-Rise Building is the type with a story of at least forty fifteen (45) or more above the ground

On another related document, the (EthiopianBuildingProclamationNo.624/2009, 2009) divides buildings into three categories;

- "category 'A' building" means a one-story building with a span of 7 meters or less between two reinforced concrete, steel or other structural frames or any dwelling house not exceeding two stories;
- "category 'B' building" means a building with a span of more than 7 meters between two reinforced concrete, steel or other structural frames or of two or more stories not covered in category 'C' or a real estate development of category 'A';

- "category 'C' building" means any public or institutional building, factory or workshop building or any building with a height of more than 12 meters;

For this research purpose, the later approach is adopted with category B building type in consideration to availability and complexity of structural systems of cases to be analyzed.

Furthermore, article 25 of the same document under the title Alteration of Service, Extension, Repair or Demolition describes the application of demolition works very briefly stating;

> 1/ A building officer shall grant permission to proceed with alteration of service, extension, repair or demolition of a building provided that it complies with the provisions of this Proclamation.
>
> 2/ In the case of major alteration, extension, repair or demolition works, a building officer may require plans, and any other analyses or evidences necessary to verify compliance with this Proclamation.
>
> 3/ All precautionary measures which should be taken for a new building shall also be taken during any alteration, repair, extension or demolition work carried on an old building.
>
> 4/ A building officer shall grant permission to demolish dangerous buildings.
>
> 5/ No person shall, at any time, during the course of or after demolition of a building leave it in a condition dangerous to the public or any adjoining property.
>
> 6/ Notwithstanding the provisions of sub-article (1) of this Article, prior written consent from the appropriate government organ shall be required before repairing or extending buildings of historical value.

The Addis Ababa city construction bureau building construction final directive (AACCB, 2018), raises various pre-requisites for demolition work and permit under section 5.8. Sub section 5.8.1 as '*To demolish any building, the client has to request to obtain a demolition permit from the city administration office or any other responsible body by filling out form no. 6.*' Sub-section 5.8.3 further states the pre-requisite documents necessary to obtain the demolition permit such as title deed, infrastructure line suspension letter, clearance, site report on impact of neighboring properties by assigned personnel, agreement with registered level 7or above GC/BC. Once granted, sub section 5.8.9 states that the permit serves for 3 months but, it can be extended if necessary.

2.12 The International Practice

2.12.1 Netherlands

In the Netherlands, the Assessment Directive Safe and Environmental-friendly Demolition (BRL SVMS-007) guarantees quality and expertise to be fulfilled in demolition work. It also has its own certifying body that carries out periodic assessment on the contractors' work

methodology, equipment validity and employees' qualification. The certified demolition process roughly follows 4 steps: pre-demolition audit, waste management planning, execution and final reporting. In the first stage the demolition contractor carries out an advance inspection of the demolition object and an inventory of the materials. This provides insight into the nature, quantity and any contamination of the released demolition materials. Followed by the waste management planning, a demolition plan is drawn up that includes, among other things, a description of the method of selective demolition and environmentally-friendly demolition, the processing and removal of released material flows and the safety measures that have to be taken. Furthermore, the implementation requirements of the client are presented systematically. Afterwards, the execution of the demolition occurs in accordance with the demolition plan. During the execution of the demolition works, employees are involved who are experts in the area of safe and environmentally-friendly demolition. Certified demolition contractors work with approved equipment. The demolition contractor must ensure that the demolition location is safe and well organized. Finally, a report will be drawn on the delivery of the project in consultation with the client and is set down in writing.

2.12.2 Hong Kong

The building demolition work manual of Hong Kong revolves around three pillars mainly related to safety of people and environment. It aims at minimizing the risks of causing damage to persons and properties of the public, endangering the health and safety of site personnel and damaging the neighborhood environment (HKBD, 2004).

According to the Hong Kong code of practice for demolition works (HKBD, 2004), it is a must to prepare a demolition plan prior to carrying out any building demolition by means of surveys and appropriate assessments. The surveys are of two types; Building Survey and a Structural Survey.

The building survey may include;

- The existing record plan/as-built showing adjoining properties, pedestrian walkway, roads and street, etc.
- The construction materials
- The existing use and, if possible, the past use of the building
- The presence of wastewater, hazardous materials, matters arising from toxic chemicals, flammable or explosive and radioactive materials, etc.
- Adjoining properties and site conditions,
- Drainage conditions and possible problems on water pollution, flooding and erosion,
- Shared facilities with adjoining building
- The sensitivity of neighborhood with respect to noise, dust, vibration and traffic impact.
- Available site area to allow on-site sorting of building debris
- Street furniture such as fire hydrant, parking space, street light, street sign

The structural survey may include;

- The structural materials used
- The original structural system employed in the design

- The method of construction
- Any dilapidation and degree of deterioration on any structural elements
- The structural conditions of adjoining structures and its shoring
- The presence of exposed bracing or possible presence of covered bracing
- The nature of walls, whether it is block wall, reinforced concrete walls, load bearing walls or partition walls
- Cantilevered structures such as canopies, balconies, or other forms of architectural features
- Any fixtures to the building such as signboard, sun-shading devices.

Based on the findings of these surveys, a demolition plan shall then be prepared and submitted to the Buildings Department for approval. The demolition plan must also be accompanied by a report together with structural calculations assessing the stability of the building to be demolished and all affected buildings, structures, streets, land and services.

2.12.3 Los Angeles city

According to (LABC, 2019), no person shall demolish any building or structure unless he/she has obtained a permit from the department of building and safety. Demolition permits must be obtained by a licensed wrecking contractor or a general engineering contractor provided that a notarized letter from the owner or a copy of the signed contract is provided indicating that the contractor has been hired to perform the demolition. Pre-inspection will be performed by a building inspector at the site of the proposed demolition before a demolition permit may be issued. The code also clearly states that no permit for demolition work will be issued until satisfactory plans and procedures have been submitted to, and approved by, the building department. After examining the methodology proposed by the contractor/owner in some cases, the department gives permission to proceed.

2.12.4 Kenya

The Kenyan code of practice for demolition of buildings starts by stating how the extent and effect of any particular planned process or physical intervention should be assessed by a competent person to take a decision about which activities would be most appropriate.

When considering the activities and the possible methods to be adopted, the various hazards and thus potential risks should be assessed (KEBS, 2018). According to this document, the amount of materials to be removed is not necessarily the key criterion but rather the proposed methods of removal is; emphasizing there should be a design ensuring that the structure is taken down in a planned and controlled manner, thus avoiding any unplanned structural instability or collapse. As per the key planning considerations, effective site knowledge, thorough risk assessment, complying with legal requirements (license and permit), program management, protection of the public, environmental management, occupational safety of the workforce and predicted weather conditions are among the major points to be considered. Apart from this, decision to choose the appropriate methodology should take account of such factors as sustainability, waste strategies, client issues, risk management issues (KEBS, 2018)

Furthermore, the following critical success factors are listed to be taken into account;

a) the information given in relevant guidance documents;
b) health, safety and environmental requirements;
c) the needs of the client, the users and the workforce;
d) the type, age, condition, use and business activity;
e) the need to avoid disruption to business continuity, the community and nearby structures;
f) legislative requirements;
g) cost and commercial benefits

2.12.5 India

The Indian standard demolition code of safety gives emphasis on four major points; planning, pre-demolition precautions, protection of the public and sequential operation of demolition (BIS, 1991). It starts by stating that before beginning the actual work of demolition, a careful study shall be made of the structure which is to be pulled down and also of all its surroundings. This shall, in particular, include study of the manner in which the various parts of the building to be demolished are supported and how far the stage-by-stage demolition will affect the safety of the adjoining structure (BIS, 1991). Afterwards, it suggests having a definite plan of procedure for the demolition work, depending upon the manner in which the loads of the various structural parts are supported, and approved by the engineer-in-charge and this shall be followed as closely as possible, in actual execution of the demolition work. Communication happens to be the other main point coined in this standard; before the commencement of each stage of demolition, the foreman shall brief the workmen in detail regarding the safety aspects to be kept in view. It should be ensured that the demolition operations do not, at any stage, endanger the safety of the adjoining buildings. Moreover, the nuisance effect of the demolishing work on the use of the adjacent buildings should be kept to the minimum (BIS, 1991)

2.13 Literature Gap

Multiple documents were reviewed for the purpose of understanding the practice in a detailed manner. This will also help in contextualizing the case for the local practice. As a result, the following table summarizes the contents of the review literatures so as to filter out the gaps which this research will try to cover later on.

The following table 2.3 summarizes the relevant literatures reviewed with their main theme to direct towards what the research is aimed to achieve in terms of uncovered area in the documents.

Table 2.3 Literature gap identification summery

	Reviewed Literature	Identified Gap
1	An Integrated System for Demolition Techniques Selection (Chimay J. Anumba, 2008)	Focused on developing model on how to select the appropriate demolition technique
2	Demolition: methods and comparison (Patel pranav, 2015)	Limited to discribing the charactersitics of different demolition methods
3	Intelligent selection of demolition techniques (Abdullah, 2003)	Limited to developing decison making model using analytical hierarcial process (AHP) and decison support system (DSS) as tools for best selection of demolition technique
4	Investigation of Building Demolition Practices and Safety Precautions on Selected Sites of Addis Ababa (Yirgalem, 2016)	Limited to identify the major safety gaps in the practice
5	Critical success factors: the development of a conceptual framework for demolition projects (Osaily, et al., 2018)	Limited to extracting critical success factors (CSFs) from desk study and adopting them to an existing demolition framework
6	Assessment of urban development practices on business expansion in Ethiopia (Asfaw, et al., 2011)	Limited to identifying the socio-economic impact of demolition practice in city centers
7	Regulatory Frameworks for Urban Services (Hodge, 2007)	Lacks demonstration of practical framework development

As can be observed from the above table, the relevant literature reviewed for this study are all exempted from developing a conceptual regulatory frame work at any level except for one in which supporting points were incorporated to support an existing framework.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

Research is a detailed systematic enquiry into nature and society to validate and refine existing knowledge and to generate new knowledge (Naidoo, 2011). It includes acquiring knowledge and developing understanding, collecting facts and interpreting facts in order to get insight about the world around us, and even within us (Walliman, 2011).

Research methodology is the philosophy or the general principle which will guide conducting of the research (Dawson, 2002). It answers why a research study has been undertaken, how the research problem has been defined, in what way and why the hypothesis has been formulated, what data have been collected and what particular method has been adopted, why particular technique of analyzing data has been used (Kothari, 2004).

This chapter discusses the research procedures and methods used to achieve the research objectives through research design, method of data collection and analysis.

3.2 Research Design

A research design is an action plan to reach at some answer or conclusion for the initial research question (Yin, 2003). It helps to answer questions validly, objectively, accurately and economically (Kumar, 2011). Therefore, it acts as the blueprint for the collection, measurement and analysis of data. It is usually concerned with getting from here to there, where here may be defined as the initial set of questions to be answered, and there is some set of conclusions (answers) about those questions.

3.2.1 Research Approach

In order to achieve the research objective qualitative research approach is selected. A study is classified as qualitative if the purpose of the study is primarily to describe a situation, phenomenon, problem or event; if the Information is gathered through the use of variables measured on nominal or ordinal scales (qualitative measurement scales); and if the analysis is done to establish the variation in the situation, phenomenon or problem without quantifying it (Kumar, 2011). It is concerned with subjective assessment of attitudes, opinions and behaviors. One of the research aims is to explore the demolition work practice and qualitative research provides an in-depth insight, and it is flexible and typically exploratory (Kothari, 2004). Under circumstances where information on the research area is limited and discovery is an important aim of the research, (Kumar, 2011) recommends qualitative research approach.

The research adopted an inductive reasoning approach. Inductive reasoning starts from specific observations or sensory experiences and then develops a general conclusion from them (Walliman, 2011). Inductive reasoning is more open-ended and exploratory (Kumar, 2011). Therefore, in order to design a building demolition regulatory framework, the research has to

start from observation in order to make some conclusion which suited with inductive research approach.

The research answers a set of questions in the process of developing the frame work in which multiple instruments are triangulated to satisfy the research objective.

As far as the first objective is concerned, the researcher will start by observing the selected cases for on-going sites and do a document analysis for passive cases. An observation checklist is developed with criteria adopted from international practice key performance indicators. The researcher then developed a set of semi-structured interview questions to use in triangulation with the above two data collection instruments for better understanding of the scenario. The data obtained from the interview helped to identify the current practice and challenges of demolition, as per the respondents' perception of the concept and/or as per the experience of the practitioners of the system. The respondents for the interview at this stage are selected based on their relevance to the project. According to (Rai, 2021), purposive sampling is a form of non-probability sampling in which decisions concerning the individuals to be included in the sample are taken by the researcher, based upon a variety of criteria which may include specialist knowledge of the research issue, or capacity and willingness to participate in the research. The researcher chose to use purposive sampling technique considering the limited number of available cases that meet the brief until data saturates (a pattern of response is observed) in mere of targeting experience and the position they acquire on the specific case.

The second objective focused on identifying gaps in the practice. For this, the researcher first starts by compiling the data gathered as a result of the first objective to use as an input for analyzing the gaps against the international practice in which an intensive review of literature was done so as to come up with relevant KPIs to drive a standard from.

Since the final aim of the research is to design a regulatory building demolition framework, it is about making a general set of propositions from the particular practice. In order to address the third objective, the researcher come up with a conceptual regulatory building demolition framework. This is done by developing a set of standard points after measuring the analyzed data against the KPIs.

The result is then individually presented for experts' validation to be assessed for its practicality and improvement points. The set of experts were selected from the three distinct areas as identified by the researcher earlier; regulatory level, enforcement level and operational level respondents.

The following figure illustrates the interrelationship between methodologies chosen and the specific objectives.

Research Methodology		Research Objectives
Observation Semi-structured interview Document Analysis	→	To assess the overall current practices of building demolition and identify key challenges
Literature Review Semi-structured interview	→	To conduct a gap analysis between current building demolition practice and international best practices by identifying key performance indicators (KPI).
Literature Review Result Analysis Validation instrument	→	To formulate a conceptual building demolishing regulatory framework for middle-rise (Category-B) buildings.

Fig 3.1 Interrelationship between research methodologies and objectives

3.2.2 Research Method

Research methods may be understood as all those methods/techniques that are used for conduction of research (Kothari, 2004). They represent the tools of the trade, and provide ways to collect, sort and analyze information to reach at some conclusions (Walliman, 2011).

Since the major aim of the research is to design building demolition regulatory framework, a contextual and in depth understanding of the current practice and existing problems is necessary. In such cases where the focus is to study in depth rather than breadth and places more emphasis on the full analysis of a limited number of events or conditions and their interrelations, (Yin, 2003) recommends a case study research method. The case study method is a very popular form of qualitative analysis and involves a careful and complete observation of a social unit, be that unit a person, a family, an institution, a cultural group or even the entire community (Kothari, 2004) . It provides an overview and in-depth understanding of a case(s), process and interactional dynamics within a unit of study. (Saunders, 2009) and (Yin, 2003) opines that case studies are the preferred strategy when "how" or "why" are being posed, when the investigator has little control over events, and when the focus is on a contemporary phenomenon within some real-life context. One of the major appeals of a case study is its capacity to be tailored to contexts (Yin, 2003). It emphasizes detailed contextual analysis of a limited number of events or conditions and their relationships.

There are five well-agreed points to give emphasis for the selected type of research method; case study

1. Research questions: - Case studies are most appropriate for research questions that are of the “how” and “why” variety.

2. Study Propositions: - Propositions are statements that help direct attention to something that should be examined in the case study, i.e., point to what should be studied. Propositions will tell where to look for relevant evidence.
3. Unit(s) of analysis: - The unit of analysis defines what a "case" is in a case study. A unit of analysis (case) may be an individual, organization, team, program, decision...etc. What unit of analysis to use generally depends on the primary research questions.
4. Logic linking the data to the propositions
5. Criteria for interpreting the findings

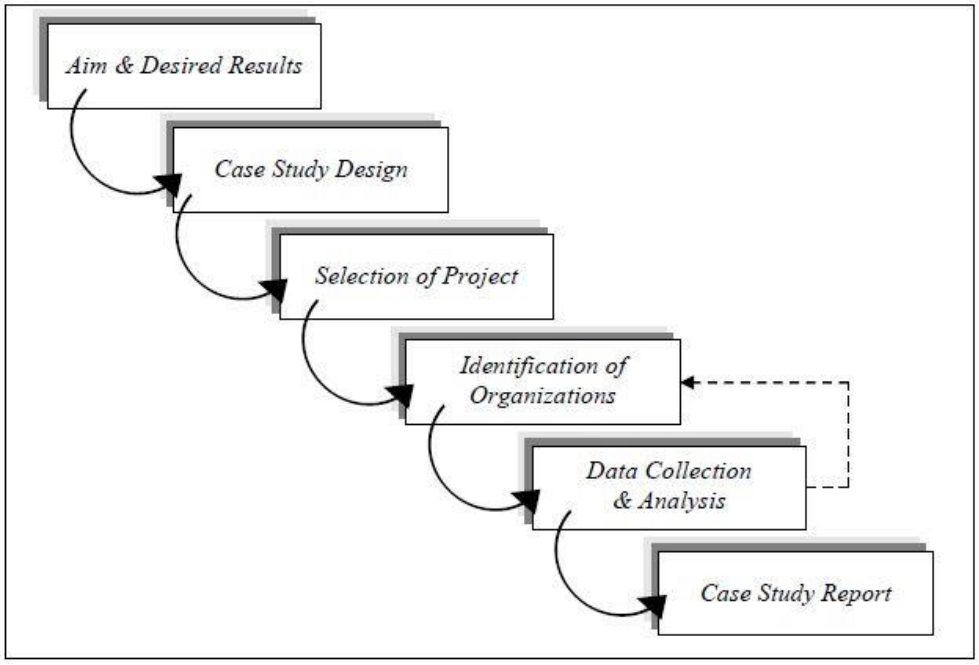


Fig. 3.2 Case Study methodology framework source: (Abdullah, 2008)

The case study targeted to capture the actual practice of a particular demolition project carried out by a local contractor. The study aimed to provide a generic level explanation on how the projects were executed. The findings of the study were not intended to be generalized but instead, provide particularization.

A. Selection of Cases

The research followed the multiple case study design method. As of (Jack, 2008) multiple case study design allows duplication to independently confirm developing theories and identify complementary aspects of the phenomenon under investigation by analyzing within and across settings. (Yin, 2003) also wrote a case study design is discovery of an important finding from a single experiment and make sure the finding by conducting a second, third, and even more experiments. According to (Kumar, 2011), in case study design selection of a case that can provide as much information as possible to understand the case in its totality is the priority rather than selecting a random sample.

The Addis Ababa City Administration (AACA) currently launched different projects related to redevelopment in its ten Sub-cities. According to (Rebecca, 2018), renewal projects are observed to be concentrated in the five inner sub cities; Kirkos, Lideta, Addis Ketema, Arada, and Yeka respectively; among which Kirkos subcity holds the biggest share. Consequently, demolition contractors also tend to go by this pattern; Kirkos and Lideta take the first two ranks. Keeping this into consideration, the researcher used this as a starting point to narrow down the geographic location of the cases.

This study selects one case as a main case and uses multiple case studies to allow the researcher to have deep knowledge. The number of cases were increased until the point of saturation is reached which was determined based on similarity of patterns (duplication of facts) observed to predict similar results. In addition to this, factors such as degree of cooperation anticipated from the project parties, scale of projects, accessibility, variety/ nature of project status, work methodology documentation as well as time and convince were considered. Accordingly; four cases were considered including the main case selected; the Eagle hills apartment project. This case is selected as it satisfies the scope of the research; middle rise (Category B) concrete-based buildings.

The following table summarizes the selected cases together with their status and other related information.

Table 3.1 List of selected cases and their status

No.	Cases	Location	Ownership	Demolition Contractor	Status
1	Eagle hills : La Gare apartment project	Kirkos, Woreda 07	State + Private	MSE	Completed
2	Metropolitan Real Estate, Central tower project	Kirkos, Woreda 11	Private	Private	Completed
3	Kera – Bulgaria embassy road expansion project	Kirkos, Woreda 09	State	MSE	On-going
4	Residential building (G+2)	Bole, Woreda 03	Private	Private	On-going

3.2.3 Data Source

For the purpose of this research, both primary and secondary data sources were used.

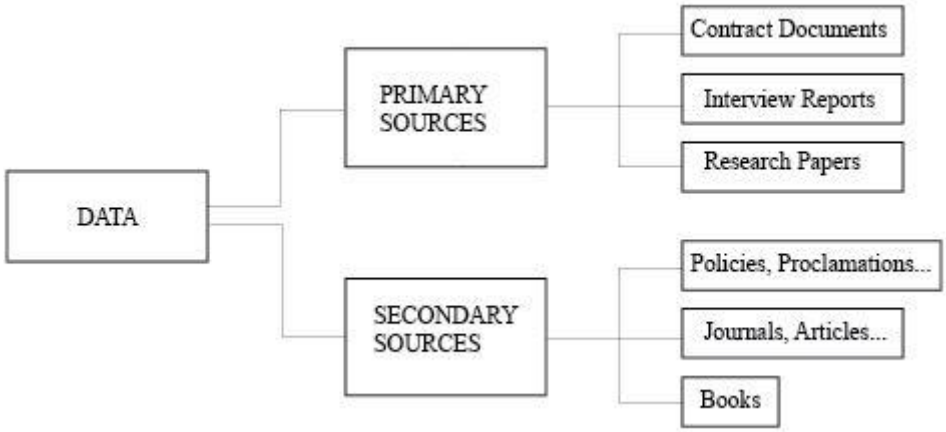


Fig. 3.3 Sources of data

3.2.4 Data Collection Methods/Instruments

The use of multiple methods to collect data is an important aspect of a case study, namely in-depth interviewing, obtaining information from secondary records, gathering data through observations, collecting information through group discussion and group interviews, etc.

As per the literature review, it was clearly visible that the local practice missed a major milestone to arise from which makes this research a pioneer study. Accordingly, first hand data collection methods were necessary so as to assess the practice very closely. The findings of the literature review served as a base point to formulate the structure of the interview and observation data collection instrument formats. Given that the study is a case study type, extraction of information from possible analysis of case documents, direct observation and interviewing relevant stakeholders for each case are selected to be used.

In this research observation, semi-structured interview and document review were used as data collection methods in the manner explained below.

A. **Observation**: - Under the observation method, a first-hand information is sought by way of the researcher's own direct presence on the scene without asking from the respondent. According to (Kothari, 2004) the main advantage of this method is that subjective bias is eliminated, if it is done accurately by using different guiding mechanisms specifically tailored to attain the maximum possible information in relevance to the research objective. Besides, the information obtained under this method relates to what is currently happening; it is not complicated by either the past behavior or future intentions or attitudes. Moreover, this method is independent of respondents' willingness to respond and as such is relatively less demanding of active cooperation on the part of respondents as happens to be the case in the other data collection methods.

   - For this study, the researcher observed the existing condition of three active and one passive building demolition sites. The points for observation were first generally derived from benchmarked countries for best practice based on repetition; which

was then filtered and adopted to fit the local practice as some of the considerations were found to be out of context. Afterwards, an explicit checklist (attached on annex 4) was developed addressing all the project actors to structure the researcher to the aimed objectives. The result was then recorded using narrative recording method and will be supported with photographs. In this form of recording the researcher records a description of the interaction in his/her own words (Kumar, 2011).

B. **Document analysis:** - Document analysis is a methodical way of reviewing or evaluating documents, both printed and electronic (computer-based and Internet-transmitted) material. It is a form of qualitative research in which documents are interpreted by the researcher to give meaning around the topic to be assessed.

   - For this study, a critical document review was done to study the characteristics, processes, techniques and requirements of the important aspects in practicing demolition operations. The source materials included Codes of Practice from different countries, local proclamations and legislations related to the practice, project documents; such as site diaries and monthly project reports. Project document analysis will be specially used to analyze the main case to retrieve the procedural facts and encountered challenges during the lifetime of the project. In addition, the researcher also tried to filter out KPIs through intensive review of literature. The literature studies were chosen by review of papers related to demolition projects: KPIs were then extracted from those papers based on the researcher's judgment, critical success factor studies on demolition projects and key words of papers. After identifying the factors, further selection was made based on number of mentions on different papers.

C. **Interview**: - According to (Kumar, 2011), an interview is a verbal interchange of relevant information, often face to face, in which an interviewer tries to extract data, beliefs or opinions from another person. It is advantageous because it is useful for collecting in-depth information, information can be supplemented and questions can be explained (Kumar, 2011).

   - In this research, semi-structured guiding questions were developed before conducting the interview as attached on Annex 1, 2 and 3. The questions were derived from the literature review based on the assessment done to adapt the benchmarked practice in consideration of the identified KPIs to evaluate the local practice. In semi-structured interview the interviewer follows the guide, but is able to follow leads of questions in the conversation that may stray from the guide when he/she feels it is appropriate (Cohen, 2006). The identification of relevant organizations is done by using a combination of two sampling techniques; purposive and snow ball sampling. The researcher targets to include respondents from variety of classes and tries to categorize them into three major groups namely; strategic, enforcement and operation level respondents. A total of 10 organizations are

identified from the above distinct levels listed. Afterwards, representatives of each organization and on-site experts (supervisors/ Forman), micro and small enterprise team leaders and others will be contacted based on their significance in the execution of the projects. In order to avoid or minimize bias, cross referencing of data with document review and observation will be used.

The following table summarizes organization approached for interview in line with their role.

Table 3.2 List of selected interviewees and their status

No.	Interviewee	Role
1	Construction works regulatory authority	Government body
2	Addis Ababa city administration land development and urban renewal agency	Government body
3	Addis Ababa city housing development corporation	Government body
4	Addis Ababa City Administration Kirkos sub city construction bureau	Local Authority
5	Noah Real Estate	Main contractor
6	Tigist, Akrem and friends S.C	Main contractor
7	Bamacon Engineering	Main contractor
8	Eagle Hills	Client
9	Addis Ababa city Roads Authority (AACRA)	Client
10	Metropolitan Real Estate	Client

3.2.5 Data Analysis Approach

As presented in the first chapter, one of the research objectives of the study was to explore the current practice of building demolition practice with key challenges faced. The data collection method used for this objective were document review, semi structured interview, and observations. Thus, the gathered data was analyzed qualitatively.

Qualitative data analysis refers to the processes and procedures that are used to analyze the data and provide some level of explanation, understanding, or interpretation (Dey, 2005). The data collection methods selected for this study are observation, document review and interview. (Neuendorf, 2017) suggests that one of the methods to analyze data obtained from such sources is content analysis. Content analysis is a systematic way of making valid inferences from verbal, visual, or written data in order to describe and quantify specific phenomena. Building demolition concepts, practice standards and international practice trends identified in the literature review section were used as the main theme of categorization and analysis. This theme of categorization was somehow modified based on the data collected. Nvivo was used to analyze the result of the interview after transcribing it to a writable format.

The second objective of this research is to conduct a gap analysis in the current building demolition practice in comparison with international benchmarked practices. To conduct the

gap analysis, selected factors were adopted from KPIs and international trend to be evaluated against the local practice.

3.3 Data Validation and Research Quality Measure

Reliability and validity are important issues in all research including qualitative Research (Lacey & Luff, 2009). The measure taken to assure quality of the research are summarized in table 3.5 below.

Table 3.3 research validation approach

Factors	Meaning	Measure to ascertain quality
Reliability	The quality of being trustworthy or of performing consistently well.	- The approach and procedures of data collection and analysis were clearly presented and justified. - External evidence including previous studies were referred.
Construct validity	The extent to which the empirical measure effectively addresses the theoretical	The study used multiple data source by cross referencing (Triangulation)
Internal validity	The extent to which the ideas about cause and effect are supported by the study	Content analysis technique was used for data analysis
External validity	The extent to which findings can be generalized to populations or to other settings	Cross validation was used in addition to using scientific approach and Justification for case selection

As far as the framework validation process is concerned, the researcher used experts' validation to examine the functionality by using a rating scale developed and attached on Annex 05 of this research. This is done after presenting and elaborating each content of the framework individually for six experts; three representing the regulatory authority and three representatives from two stakeholders at operation level with direct relation to the practice of building demolition. Afterwards, their responses will be recorded so as to adjust the framework accordingly. In addition, the experts will be asked to rate the developed conceptual framework in terms of framework simplicity, comprehensiveness, relevant and clarity using a 1-5 liker chart.

The overall methodology framework is concluded in the following chart.

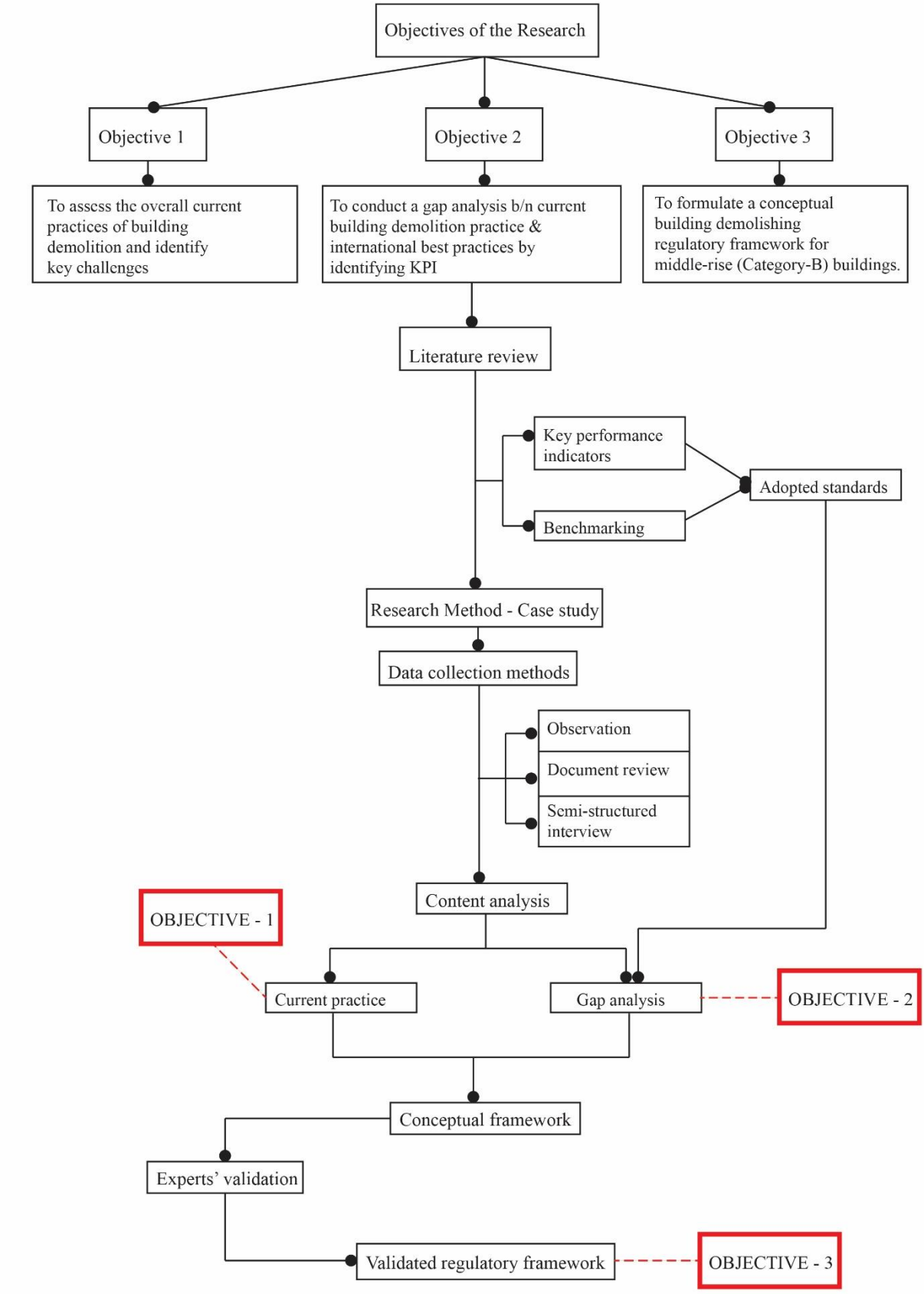


Fig 3.4 Overall research methodology framework

CHAPTER FOUR: RESULTS AND DISCUSSION

4.1 Introduction

This chapter deals with the result and discussion part of the research and it is presented in five sections. Apart from the introductory section 4.1, section 4.2 give a detailed descriptive analysis on the findings of data collected through the three data collection approaches; observation, interview and desk study together with the presentation of establishment of the selected cases with relevant background information through its different sub sections. Afterwards, section 4.3 examines through the existing monitoring procedures and presents the gap analysis of building demolition practice in comparison with standard practices. The gap analysis is extracted from the finding of the analyzed data in light of the identified bench mark practices which have been studied priorly.

As far as the data collection approaches used are concerned, interview, observation and document review were used in the following manner;

Observation was conducted in selected cases so as to capture the nature and execution of a particular building demolition project on ground as it is less likely to be biased. The findings from the study were not taken to be generic representation of the practice but rather to emphasize the performance in terms of the three selected focus areas boiled down from the KPIs as per their relevance to the objective of this study; namely guideline application, work methodology and health, safety and environmental management. Based on this and the other requirements mentioned in the case selection criteria, the four (4) projects were then selected.

The interviews highlighted first hand descriptions on the building demolition industry from individuals from different levels of expertise and experience representing various organizations and companies. The interviews were personalized and open ended to encourage respondents to reflect on their opinions, insights freely extract facts accordingly. The questions were designed to be short, simple and precise with specific characteristics catering for each group of respondents.

Document review was done to assure further in-depth information on subjects particularly existing regulatory framework and work methodology. This helped to minimize the presence of contradictory information especially since the major case study selected for this study was passed the demolition stage almost ten (10) months before the data was analyzed. The reviewed documents were in the form of correspondence letters, proclamations, regulation, directives and meeting minutes. Afterwards, the extracted information was systematically studied; then sorted and filtered based on their importance and relevance, before finally being compiled and analyzed.

The findings from all sources of data collection were then reported in the following sections of this chapter using a formal descriptive approach; incorporating tabular and graphical displays to support the written text and to improve the quality of the information whenever necessary.

4.2 Interview Analysis

A set of questions; as attached on annex 01, 02 and 03 of this paper, were first tailored for each of the identified group of respondents representing the three levels namely; the strategic, enforcement and operation. The responses of each respondent were first recorded in hand written format. Then they were transferred in to a digital word format for ease of access. The transcribed interview data was transferred and converted from word format (.doc extension) into a rich text file format (.rtf extensions) to process them as NVivo document files for analysis. Screenshots of the result are used in this paper is from NVivo version 10 wherever needed. For the sake of better communication, Amharic was used as a main language for most of the interview sessions. Each session lasted from 20 to 40 minutes.

4.2.1 Background of respondents

The interview was conducted among selected stakeholders who are involved in the building demolition practice of Addis Ababa City directly or indirectly. Initially ten (10) organization were approached for this purpose in which nine (9) were found to have a relevant input to the study. Accordingly, twelve (12) representatives from each organization's department (Two from construction works regulatory authority, one from Addis Ababa city planning and land administration bureau, Three from different departments of Kirkos sub city; development projects directorate, infrastructure development and right of way (RoW) division, Woreda 07 construction permit and supervision office, one from AACRA, One from Metropolitan Real Estate, One from Eagle hills La Gare project, one from Noah real estate, one from Bamacon Engineering and one from MSE) were contacted for the interview. The following three tables 4.1(a), 4.1(b) and 4.1(c) below summarizes the general background information of the respondents.

Table 4.1 (a) Level of respondents

Level of respondents		**Frequency**	**Percent (%)**	**Cumulative Percent (%)**
	Top management	8	66.7	66.7
	Operations Management	4	33.3	100
	Total	**12**	**100**	

As can be seen from the table above, from the total sample size of 12, 66.7% of the respondents are found to be representing their department/organization in management level while the rest of 33.3% respondents are involved in the operation management level of the building demolition acts.

Table 4.1 (b) Experience of respondents

Experience of respondents		**Frequency**	**Percent (%)**	**Cumulative Percent (%)**
	1 – 5 years	7	58.3	58.3
	More than 5 years	5	41.7	100
	Total	**12**	**100**	

As the table above illustrates, from the total sample size of 12, well more than half i.e., 58.73% of the respondents are new to the sector with experience range under five years while the rest 41.7% of the respondents have stayed in the sector for more than five years.

Table 4.1 (c) Representing entity of respondents

		Frequency	Percent (%)	Cumulative Percent (%)
Representing entity	Private company	4	33.3	33.3
	Government organization	7	58.3	91.6
	Project	1	8.4	100
	Individual	0	0	
	Total	**12**	**100**	

A tally done to understand the entities represented by the respondents show majority i.e., 58.3% are from government organizations while the second largest portion which is 33.3 % are representing a private company. Some of the respondents; 8.4 % have been contacted from projects while there happens to be no respondent representing him/herself.

Going forward, four themes, common for respondents from all levels were selected; important stakeholders, safety, environment and waste related protocols, measure of success and loopholes. Different queries were used to get a general over look of the analysis before doing an in-depth review such as a world cloud as shown in the fig 4.1 below. The word cloud is created to show the 200 most frequently used words while encoding the data in to NVivo. The font size of the words indicates the frequency of the word's appearance; the ones visible to be of large fonts are the ones which appeared most and for smaller fonts like wise. Accordingly, words such as demolition, project, organization, authority and government take the biggest share on the word cloud.

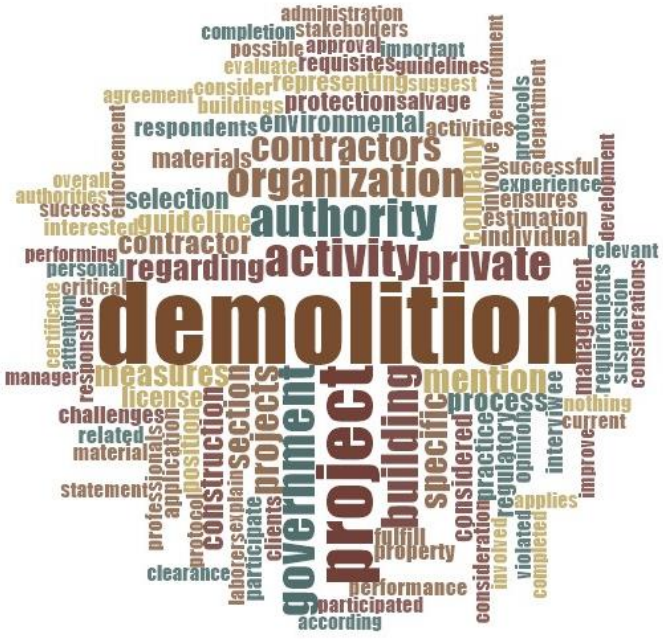


Fig. 4.1 Word frequency word cloud result (source: QSR NVivo.10 output)

4.2.2 Stakeholders management

As one part of a construction process, a demolition act also requires the involvement of different professionals and other stakeholders. The relevance of those stakeholders might vary based on certain industry specific policies and regulations but, there are some found to be common in most cases. For this research purpose, the selected respondents gave their personal opinion arising from their experience when asked to identify the three most relevant stakeholders in demolition projects among the listed five including the others category compromising of law enforcement officials and MSE group members. As a result, out of a total of 17 references, Investor/client is selected to be the leading stakeholder with 6 times reference while contractors and government policy makers comes second and third most influential stakeholder in the eyes of the respondents with 5 and 3 times references respectively.

The following table 4.2 summarizes the findings for the specific point of analysis.

Table 4.2 Summery of result for important stakeholders

Question	Alternatives	Response	
		Frequency	Percentage (%)
Who are the three most important stakeholders in demolition activities ?	Investors/Clients	6	35.3
	Contractors	5	29.4
	Local Administration	2	11.8
	Government Policy makers	3	17.6
	Others	1	5.9

The following figure 4.2 (a) and figure 4.2 (b) further highlights the registered response of respondents as presented below. As can be seen, the strategic level respondents identified contractors and clients to be the leading stakeholders in the practice of building demolition with equal three-time references each while the enforcement level respondents claim government policy makers and clients to be the two most important stakeholders with equal three-time reference each.

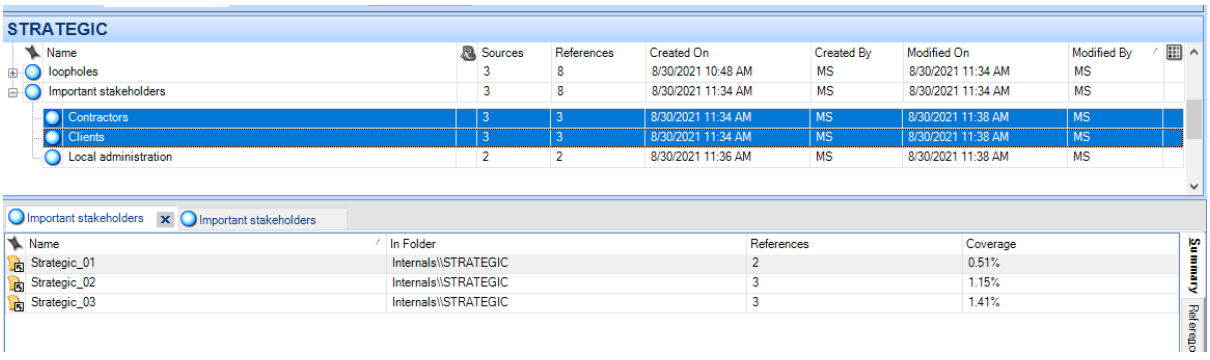


Fig. 4.2 (a) Strategic respondent's matrix coding query for important stakeholders (source: QSR NVivo.10 output)

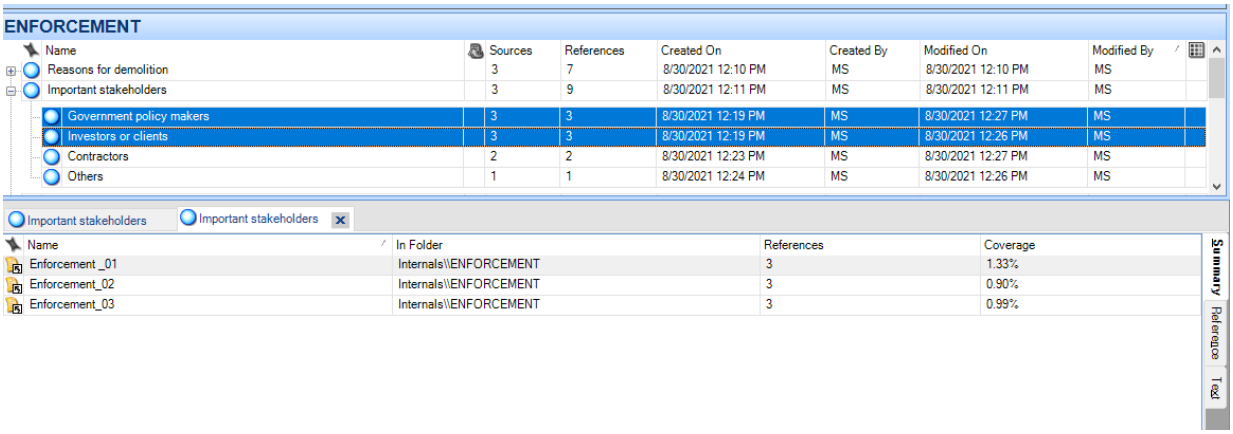


Fig. 4.2 (b) Enforcement respondent's matrix coding query for important stakeholders (source: QSR NVivo.10 output)

4.2.3 Safety, Environment and Waste management

The construction industry is always involved with the concepts of safety, environmental protection and waste management. According to (Mihai, 2019), construction and demolition wastes (C&DW) are one of the fastest-growing waste streams due to the economic development and urbanization process at a global scale. While waste is believed to bring various potentials in terms of recycling and reuse, the journal explains how these opportunities are lost due to lack of proper forcing protocol for waste disposal. It further explains that construction waste can be generated due to design errors, improper material handling and demolition activities that take place for various reasons. Keeping this highlight in mind, the respondents of this research were asked if there is any form of protocol they follow while carrying out or taking part in a building demolition activity. In response, out of a total of 15 references, the 'others' alternative was referred 12 times leaving the 'yes' option with only 3 reference points.

The following table 4.3 summarizes the findings for the specific point of analysis.

Table 4.3 Summery of result for safety, environment and waste related protocols

Question	**Alternatives**	**Response**	
		Frequency	Percentage (%)
Is there any form of safety, waste and environmental protection protocol to follow ? If yes, how do you insure the enforcement ?	Yes	3	20
	Others	12	80

According to the responses, instead of a direct reference to a certain governing protocol, most tend to practice other related measures arising from a well-developed public trend and/or personal experience. Some of the responses are directly quoted to further elaborate the scenario as follows:

"The client, be it an individual or a company will take the measure that he/she is forced to implement in any ordinary construction that will be followed by the responsible body."

Strategic level respondent 03

"All safety and environment related protocols for construction applies and if violated, measures up to suspension of work might apply."

Enforcement level respondent 02

"Nothing specific but we try to transport the debris through one channel to decrease the dust and cover the area with plastic material to protect flying materials."

Operation level respondent 06

As can be observed, the responses above are more generic due an existing gap in the safety and waste management protocol instead of exhaustively describing which exact guideline they follow.

4.2.4 Productivity and measure of success

Success of a project is dependent on various factors. As demolition is considered to be one form of a construction project with definite life span, it is dependent on certain factors. For this research purpose, the respondents were asked to select the three most influential factors that, in their opinion is translated to implicate a successful building demolition project. To frame the options, the researcher presented them with six (6) scenarios to choose from. Accordingly, from a total of 20 references, timely completion was mentioned to be the leading measure of success with 8 references while least cost and high return in salvage value were ranked second and third with equal reference point of 4 as an indication of success of a demolition project.

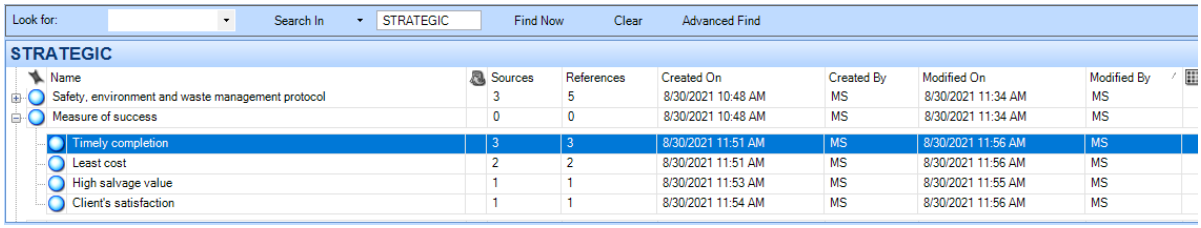
The following table 4.4 summarizes the findings for the specific point of analysis.

Table 4.4 Summery of result for measure of success

Question	**Alternatives**	**Response**	
		Frequency	Percentage (%)
When is a demolition activity considered successful ? What are the measures of a successful demolition activity ?	Timely complition	8	40
	Least cost	4	20
	High return in salvage value	4	20
	Client satisfaction	2	10
	Minimum harm to environment	2	10
	Minimum harm to work force	0	0

The following screenshot figures 4.3 a, b and c are also presented in support of the above stated outcome. As can be seen from the first figure below, respondents on the strategic level identified

the factor timely completion to be the leading measure of success of a building demolition project.



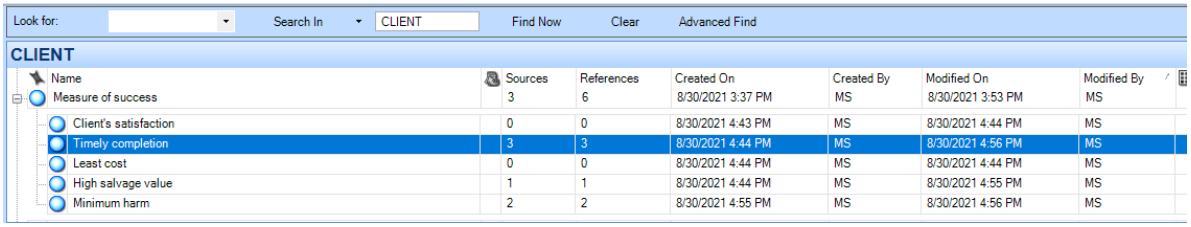
Look for: Search In STRATEGIC Find Now Clear Advanced Find

STRATEGIC

Name	Sources	References	Created On	Created By	Modified On	Modified By
Safety, environment and waste management protocol	3	5	8/30/2021 10:48 AM	MS	8/30/2021 11:34 AM	MS
Measure of success	0	0	8/30/2021 10:48 AM	MS	8/30/2021 11:34 AM	MS
Timely completion	3	3	8/30/2021 11:51 AM	MS	8/30/2021 11:56 AM	MS
Least cost	2	2	8/30/2021 11:51 AM	MS	8/30/2021 11:56 AM	MS
High salvage value	1	1	8/30/2021 11:53 AM	MS	8/30/2021 11:55 AM	MS
Client's satisfaction	1	1	8/30/2021 11:54 AM	MS	8/30/2021 11:56 AM	MS

Fig. 4.3 (a) Strategic respondent's matrix coding query for measure of success (source: QSR NVivo.10 output)

Similar to the above scenario, one of the key characters in operation level; clients ranked the factor timely completion first in terms of measuring the success of certain building demolition project.



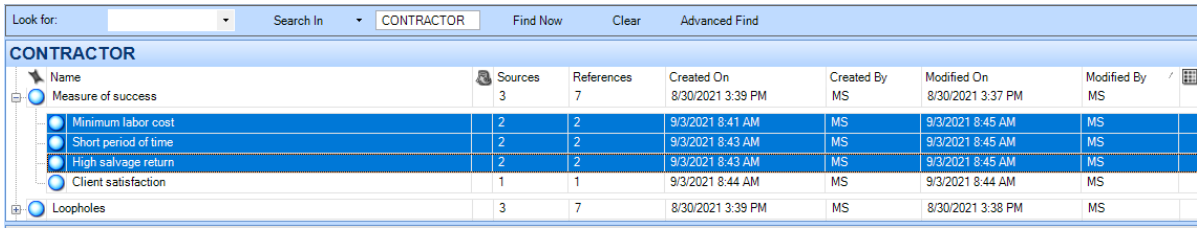
Look for: Search In CLIENT Find Now Clear Advanced Find

CLIENT

Name	Sources	References	Created On	Created By	Modified On	Modified By
Measure of success	3	6	8/30/2021 3:37 PM	MS	8/30/2021 3:53 PM	MS
Client's satisfaction	0	0	8/30/2021 4:43 PM	MS	8/30/2021 4:44 PM	MS
Timely completion	3	3	8/30/2021 4:44 PM	MS	8/30/2021 4:56 PM	MS
Least cost	0	0	8/30/2021 4:44 PM	MS	8/30/2021 4:44 PM	MS
High salvage value	1	1	8/30/2021 4:44 PM	MS	8/30/2021 4:55 PM	MS
Minimum harm	2	2	8/30/2021 4:55 PM	MS	8/30/2021 4:56 PM	MS

Fig. 4.3 (b) Operation respondent's matrix coding query for measure of success (source: QSR NVivo.10 output)

But in contrary to the above two presented responses, contractors; the other characters in the operation level ranked three factors; minimum labor cost, timely completion and high salvage return value to have the same effect on measure of success.



Look for: Search In CONTRACTOR Find Now Clear Advanced Find

CONTRACTOR

Name	Sources	References	Created On	Created By	Modified On	Modified By
Measure of success	3	7	8/30/2021 3:39 PM	MS	8/30/2021 3:37 PM	MS
Minimum labor cost	2	2	9/3/2021 8:41 AM	MS	9/3/2021 8:45 AM	MS
Short period of time	2	2	9/3/2021 8:43 AM	MS	9/3/2021 8:45 AM	MS
High salvage return	2	2	9/3/2021 8:43 AM	MS	9/3/2021 8:45 AM	MS
Client satisfaction	1	1	9/3/2021 8:44 AM	MS	9/3/2021 8:44 AM	MS
Loopholes	3	7	8/30/2021 3:39 PM	MS	8/30/2021 3:38 PM	MS

Fig. 4.3 (c) Operation respondent's matrix coding query for measure of success (source: QSR NVivo.10 output)

4.2.5 Challenges and recording

As one of the primary objectives of this research is to develop a regulatory frame work after analyzing the existing and best practices, it is of high value that bottle necks of the practice to be identified by the real actors themselves. This way, the feed backs will be used in framing the end result in to a more practical and achievable format. In this regard, respondents were asked to rank the most influential loopholes that they happen to observe while involving in a building project; among which, from a total of 21 references, lack of attention from government body was mentioned first with 10 times reference followed by no incentive for specialization and no strict safety, environment and waste guideline to follow with 5- and 4-times reference respectively to be the second and third major setbacks in the eyes of the respondents.

The following table 4.5 summarizes the findings for the specific point of analysis.

Table 4.5 Summery of result for observed loopholes

Question	Alternatives	Response	
		Frequency	Percentage (%)
What are the challenges of the practice in your opinion? Please mention them	Lack of attention from government body	10	47.6
	Young age of the sector	2	9.55
	No strict safety, environment and waste guideline to follow	4	19.05
	No incentive for specialization	5	23.8
	Others	0	0

In conclusion, apart from the commonly selected themes above, the following 4 figures; Fig 4.4 - Fig 4.7 each attempt to create a visual representation of the responses of the different level respondents.

According to strategic level respondents, clients and contractors are identified to be the most important stakeholders. Lack of attention from government; in terms of creating a specific platform/division to guide and oversee the performance of the practice is considered to be the major setback observed in the industry. As per the respondents, timely completion is the most agreed measure of success for a demolition project. Coming to safety, environment and waste management protocol, all respondents deviated from the option of following a specific guiding protocol. Similarly, all respondents answered none to having a specific license to perform a demolition activity nor to follow a demolition specific guideline while carrying out the activity.

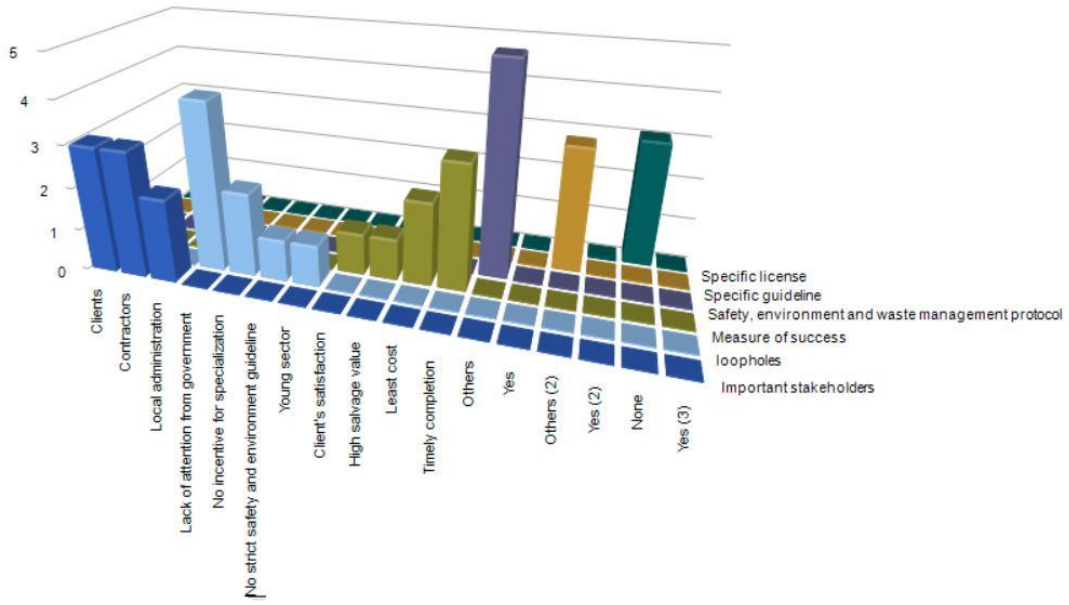


Fig. 4.4 Strategic level response preview (source: QSR NVivo.10 output)

As far as the respondents from the middle-class authorities, government policy makers and clients share equal share to be the top leading stakeholders in building demolition projects. When asked how project cost is estimated, all replied to follow pre-set rates. According to these respondents, most building demolition projects happen due to the need for brown field for redevelopment projects. Similar to the above group of respondents, all respondents here as well admitted to not be following a specific guiding protocol for safety, environment and waste management issues. Majority of the respondents gave the credit for experience when asked how they carry out time-frame calculation for a certain project as can been in the figure 4.5 below.

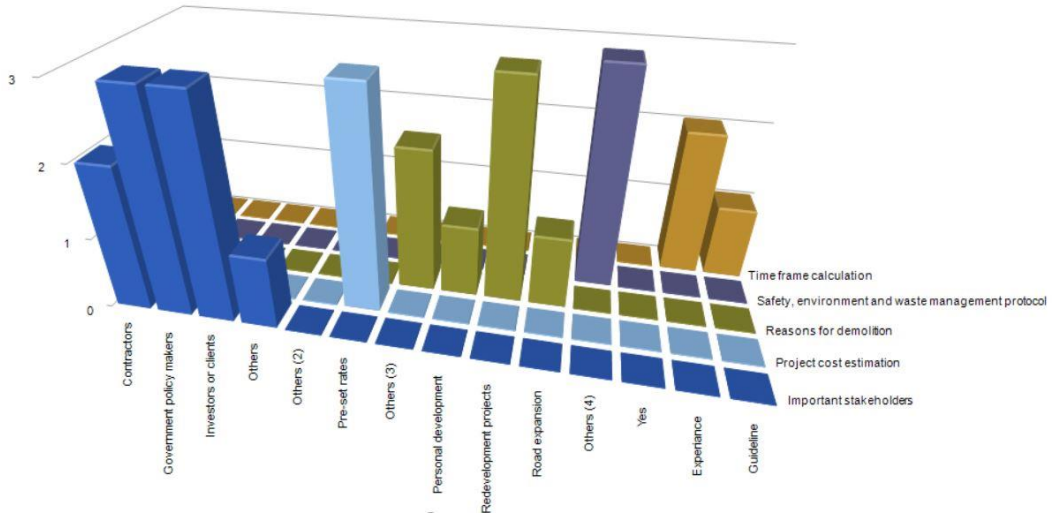


Fig. 4.5 Enforcement level response preview (source: QSR NVivo.10 output)

When coming to the parties that are directly involved with the activity of demolition; which are mainly clients and contractors, each were asked a relatively similar set of question and the results are presented as follows.

For the clients, when asked about the leading pre-demolition stage consideration they take, their first replay was preparing submittals to acquire permit. Going forward, the leading activity to be identified by the respondents for demolition stage is material separation. Timely completion was yet again identified to be the leading measure of success by majority of the respondents. As far as the professionals involved, laborers and foreman share equal share. Finally, the respondents identified lack of attention from government; in terms of creating a specific platform/division to guide and oversee the performance of the practice to be the biggest bottleneck of the practice. In return suggested to have a strong sector specific regulatory framework and encouragement for specialization for betterment of the practice as can be observed from the figure 4.6 below.

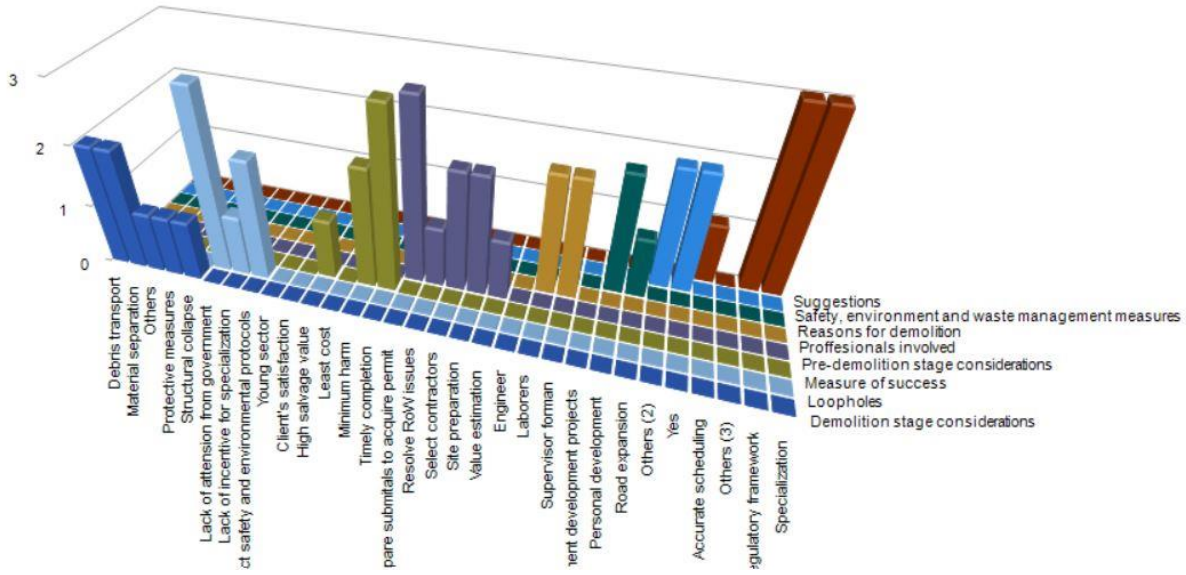


Fig. 4.6 Operation level response (Client) preview (source: QSR NVivo.10 output)

Similarly, for the contractors, when asked about the first pre-demolition activity they perform, property evaluation, site visit and team composition were the most agreed ones. Once this is done, the respondents identified categorization of materials to be a leading activity while carrying out the demolition. While daily laborers take the biggest share in terms of professionals involved, minimum labor cost was found out to be an indicator of a successful project according to majority of the responses. Similar to the client's response, the respondents identified lack of attention from government; in terms of creating a specific platform/division to guide and oversee the performance of the practice, yet to be a major setback in the practice and in return suggested to have a formal guiding protocol and incentive for specialization. figure 4.7 below concluded the above stated findings.

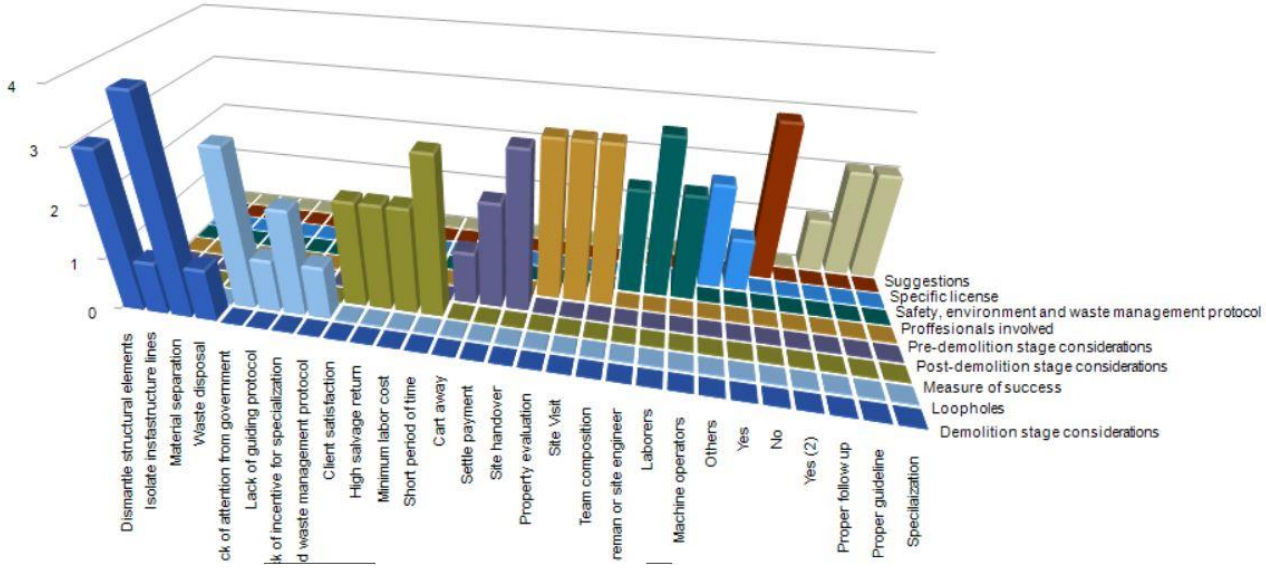


Fig. 4.7 Operation level response (Contractors) preview (source: QSR NVivo.10 output)

4.3 Observation Analysis

4.3.1 Case Establishment

4.3.1.1 Eagle Hills: La Gare Project

Background

The capital of the nation, Addis Ababa is a bustling city hub with strong commercial prospects. As home to the headquarters of the African Union and the host city of the United Nations Economic Commission for Africa (ECA), Addis Ababa is also regarded as the 'political capital of Africa' and is driving the new growth narrative of the nation. La Gare, the master-planned community by Eagle Hills, is located in the heart of Addis Ababa, in the historical setting of the La Gare train station. One of the largest of its kind integrated lifestyle communities in Ethiopia, La Gare features more than 4,000 residences set in an area of over 360,000 sqm and with total project cost of 50 billion birr (www.lagare.com, 2021).

Fig. 4.8 Proposed look of One La Gare (Source: (www.lagare.com, 2021)

One La Gare; launched on November 2018 and situated in Addis Ababa city Kirkos sub city woreda 07 is the first component to be launched at La Gare. This project is aimed to be built in place of two high-rise buildings; one of the buildings is owned by Ethiopian Shipping & Logistics Services Enterprise, while the other building is jointly owned by Varnero and the Federal Housing Corporation and is used as a residential apartment, office and commercial space (Tadesse, 2019).

Fig. 4.9 Areal view of La Gare, July, 2021(Source: (www.lagare.com, 2021)

The pictures above show the proposed look of the Eagle Hills Apartment of the La Gare project (fig. 4.8) and the latest status of the project (fig 4.9) respectively.

Assessment of the demolition practice

Regarding the demolition plan for the existing structure, Kirkos sub city administration organized close to 500 unemployed youth from nearby areas in 18 teams. As per their agreement, the youth will demolish and sell properties to earn money. But, according to (Astatike, 2019) the Woreda administration took over the task and auctioned by themselves in the absence of the representatives from the original groups in which seven individuals won the auction at a value of over a million birr for the demolition of Ethiopian Shipping Lines and Logistics Service Enterprise building.

Fig. 4.10 (a) Ethiopian Shipping Line S.C building (Source: (www.flickr.com, 2008) *(left) and La Gare Varnero Apartments (Source:* (www.skyscrapercity.com, 2019) *(right)*

Fig. 4.10 (b) Demolition of Ethiopian Shipping & Logistics Services Enterprise building, Feb., 2020 (Source: self-taken)

4.3.1.2 Metropolitan real estate Central Tower Project

Metropolitan real estate is an American - Turkey based Real Estate developing company who has been participating in the Ethiopian construction sector for the past 6 years now. The company works focusing on providing luxurious apartments for upper class Ethiopians and the diaspora community. So far, the company was able to complete two projects (Sarbet Apartments (G+5) and Bole Mid Town Apartments (B+G+9)) and is currently working on Three more projects (Metropolitan tower (4B+G+11), Westview Standard Apartments (3B+G+7) and Central Tower Apartments (B+G+19)) in different locations of the city. The company acquired 850m2 land around African Union HQ for the latest project; Central Tower Apartments two years ago and launched the project start on early January, 2021 G.C by starting the demolition process of an already existing structure on the land.

For this research purpose, the researcher took the Central Tower Apartment project as one active case and followed up closely on the procedures which later on will be analyzed using the different tools and techniques. Fig 4.11, Fig 4.12 (a) and Fig 4.12 (b) below show the proposed project and the overall status of the existing structure demolition work.

Fig. 4.11 Proposed project (Source: (www.metropolitanaddis.com, 2021)

Fig. 4.12 (a) Manual demolition of existing structural elements, Jan. 2021 (Source: self-taken)

Fig. 4.12 (b) Material extraction for reuse, Jan. 2021 (Source: self-taken)

4.3.1.3 Kera-Bulgaria embassy road expansion project

Addis Ababa city roads authority (AACRA) undertakes several road expansion and maintenance projects every year. The Kera – Bulgaria embassy road expansion project is one of the large-scale projects taking place in the city as a result of the introduction of a new

underpass road. As a result, Fig 4.13 and Fig 4.14 below give a general insight about how the demolition of buildings around the road side take place.

Fig. 4.13 Dust control mechanism, Dec. 2020 (Source: self-taken) (left), Demolition taking place, Dec. 2020 (Source: self-taken) (right)

4.3.1.4 Residential building project

This is a private development planning to upgrade an existing G+2 residential building landing on 500m^2 land into a multistory mixed used complex as a result of high demand for rental properties around the site; located around Bole sub city woreda 03, friendship hotel area. Fig 4.8 below illustrates the site status of the project during the demolition period.

Fig. 4.14 Demolition of a residential building, Dec. 2020 (Source: self-taken)

For this analysis purpose, an exhaustive checklist was developed; as attached in annex 04, to record the genuine status of the selected cases. The researcher then made multiple personal

visits to each site in different times roughly ranging from December 2020 to January 2021 G.C as necessary except for the case of La Gare in which the initial visit was made on February 2020 G.C and two other follow up visits were made on late and mid 2021 G.C after the restriction due to Covid-19. The first-hand raw data collected was in the form of yes-or-no format marking activities that are present, absent or does not apply in that specific site against the listed check points. Then the evaluation criteria were distilled down in to more generic principles derived from the key performance indicators identified from the study in the previous chapter. Those principles are believed to describe the current practice in a more concise way; for each stage of pre, demolition and post demolition. Once this is done for all projects, it was analyzed in a summarized data table where the weakest links (loopholes of the practice) were identified as an output of this section and to use as an input for the framework development. In this manner, the following are the selected principles against the observed status of the case in detail.

4.3.2 Understanding the project and its context

4.3.2.1 Stakeholder's management

In the La Gare building demolition project, five issues were insight for the stakeholder's management related evaluation principle. As observed, even though the client; one of the project stakeholders; was not directly involved in the demolition process, they were able to collect all official permits and clearances; such as building permit, building starting permit and annual lease payment clearance; required to start with the demolition of the structures. On the contrary, there was no input given by a consultant related to method selection and other related issues as there was no assigned consultant for the case from both the client and the government body. Moving forward, laborers received a brief orientation regarding the work flow by a group of assigned foremen but no prior basic skill training has been conducted on site aiming for the specific nature of the project. Before the official green light was given to start, supervisors assigned from the woreda and sub-city administration made an on-site assessment of the site.

In overall, as this was a project with a special order from the Addis Ababa City Administration (AACA), a relatively better coordination was observed between the different stakeholders of this project in terms of clearing out the scope before commencing in to the actual work. On the other hand, the dwellers of the area argued that a rushed decision was made regarding their relocation plan which later on brought a quarrel with the sub-city land administration bureau claiming the compensation fee was not calculated properly and they have not been given enough time to evacuate the place.

4.3.2.2 Multilateral communication

As construction related activities involve multiple actors, implementing effective communication system is crucial. In such manner, the La Gare building demolition project was successful in making the necessary communication with the different infrastructure authorities (water, telecom, sewer, drainage, and electricity) to get a clearance for temporary and/or full suspension of the lines after representatives of the responsible authority came and located them. On the opposite side, there was no available as-built drawing to use for reference which made the prediction of structural systems used difficult; especially in the case of the Ethiopian Shipping & Logistics Services Enterprise building. Furthermore, the project failed to record the

conditions of adjoining properties properly which later on led to ambiguous speculation about the stability of the other surrounding structures.

In conclusion, even though the project can be considered exemplary in terms of collaborative work between other infrastructure authorities and no major accident has been reported in this regard, there has been observed a serious gap in keeping record of formal correspondence letters among the regulatory authority and the contractors. This made things difficult for the researcher to analyze document related data as it was almost impossible to find one. Furthermore, since the project was awarded to MSE groups by informal bid process, a substantial amount of time has been lost while trying to negotiate with the local labor force initially aiming to overtake the project.

4.3.2.3 Planning and Methodologies

Evaluating from the responses of the checklist on planning related check points, the case was observed to have poor performance in terms of methods and planning techniques applied. There was no trace of prior planning found regarding work place safety management, waste disposal method and environmental plan against minimum damage. One of these limitations was reflected on the demolition stage later on when noticeable amount of dust was observed to pollute the surrounding environment. Apart from this, absence of professional advisors to pre-determine the type of structural system used and suggest possible demolition method was observed to affect the overall performance of the project. This included missing of formal mode of communication (written and approved work method statement and schedule) between the work parties which led to unstructured work flow as per personal experience of the contractor. On the positive side, prior project cost estimation was done based on on-site evaluation to understand the status of the existing structure and use as a base point for project award. It was also guided by a pre-set multiplication rate for certain familiar building materials by the government to be used for every relocation value estimation. In addition, the client did a full site inspection for possible hazardous material after the demolition process is complete.

4.3.3 Operation planning and control

4.3.3.1 Productivity and measure of success

The researcher tried to observe and analyze productivity in terms of both human labor use and technological applications. Accordingly, the demolition activity followed a level-by-level action of stripping, breaking and removal of demolished materials. In doing so, assigned supervisors from the local authority made random site visit aiming to make sure the activity is carried out as per related regulations. But, due to gaps in information about the structural system and other limitation on using explosive methods to demolish in such locations hindered the use of up-to-date technologies in the sector.

4.3.3.2 Safety and emergency handling

During the initial stages of the demolition process, minimal emphasis was given to work place safety measures; especially in the regards of flying object management and dust protection. But later on, a progressive improvement was observed when the site was secured with fencing and buildings were enclosed with plastic mesh to minimize the environmental pollution around the area. In addition, different signage were mounted inside the province of the project site to create

alert amongst personnel. While carrying out the activity, even though all workers on site failed to be equipped with the proper personal protective equipment (PPE); except for few with safety helmets owned personally, structural members have been dismantled in a controlled manner by skilled laborers. More or less, the coordinators of the site tried to manage a clear and clean site access for both vehicle and human access. The following figures 4.15 and 4.16 are taken to support the descriptions written above.

Fig. 4.15 Safety signage inside the site compound, Dec. 2020 (Source: self-taken)

Fig. 4.16 Clear access to and from the site compound, Dec. 2020 (Source: self-taken)

4.3.3.3 Sustainability management

With regards to sustainability, no special effort has been observed to be made expect for extraction of some elements of the building such as door and window frames carefully identified and categorized for possible recycle/reuse. Even though considerable amount of construction debris was extracted during the process, no attempt has been observed to be made to separate plastic wastes from other biodegradable wastes.

4.3.4 Performance evaluation

4.3.4.1 Post-demolition management

During the final stages of the demolition activity, the researcher visited the site to examine post-demolition activities such as waste disposal mechanisms and final hand over protocols. As a result, since there was no pre-approved plan on how to carry out cart-away of surplus material generated during the process, there has been an inconvenience related to ownership and fees to dumping sites. This forced the client to perform the disposal of the remaining waste material with separate cost. Apart from this, no formal correspondence has been noticed regarding

settlement of final payments to the contractor since there was no signed work contract between the two parties in the first place. Furthermore, the assigned local authorities were not present to do a final assessment on -site before handing over the land to the client. On the contrary, the sub-city and woreda office prepared a formal document to sign off both the client and the city administration to hand over the site officially. In doing so, no form of recognition is given to the contractor by the responsible authority for successful completion and/or performing the activity as per the acceptable regulations.

4.3.4.2 Challenges and improvement register system

This section is observed to be the weakest with zero positive observations. There has been no register of accidents encountered nor damages made both in terms of property and environment so as to do a proper compensation at the end. Similarly, there was no recording and/or progressive tracking made for challenges encountered that happened to hinder the overall performance of the project.

Observation analysis was made on three other sites of different scale in support of the previously presented case to further understand the pattern of the practice. The cases are represented with codes as; P-01 - Eagle hills: La Gare apartments project, P-02 - Metropolitan Real Estate, Central tower project, P-03 - Kera – Bulgaria embassy road expansion project and P-04 - Residential building (G+2) project. The mark '✓' is used to indicate activities that are done while the mark '×' is used to indicate activities that are missing. 'NA' is used to indicate activities that are not applicable in the sites. The following table 4.6 presents all the cases in measure of the selected observation criteria to show the performances.

Table 4.6 Summary of observation

Areas	Description	Projects				Percentage (%)
		P-01	P-02	P-03	P-04	
Document related	Client has secured official permit to demolish the structure	✓	✓	×	✓	**75**
	The project has been awarded with formal bid process	×	×	×	×	**0**
	Clearance for suspension of all infrastructure lines is obtained	✓	✓	✓	✓	**100**
	Written work method statement has been submitted and client approved	×	×	×	×	**0**
	Safety management plan has been submitted by the contractor	×	×	×	×	**0**
	Waste disposal method plan are submitted by the contractor	×	×	×	×	**0**
	Environmental plan against minimum disturbance has been submitted by the contractor	×	×	×	×	**0**
	As-built drawing is available for reference	×	×	×	×	**0**
	All supply lines (water, telecom, sewer, drainage and electricity) are identified and located by respective authorities	✓	✓	×	×	**50**
	Conditions of adjoining properties are properly recorded before the starting of the activity	×	×	×	×	**0**
Pre-demolition	Bill of quantity has been derived from as-built drawing or on-site evaluation	✓	×	✓	×	**50**
	Project cost estimation has been done as per BoQ	✓	×	✓	×	**50**
	Work schedule has been submitted and approved by the client	×	×	✓	×	**25**
	Structural system has been identified and possible work procedure has been suggested by a structural engineer	×	×	×	×	**0**
	Consultant is present to advice on method selection and other related guidance	×	×	×	×	**0**
	Full building inspection for possible hazardous materials has been conducted by professionals	✓	×	×	×	**25**
	All primary and secondary building materials has been identified	✓	✓	✓	✓	**100**
	The professionals (laborers) has been properly oriented about the work flow by the project manager	✓	✓	✓	×	**75**
	Prior basic skills training has been conducted on site for the specific nature of the project	×	×	×	×	**0**
	Assigned local authority supervisors make on-site assessment of the site before giving permission to start the activity	✓	✓	NA	×	**50**
Demolition	The site is properly secured to protect the surrounding from dust and flying objects	✓	×	✓	×	**50**
	A level-by-level procedure for stripping, breaking up and removal of demolished material is taking place	✓	✓	✓	×	**75**
	Controlled dismantling of structural members is being implemented	✓	✓	×	×	**50**

Table 4.6 Summary of observation (Cont'd)

	Assigned local authority supervisors make random visits to make sure the work is being carried out as per the regulation	✓	×	✓	×	**50**
	Materials are being properly extracted for recycle/reuse	✓	✓	×	×	**50**
	Genuine technology and machinery is being used to execute the work	×	×	×	×	**0**
	All site workers have proper PPE	×	×	×	×	**0**
	Site access is clean and clear of any blockage for easy access of both people an vehicle	✓	✓	✓	×	**75**
Post-demolition	Waste material has been disposed as per the pre-approved plan	NA	NA	NA	NA	**0**
	Proper compensation has been made to damaged properties and other work related accidents encountered during the process of the activity	×	NA	✓	NA	**25**
	Final acceptance has been made between the client and the contractor	✓	✓	✓	✓	**100**
	All remaining payments has been settled and contract has been closed	NA	NA	NA	NA	**0**
	Proper recording/tracking of overall project performance and challenges has been done by the assigned supervisor	×	×	×	×	**0**
	Assigned local authority supervisors make an on-site assessment for final approval	✓	×	✓	×	**50**
	The contractor has been awarded with certificate of completion from the local regulatory authority confirming all activities has been carried out as per the regulation	✓	×	×	×	**25**

As can be observed from the summery table of observations, activities that are highlighted with light blue color are the activities that are not performed in the respective sites at all. Judging from the table, those activities tend to fall under the first two initial stage of categorization. This indicates that most sites are negligent in pre-planning the process from the start but rather jump into the major work which later on is observed to have affecting the post-demolition performance. Similarly, there are certain activities that are only performed in one of the four sites. Taking all this into consideration, the researcher focuses on extracting activities with 0% and 25% performance score to use as weakest link of the industry to use it as an input when developing the frame work.

4.4 Document analysis

This section is especially used to examine the existing legal framework used to govern the practice of building demolition in the local context. For this purpose, legislative documents ranging from policies, proclamations, directives and regulation were analyzed at both federal and city level. These documents are found to be relevant to this study as they contain areas that highlight construction and supervision, licensing and permit, professional's certification, urban planning and work place safety management. The following table 4.7 below presents the list of reviewed documents.

Table 4.7 List of analyzed documents

No.	Name of document	Document number	Document category
1	Ministry of Urban Development and Construction (MoUDC) construction industry Policy (first draft)	MoUDC 2012	Policy
2	Ethiopian Building Proclamation	624/2009	Proclamation
3	Urban Planning Proclamation	574/2008	Proclamation
4	Expropriation of land holdings for public purpose, payment to compensation and resettlement of displaced people	1161/2019	Proclamation
5	Council of ministers building regulation	243/2011	Regulation
6	Construction certification and registration regulation	648/2021	Directive
7	MoUDC registration of construction Professionals and contractors (amended)	19	Directive
8	MoUDC registration of design professionals and consultants (amended)	22	Directive
9	MoUDC building directive	5/2011	Directive
10	Addis Ababa City construction bureau infrastructure integration, construction permit and supervision building directive	2/2018	Directive
11	Addis Ababa City construction bureau ; 2014 E.C fiscal year 1st quarter construction Works direct cost study proposal	2014	Price reference document

The construction industry policy by (MoUDC, 2012), states that "*Optimization of the role of all participants and stakeholders through process, technological, institutional enhancement and through appropriate human resource development"* to be one of the objectives. The same document identifies and presents a list of constraints that are hampering the performance of the sector mainly revolving around five main areas; inadequate experience, non - transparent procurement systems, compromised standards of safety and occupational hazards, weak policies and regulatory framework and poor technological base. In return, it suggests application of appropriate building regulations and standards, fostering technological development and

mobilization of adequate financial resources as a remedial effort to improve the performance of the sector.

Specific to regulations and standards, (MoUDC, 2012) states that even though the Ethiopian standards agency published several standard with direct relation to the construction industry, there is still a lack of commitment visible by the industry to standardize work items. Due to this and other related factors, foreign standards are in to force without proper adaptation. In addition to this, weak enforcement of the current building regulations is believed to contribute to the poor quality of products and services.

As defined on (MoUDC, 2012), demolition is set to be part of the construction process as it compromises a physical infrastructure being planned, designed, procured, constructed or produced, altered, repaired, maintained, and demolished. In an urban scale, a demolition act can be part of a structural or local development plan to perform upgrading, renewal and expansion of the existing urban fabric elements on pre-identified areas. In doing so, it must be able to state function, objective, role of implementing bodies, required institutions, budget and time of implementation for a successful application of the plan in an integrated manner (UrbanplanningproclamationNo.574/2008, 2008).

Narrowing down, the service of building demolition is partly described on article 25; alteration of services, extension, repair or demolition of (EthiopianBuildingProclamationNo.624/2009, 2009). It is stated that prior written consent form is required from the responsible government body before starting any form of the above stated services and during a work of demolition, an appointed government officer may ask for plans and any other analysis or evidence to verify its compliance with acceptable standards but, it refrained from explaining the necessary evidences and/ analysis that needed to be presented. while the document points out that all precautionary measure that applies during new construction shall be taken in to consideration for demolition projects as well, it misses on describing what exactly those measures are specific to the activity. Regarding the operational level considerations, though it states that any form of demolition activity must be carried out in such a way that it will not impact the immediate surrounding or the people moving around, sub article 32.4 of (EthiopianBuildingProclamationNo.624/2009, 2009) does not have a forcing effect as it states erecting temporary safety/protective structures is not a mandatory procedure but rather can be done out of the good will of the party undertaking the demolition activity.

Regarding permit, building demolition; like any other form of construction activity have its own permit to be issued once the required set of documents are fulfilled. These include title deed, plan of the building to be demolished, statement of reason for demolishing, distance clearance information of neighboring buildings, agreement made with the respective authorities to interrupt power, water, sewerage, telephone and other infrastructures and analysis of safety methods to be applied and the sequence of activities to be carried out (CoM243/2011, 2011). Failure to do so will result in 3000 ETB fine for category B buildings. Going forward, sub article 18.7 of (CoM243/2011, 2011) states that "*Any work of alteration of service, expansion, renovation, maintenance or demolition of a building shall be carried out by competent registered contractor*". But, article 16 (d) and 17 (f) of (MoUDC648/2021, 2021) does not

categorize the act of building demolition under any of the contractor and consultant types. According to this document, contractors are divided in to four namely; general contractor (GC), building contractor (BC), road contractor (RC) and special contractor (SC) in which the last one only covers the areas of pre-tensioning, post-tensioning, landscaping, foundation work, construction completion, site maintenance, road safety signs, aluminum door and window assembly, painting and decoration work, wood and metal work, plumbing and sanitation work. Similarly, consultants are divided in to seven categories; building consultant, consultant Architects, engineering consultants, construction management consultant, urban planning works consultant, special consultants; in which the later one includes asset valuation, interior design and decoration, landscaping, construction audit and the like.

As part of the Addis Ababa city centers redevelopment program, there has been multiple demolition cases that took place. In doing so, dwellers and land holders from these areas are forced to be relocated to another location studied to be a suitable replacement for the original land permanently or temporarily. According to article 6 of the proclamation (FDREHoR, 2019), the power to give order of evacuation on a land that has been decided for development is given to the city or woreda administration of the vicinity but, two sub articles presents a contradicting fact regarding the time frame of displacement; while article 8.1 (a) of (FDREHoR, 2019) emphasizes that land holders who are to be displaced shall be properly consulted with the city or woreda administration regarding the type, benefits and general process of the project one year prior to the planned date of evacuation, article 8.1 (b) of the same documents states that the notice period might be less than one year depending of the urgency of the project planned in that area. This creates a big loophole as it fails to set the minimum time limit and does not describe the exact criteria to classify project as urgent or not.

The other drawback sensed in the operation of building demolition is the lack of updated and standardized labor rate. Even though the Addis Ababa city construction bureau proposes a study estimate of direct labor service for demolition and other construction activities every quarter of the year; as attached in annex 07, there is a delay in the approval process once it is submitted to the city's finance bureau due to multiple reasons. In addition, due to the lack of an abiding act from the responsible authority to enforce these rates, private projects tend to set price through direct negotiation instead of applying the pre-set rates. Even for government projects, the situation is similar since there is no mandatory step that requires submission of cost estimation while issuing a permit.

4.5 Discussion of Findings and Gap Analysis

After analyzing the results of the data collected through various instruments as presented in the above sections of this chapter, it is critical to interpret the findings and locate the major gaps with respect to other reviewed studies. Accordingly, five concept pillars were selected to evaluate the results from all sources in light of the identified KPIs for the purpose of this study. Afterwards the gaps will lead the structure of the frame work and will be considered as an input when developing it later on the following chapter.

4.5.1 Stakeholders management

This section is evaluated in light of two criteria from the pre-identified KPIs for this study purpose; Professionals' involvement/ team composition and effective communication. As one element of the construction process, demolition projects require a collaborative effort from multiple stakeholders at different level of responsibility for a successful completion. According to the findings of this research, clients/investors, contractors, policy makers, local enforcement personnel and others; including MSE group members and law enforcement officials were identified as relevant stakeholders. There has been a gap detected when compared to other studies as the local practice lacks abiding terms; the fact that the existing regulatory protocols does not include a precise description of the minimum requirement for team composition of the undertaking entity and the involvement of a consulting body, made a way for opinionated performance of the activity. As a result, non-uniform results have been recorded regarding the influence of the identified stakeholders from the different data sources analyzed in this regard.

4.5.2 Planning and methodologies

As far as the planning scheme is concerned, the ideas of method selection and planning, waste management planning, cost control and contingency planning, contractor selection process and project size determination are considered. According to the evaluations made, an extremely poor performance is observed in this regard as the pre-demolition phase is not entertained with proper attention. In all cases, all forms of planning; cost, work procedure, time and waste were found to be missing. This was mainly due to the lack of exhaustiveness of the prerequisite for granting a demolition permit. In addition, failure of the bidding process to follow the formal line and lack of a forcing protocol on the regulatory documents stating mandatory submission of method statement accounts for the situation to get worse. The compromised involvement of professionals at the early stage of the practice contributes for the gap in planning as well as there is a lack of professional inputs on which method to adopt considering points such as minimal effect on the environment, anticipated amount of waste to be generated by the activity, project size and structural system complexity for a sequential flow of the work and safe completion.

4.5.3 Safety, Environment and Waste management

This is yet another major loophole of the building demolition practice as identified from the analyzed data when compared to the benchmarked indicators that comes as an after effect of the above two explained gap points. As a matter of trend, findings from all sources indicate that doing a preliminary building inspection for possible hazardous material identification is missing. Furthermore, contractors tend to do a building inspection only for the sake of rough property valuation rather than deep analysis guided by a professional in that specific area of expertise. This is also supported by the drawback observed in the legal documents as the issue of use of protection mechanism against environmental waste is stated as an optional procedure rather than being abiding and the inspecting body do not happen to give proper attention for not providing/wearing PPE. This is on top of the fact that documents in all level refrain from giving a detailed direction on recycle and reuse approaches. Due to these reasons, work place safety

environmental sensitivity is rather observed to be compromised while performing a building demolition act.

4.5.4 Productivity and measure of success

According to the KPIs, customer satisfaction; measured in both qualities of product and service is listed as one factor of evaluation. The local practice tends to focus on short period of completion rather than quality of the service when considering measure of success of a building demolition project. In doing so, the efficiency of labor is also measured by the dedication in time to dismantle parts compromising the care and caution that the process requires once the salvageable elements are extracted. The gap is visible in both sides; while contractors tend to employ several unskilled laborers with minimum daily wage instead of the skilled once in focus of getting fast cash, clients/investors are observed to stay no comment on how/ by whom the activity will take place as they focus on receiving the cleared land as fast as possible. This is mainly due to the fact that there is no regulatory framework that assists contractors on team composition as per the skill required for such projects. Rather the acting body takes liberty of choosing who to work with and the regulatory body doesn't make the necessary follow up/supervision on the project to assess the existing site management trend. The route cause for this is lack of proper assessment of the contractor's demonstrative skills before awarding the project from the client side and underestimating the lifetime of demolition projects and the skill required to do so; except in some cases where project briefing was carried out instead of short skill training sessions prior to the start of the project.

4.5.5 Challenges and recording

In the benchmarked practices for this research purpose, the post demolition management is considered to be a critical step as it involves proper closing of contract and documentation of encountered challenges and points of improvement for next step. In light of tracking technologies, salvage and recycle inventory and record keeping, the practice lacks to perform accordingly judging from the analyzed data. This is yet another aftereffect of lack of proper guiding principle on team composition including the minimum requirement of equipment and machineries necessary as per the scale of the project. Contractors decide on what type of technology to use just by a mere dependency on their capacity and experience rather than following the up-to-date advancements in the area as there is no forcing act to do so. The fact that the building demolition act doesn't not have a specific license type paved the way for contractors to lose interest in upgrading themselves in the field as well. Apart from this, there is no effort made from all sides; authority, client and contractor to keep record of inventory for recyclable and salvage items and other project related documents in purpose of creating a database for future use reference. As a result, similar challenges are observed to happen in most of the scenario.

4.6 Data Validation

(Zohrabi, 2013) defines validity as a measure of trustworthiness, utility and dependability that the researcher and the different stakeholders place into it. To do so, the measures can be taken through the different stages of a certain research; from data collection to data analysis and

interpretation. Validation is done to check the quality of an instrument, the data itself or the end product/result. Methods of validating data or instrument can be categorized in to four, according to (Zohrabi, 2013) as content validity, internal validity, utility creation and external validity. Content validity; also known as face validity, is all about examining the understandability of the research instruments and the data by a group of experts in the field so as to paraphrase misleading items and discard irrelevant questions while internal validity; also known as cross validation, is more focused on measuring how close the findings/instruments are to the reality by using one of the six recommended practices by (Merriam, 2009); triangulation, member checks, long-term observation, peer examination, participatory modes of research and researcher's bias. On the other hand, utility criterion asks whether the validation process generates enough information for the decision-makers with regard to the effectiveness and appropriateness of the program when evaluated against a certain pre-developed minimum requirement while external validity seeks to evaluate the capability of the finding to be a generic representation for a wider population (Zohrabi, 2013).

For this research purpose, the researcher used internal validation (cross validation) technique through triangulation. A data is said to be validated by triangulation when data is collected from a variety of sources and with a variety of techniques so as to arrive at a relatively same result to imply that the data is valid (Ibid). In addition, peer examination was also used to validate the data collection instruments. This involved collecting inputs from non-participants of the study but believed to have enough exposure to the research subject for comment and review. For this purpose, two university instructors (one from Dilla university and one from Addis Ababa University) and one professional from the industry were asked to forward their inputs on the effectiveness of the instruments.

CHAPTER FIVE: FRAMEWORK DEVELOPMENT AND VALIDATION

5.1 Introduction

This chapter presents a conceptual regulatory framework for the practice of building demolition, in response to the third objective of this research. After section 5.2 elaborates the development process of the framework and presents the framework itself, section 5.3 goes forward with providing a description of the results and the points considered while developing. Section 5.4 concludes by stating the validation procedure. The development of the framework was based on findings from literature review, current practice assessments and gaps identified as a result.

5.2 Conceptual Framework Development

Following the analysis of the data in purpose of current practice assessment, review of relevant documents and the gaps identified in literature review, this section presents a framework that organizes the aspects identified in the previous chapter and addresses the third objective of this research. To develop the conceptual regulatory framework, international models and framework samples were reviewed to adopt a structure as this framework is the first in its kind and there was no locally available base point to start from. Afterwards, the pillar points from the previous chapter used to analyze the data and gaps were used as a starting outline point in addition to the contents of the findings gathered through analysis.

The study aims to contribute to the body of knowledge of the industry in conceptual level for better understanding of the practice's implementation specific to building demolition in regulatory level. Accordingly, based on that gathered information, a conceptual regulatory framework is proposed by mapping barriers against acts, enabler instruments and check points as shown in the figure 5.1 below.

The proposed building demolition conceptual regulatory framework map summarizes major functions that needs to take place while performing the act together with their interlinkage in the form of flowchart for the sake of easy and precise understanding. The detail contents of the conceptual framework are explained in the sections afterward.

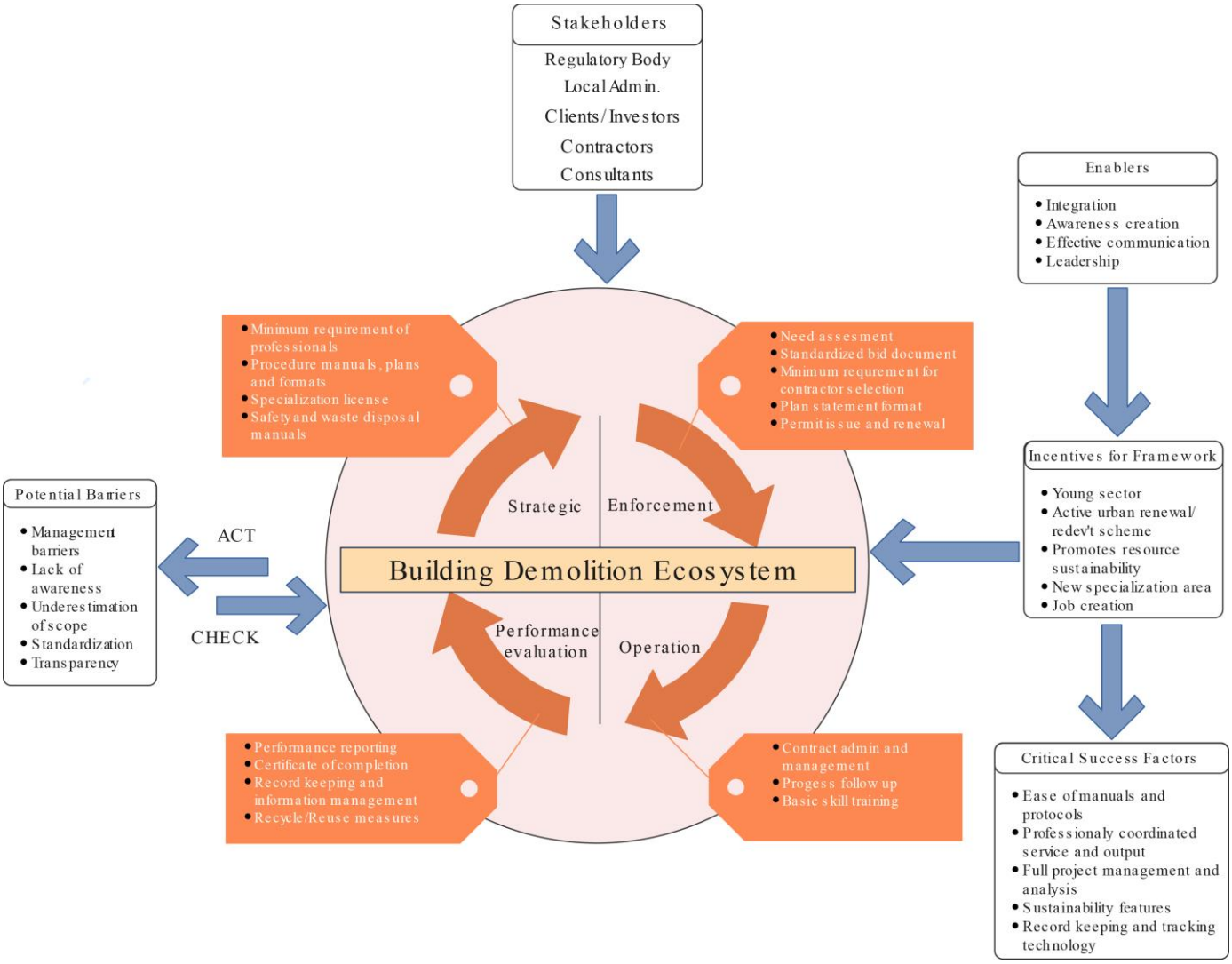


Fig 5.1 Proposed conceptual building demolition regulatory framework

5.3 Conceptual Framework Explanation

As can be seen from the conceptual framework above, it starts by listing out the key participants in a building demolition activity as identified through the data analysis and literature review. These five distinct parties; regulatory body, local administration, client/investor, contractor and consultants have responsibilities in different scale in addition to the direct effort they make for a successful operation of a certain building demolition activity. Once input is injected in to the building demolition ecosystem, there is a hierarchical flow of acts in different levels. Through all these, the five pillar points; stakeholders' management, planning and methodologies, safety, environment and waste management, productivity and measure of success and information management and recording, will be addressed in each level in the manner described below.

I. Strategic level

In strategic level, the actors are the regulatory authorities in both national and city level and will be responsible for seeing out the following points;

a. Set minimum requirement of professionals

Under the light of applicable proclamations, regulations and directives both in federal and city level, the regulatory authority shall come up with a minimum type of professionals; in terms of diversity and set of requirements for them to have when involved in a building demolition activity. The standard shall consider educational and experience backgrounds.

b. Draft procedure manuals, plans and formats

The regulatory authority will be responsible to formulate work procedure manuals and recommended plans while carrying out a demolition activity in both private and government level. These can be done by combining current positive trends followed and adopting from best practice of benchmark countries. In return, it will highly reduce the randomized act currently observed in the sector. The authority shall also give a general direction on developing follow up formats by highlighting the mandatory work items that shall be given emphasis to for the enforcement body to enhance it further and apply it.

c. Issue a specialization license

The fact that building demolition activity is not categorized under any of the construction industry service license types has been identified as one of the major gaps in this study. Considering this, the regulatory authority shall make the necessary revision on the existing service sectors to include building demolition in the special license section and come up with a license issuing and renewal criteria.

d. Draft safety and waste disposal manuals.

Since demolition is an act of controlled distraction, it is known for generating considerable amount of waste in the process. Apart from this, if the method is not guided with a proper line, the aftermath can be extended to permanent environmental distraction and compromise human life. Planning these steps in early stages, is equally important as undertaking the activity itself. In this regard, the regulatory body is required to incorporate or rather formulate a special section for safety and waste management protocols in the manuals to be drafted for the demolition sector in specific. Further details of use shall be handled by the next stakeholder in the hierarchy.

II. Enforcement level

Next in line, the enforcement body; which in this case represents the local sub-city and woreda administrations shall be responsible to accomplish the following four points;

a. Need assessment

From the findings of this study, the act of need assessment was missing in all cases; except for one question on the permit asking if the demolition is going to be full or partial. While analyzing the practice of benchmarked countries for best practice in chapter two of this research, need assessment was found to be the initial milestone for any demolition activity. This helps in getting a critical fist hand insight of the scope, expected degree of effect on neighboring properties and other related features of the project once it is found to be suitable or even; in

other cases, the team of analysists might rule out the need for demolition and suggest a better countermeasure instead.

b. Standardized bid document

During the case study of this research, absence of formal contract awarding process was detected to expose the system to corruption and other unethical moves. The enforcing body shall take the responsibility of adopting a standard bid document format to be used by all private and government operated building demolition activities as a mandatory practice. This will enhance the performance of the sector as it will incorporate the minimum requirements of professionals involved and other guidelines as directed by the regulatory authority. It will also be possible to measure the efficiency and transparency of the system while doing so.

c. Criteria for contractor selection

As per the general outline given by the regulatory authority regarding the minimum background of participating professionals, the local administration shall give a detail application guideline on what bases shall be considered while choosing a contractor for a demolition project. Once a fixed set of rules are stated, the compromised act randomness will be minimized as a clear set of responsibility will be laid on the contracting body and measures of remedy will be stated to apply on the defaulting body.

d. Plan statement format

As part of the permit issuance procedure, submission of a work plan statement compromising all the above-mentioned points shall be used as another regulatory instrument by the local administration. In doing so, the enforcement body shall be able to come up with a format stating a list of items to include as a pre-requisite; such as time frame, cost estimation, selected method, etc.

e. Permit issue and renewal

When assessing the current practice, a demolition permit is available to issue but, the gap has been noticed on the contents of the requirements. The local administration shall take the liberty to revise the permit format so as to include all the issues discussed under the previous sections to increase the performance measurability of the practice. To secure a proper flow, it shall also be accompanied by timely supervision by the assigned personnel as per the decided amount of frequency.

III. Operation level

According to the conceptual framework, clients/ investors and contractors are supposedly the two main actors of this category, under the duty of performing the following points;

a. Contract administration and management

A client or potential investor interested in redevelopment program comes in need of a brown field to develop a new project. Using the guidelines to be developed by the enforcement body for standardized bidding document, the client shall follow a full contract administration process

starting from project handover to final commissioning. In this way, both the client and the contractor will be safe from arguments to be raised due to ambiguous verbal agreements made like witnessed in the current trend, as the written agreement is a binding document before the law.

b. Progress follow up

Once the format for continues project supervision is developed by the local administration, the client shall assign responsible personnel to follow up the work as per the work method statement approved and avail all the necessary information for the purpose of locally assigned supervisors. After completion of the demolition project, the local administration shall issue a certificate of completion for the contractor after crosschecking with progress follow up reports and use them for further recording purposes as well. This will benefit both the contractor and the client in terms of keeping performance records so as to refer it as a credential document for future projects.

c. Basic skill training

Apart from composing the right team for a building demolition, it is critical to conduct an on-site basic skill training as the process is highly dependent on labor. This is a critical input as it will allow participants to have a basic understanding of the structural system, sensitivity of neighboring properties and the overall work procedure adopted specific for the project. This way, site management will be efficient since all forces will be on the same page and act in a coordinated manner.

IV. Performance evaluation

This is a final stage aiming to establish a database of project performance record in all cases. At this level, all parties will have a varying scale of responsibility in order to accomplish the following major points;

a. Performance reporting

The trend of keeping a record of report regarding the performance of the building demolition project is found out to be completely missing when evaluating the existing practice. Once a progress recording format is developed by the responsible local administration, the client shall take responsibility to keep register of work items. This will help in simplifying the tracking process of default acts against the approved work method statement and taking a remedial measure.

b. Certification and acknowledgement

Once the contract period is over, a proper decommissioning contract closing shall take place. This will include settling of all remaining payments; including compensation for damaged property (if any) and evaluating the performance of the contractor according to the contract. For this, both the client and the contractor shall be awarded with a certification in such a way that the local administration shall give confirmation for the client that the work has followed the

proper contractual agreement. Similarly, the contractor shall be able to get a certificate of acknowledgement from the client if a positive project performance was achieved.

c. Record keeping and information management

Project information management can be used as one regulatory instrument by assigning one division in the regulatory authority to develop a database of register for challenges encountered, positive experiences and possible improvement points. This way, it is possible to make continuous improvement of the building demolition sector by taking lessons from experience.

d. Recycle/ Reuse measures

The regulatory authority shall also be able to give a general outline on recycle and reuse protocols so as to be accompanied by a detail application plan to be formulated by the enforcing body. This will direct operation level actors to give emphasis to sustainable use of materials and their value in market.

5.4 Framework Validation

As discussed in the methodology, a selective expert's validation was used to validate the developed building demolition conceptual framework. The group consisted of six experts; three representing three divisions of the regulatory authority and three representatives from two stakeholders at operation level with direct relation to the practice of building demolition. These were; macro and micro building regulatory office, law, code, standard preparation directorate and professional license issue and renewal office, Metropolitan Real Estate construction department and Bamacon engineering project valuation team. Due to current Covid-19 protocols, the researcher had to present and explain the contents the framework in pairs of two in person. This was done aiming to evaluate the proposed conceptual framework in terms of contents and applicability. Based on comments made by the participants, certain amendments were made before presenting it for rating.

Finally, the same experts were asked to rate the developed conceptual framework in terms of clarity, simplicity, comprehensiveness, relevance and applicability using a five-point Likert scale (see Annex 5). This was done face-to-face after the updated version of the framework was attached with the rating scale. The result is presented as follows:

The table 5.1 below shows the distribution of the score for each factor by the experts.

Table 5.1 Validation score distribution

No.	Factors	Strongly agree (5)	Agree (4)	Neutral (3)	Disagree (2)	Strongly disagree (1)	Total Number
1	Clarity	3	3	0	0	0	**6**
2	Simplicity	3	2	1	0	0	**6**
3	Comprehensiveness	2	2	2	0	0	**6**
4	Relevance	4	2	0	0	0	**6**
5	Applicability	3	2	1	0	0	**6**

A. Clarity

As per the rating of the respondents, out of the total number of six, three of them (50%) strongly agree that the framework was clear to understand while the remaining 50% responded agree. Thus, this shows that the proposed conceptual building demolition framework is perceived to be clear by all of the respondents.

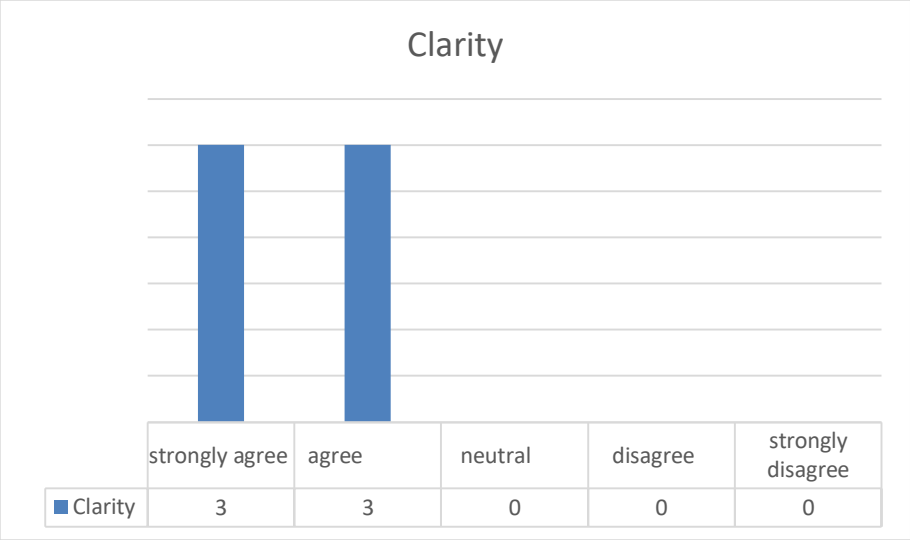


Fig 5.2 Response rate for clarity of framework

B. Simplicity

For the factor of simplicity, out of the total number of six, three of them (50%) strongly agree that the framework is simple to apply while the remaining 33.3 % and 16.6 % responded agree and neutral regarding this factor. Thus, this shows that the proposed conceptual building demolition framework is perceived to be simple by majority; (83.3 %) of the respondents.

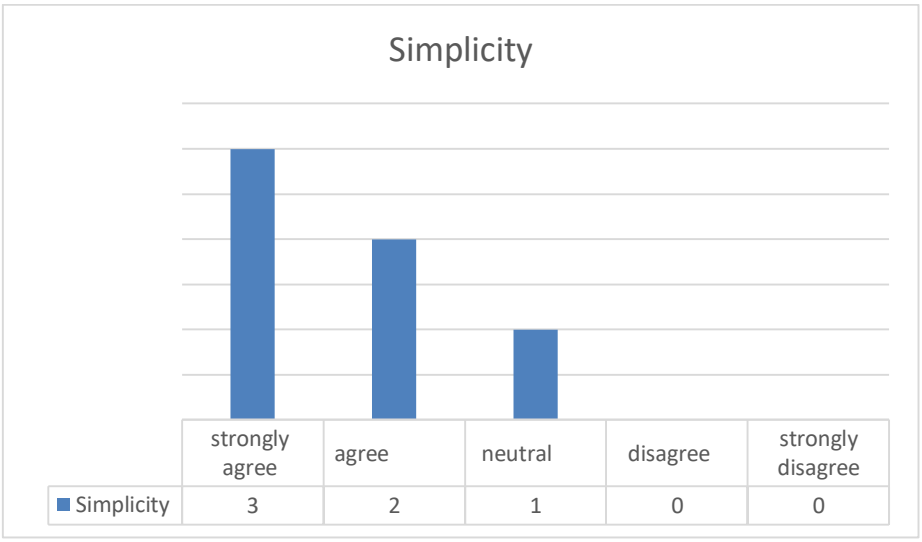


Fig 5.3 Response rate for simplicity of framework

C. Comprehensiveness

In terms of comprehensiveness, out of the total number of six, 2 of them (33.3 %) strongly agree that the framework is comprehensive while 33.3 % and responded agree and the other 33.3 % respond to be neutral. Thus, this shows that the proposed conceptual building demolition framework is perceived to be simple by majority; (66.6 %) of the respondents.

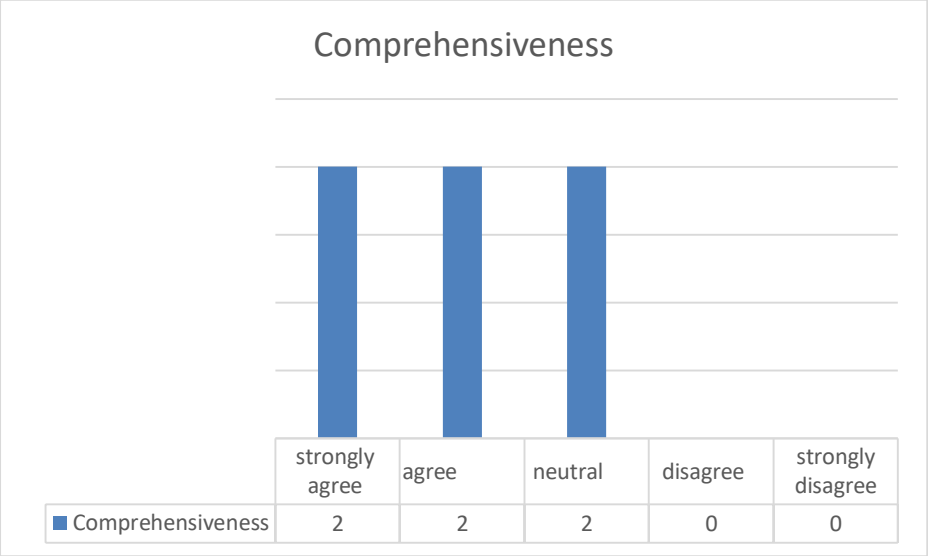


Fig 5.4 Response rate for comprehensiveness of framework

D. Relevance

Considering relevance as a factor, out of the total number of six, four of them (66.6 %) strongly agree that the framework is relevant while the remaining 33.3 % responded agree to this factor. Thus, this shows that the proposed conceptual building demolition framework is perceived to be relevant by all of the respondents.

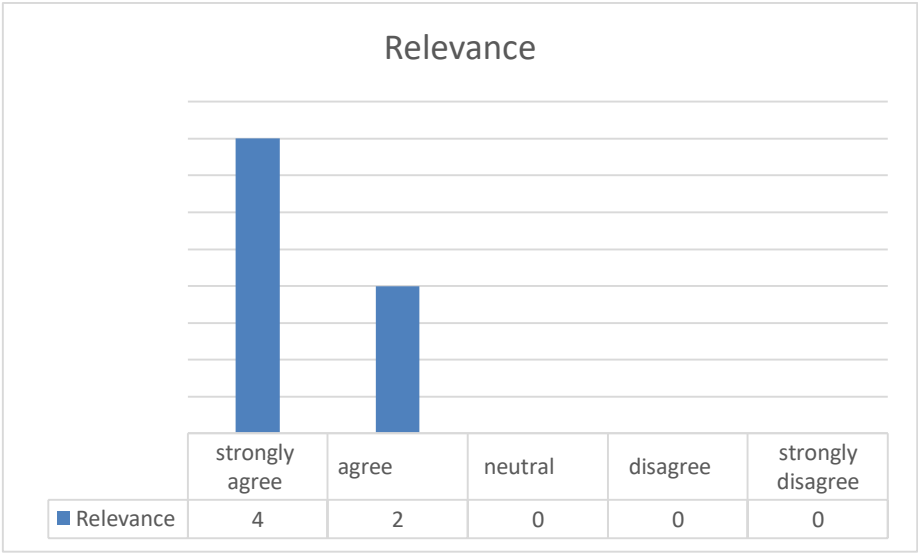


Fig 5.5 Response rate for relevance of framework

E. Applicability

When evaluating the proposed framework in terms of applicability, out of the total number of six, four of them (66.6 %) strongly agree that the framework is applicable while the remaining 33.3 % responded agree and the other 16.6 % responded neutral to this factor. Thus, this shows that the proposed conceptual building demolition framework is perceived to be applicable by majority (83.3 %) of the respondents.

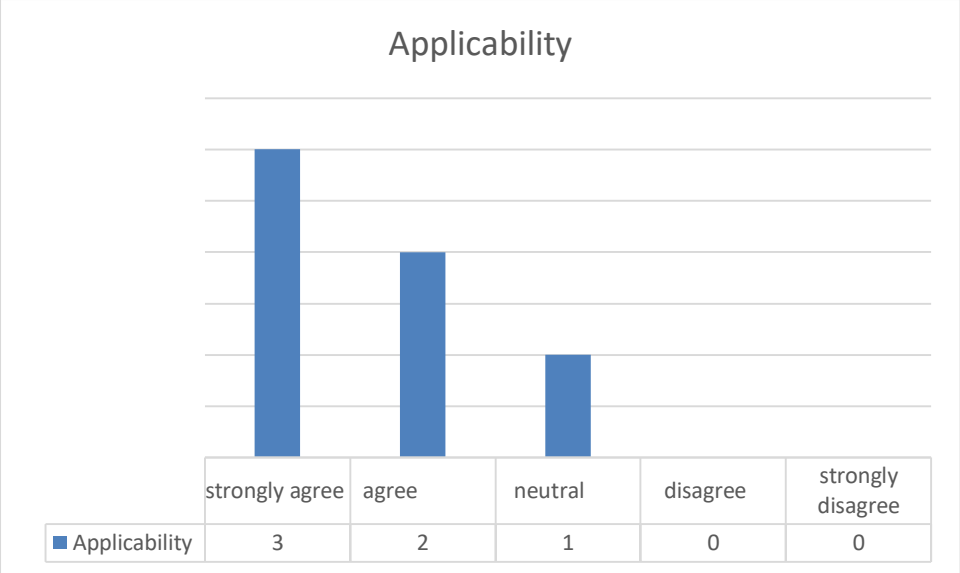


Fig 5.6 Response rate for applicability of framework

All in all, the following table 5.2 summarizes the validation result of the proposed conceptual building demolition regulatory framework by ranking the factors using a relative importance index (RII). Accordingly, relevance, clarity, applicability/simplicity and comprehensiveness are ranked to be the strength points of the framework respectively.

Table 5.2 Validation factor ranking

No.	Factors	Strongly agree (5)	Agree (4)	Neutral (3)	Disagree (2)	Strongly disagree (1)	Total	Total Number (N)	A*N	RII	Rank
1	Clarity	15	12	0	0	0	27	6	30	0.900	**2**
2	Simplicity	15	8	3	0	0	26	6	30	0.867	**3**
3	Comprehensiveness	10	8	6	0	0	24	6	30	0.800	**5**
4	Relevance	20	8	0	0	0	28	6	30	0.933	**1**
5	Applicability	15	8	3	0	0	26	6	30	0.867	**3**

CHAPTER SIX: CONCLUSION AND RECOMMENDATION

6.1 Introduction

This chapter is the final chapter of this research and seeks to summarize and draw a sound conclusion followed by a suggestion of recommendations for future improvement and development in the area. The conclusion is discussed in consideration of the achievement evaluation of the three main research objectives that are presented in chapter one of this study. After all, the study was able to address all of them. Afterwards, recommendations; which are believed to bring up on better performance of the sector are forwarded to various stakeholders. The following two sub sections 6.2 and 6.3 will go through a detail presentation of the final outcomes of the research.

6.2 Conclusion

6.2.1 Objective 1

The first objective this research aimed to address was to assess the current practice of building demolition and identify key challenges. This was critical to understand the extent of building demolition in the city of Addis Ababa. For this, direct observation on selected sites, selective interview with relevant representatives of the industry from different levels and analysis of multiple documents were the instruments used to analyze the reality. Initially, the reason behind most building's demolition is as part of the inner-city redevelopment program being carried by the AACA. Even though this takes the bigger share, other secondary intentions such as; private development purpose, physical deterioration and road expansion measures were also found to contribute.

In the process, the practice lacks proper emphasis from the regulatory authority in terms of guiding the practice by standardizing work items and qualification of professionals as it is considered to be a 'secondary (luxurious)' practice that is not worth investing on for a developing country like Ethiopia. The award process of projects lacked transparency as there is no available standard contract format to follow stating completion time, cost of demolition and methodology. The execution is carried out by MSE organized as a result of joblessness in their vicinity instead of a specialist contractor. In such cases, workers did not take any form of training regarding the work and no license was issued to the demolishing contractor. Furthermore, environmental protection, safety and waste management procedures are compromised in great deal due to lack of enforcing protocol to abide with. As a result, the practice is subjected to a high level of randomized act and lack of professionalism by both the client and the contractor in terms of professional's involvement; as minimized cost, high return from the sale of salvaged building elements and rushed completion are ought to be the measures of success in most cases.

Building demolition related decisions were also made by non-qualified actors; including owners, implying the execution is endowed with lack of knowledge without concern for effects like safety precautions and surrounding environment. All those gaps are further implied in the existing legal documents related to construction and demolition as they fail to incorporate specific detail guidelines in the main points of stakeholder's management, planning, productivity, sustainability and information management.

6.2.2 Objective 2

After a thoughtful understanding of the current practice under the first objective, the next step was to conduct a gap analysis between current building demolition practice and international best practices by identifying key performance indicators (KPI). For this purpose, an intensive review of literature was conducted to get an overall insight of the practice considering the points of type, widely used procedures, method selection criteria and approaches. In the local trend, the building demolition methods and techniques widely deployed were dominantly of the "Classic method" where manual procedures are applied; using hand tools and hammers. This was mainly due to the considerable reliance of the practice on existing experience and skill to pass on the judgment without any proper technical and economic considerations. This fires back on the weak structure that the practice has in terms of enforcing professionals and consultants' involvement with proper knowhow of building structures. The study also sought to examine the factors considered while method selection in the existing practice through interview to evaluate it in light of standard factors considered to influence the selection of demolition methods found in the review of literatures. while structural characteristics, site conditions, demolition cost, past experience, time, and potential for reuse and recycling are found out to be key factors to be considered, the local trend only focused on few of them such as, cost of demolition and capacity of contractor to pay for machinery. Then the research goes on with identifying standard practice points to arrive at key performance indicators to use as evaluation stand points on the later parts of the research. Afterwards, the locally available guideline documents related to building demolition were assessed where it was found to have lacked specificity in terms of presenting the guiding protocols to follow while performing the act of building demolition. In addition, assessment of best practice was also done on bench marked countries such as Kenya, India, Hong Kong and the Netherlands to grasp the standard practice in an international level. The strength of each country was marked on points adopted from the KPIs. This allowed to clearly identify the gaps in the local trend; where they were found to evolve around five categories as stakeholder management, planning and methodologies management, safety, environment and waste management, productivity and measure of success and recording and information management.

6.2.3 Objective 3

Finally, using the inputs from the above stated findings, the data was analyzed to arrive at a sound conclusion to use as a base point for conceptual regulatory framework development ; addressing the third and final objective of the research. Focusing on the gaps that are found to be on a regulatory level, the framework was composed of empowering the key identified stakeholders; regulatory body, local administration, client/investor and contractor in different scale of responsibility. For a successful implementation of the framework, it was necessary to

categorize actors to act level by level where it was divided in to strategic, enforcement, operation and record and performance evaluation stages. In each stage, the key actors are presented with their distinct role for a complete circle of the building demolition ecosystem. In addition to this, the need for this framework and key performance indicators were presented along with the enablers. At last, the output was presented to selected experts representing the regulatory body from different background, to assess and comment on improvement points. After minor adjustments, the framework was found to be valid for implementation in conceptual level.

6.3 Recommendation

Building demolition is essential part of the construction industry especially for developing countries where construction is booming by the day and there is a continuous need for better urban area infrastructures which require simultaneous redevelopment of city centers. According to the results of this research, it is identified that the demolition industry considered as an afterthought and is left behind in areas of guideline preparation, research and development.

Even though the construction of high-rise structures is still a new concept for Addis Ababa, by the rate that has been observed in the past few years around commercial business districts, it will not be too far to get to the point where building demolition will become a standard practice. In this sense, the following set of recommendations are proposed;

- The responsible regulatory authority shall be prepared intensively by giving the sector emphasis so as to develop abiding code of practice to provide guidance on the compliance with relevant requirements of the buildings ordinance and its subsidiary regulations. A detail-oriented operation structures with descriptive role of each actor will allow to achieve efficiency of the system by a coordinated act of the stakeholders in different levels. Furthermore, the current compromised act of professionalism, safety and environmental problems associated with demolition work would be resolved. The Code of practice should not only be in response of the current loopholes but rather take a deep consideration of future development in the sector as well.

- A study based guiding principle should be included in the code of practice to be developed to give variety of building demolition method options that are flexible, cost effective and environmentally friendly.

- The regulatory body shall incorporate building demolition as one type of construction act and issue a specialty license for qualified groups that fulfil a pre-set criterion of educational background, experience and technological advancement. In addition, a mandatory clause shall also be added to make the participation of structural engineers and consultants depending on the scale of the project. In case of possible occasions; where the government gives priority to local organized MSE groups to work on demolition projects, the government’s strategy of tackling youth unemployment shall be supported by proper skill training before commencing to work. This way, the effect of unprofessional act and negligence of safety and environment will be minimized.

- A standard contract format shall be developed for both private and government projects including clauses of method statement, techniques, safety, environment as well as waste management protocols to be adopted. The contract shall also include other standard clauses like time frame, payment modality, insurance coverage and dispute resolution methods.

- The regulatory body shall assign one distinct department to oversee the performance of building demolition projects and so as to assess their efficiency and keep a record of positive acts and challenges encountered. This will serve as an input to continuously upgrade the practice by keeping an eye not to repeat the same mistake again. In addition, this section shall also be able to certify and give acknowledgment to the stake holder that performed as per the agreed standard in order to encourage them for better output and specially to help new clients to check credential of contractors before award.

- As the sector is expected to grow drastically in the future, following the train of the construction rate, higher educational institutions focusing on engineering lessons shall enclose courses that specifically give basic knowhow on demolition and dismantling of high-rise structural elements.

6.4 Further study points

- Considering the demolition practice is responsible for generating considerable amount of waste coupled with the poor state of demolition waste management in Addis Ababa, further research could be done to address the problems faced by the industry with regards to debris recycling. Further, the research could also explore more optimal and better utilization ways of waste materials.

- Considering the future of the construction industry, further research could be conducted the interrelationship between pre-fabricated building systems and demolition in light of its flexibility and closure for reuse and recycling.

- The ministry of urban development and construction can take a special interest to undertake research to map development of cities and urban areas to project the rate of demolition and study its implications on national future planning and restructuring.

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APPENDIX 1 – INTERVIEW QUESTIONS 1

ADDIS ABABA UNIVERSITY – ETHIOPIAN INSTITUTE OF ARCHITECTURE, BUILDING CONSTRUCTION AND CITY DEVELOPMENT

ጉዳዩ: ከታች ለተጠቆመው የMSc የምርምር ስራ ቃለ መጠይቅ ላይ ዋና ተጠያቂዎች በመሆን እንዲሳተፉ ልባዊ እገዛዎን ስለመጠየቅ

የምርምር ስራው ርዕስ: የህንፃ ማፍረስ ተግባር በአዲስ አበባ ከተማ፤ ወቅታዊ ግምገማ እና የስርዐተ-ደንብ ዝግጅት

የአዲስ አበባ ከተማ አስተዳደር የከተማ መልሶ ማልማት ቢሮ ያረጁ ህንጻዎችን አፍርሶ አካባቢዎችን ለከተማ መታደስ ሲባል ለረጅም ጊዜ ሲያፀዳ ቆይቷል። ይሁን እንጂ ኢትዮጵያ ለግንባታ ማፍረስ የሚሆን የልምድ ኮድ የላትም መባሉ ተግባሩ ባልተደራጀና ባልተመቻቸ መንገድ እንዲከናወን መንገድ ጠርጓል።

በመሆኑም የዚህ ጥናት አላማ በአሁኑ ወቅት በአዲስ አበባ ከተማ በዘርፉ የሚስተዋለውን ቀዳዳ ለመለየት የተመረጡ ፕሮጀክቶችን በመጠቀም የህንፃ ማፍረስ ተግባሩን ለመመርመር ነው። በዚህም መሰረት የሌሎች ሀገሮችን ተሞክሮ እንደ መነሻነት በመጠቀም እና ወሳኝ ማስተካከያ በማድረግ ሰፊ ግምገማ ከተደረገ በኋላ የመመሪያ ዝግጅት ስራን ይሰራል። የጥናቱ ውጤት ለትምህርት ዓላማ ብቻ ሳይሆን ተግባራዊ የሚደረጉ ነጥቦችን ለመተግበሪያነት እንደሚያገለግል አጥኚው ጠንካራ እምነት አለው። የ ምርምሩን ዓላማ ለማሳካት ተከታታይ ጥያቄዎች በጥንቃቄ ተዘጋጅተዋል።

ስለሆነም ለጥናቱ ምላሽ በመስጠት ረገድ ተሳትፎ እንድታደርጉ በትህትና እየጠየቅን በዘርፉ ያለዎት የበለጸጉ ልምዶች እና የስራ መስክዎ ለምርምሩ ውጤት ጥራት በእጅጉ አስተዋፅኦ እንደሚያበረክት ጠንካራ እምነት አለን።

ውድ ጊዜያችሁን ስለሰጣችሁን በቅድሚያ እናመሰግለን።

ትሩፋት መኩሪያ

Subject: Requesting of your sincere assistance in participating as key respondents in survey work interview for MSc thesis research objectives indicated below

Research title: The Practice of Building Demolition in Addis Ababa city: Current Practice Assessment and Regulatory Framework Development

The Addis Ababa city Administration, city redevelopment office has been demolishing old buildings and clearing up slum areas for urban renewal purpose for quite some time now. However, the fact that Ethiopia doesn't have a code of practice for building demolition has paved the way for the practice to be performed in non-structured and reluctant manner.

Thus, this research aims to examine the current practice of building demolition in Addis Ababa city using selected cases to detect the loop holes. As a result, a guiding frame work will be developed after extensive review of other country's experience to use as bench marks and critical adaptations will be made. The researcher strongly believes that the study output will contribute not only for academic purpose but also for practical applications of the practice. To meet the objectives of the research, a series of questions have been carefully designed.

With this brief background we kindly request your participation in responding to the survey. We strongly believe your rich experiences and professional career path will contribute for the quality of the research output greatly. We would like to thank you in advance for your valuable times.

Tirufat Mekuria

1. For strategic level respondents

Section I - General

1. Are you representing a company/organization, a project or an individual?
2. How many years of relevant experience do you have in your current work area?
3. What is the name your organization/project?
4. What is your specific responsibility area in your organization/project?

Section II

1. What kind of services are given regarding building demolition?
2. Who are considered the three most important stakeholders in a building demolition activity?
3. How are contractors interested to participate in building demolition sector entertained?
4. Is there a specific license type for performing building demolition activity?
   If any, what requirements do contractors have to fulfil to get approval?
5. Is there any framework to govern the regulatory authority? If no, what other guideline do you use?
6. Are there any guidelines regarding safety management during a demolition activity?
   If yes, how does the authority ensures its application?
7. Are there any guidelines regarding environmental protection/sustainability management during a demolition activity?
   If yes, how does the authority ensures its application?
8. Are there any protocols regarding waste management?
   If yes, how does the authority ensures its application?
9. When is a demolition activity considered successful? What are the measures of a successful demolition activity?
10. Does the authority evaluate demolition plans before approval?
    If yes, what are the criteria to be considered?
11. Are there any restrictions regarding demolition techniques selection?
    If yes, on what basis are they decided up on?
12. Does the authority keep any form of database on previously performed building demolition activity including challenges encountered?
    If yes, how are they utilized?
13. What are the major loop wholes observed (points that shall be subjected to change) in the current system according to personal opinion of the respondent?

APPENDIX 2 – INTERVIEW QUESTIONS 2

ADDIS ABABA UNIVERSITY – ETHIOPIAN INSTITUTE OF ARCHITECTURE, BUILDING CONSTRUCTION AND CITY DEVELOPMENT

ጉዳዩ: ከታች ለተጠቆመው የMSc የምርምር ስራ ቃለ መጠይቅ ላይ ዋና ተጠያቂዎች በመሆን እንዲሳተፉ ልባዊ እገዛዎን ስለመጠየቅ

የምርምር ስራው ርዕስ: የህንፃ ማፍረስ ተግባር በአዲስ አበባ ከተማ፤ ወቅታዊ ግምገማ እና የስርዐተ-ደንብ ዝግጅት

የአዲስ አበባ ከተማ አስተዳደር የከተማ መልሶ ማልማት ቢሮ ያረጁ ህንጻዎችን አፍርሶ አካባቢዎችን ለከተማ መታደስ ሲባል ለረጅም ጊዜ ሲያፀዳ ቆይቷል። ይሁን እንጂ ኢትዮጵያ ለግንባታ ማፍረስ የሚሆን የልምድ ኮድ የላትም መባሉ ተግባሩ ባልተደራጀና ባልተመቻቸ መንገድ እንዲከናወን መንገድ ጠርጓል።

በመሆኑም የዚህ ጥናት አላማ በአሁኑ ወቅት በአዲስ አበባ ከተማ በዘርፉ የሚስተዋለውን ቀዳዳ ለመለየት የተመረጡ ፕሮጀክቶችን በመጠቀም የህንፃ ማፍረስ ተግባሩን ለመመርመር ነው። በዚህም መሰረት የሌሎች ሀገሮችን ተሞክሮ እንደ መነሻነት በመጠቀም እና ወሳኝ ማስተካከያ በማድረግ ሰፊ ግምገማ ከተደረገ በኋላ የመመሪያ ዝግጅት ስራን ይሰራል። የጥናቱ ውጤት ለትምህርት ዓላማ ብቻ ሳይሆን ተግባራዊ የሚደረጉ ነጥቦችን ለመተግበሪያነት እንደሚያገለግል አጥኚው ጠንካራ እምነት አለው። የ ምርምሩን ዓላማ ለማሳካት ተከታታይ ጥያቄዎች በጥንቃቄ ተዘጋጅተዋል።

ስለሆነም ለጥናቱ ምላሽ በመስጠት ረገድ ተሳትፎ እንድታደርጉ በትህትና እየጠየቅን በዘርፉ ያለዎት የበለጸጉ ልምዶች እና የስራ መስክዎ ለምርምሩ ውጤት ጥራት በእጅጉ አስተዋፅኦ እንደሚያበረክት ጠንካራ እምነት አለን።

ውድ ጊዜያችሁን ስለሰጣችሁን በቅድሚያ እናመሰግለን።

ትሩፋት መኩሪያ

Subject: Requesting of your sincere assistance in participating as key respondents in survey work interview for MSc thesis research objectives indicated below

Research title: The Practice of Building Demolition in Addis Ababa city: Current Practice Assessment and Regulatory Framework Development

The Addis Ababa city Administration, city redevelopment office has been demolishing old buildings and clearing up slum areas for urban renewal purpose for quite some time now. However, the fact that Ethiopia doesn't have a code of practice for building demolition has paved the way for the practice to be performed in non-structured and reluctant manner.

Thus, this research aims to examine the current practice of building demolition in Addis Ababa city using selected cases to detect the loop holes. As a result, a guiding frame work will be developed after extensive review of other country's experience to use as bench marks and critical adaptations will be made. The researcher strongly believes that the study output will contribute not only for academic purpose but also for practical applications of the practice. To meet the objectives of the research, a series of questions have been carefully designed.

With this brief background we kindly request your participation in responding to the survey. We strongly believe your rich experiences and professional career path will contribute for the quality of the research output greatly. We would like to thank you in advance for your valuable times.

Tirufat Mekuria

2. For enforcement level respondents

Section I – General

1. Are you representing a company/organization, a project or an individual?
2. How many years of relevant experience do you have in your current work area?
3. What is the name your organization/project?
4. What is your specific responsibility area in your organization/project?

Section II

1. What are the major responsibilities to be covered by your specific authority regarding a building demolition activity?
2. For what purpose do most demolition projects happen in your vicinity?
3. Who are the three most important stakeholders in demolition activities?
4. What are the most critical requirements you check from the client side before a demolition activity takes place?
5. What are the most critical requirements you check from the contractor side before a demolition activity takes place?
6. Are clients and/or contractors asked to submit a work statement before the work starts? If yes, how is it evaluated?
7. Does your authority participate in the selection process of contractors for private demolition projects? if yes, please explain how?
8. Does your authority participate in the selection process of contractors for public demolition projects? if yes, please explain how?
9. Do you follow up an ongoing demolition project? if yes, what follow up measures do you take during the period of demolition? What is the frequency?
10. Are there any conditions which are considered unacceptable and might led to suspension of a demolition site? If yes, what are they?
11. Is there any form of safety and environmental protection protocol? If yes, how do you insure the enforcement? What correction measures will you take if violated?
12. How do you communicate with other infrastructure authorities regarding a demolition activity?
13. Do you have any form of stake regarding project cost estimation and method selection? If yes, which roles are you responsible for?
14. Is there any form of guideline to decide on the time frame? If yes, what are the considerations?

APPENDIX 3 – INTERVIEW QUESTIONS 3

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ጉዳዩ: ከታች ለተጠቆመው የMSc የምርምር ስራ ቃለ መጠይቅ ላይ ዋና ተጠያቂዎች በመሆን እንዲሳተፉ ልባዊ እገዛዎን ስለመጠየቅ

የምርምር ስራው ርዕስ: የህንፃ ማፍረስ ተግባር በአዲስ አበባ ከተማ፤ ወቅታዊ ግምገማ እና የስርዐተ-ደንብ ዝግጅት

የአዲስ አበባ ከተማ አስተዳደር የከተማ መልሶ ማልማት ቢሮ ያረጁ ህንጻዎችን አፍርሶ አካባቢዎችን ለከተማ መታደስ ሲባል ለረጅም ጊዜ ሲያፀዳ ቆይቷል። ይሁን እንጂ ኢትዮጵያ ለግንባታ ማፍረስ የሚሆን የልምድ ኮድ የላትም መባሉ ተግባሩ ባልተደራጀና ባልተመቻቸ መንገድ እንዲከናወን መንገድ ጠርጓል።

በመሆኑም የዚህ ጥናት አላማ በአሁኑ ወቅት በአዲስ አበባ ከተማ በዘርፉ የሚስተዋለውን ቀዳዳ ለመለየት የተመረጡ ፕሮጀክቶችን በመጠቀም የህንፃ ማፍረስ ተግባሩን ለመመርመር ነው። በዚህም መሰረት የሌሎች ሀገሮችን ተሞክሮ እንደ መነሻነት በመጠቀም እና ወሳኝ ማስተካከያ በማድረግ ሰፊ ግምገማ ከተደረገ በኋላ የመመሪያ ዝግጅት ስራን ይሰራል። የጥናቱ ውጤት ለትምህርት ዓላማ ብቻ ሳይሆን ተግባራዊ የሚደረጉ ነጥቦችን ለመተግበሪያነት እንደሚያገለግል አጥኚው ጠንካራ እምነት አለው። የ ምርምሩን ዓላማ ለማሳካት ተከታታይ ጥያቄዎች በጥንቃቄ ተዘጋጅተዋል።

ስለሆነም ለጥናቱ ምላሽ በመስጠት ረገድ ተሳትፎ እንድታደርጉ በትህትና እየጠየቅን በዘርፉ ያለዎት የበለጸጉ ልምዶች እና የስራ መስክዎ ለምርምሩ ውጤት ጥራት በእጅጉ አስተዋፅኦ እንደሚያበረክት ጠንካራ እምነት አለን።

ውድ ጊዜያችሁን ስለሰጣችሁን በቅድሚያ እናመሰግለን።

ትሩፋት መኩሪያ

Subject: Requesting of your sincere assistance in participating as key respondents in survey work interview for MSc thesis research objectives indicated below

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Thus, this research aims to examine the current practice of building demolition in Addis Ababa city using selected cases to detect the loop holes. As a result, a guiding frame work will be developed after extensive review of other country's experience to use as bench marks and critical adaptations will be made. The researcher strongly believes that the study output will contribute not only for academic purpose but also for practical applications of the practice. To meet the objectives of the research, a series of questions have been carefully designed.

With this brief background we kindly request your participation in responding to the survey. We strongly believe your rich experiences and professional career path will contribute for the quality of the research output greatly. We would like to thank you in advance for your valuable times.

Tirufat Mekuria

3. For operation level respondents

Contractors

Section I – General

1. Are you representing a company/organization, a project or an individual?
2. How many years of relevant experience do you have in your current work area?
3. What is the name your organization/project?
4. What is your specific responsibility area in your organization/project?

Section II

1. How many years of relevant experience do you have on building demolition projects and how many projects have you completed so far?
2. Do you have a specific type of license or certificate for building demolition activities?
3. What are the scenario that you get to secure a demolition project?
4. How do you compose your team for a specific project? what are the points you take into consideration?
5. Which professionals are involved in your project? what is their specific role?
6. What types of buildings are considered the most sensitive?
7. What are the basic steps you take on pre-demolition stage? Please mention the top three.
8. Have you ever participated in a public building demolition project? if yes, what pre-requisites are you asked to fulfill?
9. Have you ever participated in a private building demolition project? if yes, what pre-requisites are you asked to fulfill?
10. Do you prepare a work statement before starting the work? If yes, in what basis do you draft a work plan?
11. On what basis do you do a cost estimation? What are the major points you consider?
12. How do you select which method of demolition to use? Is there any form of guideline you refer?
13. What are the basic steps you take on demolition stage? Please mention the top three.
14. How do you in cooperate safety and environmental protection considerations in your project? Is there any form of guideline to refer?
15. What are the basic steps you take on post-demolition stage? Please mention the top three.
16. How do you measure the success of your activity?
17. What are the challenges of the practice in your opinion? Please mention them
18. What measures do you suggest to be taken to improve the performance of the practice? Please mention them.

Clients

Section I - General

1. Are you representing a company/organization, a project or an individual?
2. How many years of relevant experience do you have in your current work area?
3. What is the name your organization/project?
4. What is your specific responsibility area in your organization/project?

Section II

1. What is the motive for your building demolition?
2. What are the basic steps you take on pre-demolition stage? Please mention the top three.
3. How do you decide on your contractor? What are the points you take into consideration? What kind of agreement do you enter in to?
4. Are you required to have any form of permit from the local authority before a demolition activity? If yes, what are the pre-requisites? Which organ issued it?
5. What other prep works do you fulfill before the start of the demolition work?
6. Which professionals are involved in your project? what is their specific role?
7. What are the basic steps you take on demolition stage? Please mention the top three.
8. What measures do you take to ensure safety and environmental protection during the process of the work? Do you play any role in waste management planning?
9. How do you evaluate the overall quality/success of the work?
10. What are the challenges of the practice in your opinion? Please mention them
11. What measures do you suggest to be taken to improve the performance of the practice? Please mention them.

APPENDIX 4 – OBSERVATION CHECKLIST

The following checklist consists of critical points adopted from different literature review to serve as a tool for the researcher to evaluate the current practice and rate accordingly. The "✓" will be used to mark activities that are done, the "x" will be used to mark activities that are absent and the "N/A" will be used to mark activities that are not applicable on that specific project.

Project name	Site Address	Main contractor	Project level

Areas	Description	√/ ×/ N/A	Remark
Document related	Client has secured official permit to demolish the structure		
	The project has been awarded with formal bid process		
	Clearance for suspension of all infrastructure lines is obtained		
	Written work method statement has been submitted and client approved		
	Safety management plan has been submitted by the contractor		
	Waste disposal method plan are submitted by the contractor		
	Environmental plan against minimum disturbance has been submitted by the contractor		
	As-built drawing is available for reference		
	All supply lines (water, telecom, sewer, drainage and electricity) are identified and located by respective authorities		
	Conditions of adjoining properties are properly recorded before the starting of the activity		
Pre-demolition	Bill of quantity has been derived from as-built drawing or on-site evaluation		
	Project cost estimation has been done as per BoQ		
	Work schedule has been submitted and approved by the client		
	Structural system has been identified and possible work procedure has been suggested by a structural engineer		
	Consultant is present to advice on method selection and other related guidance		
	Full building inspection for possible hazardous materials has been conducted by professionals		
	All primary and secondary building materials has been identified		

	Description	√/ ×/ **N/A**	**Remark**
	The professionals (laborers) has been properly oriented about the work flow by the project manager		
	Prior basic skills training has been conducted on site for the specific nature of the project		
	Assigned local authority supervisors make on-site assessment of the site before giving permission to start the activity		
Demolition	The site is properly secured to protect the surrounding from dust and flying objects		
	A level-by-level procedure for stripping, breaking up and removal of demolished material is taking place		
	Controlled dismantling of structural members is being implemented		
	Assigned local authority supervisors make random visits to make sure the work is being carried out as per the regulation		
	Materials are being properly extracted for recycle/reuse		
	Genuine technology and machinery is being used to execute the work		
	All site workers have proper PPE		
	Site access is clean and clear of any blockage for easy access of both people an vehicle		
Post-demolition	Waste material has been disposed as per the pre-approved plan		
	Proper compensation has been made to damaged properties and other work related accidents encountered during the process of the activity		
	Final acceptance has been made between the client and the contractor		
	All remaining payments has been settled and contract has been closed		
	Proper recording/tracking of overall project performance and challenges has been done by the assigned supervisor		
	Assigned local authority supervisors make an on-site assessment for final approval		
	The contractor has been awarded with certificate of completion from the local regulatory authority confirming all activities has been carried out as per the regulation		

APPENDIX 5 – FRAMEWORK VALIDATION CHECKLIST

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□□□: ከታች ለተጠቆመው የMSc የምርምር ስራ ቃለ መጠይቅ ላይ ዋና ተጠያቂዎች በመሆን እንዲሳተፉ ልባዊ እገዛዎን ስለመጠየቅ

የምርምር ስራው ርዕስ: የህንፃ ማፍረስ ተግባር በአዲስ አበባ ከተማ፤ ወቅታዊ ግምገማ እና የስርዐተ-ደንብ ዝግጅት

የአዲስ አበባ ከተማ አስተዳደር የከተማ መልሶ ማልማት ቢሮ ያረጁ ህንጻዎችን አፍርሶ አካባቢዎችን ለከተማ መታደስ ሲባል ለረጅም ጊዜ ሲያፀዳ ቆይቷል። ይሁን እንጂ ኢትዮጵያ ለግንባታ ማፍረስ የሚሆን የልምድ ኮድ የላትም መባሉ ተግባሩ ባልተደራጀና ባልተመቻቸ መንገድ እንዲከናወን መንገድ ጠርጓል።

በመሆኑም የዚህ ጥናት አላማ በአሁኑ ወቅት በአዲስ አበባ ከተማ በዘርፉ የሚስተዋለውን ቀዳዳ ለመለየት የተመረጡ ፕሮጀክቶችን በመጠቀም የህንፃ ማፍረስ ተግባሩን ለመመርመር ነው። በዚህም መሰረት የሌሎች ሀገሮችን ተሞክሮ እንደ መነሻነት በመጠቀም እና ወሳኝ ማስተካከያ በማድረግ ሰፊ ግምገማ ከተደረገ በኋላ የመመሪያ ዝግጅት ስራን ይሰራል። የጥናቱ ውጤት ለትምህርት ዓላማ ብቻ ሳይሆን ተግባራዊ የሚደረጉ ነጥቦችን ለመተግበሪያነት እንደሚያገለግል አጥኚው ጠንካራ እምነት አለው። በዚሁ መሰረት ተቆጣጣሪ ስርዐተ-ደንብ ተዘጋጅቷል።

ስለሆነም በቀረበው ስርዐተ-ደንብ ላይ በተቀመጠው መስፈርት መሰረት ያለዎትን አስተያየት እና የማሻሻያ ነጥብ በመስጠት ረገድ ተሳትፎ እንድታደርጉ በትህትና እየጠየቅን በዘርፉ ያለዎት የበለጸጉ ልምዶች እና የስራ መስክዎ ለምርምሩ ውጤት ጥራት በእጅጉ አስተዋፅኦ እንደሚያበረክት ጠንካራ እምነት አለን።

ውድ ጊዜያችሁን ስለሰጣችሁን በቅድሚያ እናመሰግለን።

ትሩፋት መኩሪያ

Subject: Requesting of your sincere assistance in participating as key respondents in survey work interview for MSc thesis research objectives indicated below

Research title: The Practice of Building Demolition in Addis Ababa city: Current Practice Assessment and Regulatory Framework Development

The Addis Ababa city Administration, city redevelopment office has been demolishing old buildings and clearing up slum areas for urban renewal purpose for quite some time now. However, the fact that Ethiopia doesn't have a code of practice for building demolition has paved the way for the practice to be performed in non-structured and reluctant manner.

Thus, this research aims to examine the current practice of building demolition in Addis Ababa city using selected cases to detect the loop holes. As a result, a guiding frame work will be developed after extensive review of other country's experience to use as bench marks and critical adaptations will be made. The researcher strongly believes that the study output will contribute not only for academic purpose but also for practical applications of the practice. As a result, a regulatory framework was developed based on the study points.

With this brief background we kindly request your participation in rating the presented framework in terms of the written criteria and forward your improvement points afterward if any. We strongly believe your rich experiences and professional career path will contribute for the quality of the research output greatly. We would like to thank you in advance for your valuable times.

Tirufat Mekuria

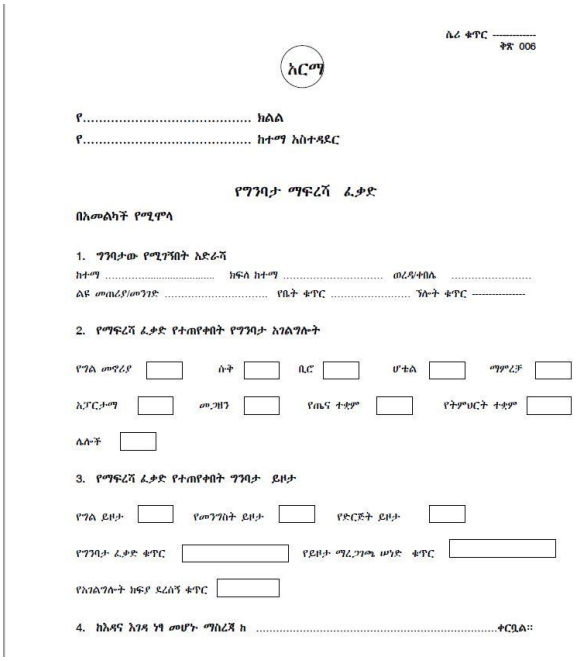
Based on the developed and presented framework for building demolition practice and its brief description provided, please state your level of agreement with the framework using the following set of criteria in the following five-scale liker chart where, each state is represented as; 5 – Strongly agree, 4 – Agree, 3 – Neutral, 2 – Disagree and 1 – Strongly disagree.

Criteria	Strongly agree **(5)**	Agree **(4)**	Neutral **(3)**	Disagree **(2)**	Strongly disagree **(1)**
Clarity					
Simplicity					
Comprehensiveness					
Relevance					
Applicability					

Point of improvement

_____
_____
_____
_____
_____
_____
_____

APPENDIX 6 –DEMOLITION PERMIT REQUEST FORM NO. 06



ቤሪ ቁጥር ----------
ቅጽ 006

አርማ

የ..... ክልል
የ..... ከተማ አስተዳደር

የግንባታ ማፍረሻ ፈቃድ

በአመልካች የሚሞላ

1. ግንባታው የሚገኝበት አድራሻ

ከተማ ..... ክፍለ ከተማ ..... ወረዳ/ቀበሌ .....
ልዩ መጠሪያ/መንገድ ..... የቤት ቁጥር ..... ንሎት ቁጥር ----------

2. የማፍረሻ ፈቃድ የተጠየቀበት የግንባታ አገልግሎት

የግል መኖሪያ ☐ ሱቅ ☐ ቢሮ ☐ ሆቴል ☐ ማምረቻ ☐
ኢንዱስትማ ☐ መጋዘን ☐ የጤና ተቋም ☐ የትምህርት ተቋም ☐
ሌሎች ☐

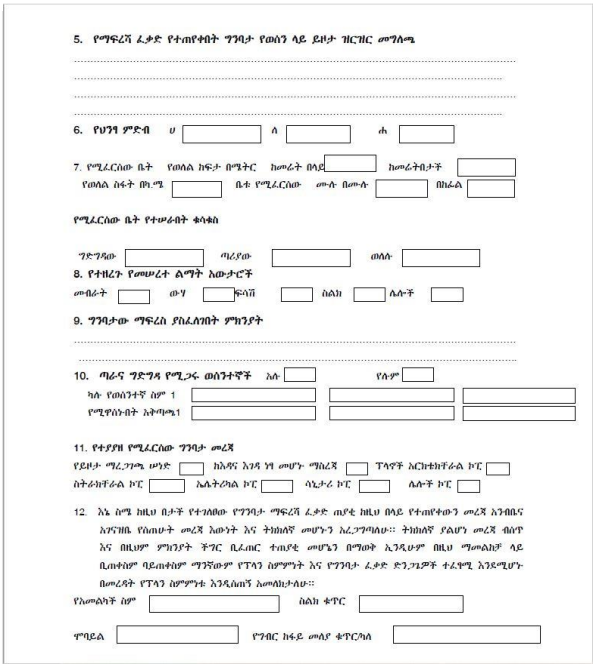
3. የማፍረሻ ፈቃድ የተጠየቀበት ግንባታ ይዞታ

የግል ይዞታ ☐ የመንግስት ይዞታ ☐ የድርጅት ይዞታ ☐

የግንባታ ፈቃድ ቁጥር ☐ የይዞታ ማረጋገጫ ሠነድ ቁጥር ☐

የአገልግሎት ክፍያ ደረሰኝ ቁጥር ☐

4. ከአዳና አገዳ ነፃ መሆኑ ማስረጃ ከ .....ቀርቧል።



5. የማፍረሻ ፈቃድ የተጠየቀበት ግንባታ የወሰን ላይ ይዞታ ዝርዝር መግለጫ

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.....
.....

6. የህንፃ ምድብ ሀ ☐ ለ ☐ ሐ ☐

7. የሚፈርሰው ቤት የወለል ክፍታ በሜትር ከመሬት በላይ ☐ ከመሬትበታች ☐
የወለል ስፋት በካ.ሜ ☐ ቤቱ የሚፈርሰው ሙሉ በሙሉ ☐ በከፊል ☐

የሚፈርሰው ቤት የተመሰረበት ቁሳቁስ

ግድግዳው ☐ ጣሪያው ☐ ወለሉ ☐

8. የተዘረጉ የመሠረተ ልማት አውታሮች
መብራት ☐ ውሃ ☐ ፍሳሽ ☐ ስልክ ☐ ሌሎች ☐

9. ግንባታው ማፍረስ ያስፈለገበት ምክንያት

.....
.....

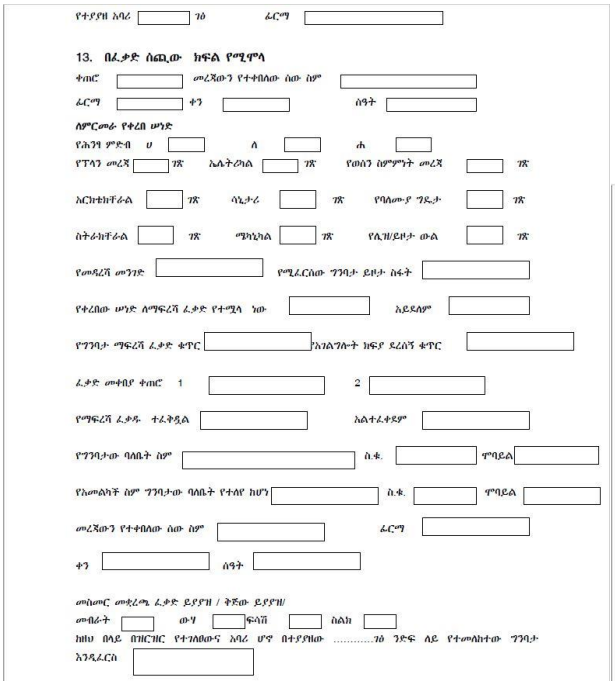
10. ጣራና ግድግዳ የሚጋሩ ወሰንተኞች አሉ ☐ የሉም ☐
ካሉ የወሰንተኛ ስም 1 ☐ ☐ ☐
የሚኖሩበት አቅጣጫ1 ☐ ☐ ☐

11. የተያያዘ የሚፈርሰው ግንባታ መረጃ
የይዞታ ማረጋገጫ ሠነድ ☐ ከአዳና አገዳ ነፃ መሆኑ ማስረጃ ☐ ፕላኖች አርክቴክቸራል ኮፒ ☐
ስትራክቸራል ኮፒ ☐ ኤሌትሪካል ኮፒ ☐ ሳኒታሪ ኮፒ ☐ ሌሎች ኮፒ ☐

12. እኔ ስሜ ከዚህ በታች የተገለፀው የግንባታ ማፍረሻ ፈቃድ ጠያቂ ከዚህ በላይ የተጠየቀውን መረጃ አንብቤና አጥናዝቤ የሰጠሁት መረጃ እውነት እና ትክክለኛ መሆኑን አረጋግጣለሁ። ትክክለኛ ያልሆነ መረጃ ብሎ እና በዚህም ምክንያት ችግር ቢፈጠር ተጠያቂ መሆኔን በማወቅ ኢንዲሁም በዚህ ማመልከቻ ላይ ቢጠቀስም ባይጠቀስም ማንኛውም የፕላን ስምምነት እና የግንባታ ፈቃድ ድንጋጌዎች ተፈፃሚ እንደሚሆኑ በመረጃት የፕላን ስምምነቱ እንዲሰጠኝ አመለክታለሁ።

የአመልካች ስም ☐ ስልክ ቁጥር ☐

ሞባይል ☐ የንብር ከፋይ መለያ ቁጥርካለ ☐



የተያያዘ አባሪ ☐ ገፅ ፊርማ ☐

13. **በፈቃድ ሰጪው ክፍል የሚሞላ**

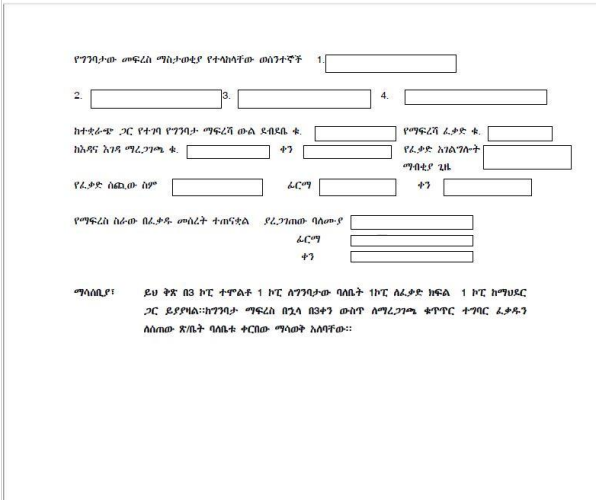
ቀጠሮ ☐ መረጃውን የተቀበለው ሰው ስም ☐
ፊርማ ☐ ቀን ☐ ሰዓት ☐

ለምርመራ የቀረበ ሠነድ
የሕንፃ ምድብ ሀ ☐ ለ ☐ ሐ ☐
የፕላን መረጃ ☐ ገጽ ኤሌትሪካል ☐ ገጽ የወሰን ስምምነት መረጃ ☐ ገጽ
አርክቴክቸራል ☐ ገጽ ሳኒታሪ ☐ ገጽ የባለሙያ ንዲታ ☐ ገጽ
ስትራክቸራል ☐ ገጽ ሜክኒካል ☐ ገጽ የሲ.ዝ/ይዞታ ውል ☐ ገጽ

የመጻረሻ መንገድ ☐ የሚፈርሰው ግንባታ ይዞታ ስፋት ☐
የቀረበው ሠነድ ለማፍረሻ ፈቃድ የተሟላ ነው ☐ አይደለም ☐
የግንባታ ማፍረሻ ፈቃድ ቁጥር ☐ የአገልግሎት ክፍያ ደረሰኝ ቁጥር ☐

ፈቃድ መቀበያ ቀጠሮ 1 ☐ 2 ☐
የማፍረሻ ፈቃዱ ተፈቅዷል ☐ አልተፈቀደም ☐
የግንባታው ባለቤት ስም ☐ ስ.ቁ ☐ ሞባይል ☐
የአመልካች ስም ግንባታው ባለቤት የተለየ ከሆነ ☐ ስ.ቁ ☐ ሞባይል ☐
መረጃውን የተቀበለው ሰው ስም ☐ ፊርማ ☐
ቀን ☐ ሰዓት ☐

መስመር መቋረጫ ፈቃድ ይያያዝ / ቅጀው ይያያዝ/
መብራት ☐ ውሃ ☐ ፍሳሽ ☐ ስልክ ☐
ከዘህ በላይ በዝርዝር የተገለፀውና አባሪ ሆኖ በተያያዘው .....ገፅ ንድፍ ላይ የተመለከተው ግንባታ እንዲፈርስ ☐



የግንባታው መፍረስ ማስታወቂያ የተሳሰላቸው ወሰንተኞች 1. ☐
2. ☐ 3. ☐ 4. ☐
ከተቋራጭ ጋር የተገባ የግንባታ ማፍረሻ ውል ዳብዳቤ ቁ. ☐ የማፍረሻ ፈቃድ ቁ. ☐
ከአዳና አገዳ ማረጋገጫ ቁ. ☐ ቀን ☐ የፈቃድ አገልግሎት ማብቂያ ጊዜ ☐
የፈቃድ ሰጪው ስም ☐ ፊርማ ☐ ቀን ☐

የማፍረስ ስራው በፈቃዱ መሰረት ተጠናቋል ያረጋገጠው ባለሙያ ☐
ፊርማ ☐
ቀን ☐

ማሳሰቢያ፡ ይህ ቅጽ በ3 ኮፒ ተሞልቶ 1 ኮፒ ለግንባታው ባለቤት 1ኮፒ ለፈቃድ ክፍል 1 ኮፒ ከማህደር ጋር ይያያዛል።ከግንባታ ማፍረስ በኋላ በ3ቀን ውስጥ ለማረጋገጫ ቁጥጥር ተገባር ፈቃዱን ለሰጠው ጽ/ቤት ባለቤቱ ቀርቦው ማሳወቅ አለባቸው።

APPENDIX 7 – ADDIS ABABA CITY CONSTRUCTION BUREAU 2014 E.C 1ST QUARTER CONSTRUCTION WORKS DIRECT LABOR COST STUDY PROPOSAL

በአዲስ አበባ ከተማ አስተዳደር
የኮንስትራክሽን ቢሮ
CITY GOVERNMENT OF ADDIS ABEBA
CONSTRUCTION BUREAU

ቁጥር.
Ref.
ቀን. 03-02-2014
Date.

በአዲስ አበባ ከተማ አስተዳደር

- ለም/ቢሮ ኃላፊ የኮንትራት አስተደደር ዘርፍ
- ለም.ቢሮ ኃላፊ የዲዛይን ዝግጅትና ምህንድስና ግዥ ዘርፍ
- ለልደታ ክፍለ ከተማ ጽ/ቤት
- ለየካ ክፍለ ከተማ ጽ/ቤት
- ለቦሌ ክፍለ ከተማ ጽ/ቤት
- ለኮልፌ ቀራኒዮ ክፍለ ከተማ ጽ/ቤት
- ለቂርቆስ ክፍለ ከተማ ጽ/ቤት
- ለንፋስ ስልክ ክፍለ ከተማ ጽ/ቤት
- ለአራዳ ክፍለ ከተማ ጽ/ቤት
- ለጉለሌ ክፍለ ከተማ ጽ/ቤት
- ለአዲስ ከተማ ክፍለ ከተማ ጽ/ቤት
- ለአቃቂ ቃሊቲ ክፍለ ከተማ ጽ/ቤት
- ለለሚ ኩራ ክፍለ ከተማ ጽ/ቤት
- በአዲስ አበባ ከተማ አስተዳደር ለቤቶች ልማትና አስተዳደር ቢሮ
- በአዲስ አበባ ከተማ አስተዳደር ለአዲስ አበባ ውሃና ፍሳሽ ባለስልጣን
- በአዲስ አበባ ከተማ አስተዳደር ለአዲስ አበባ መንገዶች ባለስልጣን
- በአዲስ አበባ ከተማ አስተዳደር ለመሬት ልማትና ማኔጅመንት ቢሮ
- ለአካባቢ ጥበቃና አረንጓዴ ልማት ኮሚሽን
- ለአርሶ አደርና ከተማ ግብርና ልማት ኮሚሽን
- ለተፋሰስ አረንጓዴ አካባቢዎች ልማት እና አስተዳደር ኤጀንሲ
- ለቤቶች ልማት ኮርፖሬሽን
- ለኢትዮያ ኤሌክትሪክ አገልግሎት
- ለአዲስ አበባ ከተማ አስተዳደር ትራንስፖርት ቢሮ

አዲስ አበባ

ስልክ TEL 0118330001 | ፖ.ሳ.ቁ P.O.BOX 14659 | ፋክስ/ Fax | Face book aaconstructionbureau@gmail.com

በአዲስ አበባ ከተማ አስተዳደር
የኮንስትራክሽን ቢሮ
CITY GOVERNMENT OF ADDIS ABEBA
CONSTRUCTION BUREAU

ቁጥር. ------------
Ref.
ቀን. ------------
Date.

ጉዳዩ፡- የ2014 በጀት ዓመት 1ኛ ሩብ ዓመት የኮንስትራክሽን ሥራዎች የቀጥተኛ ዋጋን (Direct cost) ይመለከታል

ከላይ በርእሱ እንደተጠቀሰው በአዲስ አበባ ከተማ አስተዳደር ኮንስትራክችን ቢሮ በአዋጅ ቁጥር 64/2011 በተሰጠው ስልጣን መሠረት ወቅታዊ የግንባታ ዋጋ በማጥናት ለተጠቃሚ እንደሚያሰራጭ ይታወቃል፡፡ በዚህ መሠረት በኮንስትራክሽን ቢሮ ተዘጋጅቶ የፀደቀውን የ2014 ዓ.ም የ1ኛ ሩብ ዓመት የኮንስትራክሽን ሥራዎች ቀጥተኛ ዋጋ (Direct cost only) ከታች በተገለጸው በቢሮው ድረ ገጽ መጠቀም የምትችሉ መሆኑን እንገልጻለን፡፡

1. FACE BOOK፡- Addis Ababa Construction bureau ከ21,000 በላይ ተከታይ ያለው
2. TELEGRAM:- Addis Ababa city Construction bureau ከ5,500 በላይ ተከታይ ያለው
3. TWITTER፡- Addis Ababa city Construction bureau ከ950 በላይ ተከታይ ያለው

ከሠላምታ ጋር

Eng Abenet Alene

ግልባጭ

- ለቢሮ ኃላፊ
- ለም/ቢሮ/ኃ/ኮ/ኢ/ል/ቁ/ዘርፍ
- የኮ/ግ/አቅ/ግ/ዳይሬክተር
- ለግንባታ ግብዓት ዋጋ ትመናና ትንበያ ቡድን መሪ

ኮ/ቢሮ

ስልክ TEL | ፖ.ሳ.ቁ P.O.BOX 14659 | ፋክስ/ Fax | Face book

ITEM NO	DESCRIPTION	UNIT	2014 1st Quarter (Only Direct cost)
1.1	**Load and cart away all demolishing & dismantling material to an appropriate tip. (Manually)**		
1.1.1	Demolishing the lamera wall	m^2	26.42
1.1.2	Demolishing the existing CIS wall	m^2	5.19
1.1.3	Demolishing of wooden wall	m^2	29.80
1.1.4	Demolishing of gypsum wall	m^2	14.90
1.1.5	Demolishing the CIS roof	m^2	8.31
1.1.6	Demolishing of 7x5 cm zigba purline	ml	4.15
1.1.7	Demolishing of eucalyptus upper & lower chords	ml	13.20
1.1.8	Dimolish RHS purline	ml	6.60
1.1.9	Dimolishing the RHS truss.	ml	17.83
1.1.10	Desmantling Gutter	ml	5.79
1.1.11	Desmantling down pipe	ml	9.19
1.1.12	Demolishing the chipwood ceiling	m^2	14.51
1.1.13	Demolishing the tember ceiling	m^2	21.77
1.1.14	Demolishing the abujedid ceiling	m^2	5.44
1.1.15	Dismantle the metal doors from the wall.	m^2	29.61
1.1.16	Dismantle the metal windows from the wall.	m^2	26.65
1.1.17	Desmantling fascia board	ml	7.90
1.1.18	Desmantling ridge & copping	ml	11.58
1.1.19	Demolishing the PVC floor tile	m^2	7.01
1.1.20	Demolishing kitchen sink	pcs	10.34
1.1.21	Demolishing toilet WC,HW,turkish seat	pcs	31.01
1.1.22	Desmantling of wooden door & window	m^2	23.68
1.2	***Demolishing Work of different structures N.B. price include clearing the working area & dispose debri as indicated the supervisour***		
1.2.1	Masonary Structure (BGL)	m^3	127.38
1.2.2	Masonary Structure (AGL)	m^3	169.84
1.2.3	Demolishing of 25cm thick hardcore	m^2	11.30
1.2.4	Concrete Structures	m^3	704.22
1.2.5	10cm thick HCB Structure	m^2	11.81
1.2.6	15cm thick HCB Structure	m^2	15.78
1.2.7	20cm thick HCB Structure	m^2	22.09
1.2.8	Terrazzo floor	m^2	24.55
1.2.9	Cement screed floor	m^2	5.52
1.2.10	8cm thick Mass concrete floor	m^2	7.36
1.2.11	30x120x3cm thick marble tread	pcs	45.87
1.2.12	15x120x3cm thick marble riser	pcs	34.40
1.2.13	Steel Structure	Kg	2.11
1.2.14	Demolishing the ceramic wall tile	m^2	24.55
1.2.15	Demolishing the ceramic floor tile (6 & 8 mm thick)	m^2	27.62
	(From 1st -3rd floor)		
1.2.14	Concrete Structures	m^3	929.78
1.2.15	10cm thick HCB Structure	m^2	16.48
1.2.16	15cm thick HCB Structure	m^2	21.19
1.2.17	20cm thick HCB Structure	m^2	29.66
1.2.18	Terrazzo floor	m^2	32.51
1.2.19	Cement screed floor	m^2	7.32
1.2.20	30x120x3cm thick marble tread	m^2	57.81
1.2.21	15x120x3cm thick marble riser	m^2	43.36
1.2.22	Steel Structure	kg	2.56
1.2.23	Demolishing the ceramic wall tile	m^2	32.51
1.2.24	Demolishing the ceramic floor tile (6 & 8 mm thick)	m^2	36.58

ADDIS ABABA CITY CONSTRUCTION BUREAU

Prepared by Gezahegn G.

Checked by :- Hiwut A.

Approved by :- [illegible]

2

	(From 4th -7th floor)		
1.2.23	Concrete Structures	m^3	1168.67
1.2.24	10cm thick HCB Structure	m^2	17.49
1.2.25	15cm thick HCB Structure	m^2	22.48
1.2.26	20cm thick HCB Structure	m^2	31.48
1.2.27	Terrazzo floor	m^2	34.97
1.2.28	Cement screed floor	m^2	7.87
1.2.29	30x120x3cm thick marble tread	m^2	69.09
1.2.30	15x120x3cm thick marble riser	m^2	51.82
1.2.31	Steel Structure	kg	3.57
1.2.32	Demolishing the ceramic wall tile	m^2	40.47
1.2.33	Demolishing the ceramic floor tile (6 & 8 mm thick)	m^2	45.53
	(From 8th -12th floor)		
1.2.32	Concrete Structures	m^3	1407.56
1.2.33	10cm thick HCB Structure	m^2	25.12
1.2.34	15cm thick HCB Structure	m^2	27.60
1.2.35	20cm thick HCB Structure	m^2	38.64
1.2.36	Terrazzo floor	m^2	42.94
1.2.37	Cement screed floor	m^2	9.66
1.2.38	30x120x3cm thick marble tread	m^2	81.03
1.2.39	15x120x3cm thick marble riser	pcs	60.78
1.2.40	Steel Structure	kg	3.50
1.2.41	Demolishing the ceramic wall tile	m^2	48.44
1.2.42	Demolishing the ceramic floor tile (6 & 8 mm thick)	m^2	54.49
	(From 13th -20th floor)		
1.2.41	Concrete Structures	m^3	1646.44
1.2.42	10cm thick HCB Structure	m^2	25.45
1.2.43	15cm thick HCB Structure	m^2	32.72
1.2.44	20cm thick HCB Structure	m^2	45.81
1.2.45	Terrazzo floor	m^2	50.90
1.2.46	Cement screed floor	m^2	11.45
1.2.47	30x120x3cm thick marble tread	m^2	92.98
1.2.48	15x120x3cm thick marble riser	pcs	69.73
1.2.49	Steel Structure	kg	3.95
1.2.50	Demolishing the ceramic wall tile	m^2	56.40
1.2.51	Demolishing the ceramic floor tile (6 & 8 mm thick)	m^2	63.45

Prepared by Gezahegn G.

Checked by:- Hirut A.

ADDIS ABABA CITY CONSTRUCTION BUREAU

Approved by :-

APPENDIX 8 – PUBLISHABLE MANUSCRIPT

The Practice of Building Demolition in Addis Ababa city: Current Practice Assessment and Regulatory Framework Development

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ABSTRACT

The Addis Ababa city Administration has been demolishing old buildings and clearing up slum areas for urban renewal purpose for quite some time now. However, the practice is not coping up with the technological advancements in the area; rather it is highly dependent on the experience and skill of individuals involved. The fact that Ethiopia doesn't have a code of practice for building demolition has paved the way for the practice to be performed in non-structured manner. This research started aiming at achieving three objectives; the first being examining the current practice of building demolition in Addis Ababa city. This was done by using selected cases to detect the loop holes through direct observation and interviewing representatives of parties involved in a building demolition project. Furthermore, an in-depth document analysis was done on existing local protocols; ranging from policies to codes and regulations. As a result, the gaps were analyzed in five major categories related to stakeholders' management, planning and methodologies, safety, environment and waste management, productivity and performance recording. The second objective goes on with examining the international trend of the sector through intensive review of literatures. For this, it was necessary to benchmark certain countries with best practice, such as Kenya, India, Hong Kong and the Netherlands. Afterwards, standard factors extracted from the study were categorized under generic sections after critical adaptations are made. The third and final objective of this research was to develop a guiding regulatory framework. The developed framework describes the main actors of the building demolition ecosystem and states the major responsibility of each entity for the success of the cycle. Finally, it concludes by pointing out the practice lacks proper emphasis from the regulatory body in terms of standardizing work items like contracts and safety protocol strictly to follow while performing the act.

Key Words: Building demolition, Construction Industry, Building, Code of practice, Regulatory framework

INTRODUCTION

Starting from the era where the concept of shelter was first coined, the fashion of constructing it has been evolving significantly. Focusing on the modern-day living style, people continue to upgrade techniques and materials of construction based on cones and prone analysis made through experience. Today, the world has arrived at concrete structures as the leading technology in the construction industry. During the life cycle of structures, they often meet with some situations like disasters, changing functions, city reconstruction, or higher residence demand due to population, all these lead to demolition or re-construction of existing structures

(Patel pranav, 2015). Buildings are changed in harmony with the needs of the age. As the complexity in construction increases, it is obviously critical to consider the overall demolition work is being as important as construction work (Yirgalem, 2016). Before few decades ago, buildings were mostly dismantled by human hand at the end of their lives due to structural or functional obsolescence. Today various kinds of demolition methods are available, but the method of implementation for demolition work varies with the site condition, safety and cost (Patel pranav, 2015). In developed countries, demolition is very essential for development of new structures for various residential and industrial purposes (luckyguyishere, October 14, 2017). On the other side, the issue of urban informal settlements, as observed in most urban centers of Africa, Asia, and Latin America is broad, complex and dynamic (Jemal, 2019). According to Kalugila (2013), Informal urbanization trends in sub-Saharan Africa show Tanzania to be one of the countries with highest population living in informal settlements followed by Mozambique and Ethiopia. In the Ethiopian context these types of settlements are known as "*Chereka Bet*". The term *Chereka bet* can directly be defined as "house of the moon" implying the illegal construction of houses is done at nights without the consent of city government for construction permit (Jemal, 2019). In Addis Ababa (Bole, Yeka and Kolfe sub-cities) there were demolitions in 1994, which destroyed 13,440 informally constructed houses (Gondo, 2011). In Bahir Dar, eviction through demolition took place in 1995 in Kebeles11 and 13. In Ambo, the municipality applied litigation, whereby 412 land related cases were filed in courts during the periods August 10/ 2005 to May 18/2008 (Jemal, 2019). The practice of demolition in Addis Ababa is commenced for plenty of new construction activities mainly for infrastructural development, investments and housing programs. However, the practice is criticized for being solely dependent on the skills of daily laborers not supported with proper training but rather gained through experience. Generally, the current practice lacks professionalism and it is difficult to access available documents that involve records, demolition code of practices, research papers regarding the trend of demolition work. In most cases, countries amend their own guideline/ code of practice to follow during the practice based on the existing policies, rules and regulations regarding the construction industry. They are largely based on existing codes and guidelines (if any) that support the previous legislation. In any work environment, a code of practice ensures that the activities of a particular professional or other project stakeholder to comply with required standards. This helps to identify and manage risks in order to ensure safety and proper work flow.

Purpose of demolition

The era of demolition began centuries ago coupled with the start of construction. Nowadays, the industry brings a lot of potentials and become highly sophisticated business requiring expertise and competent persons across the world. People have demolished structures to make room for new structures, to rehabilitate the existing ones, and to create new buildings with materials taken from existing structures. When demolition occurs, it is usually a sign of new growth, expansions and inner-city urban renewals (Richard J. Diven, 2006).

Demolition Vs City Expansion

According to (UNHabitat, 2018), by the year 2025, close to half of the population of the world (68%) is estimated to live in cities and towns. The prediction is done for three categories; least developed less developed and more developed regions. The more developed regions comprise all regions of Europe, Northern America, Australia/New Zealand and Japan. The less developed regions comprise all regions of Africa, Asia (excluding Japan), Latin America and the Caribbean. The least developed countries, as per the updated United Nations General Assembly classification in February 2021 include 46 countries: 36 in Africa, 5 in Asia, 1 in Latin America and 4 in Oceania. These countries are also included in the less developed regions.

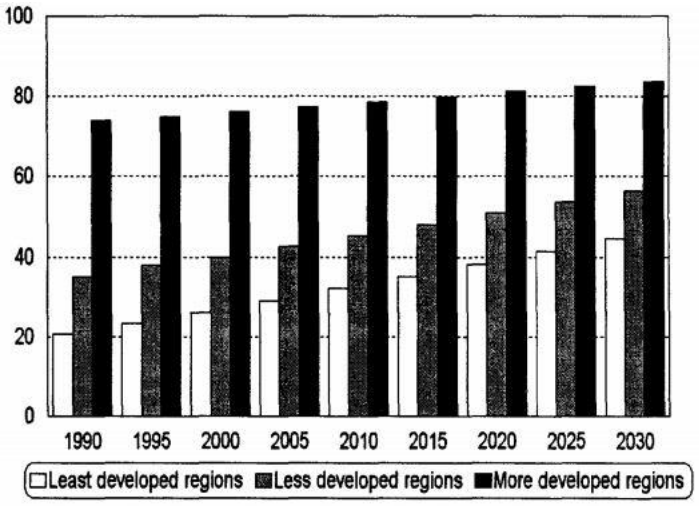

Fig 1.1 Percentage of urban population, 1990-2030 (UNHabitat, 2018)

Accordingly, dense concentration of inhabitants in cities and towns implies that the economic contribution of urban regions to gross regional product (GRP) is becoming dominant (Asfaw, et al., 2011). On the other hand, rapid urbanization is creating mounting pressure on infrastructure, service provision and management capacity of governments. In line with this, existing city centers will be forced to accommodate more than they used to in which demolition of structures for efficient redevelopment will become mandatory.

PROBLEM STATEMENT

As the built environment ages, demolition has become a fast-growing industry creating multiple employment opportunities. During the 1990s in US alone, the number of contractors grew by nearly 60% and there are now over 800 U.S. companies focused on demolition, as well as many more offering this service as part of their portfolio. It has also become an increasingly complex business, requiring a unique combination of project management skills, legal and contractual knowledge, and engineering skills from its practitioners (Richard J. Diven, 2006). Any construction output has a limited life span during which it requires repair and maintenance works to the point where it is no more economical and/or there is a need to change the original purpose of the facility. While it is typical to perform demolition works in the construction industry, the process of doing it is a critical point to give attention to. As cities get dense, the need for planned settlement becomes a critical issue which in return makes the application of controlled demolitions mandatory. During such conditions, it becomes difficult and time consuming to perform the activity unless there is a systematic way of approaching it. Internationally, countries like Australia, New Zealand and England draft a code of practice; even in city levels, specific for demolition works with extensive details on how to conduct each and every procedure coupled with the role of responsibility of stake holders. On the contrary, Ethiopia does not have a guiding regulation towards the practice except for the fact that it is barely mentioned on other related proclamations such as the Ethiopian building proclamation (EthiopianBuildingProclamationNo.624/2009, 2009) and the urban planning proclamation (UrbanplanningproclamationNo.574/2008, 2008) in federal level. The Ethiopian Construction Works Regulatory Authority; being the one responsible for issuing license for construction professionals in Ethiopia, does not include demolition to issue any form of specialization license in the list of specialty contractors in the newly drafted directive for certification and registration of construction professionals (MoUDC648/2021, 2021). In city level, even though the Addis Ababa City construction bureau entertains demolition acts as one type of construction activity and suggests that having a demolition permit is a mandatory step (AACCB, 2018), it lacks detail in terms of describing specific requirements necessary at operation level. In addition, work

place safety and environmental management are seen to be greatly compromised due to lack of forcing protocol to follow. All the above boils down to emphasize the gap in regulatory framework and has led to a compromised performance of the practice in terms of many aspects; the ruling one being arbitrariness; failure to follow a systematic and structured procedure on how to perform the work and understand the logic behind structural components. Judging from preliminary study, the fact that the sector is lacking proper work guideline made it to be highly dependent on personal skills and previous experience of similar activities of daily laborers. Given most daily laborers are not professionally skilled, the work is always under risk for issues related to safety and health for both on-site workers and their immediate surroundings. Aside from this, falling behind on following up-to-date technology in the area is another area of concern; the use of traditional techniques results in inefficiency of the work in the dimensions of time, cost and quality. The fact that the sector is growing rapidly and is still solely dependent on existing experience of low rise building demolition shows the need to have a structured regulatory framework to implement in the near future. After assessing current loopholes of the practice, this study will mainly focus on addressing the gaps in regulatory framework scale to serve as an input for the regulatory body to strengthen and reframe the existing trend by which critical adaptations will be made from selected benchmarks to attain the goal.

OBJECTIVES

This research is aimed at developing a conceptual building demolition regulatory framework for purpose of serving as an input and guiding the practice in regulatory level after generating a perspective insight into the current state of building demolition works which in return, will be beneficially applied to serve as a milestone for gap identification and critical adaptation purpose.

Specific Objective

1. To assess the current practices of building demolition and identify key challenges
2. To conduct a gap analysis between current building demolition practice and international best practices by identifying key performance indicators (KPI).
3. To formulate a conceptual building demolishing regulatory framework for middle-rise (Category-B) buildings.

SCOPE

Demolition works vary by nature and scope as partial and full demolition works. This study will focus on full demolition works of middle-rise building in the city of Addis Ababa. In addition, the scope of the investigation has been limited to selected private property demolition works and government-owned demolition sites where demolition activities are dominantly noticeable. As per the limitations, viable ongoing demolition cases might be limited in number which might be challenging to draw a pattern and lack of up-to-date published data sources on the local practice might be considered the major ones.

SIGNIFICANCE

As rapid urbanization is observed more than ever in the city Addis Ababa, the need for mutating the purpose and existence of facilities is becoming a common scenario. In the process, dismantling of structures as per the intended purpose is required. Such critical activity needs to be accompanied with the suitable technique, technology and skill in order to achieve the desired goal without any further casualties both in terms of efficiency and quality of work. There are only a hand-full of relevant studies made concerning the area of building demolition projects in Addis Ababa; which makes this research a pioneer study for its kind. As a result, it will contribute towards improving the poor perception given to the importance of a coordinated demolition work procedure among regulatory authorities, contractors and clients. Furthermore, it will serve as a milestone for policy makers to come up with a synchronized code of practice with the necessary modifications.

METHODOLOGY

Research methodology is the philosophy or the general principle which will guide conducting of the research (Dawson, 2002). It answers why a research study has been undertaken, how the research problem has been defined, in what way and why the hypothesis has been formulated, what data have been collected and what particular method has been adopted, why particular technique of analyzing data has been used (Kothari, 2004).

Approach – Qualitative

In order to achieve the research objective qualitative research approach is selected. A study is classified as qualitative if the purpose of the study is primarily to describe a situation, phenomenon, problem or event; if the Information is gathered through the use of variables measured on nominal or ordinal scales (qualitative measurement scales); and if the analysis is done to establish the variation in the situation, phenomenon or problem without quantifying it (Kumar, 2011). It is concerned with subjective assessment of attitudes, opinions and behaviors. One of the research aims is to explore the demolition work practice and qualitative research provides an in-depth insight, and it is flexible and typically exploratory (Kothari, 2004). Under circumstances where information on the research area is limited and discovery is an important aim of the research, (Kumar, 2011) recommends qualitative research approach.

Reasoning – Inductive

Inductive reasoning starts from specific observations or sensory experiences and then develops a general conclusion from them (Walliman, 2011). Inductive reasoning is more open-ended and exploratory (Kumar, 2011). Therefore, in order to design a building demolition regulatory framework, the research has to start from observation in order to make some conclusion which suited with inductive research approach.

Research objective – Triangulation

The research answers a set of questions in the process of developing the frame work in which multiple instruments are triangulated to satisfy the research objective. As far as the first objective is concerned, the researcher will start by observing the selected cases for on-going sites and do a document analysis for passive cases. An observation checklist is developed with criteria adopted from international practice key performance indicators. The researcher then developed a set of semi-structured interview questions to use in triangulation with the above two data collection instruments for better understanding of the scenario. The data obtained from the interview helped to identify the current practice and challenges of demolition, as per the respondents' perception of the concept and/or as per the experience of the practitioners of the system. The respondents for the interview at this stage are selected based on their relevance to the project. The researcher used purposive sampling technique until data saturates (a pattern of response is observed) in mere of targeting experience and the position they acquire on the specific case. The second objective focused on identifying gaps in the practice. For this, the researcher first starts by compiling the data gathered as a result of the first objective to use as an input for analyzing the gaps against the international practice in which an intensive review of literature was done so as to come up with relevant KPIs to drive a standard from. Since the final aim of the research is to design a regulatory building demolition framework, it is about making a general set of propositions from the particular practice. In order to address the third objective, the researcher come up with a conceptual regulatory building demolition framework. This is done by developing a set of standard points after measuring the analyzed data against the KPIs. The result is then individually presented for experts' validation to be assessed for its practicality and improvement points. The set of experts were selected from the three distinct areas as identified by the researcher earlier; regulatory level, enforcement level and operational level respondents. The following figure illustrates the interrelationship between methodologies chosen and the specific objectives.

Research Methodology		Research Objectives
Observation Semi-structured interview Document Analysis	→	To assess the overall current practices of building demolition and identify key challenges
Literature Review Semi-structured interview	→	To conduct a gap analysis between current building demolition practice and international best practices by identifying key performance indicators (KPI).
Literature Review Result Analysis Validation instrument	→	To formulate a conceptual building demolishing regulatory framework for middle-rise (Category-B) buildings.

Fig 1.2 Interrelationship between research methodologies and objectives

Research Method – Case Study

Since the major aim of the research is to design building demolition regulatory framework, a contextual and in depth understanding of the current practice and existing problems is necessary. In such cases where the focus is to study in depth rather than breadth and places more emphasis on the full analysis of a limited number of events or conditions and their interrelations, (Yin, 2003) recommends a case study research method. The case study method is a very popular form of qualitative analysis and involves a careful and complete observation of a social unit, be that unit a person, a family, an institution, a cultural group or even the entire community (Kothari, 2004) . It provides an overview and in-depth understanding of a case(s), process and interactional dynamics within a unit of study. (Saunders, 2009) and (Yin, 2003) opines that case studies are the preferred strategy when "how" or "why" are being posed, when the investigator has little control over events, and when the focus is on a contemporary phenomenon within some real-life context. One of the major appeals of a case study is its capacity to be tailored to contexts (Yin, 2003). It emphasizes detailed contextual analysis of a limited number of events or conditions and their relationships.

Selection of Cases

According to (Kumar, 2011), in case study design selection of a case that can provide as much information as possible to understand the case in its totality is the priority rather than selecting a random sample. The Addis Ababa City Administration (AACA) currently launched different projects related to redevelopment in its ten Sub-cities. According to (Rebecca, 2018), renewal projects are observed to be concentrated in the five inner sub cities; Kirkos, Lideta, Addis Ketema, Arada, and Yeka respectively; among which Kirkos subcity holds the biggest share. Consequently, demolition contractors also tend to go by this pattern; Kirkos and Lideta take the first two ranks. Keeping this into consideration, the researcher used this as a starting point to narrow down the geographic location of the cases. For this research purpose, four cases were considered including the main case selected for further detail examination; the Eagle hills apartment project. The number of cases were increased until the point of saturation is reached which was determined based on a similarity of patterns observed. In addition to this, factors such as degree of cooperation anticipated from the project parties, scale of projects, variety of status, work methodology as well as time and convince were considered.

The following table summarizes the selected cases together with their status and other related information.

Table 1.1 List of selected cases and their status

No.	Cases	Location	Ownership	Demolition Contractor	Status
1	Eagle hills : La Gare apartment project	Kirkos, Woreda 07	State + Private	MSE	Completed
2	Metropolitan Real Estate, Central tower project	Kirkos, Woreda 11	Private	Private	Completed
3	Kera – Bulgaria embassy road expansion project	Kirkos, Woreda 09	State	MSE	On-going
4	Residential building (G+2)	Bole, Woreda 03	Private	Private	On-going

Data Source Size

The research followed the multiple case study design method. As of (Jack, 2008) multiple case study design allows duplication to independently confirm developing theories and identify complementary aspects of the phenomenon under investigation by analyzing within and across settings. (Yin, 2003) also wrote a case study design is discovery of an important finding from a single experiment and make sure the finding by conducting a second, third, and even more experiments. This study selects one case as a main case and uses multiple case studies as data source size to allow the researcher to have deep knowledge. The researcher will see one case; The Eagle Hills apartment project in this case for detailed examination purpose and will look for duplication of facts from other cases to predict similar results. This case is selected as it satisfies the scope of the research; middle rise (Category B) concrete-based buildings. In addition, factors such as accessibility, scale, documentation and project nature were considered.

Data Collection Methods/Instruments

The use of multiple methods to collect data is an important aspect of a case study. As per the literature review, it was clearly visible that the local practice missed a major milestone to arise from which makes this research a pioneer study. Accordingly, first hand data collection methods were necessary so as to assess the practice very closely. The findings of the literature review served as a base point to formulate the structure of the interview and observation data collection instrument formats. Given that the study is a case study type, extraction of information from possible analysis of case documents, direct observation and interviewing relevant stakeholders for each case are selected to be used. In this research observation, semi-structured interview and document review were used as data collection methods in the manner explained below.

A. **Observation**: - For this study, the researcher observed the existing condition of three active and one passive building demolition sites. The points for observation were first generally derived from benchmarked countries for best practice based on repetition; which was then filtered and adopted to fit the local practice as some of the considerations were found to be out of context. Afterwards, an explicit checklist (attached on annex 4) was developed addressing all the project actors to structure the researcher to the aimed objectives. The result was then recorded using narrative recording method and will be supported with photographs. In this form of recording the researcher records a description of the interaction in his/her own words (Kumar, 2011).
B. **Document analysis:** - For this study, a critical document review was done to study the characteristics, processes, techniques and requirements of the important aspects in practicing demolition operations. The source materials included Codes of Practice from different countries, local proclamations and legislations related to the practice, project documents; such as site diaries and monthly project reports. Project document analysis will be specially used to analyze the main case to retrieve the procedural facts and encountered challenges during the lifetime of the project. In addition, the researcher also tried to filter out KPIs through intensive review of literature. The literature studies were chosen by review of papers related to demolition projects: KPIs were then extracted

from those papers based on the researcher's judgment, critical success factor studies on demolition projects and key words of papers. After identifying the factors, further selection was made based on number of mentions on different papers.

C. **Interview**: - In this research, semi-structured guiding questions were developed before conducting the interview as attached on Annex 1, 2 and 3. The questions were derived from the literature review based on the assessment done to adapt the benchmarked practice in consideration of the identified KPIs to evaluate the local practice. In semi-structured interview the interviewer follows the guide, but is able to follow leads of questions in the conversation that may stray from the guide when he/she feels it is appropriate (Cohen, 2006). The identification of relevant organizations is done by using a combination of two sampling techniques; purposive and snow ball sampling. The researcher targets to include respondents from variety of classes and tries to categorize them into three major groups namely; strategic, enforcement and operation level respondents. A total of 10 organizations are identified from the above distinct levels listed. Afterwards, representatives of each organization and on-site experts (supervisors/ Forman), micro and small enterprise team leaders and others will be contacted based on their significance in the execution of the projects. In order to avoid or minimize bias, cross referencing of data with document review and observation will be used. The following table summarizes organization approached for interview in line with their role.

Table 1.2 List of selected interviewees and their status

No.	Interviewee	Role
1	Construction works regulatory authority	Government body
2	Addis Ababa city administration land development and urban renewal agency	Government body
3	Addis Ababa city housing development corporation	Government body
4	Addis Ababa City Administration Kirkos sub city construction bureau	Local Authority
5	Noah Real Estate	Main contractor
6	Tigist, Akrem and friends S.C	Main contractor
7	Bamacon Engineering	Main contractor
8	Eagle Hills	Client
9	Addis Ababa city Roads Authority (AACRA)	Client
10	Metropolitan Real Estate	Client

Data Analysis Approach

one of the research objectives of the study was to explore the current practice of building demolition practice with key challenges faced. The data collection method used for this objective were document review, semi structured interview, and observations. Thus, the gathered data was analyzed qualitatively. Qualitative data analysis refers to the processes and procedures that are used to analyze the data and provide some level of explanation, understanding, or interpretation (Dey, 2005). The data collection methods selected for this study are observation, document review and interview. (Neuendorf, 2017) suggests that one of the methods to analyze data obtained from such sources is content analysis. Content analysis is a systematic way of making valid inferences from verbal, visual, or written data in order to describe and quantify specific phenomena. Building demolition concepts, practice standards and international practice trends identified in the literature review section were used as the main theme of categorization and analysis. This theme of categorization was somehow modified based on the data collected. Nvivo was used to analyze the result of the interview after transcribing it to a writable format. The second objective of this research is to conduct a gap analysis in the current building demolition practice in comparison with international

benchmarked practices. To conduct the gap analysis, selected factors were adopted from KPIs and international trend to be evaluated against the local practice.

Data Validation and Research Quality Measure

(Zohrabi, 2013) defines validity as a measure of trustworthiness, utility and dependability that the researcher and the different stakeholders place into it. Methods of validating data or instrument can be categorized in to four, according to (Zohrabi, 2013) as content validity, internal validity, utility creation and external validity. For this research purpose, the researcher used internal validation (cross validation) technique through triangulation. A data is said to be validated by triangulation when data is collected from a variety of sources and with a variety of techniques so as to arrive at a relatively same result to imply that the data is valid (Ibid). In addition, peer examination was also used to validate the data collection instruments. This involved collecting inputs from non-participants of the study but believed to have enough exposure to the research subject for comment and review. For this purpose, two university instructors (one from Dilla university and one from Addis Ababa University) and one professional from the industry were asked to forward their inputs on the effectiveness of the instruments. As far as the framework validation process is concerned, the researcher used experts' validation to examine the functionality by using a rating scale developed and attached on Annex 05 of this research. This is done after presenting and elaborating each content of the framework individually for six experts representing relevant divisions in the regulatory body. Afterwards, their responses will be recorded so as to adjust the framework accordingly. In addition, the experts will be asked to rate the developed conceptual framework in terms of framework simplicity, comprehensiveness, relevant and clarity using a 1-5 liker chart.

RESULT AND DISCUSSION

INTERVIEW

The research used data from three instruments; observation, interview and document review. The interviews highlighted first hand descriptions on the building demolition industry from individuals from different levels of expertise and experience representing various organizations and companies. The questions personalized and open ended to encourage respondents to reflect on their insights freely and extract facts accordingly. The background assessment of the respondents shows that well more than half i.e., 58.73% of the respondents are new to the sector with experience range under five years while the rest 41.7% of the respondents have stayed in the sector for more than five years. 66.7% of the respondents are found to be representing their department/organization in management level while the rest of 33.3% respondents are involved in the operation management level of the building demolition acts. On the other hand, 58.3% represent government organizations while the second largest portion which is 33.3 % are representing a private company. Some of the respondents; 8.4 % have been contacted from projects while there happens to be no respondent representing him/herself. A word cloud is created to show the 200 most frequently used words while encoding the data in to NVivo. The font size of the words indicates the frequency of the word's appearance; the ones visible to be of large fonts are the ones which appeared most and for smaller fonts like wise. Accordingly, words such as demolition, project, organization, authority and government take the biggest share on the word cloud.

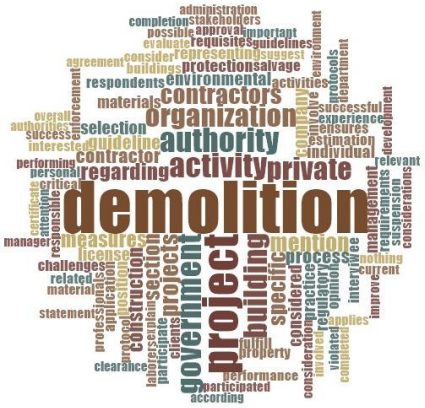

Fig. 1.3 Word frequency word cloud result (source: QSR NVivo.10 output)

Stakeholders management

As one part of a construction process, a demolition act also requires the involvement of different professionals and other stakeholders. The relevance of those stakeholders might vary based on certain industry specific policies and regulations but, there are some found to be common in most cases. For this research purpose, the selected respondents gave their personal opinion arising from their experience when asked to identify the three most relevant stakeholders in demolition projects. As a result, out of a total of 17 references, Investor/client is selected to be the leading stakeholder with 6 times reference while contractors and government policy makers comes second and third most influential stakeholder in the eyes of the respondents with 5 and 3 times references respectively.

Safety, Environment and Waste management

The construction industry is always involved with the concepts of safety, environmental protection and waste management. According to (Mihai, 2019), construction and demolition wastes (C&DW) are one of the fastest-growing waste streams due to the economic development and urbanization process at a global scale. While waste is believed to bring various potentials in terms of recycling and reuse, the journal explains how these opportunities are lost due to lack of proper forcing protocol for waste disposal. It further explains that construction waste can be generated due to design errors, improper material handling and demolition activities that take place for various reasons. Keeping this highlight in mind, the respondents of this research were asked if there is any form of protocol they follow while carrying out or taking part in a building demolition activity. In response, out of a total of 15 references, the 'others' alternative was referred 12 times leaving the 'yes' option with only 3 reference points.

Productivity and measure of success

Success of a project is dependent on various factors. As demolition is considered to be one form of a construction project with definite life span, it is dependent on certain factors. For this research purpose, the respondents were asked to select the three most influential factors that, in their opinion is translated to implicate a successful building demolition project. To frame the options, the researcher presented them with six (6) scenarios to choose from. Accordingly, from a total of 20 references, timely completion was mentioned to be the leading measure of success with 8 references while least cost and high return in salvage value were ranked second and third with equal reference point of 4 as an indication of success of a demolition project.

Challenges and recording

As one of the primary objectives of this research is to develop a regulatory frame work after analyzing the existing and best practices, it is of high value that bottle necks of the practice to be identified by the real actors themselves. This way, the feed backs will be used in framing the end result in to a more practical and achievable format. In this regard, respondents were asked to rank the most influential loopholes that they happen to observe while involving in a building project; among which, from a total of 21 references, lack of attention from government body

was mentioned first with 10 times reference followed by no incentive for specialization and no strict safety, environment and waste guideline to follow with 5- and 4-times reference respectively to be the second and third major setbacks in the eyes of the respondents.

OBSERVATION

Observation was conducted in selected cases so as to capture the nature and execution of a particular building demolition project on ground as it is less likely to be biased. The findings from the study were not taken to be generic representation of the practice but rather to emphasize the performance in terms of the three selected focus areas boiled down from the KPIs as per their relevance to the objective of this study; namely guideline application, work methodology and health, safety and environmental management. Based on this, four (4) projects were selected; La Gare apartments, one la gare project, Metropolitan Real Estate Central Tower project, Kera-Bulgaria road expansion project and G+2 residential building. The results were analyzed in the follwing context.

Stakeholder's management

In the La Gare building demolition project, five issues were insight for the stakeholder's management related evaluation principle. As observed, even though the client; one of the project stakeholders; was not directly involved in the demolition process, they were able to collect all official permits and clearances; such as building permit, building starting permit and annual lease payment clearance; required to start with the demolition of the structures. On the contrary, there was no input given by a consultant related to method selection and other related issues as there was no assigned consultant for the case from both the client and the government body. Moving forward, laborers received a brief orientation regarding the work flow by a group of assigned foremen but no prior basic skill training has been conducted on site aiming for the specific nature of the project. Before the official green light was given to start, supervisors assigned from the woreda and sub-city administration made an on-site assessment of the site. In overall, as this was a project with a special order from the Addis Ababa City Administration (AACA), a relatively better coordination was observed between the different stakeholders of this project in terms of clearing out the scope before commencing in to the actual work. On the other hand, the dwellers of the area argued that a rushed decision was made regarding their relocation plan which later on brought a quarrel with the sub-city land administration bureau claiming the compensation fee was not calculated properly and they have not been given enough time to evacuate the place.

Multilateral communication

As construction related activities involve multiple actors, implementing effective communication system is crucial. In such manner, the La Gare building demolition project was successful in making the necessary communication with the different infrastructure authorities (water, telecom, sewer, drainage, and electricity) to get a clearance for temporary and/or full suspension of the lines after representatives of the responsible authority came and located them. On the opposite side, there was no available as-built drawing to use for reference which made the prediction of structural systems used difficult; especially in the case of the Ethiopian Shipping & Logistics Services Enterprise building. Furthermore, the project failed to record the conditions of adjoining properties properly which later on led to ambiguous speculation about the stability of the other surrounding structures. In conclusion, even though the project can be considered exemplary in terms of collaborative work between other infrastructure authorities and no major accident has been reported in this regard, there has been observed a serious gap in keeping record of formal correspondence letters among the regulatory authority and the contractors. This made things difficult for the researcher to analyze document related data as it was almost impossible to find one. Furthermore, since the project was awarded to MSE groups by informal bid process, a substantial amount of time has been lost while trying to negotiate with the local labor force initially aiming to overtake the project.

Planning and Methodologies

Evaluating from the responses of the checklist on planning related check points, the case was observed to have poor performance in terms of methods and planning techniques applied. There was no trace of prior planning found regarding work place safety management, waste disposal method and environmental plan against minimum damage. One of these limitations was reflected on the demolition stage later on when noticeable amount of dust was observed to pollute the surrounding environment. Apart from this, absence of professional advisors to pre-determine the type of structural system used and suggest possible demolition method was observed to affect the overall performance of the project. This included missing of formal mode of communication (written and approved work method statement and schedule) between the work parties which led to unstructured work flow as per personal experience of the contractor. On the positive side, prior project cost estimation was done based on on-site evaluation to understand the status of the existing structure and use as a base point for project award. It was also guided by a pre-set multiplication rate for certain familiar building materials by the government to be used for every relocation value estimation. In addition, the client did a full site inspection for possible hazardous material after the demolition process is complete.

Productivity and measure of success

The researcher tried to observe and analyze productivity in terms of both human labor use and technological applications. Accordingly, the demolition activity followed a level-by-level action of stripping, breaking and removal of demolished materials. In doing so, assigned supervisors from the local authority made random site visit aiming to make sure the activity is carried out as per related regulations. But, due to gaps in information about the structural system and other limitation on using explosive methods to demolish in such locations hindered the use of up-to-date technologies in the sector.

Safety and emergency handling

During the initial stages of the demolition process, minimal emphasis was given to work place safety measures; especially in the regards of flying object management and dust protection. But later on, a progressive improvement was observed when the site was secured with fencing and buildings were enclosed with plastic mesh to minimize the environmental pollution around the area. In addition, different signage was mounted inside the province of the project site to create alert amongst personnel. While carrying out the activity, even though all workers on site failed to be equipped with the proper personal protective equipment (PPE); except for few with safety helmets owned personally, structural members have been dismantled in a controlled manner by skilled laborers. More or less, the coordinators of the site tried to manage a clear and clean site access for both vehicle and human access.

Sustainability management

In regards to sustainability, no special effort has been observed to be made expect for extraction of some elements of the building such as door and window frames carefully identified and categorized for possible recycle/reuse. Even though considerable amount of construction debris was extracted during the process, no attempt has been observed to be made to separate plastic wastes from other biodegradable wastes.

Post-demolition management

During the final stages of the demolition activity, the researcher visited the site to examine post-demolition activities such as waste disposal mechanisms and final hand over protocols. As a result, since there was no pre-approved plan on how to carry out cart-away of surplus material generated during the process, there has been an inconvenience related to ownership and fees to dumping sites. This forced the client to perform the disposal of the remaining waste material with separate cost. Apart from this, no formal correspondence has been noticed regarding settlement of final payments to the contractor since there was no signed work contract between the two parties in the first place. Furthermore, the assigned local authorities were not present to

do a final assessment on -site before handing over the land to the client. On the contrary, the sub-city and woreda office prepared a formal document to sign off both the client and the city administration to hand over the site officially. In doing so, no form of recognition is given to the contractor by the responsible authority for successful completion and/or performing the activity as per the acceptable regulations.

Challenges and improvement register system

This section is observed to be the weakest with zero positive observations. There has been no register of accidents encountered nor damages made both in terms of property and environment so as to do a proper compensation at the end. Similarly, there was no recording and/or progressive tracking made for challenges encountered that happened to hinder the overall performance of the project.

Document Analysis

This section is especially used to examine the existing legal framework used to govern the practice of building demolition in the local context. For this purpose, legislative documents ranging from policies, proclamations, directives and regulation were analyzed in both federal and city level. These documents are found to be relevant to this study as they contain areas that highlight construction and supervision, licensing and permit, professional's certification, urban planning and work place safety management. The following table presents the list of reviewed documents.

Table 1.3 List of analyzed documents

No.	Name of document	Document number	Document category
1	Ministry of Urban Development and Construction (MoUDC) construction industry Policy (first draft)	MoUDC 2012	Policy
2	Ethiopian Building Proclamation	624/2009	Proclamation
3	Urban Planning Proclamation	574/2008	Proclamation
4	Expropriation of land holdings for public purpose, payment to compensation and resettlement of displaced people	1161/2019	Proclamation
5	Council of ministers building regulation	243/2011	Regulation
6	Construction certification and registration regulation	648/2021	Directive
7	MoUDC registration of construction Professionals and contractors (amended)	19	Directive
8	MoUDC registration of design professionals and consultants (amended)	22	Directive
9	MoUDC building directive	5/2011	Directive
10	Addis Ababa City constrcution bureau infrastructure integration, construction permit and supervision building directive	2/2018	Directive
11	Addis Ababa City constrcution bureau ; 2014 E.C fiscal year 1st quarter construction works direct cost study proposal	2014	Price reference doc

Discussion of Findings and Gap Analysis

Stakeholders management

According to the findings of this research, clients/investors, contractors, policy makers, local enforcement personnel and others were identified as relevant stakeholders. There has been a gap detected when compared to other studies as the local practice lacks abiding terms; the fact that the existing regulatory protocols does not include a precise description of the minimum requirement for team composition of the undertaking entity and the involvement of a consulting body, made a way for opinionated performance of the activity. As a result, non-uniform results

have been recorded regarding the influence of the identified stakeholders from the different data sources analyzed in this regard.

Planning and methodologies

According to the evaluations made, an extremely poor performance is observed in this regard as the pre-demolition phase is not entertained with proper attention. In all cases, all forms of planning; cost, work procedure, time and waste were found to be missing. This was mainly due to the lack of exhaustiveness of the prerequisite for granting a demolition permit. In addition, failure of the bidding process to follow the formal line and lack of a forcing protocol on the regulatory documents stating mandatory submission of method statement accounts for the situation to get worse. The compromised involvement of professionals at the early stage of the practice contributes for the gap in planning as well as there is a lack of professional inputs on which method to adopt considering points such as minimal effect on the environment, anticipated amount of waste to be generated by the activity, project size and structural system complexity for a sequential flow of the work and safe completion.

Safety, Environment and Waste management

As a matter of trend, findings from all sources indicate that doing a preliminary building inspection for possible hazardous material identification is missing. Furthermore, contractors tend to do a building inspection only for the sake of rough property valuation rather than deep analysis guided by a profession in that specific area of expertise. This is also supported by the drawback observed in the legal documents as the issue of use of protection mechanism against environmental waste is stated as an optional procedure rather than being abiding and the inspecting body do not happen to give proper attention for not providing/wearing PPE. This is on top of the fact that documents in all level refrain from giving a detailed direction on recycle and reuse approaches. Due to these reasons, work place safety environmental sensitivity is rather observed to be compromised while performing a building demolition act.

Productivity and measure of success

According to the KPIs, customer satisfaction; measured in both qualities of product and service is listed as one factor of evaluation. The local practice tends to focus on short period of completion rather than quality of the service when considering measure of success of a building demolition project. In doing so, the efficiency of labor is also measured by the dedication in time to dismantle parts compromising the care and caution that the process requires once the salvageable elements are extracted. The gap is visible in both sides; while contractors tend to employ several unskilled laborers with minimum daily wage instead of the skilled once in focus of getting fast cash, clients/investors are observed to stay no comment on how/ by whom the activity will take place as they focus on receiving the cleared land as fast as possible. This is mainly due to the fact that there is no regulatory framework that assists contractors on team composition as per the skill required for such projects. Rather the acting body takes liberty of choosing who to work with and the regulatory body doesn't make the necessary follow up/supervision on the project to assess the existing site management trend. The route cause for this is lack of proper assessment of the contractor's demonstrative skills before awarding the project from the client side and underestimating the lifetime of demolition projects and the skill required to do so; except in some cases where project briefing was carried out instead of short skill training sessions prior to the start of the project.

Challenges and recording

In light of tracking technologies, salvage and recycle inventory and record keeping, the practice lacks to perform accordingly judging from the analyzed data. This is yet another aftereffect of lack of proper guiding principle on team composition including the minimum requirement of equipment and machineries necessary as per the scale of the project. Contractors decide on what type of technology to use just by a mere dependency on their capacity and experience rather than following the up-to-date advancements in the area as there is no forcing act to do so. The fact that the building demolition act doesn't not have a specific license type paved the way for contractors to lose interest in upgrading themselves in the field as well. Apart from this, there is no effort made from all sides; authority, client and contractor to keep record of inventory for recyclable and salvage items and other project related documents in purpose of creating a database for future use reference. As a result, similar challenges are observed to happen in most of the scenario.

FRAMEWORK DEVELOPMENT AND VALIDATION

To develop the conceptual regulatory framework, international models and framework samples were reviewed to adopt a structure as this framework is the first in its kind and there was no locally available base point to start from. Afterwards, the pillar points used to analyze the data and gaps were used as a starting outline point in addition to the contents of the findings gathered through analysis. The study aims to contribute to the body of knowledge of the industry in conceptual level for better understanding of the practice's implementation specific to building demolition in regulatory level. Accordingly, a conceptual regulatory framework is proposed by mapping barriers against acts, enabler instruments and check points as shown in the figure below.

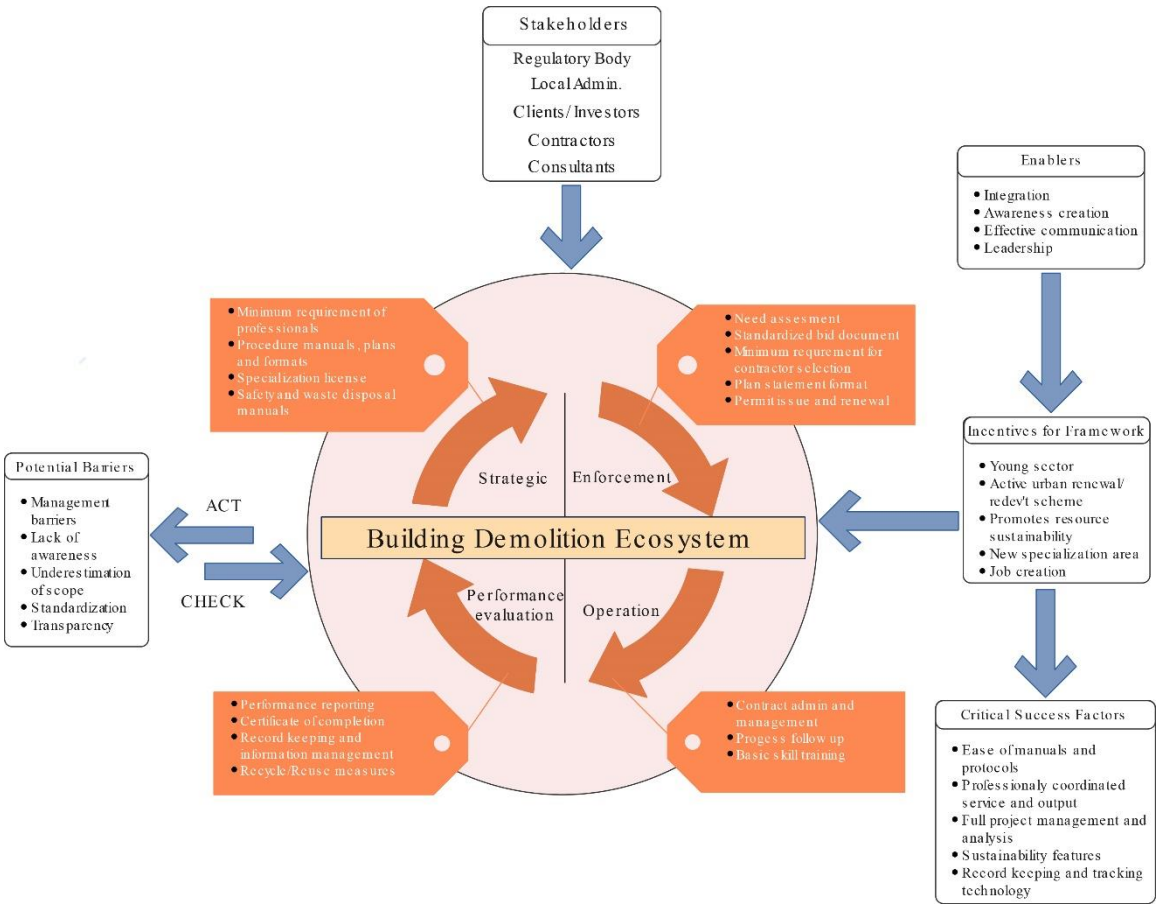

Fig 1.4 Proposed conceptual building demolition regulatory framework

As can be seen from the conceptual framework above, it starts by listing out the key participants in a building demolition activity as identified through the data analysis and literature review. These five distinct parties; regulatory body, local administration, client/investor, contractor and consultants have responsibilities in different scale in addition to the direct effort they make for a successful operation of a certain building demolition activity. Once input is injected in to the building demolition ecosystem, there is a hierarchical flow of acts in different levels. Through all these, the five pillar points; stakeholders' management, planning and methodologies, safety, environment and waste management, productivity and measure of success and information management and recording, shall be addressed in each level.

For validation, a selective expert's validation was used to validate the developed building demolition conceptual framework. The group consisted of six experts representing three divisions of the regulatory authority with direct relation to the practice of building demolition. These were; macro and micro building regulatory office, law, code and standard preparation directorate and professional license issue and renewal office. Due to current Covid-19 protocols, the researcher had to present and explain the contents the framework in pairs of two in person. This was done aiming to evaluate the proposed conceptual framework in terms of contents and applicability. Based on comments made by the participants, certain amendments were made before presenting it for rating. Finally, the same experts were asked to rate the developed conceptual framework in terms of clarity, simplicity, comprehensiveness, relevance and applicability using a five-point Likert scale (see Annex 5). This was done face-to-face after the updated version of the framework was attached with the rating scale. The result is presented as follows:

Table 1.4 Validation factor ranking

No.	Factors	Strongly agree (5)	Agree (4)	Neutral (3)	Disagree (2)	Strongly disagree (1)	Total	Total Number (N)	A*N	RII	Rank
1	Clarity	15	12	0	0	0	27	6	30	0.900	**2**
2	Simplicity	15	8	3	0	0	26	6	30	0.867	**3**
3	Comprehensiveness	10	8	6	0	0	24	6	30	0.800	**5**
4	Relevance	20	8	0	0	0	28	6	30	0.933	**1**
5	Applicability	15	8	3	0	0	26	6	30	0.867	**3**

CONCLUSION

The first objective this research aimed to address was to assess the current practice of building demolition and identify key challenges. For this, direct observation on selected sites, selective interview with relevant representatives of the industry from different levels and analysis of multiple documents were the instruments used to analyze the reality. Initially, the reason behind most building's demolition is as part of the inner-city redevelopment program being carried by the AACA. Even though this takes the bigger share, other secondary intentions such as; private development purpose, physical deterioration and road expansion measures were also found to contribute. In the process, the practice lacks proper emphasis from the regulatory authority in terms of guiding the practice by standardizing work items and qualification of professionals as it is considered to be a 'secondary (luxurious)' practice that is not worth investing on for a developing country like Ethiopia. The award process of projects lacked transparency as there is no available standard contract format to follow stating completion time, cost of demolition and methodology. The execution is carried out by MSE organized as a result of joblessness in their vicinity instead of a specialist contractor. In such cases, workers did not take any form of training regarding the work and no license was issued to the demolishing contractor.

Furthermore, environmental protection, safety and waste management procedures are compromised in great deal due to lack of enforcing protocol to abide with. As a result, the practice is subjected to a high level of randomized act and lack of professionalism by both the client and the contractor in terms of professional's involvement; as minimized cost, high return from the sale of salvaged building elements and rushed completion are ought to be the measures of success in most cases. Building demolition related decisions were also made by non-qualified actors; including owners, implying the execution is endowed with lack of knowledge without concern for effects like safety precautions and surrounding environment. All those gaps are further implied in the existing legal documents related to construction and demolition as they fail to incorporate specific detail guidelines in the main points of stakeholder's management, planning, productivity, sustainability and information management. After a thoughtful understanding of the current practice under the first objective, the next step was to conduct a gap analysis between current building demolition practice and international best practices by identifying key performance indicators (KPI). For this purpose, an intensive review of literature was conducted to get an overall insight of the practice considering the points of type, widely used procedures, method selection criteria and approaches. In the local trend, the building demolition methods and techniques widely deployed were dominantly of the "Classic method" where manual procedures are applied; using hand tools and hammers. This was mainly due to the considerable reliance of the practice on existing experience and skill to pass on the judgment without any proper technical and economic considerations. This fires back on the weak structure that the practice has in terms of enforcing professionals and consultants' involvement with proper knowhow of building structures. The study also sought to examine the factors considered while method selection in the existing practice through interview to evaluate it in light of standard factors considered to influence the selection of demolition methods found in the review of literatures. while structural characteristics, site conditions, demolition cost, past experience, time, and potential for reuse and recycling are found out to be key factors to be considered, the local trend only focused on few of them such as, cost of demolition and capacity of contractor to pay for machinery. Then the research goes on with identifying standard practice points to arrive at key performance indicators to use as evaluation stand points on the later parts of the research. Afterwards, the locally available guideline documents related to building demolition were assessed where it was found to have lacked specificity in terms of presenting the guiding protocols to follow while performing the act of building demolition. In addition, assessment of best practice was also done on bench marked countries such as Kenya, India, Hong Kong and the Netherlands to grasp the standard practice in an international level. The strength of each country was marked on points adopted from the KPIs. This allowed to clearly identify the gaps in the local trend; where they were found to evolve around five categories as stakeholder management, planning and methodologies management, safety, environment and waste management, productivity and measure of success and recording and information management. Finally, using the inputs from the above stated findings, the data was analyzed to arrive at a sound conclusion to use as a base point for conceptual regulatory framework development; addressing the third and final objective of the research. Focusing on the gaps that are found to be on a regulatory level, the framework was composed of empowering the key identified stakeholders; regulatory body, local administration, client/investor and contractor in different scale of responsibility. For a successful implementation of the framework, it was necessary to categorize actors to act level by level where it was divided in to strategic, enforcement, operation and record and performance evaluation stages. In each stage, the key actors are presented with their distinct role for a complete circle of the building demolition ecosystem. In addition to this, the need for this framework and key performance indicators were presented along with the enablers. At last, the output was presented to selected experts representing the regulatory body from different background, to assess and comment on improvement points.

After minor adjustments, the framework was found to be valid for implementation in conceptual level.

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