Investigation on Practice of Construction Continuity Management Strategy in Case of Ethiopian Construction Sectors

Chaltu Kejela Wayessa

A Thesis Submitted to

The department of Civil Engineering

School Of Civil Engineering and Architecture

Presented in Partial Fulfillment of the Requirement for the Degree of Masters Program in Construction Engineering and Management

Office of Postgraduate Students

Adama Science and Technology University

June, 2024

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Declaration

I hereby declare that this Master Thesis entitled "Investigation on Practice of Construction Continuity Management Strategy in Case of Ethiopian Construction Sectors" is my original work. That is, it has not been submitted for the award of any academic degree, diploma or certificate in any other university. All sources of materials that are used for this thesis have been duly acknowledged through citation.

Chaltu Kejela Wayessa	_____	_____
Name of the student	Signature	Date

Recommendation

I/we, the advisor(s) of this thesis, hereby certify that I/we have read the revised version of the thesis entitled “Investigation on Practice of Construction Continuity Management Strategy in Case of Ethiopian Construction Sectors” prepared under my/our guidance by Chaltu Kejela submitted in partial fulfillment of the requirements for the degree of Master’s of Science in Construction Engineering and Management.

Therefore, I/we recommend the submission of revised version of the thesis to the department following the applicable procedures.

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Approval Page

I/we, the advisors of the thesis entitled "Investigation on Practice of Construction Continuity Management Strategy in Case of Ethiopian Construction Sectors" and developed by Chaltu Kejela, hereby certify that the recommendation and suggestions made by the board of examiners are appropriately.

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We, the undersigned, members of the Board of Examiners of the thesis by Chaltu Kejela, have read and evaluated the thesis entitled "Investigation on Practice of Construction Continuity Management Strategy in Case of Ethiopian Construction Sectors" and examined the candidate during open defense. This is, therefore, to certify that the thesis is accepted for partial fulfillment of the requirement of the degree of Master of Science in Construction Engineering and Management.

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ABSTRACT

Construction continuity indicates the ability of an organization to perform under all conditions. This continuity can be achieved through planning that consist risk management and procedures for preventing interruptions (mitigating disruptions to operations). In other definition it is preparedness of the construction industry during a disaster time for running the organizational activities in proper manner. Construction continuity management strategy is essential for continuation of the construction sector and every construction sector has to have this as a major part of all work. The objective of the study is to assess the factors affecting construction continuity, to analyze the impacts caused by failure in achievement of construction continuity, to assess the methods to overcome factors affecting the construction continuity and to investigate practice of construction continuity management program. The studies on construction continuity management area are not enough for the readers. Study area of the research was Ethiopian construction authority, Adama city construction administration authority, Oromia construction cooperatives, and Arsi zone construction authority. The sample size is finite population. The sampling technique for the study is Non-probability sampling which is purposive sampling technique. This technique is useful for the researcher to select a sample using their expertise that is useful for the research and to gain detailed knowledge about a specific phenomenon. Data collected through questionnaire and interview analyzed using severity index method. Factors affecting Construction Continuity Management are lack of awareness, pandemic, lack of cc plan and management concern. The highest value of impact of factors using SI value is construction continuity plan and risk analysis which is =100%,2nd highest value is 93.75% which is organizational alertness and preparedness, 3rdvalue for rate impact of factors is 87.5% training and awareness. Generally the researcher recommend for the government a series governmental focus on continuity, devising the manufacturing industry of construction material, increase and motivate innovation of construction materials and give financial support, Governmental decision making on material cost, Know demand and supply for devising for regional requirement, and for the stake holders prepare continuity plan, risk analysis, prepare continuity strategies, know roles and responsibilities and give training and awareness on continuity.

Key words: - *construction continuity, risk management, disaster time, preparedness, mitigate, disruptions, purposive sampling, severity index*

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ACRONYMS

BCI: - Business Continuity Institute

BIA: - Business Impact Analysis

BS: - British Standard

CCM: - Construction Continuity Management

CCMS: - Construction Continuity Management Strategy

CCP: - Construction Continuity Plan

DRP: - Disaster Recovery Plan

FEMA: - Federal Emergency Management Agency

ISO: - International Organization for Standardization

FMB: - Federation of Master Builders

MTD:-Maximum Tolerable Downtime

NFPA:-National Fire Protection Association

PAS:-Publicly Available Specification

RPO:-Recovery Point Objective

RTO:-Recovery Time Objectives

TT&E: - Test, Training and Exercise

IRT: - Source Incident Response Team

CRT:-Program Crisis Response Team

CMTC: - Crisis Management Team Commander

CEO: - Chief Executive Officer

CHAPTER ONE

1.0. Introduction

In view of today's unpredictable environment, there is a tendency for catastrophes to occur unexpectedly and bring about undesired consequences. On the occurrence of a crisis like material shortage, many parties which have direct and indirect relation could be affected (Junying Liu, 2014).

Continuity in this study is not mean the indication of the progress or time period of an organization (what was?, what is? and what will be) but it means being in an industry or it is an organizations ability to be operational in all conditions. It has to be a strategic responsibility and function for all organizations. Having of the right tools and processes in place helps to keep a construction sector for moving forward in the face of difficulty through construction continuity plan as a tool, and every construction sector should have this plan. Construction continuity is achieved through the business continuity management strategy which consist business continuity plan.

Construction continuity management is a 'holistic management process that provides a framework for building resilience and the capability for an effective response to potential risks that safeguards the interests of its key stakeholders (Salman Alsalman, 2018). The other definition according to Multi-hazard Business Continuity Management, 2021; it is a management process which is practiced to counteract the negative impacts of possible threats on the continuity of organizational activities.

Construction continuity management contains the plan for construction continuity, it essentially provides a framework on the basis of which an organization builds its resilience and facilitates the continuation of its operations in the event of disruption of activities. Construction Continuity Management (CCM) is strongly related to crisis and incident (disruptions or strikes) management and preparedness planning (Istvan Posta M., et.al, 2011).

Construction Continuity Management strategy is aligned with international best practices and regulatory guide-lines reviewed and tested to ensure the readiness and effectiveness of alternate sites arrangements during uncertain situations. It is an ongoing process supported by senior management and funded to ensure that the necessary steps are taken to identify the impact of potential losses, maintain viable recovery strategies and recovery plans, and ensure continuity of services (Gregory L. Shaw, et.al.).

Generally, to be successful Construction Continuity Management has to become part of the culture of all organizations. This can be achieved through a combination of awareness raising and training.

1.1 Back Ground of the Study

Construction continuity management relates to crisis management, which means the organization works on coordination of activities in preparation for, and response to events that prevent or impede normal organizational operations. As a form of crisis management, construction continuity management (CCM) has evolved since the 1970s in response to the technical and operational risks that threaten an organization's recovery from hazards and interruptions. Its concept is evolved from Disaster Recovery Planning (DRP) (Brahim Herbane, 2010).

The results in Singapore suggest that greater effort has to be put in by the relevant authorities to promote Construction Continuity Management to large construction companies because the main reason for not implementing construction continuity management is lack of awareness to such a concept. Other than the increase in the prices of raw materials, the financial crisis was also considered as a crisis of severity (Junying Liu, 2010).

A good example was the sudden and unannounced ban on the export of sand on 9 February 2007 into Singapore by the Indonesian government. The sudden ban resulted in a shortage of sand supply in Singapore, leading to an exorbitant increase in the price of ready-mix concrete. Companies in the midst of their projects faced the prospect of further increase to their initial project cost estimates; as such, companies without adequate financial resources were left in a dire state and project progress slowed down or even stopped altogether (Junying Liu, 2010).

A recent survey by the Federation of Master Builders (FMB) found the critical issue facing constructions firms to be the rising cost of materials. The survey reveals that nine in 10 builders face increasing costs, and are experiencing a lack of materials such as timber, plaster and roof tiles.

The United Kingdom construction industry manufactures and uses an incredible amount of materials each year, producing around 2bn bricks, over 70 million sq m of concrete blocks and 30 million sq m of roof tiles per annum. However, in a year where the construction industry has faced unprecedented challenges owing to the COVID-19 pandemic process, we have seen shortages in supply of construction materials, and this causes significant delay and disruption to construction projects (Sinem Korkmaz, et.al, 2008).

Despite huge production levels, the UK remains a net importer of materials: with roughly 60 per cent of imported materials used in UK construction projects coming from the EU, and with congestion at UK ports already causing serious delays additional bureaucratic processes at the major ports could lead to short or medium term disruption (Sinem Korkmaz, et.al, 2008).

Many of the older European countries are now turning their attention to CCM in a big way, after many years of relative indifference. The state of CCM maturity in the Middle East is quite well like Saudi Arabia and Egypt. In Sri Lanka and Pakistan there is low concern on Construction Continuity Management but from Asian countries China takes CCM very seriously (Andrew Hiles, 2011).

Construction Continuity Management membership statistics shows that in Europe (66% coverage), Asia (10%), North America (9%), Australia (8%), Africa (3%), Middle East (3%), and South America with 1% (Andrew Hiles, 2011).

Construction continuity management in Africa is still in its infancy and even completely absent in a few countries. South Africa is the leading light in African construction Continuity Management, with a long history of professional services and adherence to global standards. While it would be incorrect to say the country is the perfect example of construction continuity compliance, it measures up to many European and American standards. Even

though there is a distinct lack of construction continuity management in government and financial circles in Africa in general, this does not mean the concept is unknown on the continent The biggest problem facing the implementation of Business Continuity Management standards across the board, from Namibia and Botswana to East and West Africa is the severe lack of skills available on the continent (Andrew Hiles, 2011).

According to a report from the Federal Emergency Management Agency (FEMA), 40% of businesses do not reopen following a disruption. On top of that, another 25% fail within one year.

Construction continuity is not something implemented at the time of a disruption; it refers to those activities performed daily to maintain service, consistency and recoverability. This illustrates that in order for construction companies to survive in such a volatile environment, companies fundamentally require a sound Continuity Plan.

1.2. Statement of the problem

Construction continuity is vital for any organization to survive in a competitive environment. It is too critical for organizations dealing with financial services, where a fraction of a minute may worth several millions of dollars (Nigussie Tariku, 2021). Being in an industry when it is constantly subjected to internal and external pressure is an indication for construction continuity; construction companies are likely to incur costly errors if they are caught unprepared when a crisis strikes.

Construction continuity management can make opportunities for advantage and gain hence those business units that react positively to a disruptive event can position themselves to recuperate rapid and move forward their long-term business execution (Kidist Shemeles, 2020). The advantages from construction continuity are that services and products remain available, employees remain employed, and related businesses and industries are not further disrupted.

The ambition of construction continuity itself as a conceptual matter is to allow the sector that has been affected adversely by a hazard event or crisis to surmount attendant obstacles and

return the business to functional form. The objective of continuity has less to do with returning to pre-event normal, because returning to normal in that respect may not be possible given the changed circumstances of the post-event environment. Rather, continuity suggests that a business, with planning, can restart operations rapidly (Christopher L. Atkinson, 2017).

Having a CCM that benefits an organization will assure that there is a more stable working environment. Analyzing the risks and threats can lead to a more cautious way of working with less disruptions and a more resilient organization. Identifying requirements and knowing how to deal with disruptions can also eliminate inefficient ways of working (Peter Gneist, et.al.2009).

Consequences if the construction continuity can't be practicable are; Violations of law (by absence of business plan they directly violating the law), Reputation (due to idleness of work), Decrease stability (the survival rate of a business continuity plan is less than 10% in this case), Financial risk (downtimes prevent operations from going smoothly, therefore the time value lead to financial loss), Reduced productivity, Construction interruption and Delays (Abebe Demissew Gashahun, 2020).

In the developing countries like Ethiopia, these difficulties and challenges regarding construction continuity are present alongside a general situation of socio-economic stress, chronic resource shortages, institutional weaknesses and a general inability to deal with the key issues. Evidences show that the problems have become greater in extent and severity in recent years. The awareness of the stake holders on construction continuity is backward.

1.3. Research questions

1. What is the current practice on construction continuity management strategy?
2. What are the factors affecting construction continuity?
3. What are the consequences if construction continuity can't be achieved?
4. How to overcome the factors affecting construction continuity?

1.4. Objectives

1.4.1. General objectives

The general objective is to investigate practice of construction continuity strategic management in Ethiopian construction sectors.

1.4.2. Specific objectives

- ✓ To investigate the practice of construction continuity management strategy
- ✓ To assess factors affecting construction continuity and their impacts on CCMS
- ✓ To analyze methods to achieve construction continuity
- ✓ To develop the construction continuity management strategy framework

1.5. Scope and limitations

This study was done on construction sectors for construction continuity management strategy and mainly focused on materials and business continuity plan as a factor for construction continuity, because of the major recent failure cases on construction sectors in Ethiopia. Materials nowadays become major cause of problem in the construction industry, and as a limitation lack of awareness on construction continuity management within the selected construction sectors were major, which is not enough for running the construction industry forward without disruption to activities.

1.6. Significance of the research

Construction projects face challenges during their execution; these challenges can be natural or man-made. From the major challenges one is lack of availability of construction materials like cement, inflation in cost of materials, and sustainability of the countries, therefore to perform in the middle of these crises construction industry have to practice construction continuity management strategy. In this case this study is significant for construction projects to adopt the best practices of construction continuity strategy if it is applicable in proper manner.

It has been found that there are no studies yet on Ethiopian construction industry adopting

Construction continuity management in their organizations. Therefore, this study is important to fill the knowledge gap. The findings from this study are beneficial and insightful for the research and development of the Ethiopian construction sector, particularly on knowledge about adopting and implementing management concepts in construction firms. The study contributed a framework for understanding construction continuity management for Ethiopian construction sector.

The beneficiaries from this study are the Contractor (because the contractor can work only if the construction activities are operational, and due to disruption the contractors lose their job), Owners (the crisis like scarcity of material within construction sector cause the owners to do not meet their demand means the scarcity of materials can cause inflation and owners estimate for the project and the cost of materials vary), Suppliers, Employees (the employees whose income is dependent on construction work), and Government (if this continuity program is practiced the government can get tax; that support the country's economy).

1.7. Hypotheses

Depending on the objectives of the study which are; to investigate the practice of construction continuity management strategy, to assess factors affecting construction continuity and their impacts on CCMS, to analyze methods to achieve construction continuity and to develop the construction continuity management strategy framework the researcher puts his hypotheses as follows;

H1:- Practice of construction continuity management in our country (Ethiopia) is insufficient but there is some awareness regarding to the CCM.

H2:- Major factors for CCM implementation will be lack of awareness and lack of proper continuity planning.

H3:- The negative impact from factors affecting CCM is losing resilience and continuation for construction industry.

Generally, Construction continuity is vital for all organizations and it provides a framework on the basis of which an organizations their resilience and it facilitates the continuation of its operations. Being in an industry or ability of being operational in all condition is said continuity. Construction continuity management is used for readiness and preparedness before and after crisis occurrence. The concept of construction continuity in African continent lack awareness between stakeholders. This can cause to less productivity, decreased stability, and insufficient reputation and also lead to interruptions and delays. The study is beneficial for all stakeholders and contributed a framework for understanding CCM for Ethiopian construction sectors. Therefore it is must to have a construction continuity management among all construction sectors.

CHAPTER TWO

LITERATURE REVIEW

2.1. Introduction

Construction continuity has many inter-related definition and is defined by different professionals as follows;

Construction continuity is a level of readiness or preparedness to maintain critical functions after an emergency or disruption. Maintaining critical functions after an emergency can be the difference between the failure and success of the industry. Getting a construction continuity strategy in place before disaster hits can save a tremendous amount of time and money as stated in VMware book of 2022.

Construction continuity is an organization's ability to maintain essential functions during and after a disaster has occurred. Construction continuity planning establishes risk management processes and procedures that aim to prevent interruptions to mission-critical services, and reestablish full function to the organization as quickly and smoothly as possible (Emre Balibek, et.al. 2021).

Construction continuity may be defined as an ongoing process to ensure that the necessary steps are taken to identify the impacts of potential losses and maintain viable continuity and recovery strategies and plans. It speaks to a general hope that an organization endures, beyond its creators, and into the indeterminate future. The ambition of continuity itself as a conceptual matter is to allow an organization that has been affected adversely by a hazard event or crisis to surmount attendant obstacles and return the functional form (Christopher L. Atkinson, 2017).

The objective of continuity has less to do with returning to pre-event normal, because returning to normal in that respect may not be possible given the changed circumstances of the post-event environment. Rather, continuity suggests that an organization, with planning, can restart operations rapidly. Construction continuity management (CCM) can be defined as

a management process that identifies risk, threats and vulnerabilities that could impact an entity's continued operations and provides a framework for building organizational resilience and the capability for an effective response Continuity planning is strongly connected to resilience of businesses and communities (Christopher L. Atkinson, 2017).

Construction continuity management (CCM) is a 'holistic management process that provides a framework for building resilience and the capability for an effective response to potential risks that safeguards the interests of its key stakeholders'. Also it is a way in which companies take the steps, and use the capabilities, which are necessary; to provide protection of assets and to proceed with the company's most important organizational processes after an unexpected interruption to business processes has happened (Salman Alsalman, 2018 and ISO 22301, 2019).

Construction continuity management relates to crisis management that is the organization and coordination of activities in preparation for, and response to, events that prevent or impede normal organizational operations. Being in an industry that is constantly subjected to internal and external pressure is an indication for construction continuity; construction companies are likely to incur costly errors if they are caught unprepared when a crisis strikes (Junying Liu, 2014).

Construction Continuity Management (CCM) is strongly related to crisis and incident management, and emergency planning. Construction Continuity Management evolved from Disaster Recovery Planning (DRP) (Istvan Posta M., et.al, 2011). Construction continuity management is also the process of planning for and dealing with potential threats and hazards to an organizations ability to maintain construction continuity and to stay operational (VMware, 2022).

Construction continuity management integrates the disciplines of Emergency response, Crisis management, Disaster recovery and construction continuity (DRI International, 2022). According to Business continuity management program solutions book the construction continuity management program provide capabilities for availability risk assessment,

organizational impact analysis, organizational process and resource dependency mapping, recovery plan management, exercise and crisis management.

CCM can be seen as strategic and tactical competence of the organization to respond to the emergency and disruption of its activities and the continuation of the activities on predetermined acceptable level (Hana Malachová, 2016).

A construction continuity management strategy is a planned series of actions for maintaining critical functions during a disruption. Any construction continuity strategy should align with a disaster lifecycle, which is the various stages a business goes through before, during, and after a disaster (Lisa Mc Stay, 2023).

The Construction Continuity Management strategy follows the Plan – Do – Check - Act life cycle, which aims for continuous improvement and ensure its alignment to the evolving needs of the construction sector (ISO 22301, 2019).

Fig.2.0: Construction continuity management strategy life cycle

Establishing and managing the CCMS (Plan**)** include:- defining the scope and boundaries of your Construction Continuity Management Strategy, and to ensure that, statement of organization's objectives, understood and communicated, demonstration of top management's commitment to CCM, Proper resources are allocation, and those with CCM responsibilities

are competent to perform their role, ensure that the organization embeds business continuity into routine operations and management processes (Robert Whitcher, 2009).

Implementing and operating the CCMS (Do) helps to enable you to identify critical activities and the resources needed to support your key products and services, to understand the threats to them and choose appropriate risk treatments, to identify CCM arrangements that will enable you to recover your critical activities within the recovery time objectives you set, to enable you to develop and implement appropriate CCM plans and arrangements (to manage any incident and to continue running your critical activities).

Monitoring and reviewing the CCMS (Check) helps to:-To ensure that the management monitor and review the effectiveness and efficiency of CCMS, review the appropriateness of your business continuity policy, objectives and scope, and to determine and authorize actions for remediation and improvement (Robert Whitcher, 2009).

Maintaining and improving the CCMS (Act) helps to: -maintain and improve the effectiveness and efficiency of your BCMS, for taking corrective and preventive actions as determined by the management review (Robert Whitcher, 2009).

International Labor Office of 2021 states, in Construction Continuity Management, the greatest part of the effort is to be done before the crisis, and the success depends on: how well the chain of catastrophic events has been anticipated, how accurately the response has been designed and communicated to team members.

The construction continuity strategy helps to ensuring that an organization can perform its essential functions under all conditions, also for reducing or mitigating disruptions to operations, ensures and validates continuity readiness through a dynamic and integrated continuity Test, Training, and Exercise (TT&E) program and operational capability and additionally to achieve the organization’s timely and orderly recovery and reconstitution from an emergency (Junying Liu, 2014).

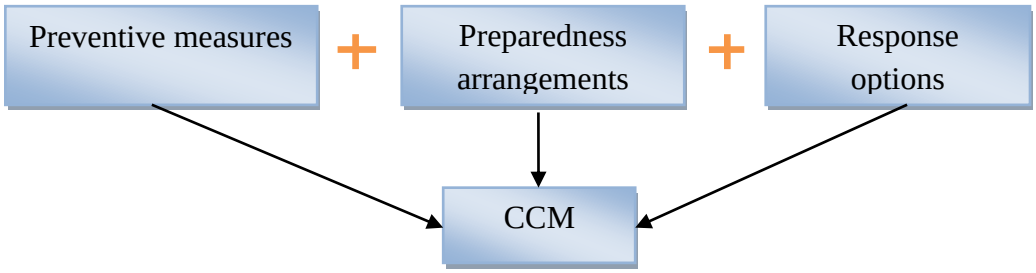

Fig.2.1: CCM (Business Continuity Management Toolkit, 2006).

Preventive measures and Preparedness arrangements are processes prior to occurrence of a disaster, but response options are actions after occurrence of disaster.

Construction continuity planning typically focuses on "high-impact" risks and on the critical functions and activities of the treasury, and assists in preventing, preparing for, responding to, managing, and recovering from the impacts of an incident or disruptive event to ensure operational resilience and limit losses. An effective construction continuity planning framework builds on analysis of potential impact of risks on business processes and includes risk mitigation and recovery strategies as well as testing, training and communication and crisis management programs. The most basic continuity requirement is to keep essential functions up and running during a disaster and to recover with as little downtime as possible (Emre Balibek, et.al. 2021).

Construction continuity features clear guidelines for what an organization must do to maintain operations. If the time comes for response, there should be no question about how to move forward with organizational processes. The company, customers and employees are all potentially at stake.

2.2. Advantages of construction continuity management

Construction continuity management is needed to achieve the following purposes:

Table 2.1: Advantages of construction continuity management

According to Junying Liu, 2014	According to Continuity Plan Template

	and Instructions, 2013
To enable a focused approach in developing a continuity plan using a well structured and comprehensive methodology,	Ensuring that an organization can perform its essential functions under all conditions,
To bring the situation back to normal as soon as possible after an adverse event,	Reducing or mitigating disruptions to operations,
To develop a pragmatic, cost effective and operable recovery plan to enable the company to achieve critical business processes during a major disruption to the company's operations, and	Achieving the organization's timely and orderly recovery and reconstitution from an emergency, and
To minimize the impact of the crisis on the company's operations	Ensuring and validating continuity readiness through a dynamic and integrated continuity Test, Training, and Exercise (TT&E) program and operational capability.

2.3. Principles of Construction Continuity Management

Main Principles of Construction Continuity Management to execute Continuity management include, each organization must recognize the threats and assess their resulting impacts. CCM ought to address issues and concerns in six wide ranges following the order (Kidist Shemeles, 2020).

Table 2.20: Steps for Construction Continuity Management

Steps for Continuity	**Definition**

Risk analysis and review	The threats to an organization can be identified through a risk analysis and review of its internal operations and external operating environment.
Business Impact Analysis	This means analysis of the potential impact of these threats on an organization and its ability to continue business operations and service can be obtained by conducting a business impact analysis. This would incorporate, where possible, the loss affects from both several days of business disturbance and financial results.
Strategy	The organization determines the appropriate methodologies to defend its interests. These procedures can be preventive or pre-emptive in nature.
Construction Continuity Plan (CC Plan)	That is a detailed business continuity plan. Should: set out the critical activities to be recovered, the timescales in which they are to be recovered and the recovery levels needed; the resources available at different points in time to deliver your critical activities; the process for mobilizing these resources; and detail actions and tasks needed to ensure the continuity and recovery of your critical activities.
Test and exercises	A built-up continuity plan should be approved by executing tests and exercises. These are done to highlight errors or omissions and confirm if the assets committed are available, accessible, and satisfactory for effective and compelling recovery. It also confirms whether the staff is recognizable with recovery methods, and whether the BC arranges meet its recovery objectives
Program management	It demonstrate as the organizations illustrate commitment in keeping up the currency of their plan through standard and systematic review of risks and organizational impacts, frequently reviewing its CCM procedures and re validating its BC plan. Program management

	serves to approve the capability of the BC plan to fulfill the plan's objectives. Approval points to uncover flaws within the plan design, for example any mistakes and inadequacy of the plan of the plan.

Impact analysis uses are presented accordingly in table 2.21.

Table 2.21: advantages of BIA

1	Refine the scope of the Business Continuity Management System
2	Aid in the understanding of where to focus risk treatment
3	Begins the process of continuity strategy development and allows the organizations to select the most cost-effective strategies
4	Understand where to set escalation levels for support systems and potentially when to activate the business continuity plan
5	Serve as a venue for the awareness of the business continuity management system
6	Reveal potential inefficiencies in normal operations. The results of any LEAN initiatives that produce process mapping can be incorporated into the BIA and provide a deeper level of "understanding the organization"
7	Identify critical resource requirements to support the management system and to implement the continuity strategies
8	Identify the financial and operational consequences of a function's loss over time
9	Highlight inter-dependencies from one process or function to another and to any third party relationships
10	Establish the Recovery Time Objectives (RTOs), Recovery Point Objective (RPO), and the Maximum Tolerable Downtime (MTD) and
11	Determine the legal, regulatory, and contractual obligations related to business continuity or to the failure to provide a service or product.

2.4. Stake holders and their role in construction continuity management

Construction continuity can be achieved through stake-holders active participation with in a construction industry. These stake holders are listed according to Multi-hazard Business Continuity Management, 2021.

Table 2.3: Stakeholders and their role in CCM

Stake holders	Roles
Employers	Make strategic decision; lead the development and management of business continuity; allocate and redeploy resources as needed; take care of the workforce.
Workers	Participate actively in the continuity management process, possibly as members of CCM teams.
Customers	Collaborate with suppliers to design integrated business continuity strategies; share information before, during and after the disaster.
Financial institutions	Provide different financial services; develop insurance products that are tailored to the risk profiles of the concerned geographic areas and businesses; deliver a whole set of services to clients by providing professional advice and training.
Suppliers	Collaborate with the clients to design integrated business continuity strategies; share information before, during and after the disaster.
Associations and service providers	Provide technical counseling; prompt networking; collect and disseminate information (possibly acting as main centre of information production and dissemination).
Public authorities	Coordinate rescue operations and the recovery response.

2.5. Factors affecting construction continuity

2.5.1. Shortage of material and finance

According to recent data, 71% of contractors are facing raw materials shortages in at least one material. Prices are also high at the moment. The increase in demand and reduction of supply has caused the price of raw materials to increase, and it isn't clear when things will return to normal. For most projects, this only means the price to complete the project is more than it normally would be. Construction workers have to find something else to do when the materials of another task aren't available. Growing supply chain issues are endangering the construction industry's recovery and with it the economic recovery of many nations worldwide (Mike Hayes, 2021).

Only very few construction materials are locally available. The raw materials (i.e. ingredients or components) of certain materials are sometimes ordered and collected from some other countries (M M Rahman, et.al. 2017). The supply of a particular building material is affected by: the availability of raw materials; the technology for extracting and processing raw materials; the environmental impacts related to the production process; and the government policy.

Apart from the lack of raw materials, building materials supply may be unable to meet local demand because of the low production capacity and low quality, especially in the developing countries. Apart from market forces, the price of building materials may also be controlled by the government. To facilitate the local construction industry, the government can fix the price levels, and provide subsidies for some materials, especially for the materials that are used in public sector projects. The government can encourage or discourage the import of some building materials by changing import duties, and taxes, or quotas on them (Low Sui Pheng, et.al. 2019).

A report from Challenges in construction states raw material shortages and price increases scarcity of raw materials due to supply chain disruptions and rising wages are leading to high inflation in the construction sector, casting a cloud over construction quality and future insurance losses. Even if prices in the construction sector soften and align with general inflation, long-tail risks remain. According to Melaku Alebel, Minister of Trade and Industry, the shortage of cement is mainly due to lack of inputs, lack of leadership and professional skills, security problems, supply of raw materials, and other pertinent issues.

The other reason for many organizations fail to implement effective BCM is due to lack of financial support as great prudence in expenditures is exercised by many senior management and the board of directors. This may be due to there is no direct financial benefit or return of investment is seen from the BCM implementation (Zahari Abu Bakar, et.al, 2015).

2.5.2. Pandemic problem

One example seen is COVID-19, it is having a massive impact on construction projects, by slowing them down, causing disruption, even if only because supply chains have been severally disrupted. In construction, the impact will be seen on temporary workers or daily laborers since construction works specifically small and medium projects will face significant loss on demand; hence, daily income will drop to zero for this segment. When we conclude it, scarcity and increasing cost of construction materials, hard currency shortages, reduction productivity, shortages of labors, delay of projects (extension of time), and incurring additional cost are the major impacts of COVID-19 on the Ethiopian construction industry (Abebe Demissew Gashahun, 2020).

Labors shortages due to difficulties in mobilization and it will cause 61% of job loss in the only by construction industry. In this case, temporary/daily laborers (that constitute up to 90% of the jobs in this industry) are expected to lose their jobs relatively quickly, and different levels of skilled works will be affected in the waves. COVID-19 also cause reduction in productivity is because of the social distancing of laborers and restrictions by the government, management becomes intensive because of unfamiliar roles &responsibilities introduced by regulatory bodies and claim administration and Price escalations of a resource

like the cost of cement were 210ETB before COVID-19 and now it riches to 500ETBwhich is 239% of price escalation (Abebe Demissew Gashahun, 2020).

Disruptions on the supply chain of construction materials, due to difficulty in mobilizing especially importing materials like cement, steel, and aluminum. This due to the major countries (China, Turkey, Japan, UAE, UK, USA, Italy, South Africa, India,) that Ethiopia imports for the construction industry are now made lockdown due to this Noble Corona Virus pandemic (Abebe Demissew Gashahun, 2020).

Ethiopian GDP declined by 2.7% due to a decline in commodity prices, FDRE, Ministry of Urban Development and Construction, May 2020, report stated that COVID-19 will cause reduction of productivity by 40%, the income of labor, and material suppliers. In addition to that contractor's expenditure and the unemployment rate will be increased by 15.1% and 40% respectively. As well as GDP may be reduced by 40% (Abebe Demissew Gashahun, 2020).

2.5.3. Failure in construction continuity plan

An effective CCP is critical for companies in the construction industry. Being in an industry that is constantly subjected to internal and external pressure, construction companies are likely to incur costly errors if they are caught unprepared when a crisis strikes. According to the Business Continuity Institute (BCI) (2002), Business continuity plan is the act of anticipating incidents that will affect mission- critical functions and processes for the organization and ensuring that it responds to any incident in a planned and rehearsed manner (Junying Liu, 2014).

Construction continuity starts with initiating the planning project. Construction impact analysis (CIA) and risk assessment are essential steps in gathering information for the plan. Construction continuity plan helps to have the right tools and processes in place to help keep a construction company moving forward in the face of difficult circumstances. One of these tools is called a construction continuity plan, and every construction business should have one (Istvan Posta M., et.al, 2011).

According to Risk SOURCE Clark-Theders, construction continuity planning is the process of identifying the parts of your company that are most vulnerable in order to create a plan to

recover them if a business interruption occurs. A construction continuity plan is a document that details how a construction company will continue to operate during and after a disruptive event. Weather emergencies and natural disasters often come to mind as having the potential to affect a construction company's operations. However, they are not the only issues that can disrupt projects and cause financial harm to a business.

The CC Plan is a central pillar of Construction Continuity Management. It is a documented collection of procedures and information that have been developed, compiled and maintained in readiness for use in an incident, to enable an organization to continue to deliver its important and urgent activities at an acceptable predefined level. The term Construction Continuity Plan implies having a single document, but in practice, it usually consists of multiple plans corresponding to five stages of the BC cycle: emergency response, incident management, continuity, recovery and resumption (Emre Balibek, et.al. 2021).

Construction continuity plan (CCP)" refers to the identification and protection of critical construction processes and resources required to maintain an acceptable level of a construction, protecting such resources and preparing procedures to ensure the survival in times of construction disruptions. Thus the existence of the CCP enables to resume operations at the earliest opportunity without any further implication in the event of an encounter with such contingencies. CCP is crucial to every company as it helps to ensure the continuous well-being of the company (Junying Liu, et.al.2010).

The biggest problem facing the implementation of Construction Continuity Management standards across the board, from Namibia and Botswana to East and West Africa is the severe lack of skills available on the continent and the main challenges faced include awareness, understanding, long - term management and maintenance and cost (Andrew Hiles, et.al., 2011).

2.5.4. Lack of awareness

Construction continuity awareness is crucial because it helps ensure that all members of an organization are familiar with the organization's CC plan and understand their roles and responsibilities in the event of a disruption. If everyone is aware of the plan and knows what

to do in the event of a disruption, it will be much easier to implement and help your organization keep its operations intact (Bryan Strawser, 2021).

2.6 Methods to overcome factors that affect construction continuity

Best practices for dealing with materials shortages and practice of continuity plan according to 4 Ways to handle Material shortages as a Business book these are:-

2.6.1Be prepared with alternative sources

Obviously the biggest problem with raw materials shortages is the reduction of your business' ability to sell finished products. Running out of raw materials with no alternative source is an easy and preventable way to lose out on revenue streams.

Quote materials from several suppliers so we have multiple potential sources for our raw material, and be prepared to utilize several of them when our regular supplier runs into shortages. Keep in mind that if we go this route, we may need to alert your customers to a potential change in raw material quality. If no alternative source exists or we are unable to order the same material from any of our sources, we'll need to look into a temporary redesign or reformulation of our product (Lisa Dromgoole, 2021).

The other means of preparing for alternative sources is through diversifying supply chain; the sector has a long and fragmented low-margin supply chain, and was part of the economy that was likely to be quickly and heavily impacted by the pandemic. Factory shut-down during the first lockdown and stockpiling of materials created a backlog, but with recovery in mind, it's in the interests of all in the sector to help stabilize the UK supply chain as well as ensuring your projects are able to run as smoothly as possible. Responsibility falls to all to ensure the supply chains are managed and that industry competence and UK credibility is maintained (Lisa Dromgoole, 2021).

2.6.2 Stay up to date on global supply patterns

Global supply chains follow trends that allow you to roughly predict the rise and fall of materials shortages. Simply staying up to date with current events and being aware of your supply origin is the most effective way of predicting a coming material shortage.

Professionals in any industry and at all levels should be aware of current world events for this reason (Ihsan Ali Husie, 2021).

2.6.3 Plan as early as possible

If we utilize alternative sources and follow our industry network to stay up to date on global and industry supply trends, you should be able to plan for shortages and rises in demand earlier than most. Planning ahead could allow us to adjust our products to accommodate different materials or come up with cost effective solutions to material storage problems (Lisa Dromgoole, 2021).

Long term planning is one type of planning; our materials have no shelf-life and we've invested in the long term storage of these materials to ensure that when shortages come, we're significantly less affected by them. We can absorb price shocks better than most manufacturers navigating materials shortages, making our parts as affordable during shortages as they are during times of abundant supply.

The steps that need to be followed in order to ensure good construction continuity in construction companies which experience a crisis are;

Fig. 2.2: Steps for risk management (Salman Alsalman, 2018)

The identification of risks is so important it affects the success of the whole business continuity management process, and needs to be repeated, rather than being a one-off process, and that even in later stages of the project, risks need to be identified. Different processes which can be used to identify risks include brainstorms, modelling, checklists and the use of project plans (Salman Alsalman, 2018).

Once the risks have been identified, the construction company needs to measure the size of each risk based on the likelihood that they will occur and, if they do occur, the effect that they

will have on the organization. This will help to identify the major risks which need to be tackled. These risks can then be prioritized in order of their effect on the company. This can be done using qualitative or quantitative analysis.

Response to risks, there are four ways for construction companies to deal with risks. they can avoid the risk by changing their project plans so the risk no longer exists; they can use contracts to transfer the risk to a third party; they can mitigate the risks by reducing its probability or impact; or they can accept the risk by factoring in the potential consequences which will happen. It is very important that there be close communication and teamwork in order to effectively manage the process of risk control. An effective way for construction companies to assess the process of risk management is by giving different risks different statuses – for example, a risk should belong to one of the following outcomes: identified, assessed, responses implemented, occurred or avoided (Salman Alsalman, 2018).

To be effective, the management of operational risk that is associated with individual construction projects needs to be tied into the risks of the overall company strategy. In other words, in order to ensure good business continuity management at the company level, it is important for the company to treat each of their different construction projects as a portfolio which is measured according to their level of risk. This will mean that the company can be aware of the construction projects which are the riskiest and then take steps to control these risks and reduce their impact on the operations of the whole company (Salman Alsalman, 2018).

The construction industry still has poor levels of risk management due to the fact that they rely mainly on contracts for the transfer of risk instead of proactively trying to manage risk themselves.

Risk management is a system that defines an organizational structure, as well as team roles and responsibilities, to enable a company to react to situations ahead of an emergency, it is a bridge between risk mitigation (business protection), risk management (business resilience), and crisis recovery (business resumption), also a holistic solution meeting the requirements of all corporate needs and activities, whether related to brand, operations, reputation, a tool that

helps companies negotiate fluid and challenging risk environments, effectively dealing with unpredictable events, and an insurance mechanism that supports business continuity and recovery when risk mitigation measures fail.

2.7. Practice of Construction Continuity Management in Ethiopia

To strengthen Construction Continuity Management in Ethiopia, it is recommended, drawing on global best practices and experiences efforts are made to encourage Universities and other higher-level schools to include the concept of Construction Continuity Management in their curricula. As for the Government of Ethiopia - mentioned above - it is highly recommended that it should opt for a modern approach of BC management aiming at improving and strengthening organizational continuity capabilities, such as the adaptive CC approach. Adopting a long- term view, construction continuity management could be promoted beyond the public sector, namely to the private sector and civil society organizations (Aynalem Abayneh Mamo, 2020)

The capabilities to deliver services or manufacture products and continue these business activities during crises will become more and more important. It could be the function of the Job Creation Commission in partnership with the Investment Commission to develop guidelines for new and existing businesses to include construction continuity management in their strategic planning as well as guidelines for providing that should enable the businesses to survive a crisis, such as the one caused by COVID-19.

Sometimes, the need to become more creative and innovative to maintain the survival of the business creates an opportunity to realign products, services or at least revisit the best way to manufacture or deliver the business services thus promising better business results in general. The need to pivot the organization’s business more creatively can result in a wider offer, or in the ability to enter a new market, or in developing more efficient and effective ways to provide one’s services or products.

2.8. Negative impact of factors affecting Construction Continuity

2.8.1 Failure in continuity plan

If a business is not properly prepared and cannot address a disruption that has an impact on the business continuity of an organization, it can drastically affect the company's reputation and its future. Clients and consumers both accept the likelihood of a disaster taking place, but they also want businesses to have efficient measures in place to respond to any disruptions (Ingrid Horvath, 2023).

Possibly one of the biggest consequences of not having a business continuity plan would be the financial impact on the company. The survival rate of a business without a business continuity plan is less than 10% and 78% of companies had reported losing out on one or more mission-critical applications due to a disaster or crisis at some point in their lifetime, and around 28% reported losing a data center for more than a week time. This level of disruption causes a loss of productivity. It also damages a lot of different aspects of business operations. It affects sales as leads do not get converted, which negatively impacts customer service as the crisis continues. All employees need to have the most up-to-date, relevant knowledge and training possible in case of a crisis to minimize the damage in case the company is still operational (Ingrid Horvath, 2023).

2.8.2 Lack of awareness

This can result in vulnerability to potential disruptions. When businesses do not have a clear understanding of the potential risks and impacts on their operations, they may not allocate the appropriate resources or develop effective strategies to address them (Ollie Law, 2023).

2.8.3 Pandemic problem

URM article released in 2023 states the pandemic had a significant impact on supply chains, with major disruptions to global trade and transportation, factory closures and workforce shortages, all causing delays and shortfalls of essential goods and raw materials. During the peak of COVID, organizations had to deal with staff shortages due to employees falling sick, having to self-isolate, or having to take care of family members. Following on from this, COVID has also led many people to re-evaluate their lifestyle choices and has led.

2.8.4 Material and financial shortage

Financial resilience is a crucial aspect of business continuity issues. It ensures a business has the financial resources and stability to withstand unexpected disruptions or challenges. One of the main challenges businesses face in terms of economic resilience is maintaining sufficient cash flow during times of crisis. This can be particularly challenging for small businesses or those with limited access to capital.

Insufficient resource can present significant business challenges in maintaining business continuity. Without the proper resources, companies may struggle to carry out daily operations. This can result in delays, and decreased overall productivity (Ollie Law, 2023).

2.9. Strategies for Construction Continuity Management

According to Business continuity strategy, 2019 the strategies for construction continuity management helps;-

Table 2.4: Objectives of the strategy

No	**Objectives of Strategy**
1	To identify preventative measures that can be carried out to minimize the likelihood of an incident occurring, to ensure the Council can continue to exercise its functions in the event of an emergency, ensuring that statutory requirements are maintained.
2	To develop a process to review and update the overall Plan and develop service area, functional or specific plans where necessary, in order to protect the services and reputation of the Council.
3	To undertake training and awareness program for staff elected members, suppliers and partners.
4	To carry out regular tests of the Plan to validate the arrangements.

5	To integrate the Business Continuity requirements with the Emergency Planning responsibilities of the Authority to ensure that in the event of a major disruption the Authority can respond appropriately both internally and externally.
6	To identify the essential services, in order to determine overall priorities for recovery of functions if disruption takes place, to ensure all Council service areas are involved in the preparation of the Plan, so that there is an effective and consistent response to service continuity, and
7	To provide a basis for cost benefit analysis to determine which contingency plans will be developed.

The first Strategy is assessing Risks and Impacts a thorough risk and impact assessment is key to any effective business continuity plan. This involves identifying potential threats that could disrupt operations. Each business, even within the same industry, faces unique challenges and vulnerabilities. The assessment should include a detailed analysis of how these risks could impact various aspects of the business, such as revenue, customer satisfaction, and employee safety.

This strategy is crucial for understanding which areas is most at risk and need prioritization in the continuity plan. By evaluating both the likelihood and potential impact of different scenarios, organizations can develop more targeted and effective strategies to mitigate these risks **(**Lisa McStay, 2023**).**

The second strategy is developing a Comprehensive Plan covering all critical functions; this involves identifying and safeguarding critical functions that are essential for maintaining operations during a disruption. This process requires a deep understanding of the organizations operational framework. Critical functions include, for example, key customer services, supply chain management, IT infrastructure, and employee safety protocols.

The plan should outline procedures for maintaining or rapidly restoring these functions in the event of a disruption. This could involve diversifying supply chains, implementing redundant IT systems, or establishing alternative operational procedures. The goal is to ensure that the business can continue to operate, even in a reduced or modified capacity, during a crisis.

The third strategy is involving Key Stakeholders in the Planning Process; -Input from stakeholders – including employees, staff members, customers, suppliers, investors, and local communities – can provide valuable insights into potential risks and practical recovery strategies. Engaging stakeholders helps to align the continuity plan with the expectations and needs of those it will affect. This collaborative approach can also ensure that the business has access to necessary resources during a crisis and fosters a sense of shared responsibility and commitment to the plan. Regular meetings and communications with stakeholders can keep the plan aligned with changing expectations and business environments.

Fourthly Train Employees on their Roles in the Continuity Plan; -Employees should understand the potential risks the organization faces and their specific responsibilities during a crisis. Hence, Continuity training should cover essential crisis management and emergency response procedures, emphasizing coordination and communication within the team. Employees should be comfortable with their roles and understand how their actions can impact the overall recovery effort.

Regular training sessions can help employees stay prepared and ensure that the organization can respond effectively to a crisis. Such preparedness not only boosts the employees' confidence but also enhances the overall resilience of the organization (Lisa McStay, 2023).

After training Test the plan regularly to identify weaknesses; - testing should simulate various disruption scenarios to evaluate how the organization and its employees would respond. This process helps to reveal potential weaknesses in the plan, such as resource shortages, communication breakdowns, or logistical challenges. Regular testing also ensures that all employees are familiar with their roles and responsibilities in the event of an actual disruption. These tests can range from tabletop exercises to full-scale drills. Feedback from

these tests should be used to refine and update the plan, ensuring it remains relevant and effective.

Updating the Plan Periodically for Current Organizational Need is next; -The business environment is constantly evolving, with new risks emerging and existing risks changing in nature. Therefore, it's essential to update the construction continuity plan periodically to reflect these changes. This could involve adapting to new technologies, regulatory changes, or shifts in the market. Regular reviews should be scheduled to assess the plan's relevance and effectiveness in the current business context (Lisa McStay, 2023).

These updates should also consider feedback from stakeholders, lessons learned from past disruptions, and changes in the business's structure or operations. An up-to-date plan ensures that the business is always prepared for the most relevant and likely risks it faces.

The other strategy is communicating the Plan to all Employees and Stakeholders; - Effective communication of the construction continuity plan ensures that all employees and stakeholders are aware of their roles and the procedures to follow during a crisis. Clear and transparent communication helps to build confidence and ensures a coordinated response to disruptions.

Crisis communication strategy should include regular updates, training sessions, and accessible documentation of the plan. It's best to use a variety of communication channels to reach all parts of the organization and its external partners. In addition, the plan should include protocols for external communication with customers, suppliers, and the public to maintain trust and reputation during a crisis (Lisa McStay, 2023).

2.10. Major outcomes if construction continuity can’t be achieved

According to Agility Recovery, 2019 and KORTEX Solutions, 2021 the outcomes are; Violations (if the business does not having an emergency action plan, they are in direct violating the law), Reputation due to idleness of work, Decrease stability (the survival rate of a business continuity plan is less than 10%), Financial risk (downtimes prevent operations

from going smoothly, therefore the time value lead to financial loss), Reduced productivity, Construction interruption and Delay of projects.

2.11 Inclusions in construction continuity management strategy

Preparedness plan for Construction includes the following steps:-

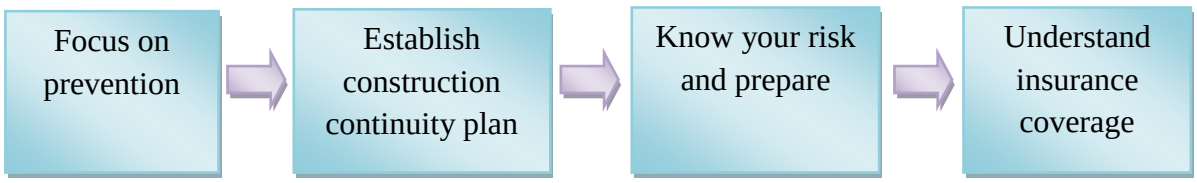

Fig. 2.3: Steps for preparedness in construction

Focusing on prevention is the best way to avoid a disaster is to try and prevent it from happening in the first place, and Knowing risks and be prepare for means once you know the types of disasters for which you are most at risk, then you take steps to minimize loss.

Major processes in Construction continuity management are; -

Fig.2.4: Major processes in CCM (Hana Malachová, 2016).

Understanding the organization means using construction impact analysis and risk assessment to identity the critical deliverable s, evaluates recovery priorities and assesses the risks that may lead to a disruption in service delivery. At this stage it is important to define the main processes running in the organization and resources that are involved in their realization.

Determining CCM strategy identifies alternative strategies available to mitigate loss, and determine their potential effectiveness to deliver its critical function. In this phase, procedures for the selection of a suitable strategy for reducing losses in case of emergencies are designed. Specific steps for crisis management situations have to be determined. All procedures are based on material as well as human resources of the organization and the ability to preserve the continuous operation in the case of emergency or disaster so as the functioning of the organization and provision of services under limited conditions are not endangered (Hana Malachová, 2016).

Developing and implementing CCM response means developing a response to construction continuity challenges and plans underpinning it. One of the main outputs of construction continuity management is a Construction Continuity Plan. The plan provides a comprehensive overview of the steps and procedures that must be implemented for business continuity and operations. This plan covers all identified threats that could disrupt operations. The plan also contains a detailed guide how to restore services in the shortest possible time.

Construction Continuity Plan should consider at least these main points; Purpose and scope, Roles and responsibilities, Conditions and procedures of the plan activation, Locations, The list of tasks and activities, and Important contact information. The main benefit of the plans for construction continuity management is the fact that at the time of the plan activation, all responsible personnel is familiar with and trained in the procedure for dealing with emergencies (Hana Malachová, 2016).

Maintaining and auditing CCM is ensuring that CCM plans are fit for use, kept up to date and quality assured. Training tests help in determining whether strategies and CCP plans are up-to-date and reflect the actual needs of the organization. Regular testing increases the ability of

employees to respond flexibly to unexpected events. They also help to optimize the resources needed for the restoration process (Hana Malachová, 2016).

Establishing a CCM culture in the organization concerns on the need to ensure continuity culture is embedded in the company by raising awareness throughout the key stakeholders, and offering training to key staffs on BCM issues (Junying Liu, 2014).

2.12 CCM Standards

The future is uncertain. An effectively implemented CCM standard gives an organization confidence to move forward knowing it can manage a disruption, has competitive advantages and also for preparedness of organizational disruption (this is particularly important in sectors where disruption can have significant impact on people's lives as well as financial impacts).

ISO 22301 standards designed to be applicable to all type of organization. Regardless of size, complexity, sector, industry, purpose, any organization can implement and maintain these Business Continuity Management Standards (BCMS) that complies with ISO 22301(ISO, 2019).

Table 2.5: Standards for CCMS

Name	Title	Description
ISO 22301	Business Continuity Standard implementation guide	Newly introduced BCM standard in 2019 and provides a best practice framework to support organizations to effectively manage the impact of a disruption to its normal operation.
FEMA	Federal Emergency Management Agency /Federal Executive Branch National Continuity Program and Requirements/	It is published by United States and states that organizations must fully integrate continuity planning and procedures into all aspects of daily operations to create a culture of continuity. Only with a coordinated approach to continuity can organizations effectively respond to and recover

		from catastrophic emergencies
PAS56	Publicly available specification – BCM	It is a standard that was published by the British Standards Institution in 2003 which then, largely succeeded by BS 25999. The intention of PAS 56 is to be adopted by organizations to enhance their performance in BCM, whether starting out the BCM plan for the first time or refining their existing BCM plan next to best practice
BS 25999 (Part 1 and 2)	BSI BCM	The standard was launched by British Standard Institute in 2006 and 2007 which is considered as excellent reference for BCM. The standard has 2 parts namely, code of practice and specification for BCM
NFPA 1600	Standard on Disaster and Emergency Management and Business Continuity Programs	It was created by National Fire Protection Association (U.S) in 1995 which is used as blueprint for any organization in dealing with emergency and BCM

2.13. Research Gap

The concept of construction continuity in different countries lack understanding/ awareness by construction stake holders. Especially in developing countries most of the projects face delays when crisis strike and the activities are disrupted in the time of crisis. The studies on this area (construction continuity management strategy) are rare for giving more awareness and also they lack conceptual frame work for companies.

Generally construction continuity management strategy is a vital process of achieving the continuity of construction activities without interruption of the activities and all organizations

must practice. It is achieved through application of business continuity plan that make an organization to be in an industry by means of strategic actions and planning.

This construction continuity management strategy helps for the construction sectors for being operational in all conditions, build their resilience, keep the progress of projects, reduce financial loss, manage crisis, and etc.

CHAPTER THREE

METHODOLOGY

3.1 Study Area

This study was carried out in four selected construction sectors; these sectors are Ethiopian construction authority (Addis Ababa), Adama city construction administration authority (Adama), Oromia construction cooperatives (Addis Ababa), and Arsi zone construction authority (Assela). The reason is federal construction office is the major source of information for this study because, the flow of authority if from upper lever to lower. Beside Adama and Asella were more nearest for the collection of data.

3.2. Study Design

In this study, mixed method research approaches were used. Mixed approach on the contrary adopts the combination of both quantitative and qualitative approaches. To employ mixed method, a questionnaire survey was conducted and analyzed.

In line with the above strategies this thesis was carried out using a four phase approach in order to achieve the objectives of the research. The first was undertaking a literature search on previous publications (secondary sources of data) like articles, books, researches and journals on construction continuity management strategy. In the second phase, questionnaires were developed and distributed. On the third phase upon obtaining the desired data from selected construction offices, data's were checked and sorted. Finally, this was followed by thorough discussions in order to draw conclusions and to forward recommendations based on the findings of the study.

3.3 Population

For this study the populations were the Federal construction authority, Adama city construction administration authority, Oromia construction cooperatives, and Arsi zone construction authority because of for their easiness of access to data and not far for the study.

3.4 Sample Size and Sampling Procedure (Sampling Techniques)

The sampling technique for the study was Non-probability sampling (used to pick out the sample in relation to criterion and all individuals within the population have no equal chance of being in the sample) which is purposive sampling technique. This technique uses the researcher to select a sample using their expertise that is useful for the research and to gain detailed knowledge about a specific phenomenon. Mostly it represents the information's gathered and data's that are collected by descriptive format also by tables. The information's collected from the questioners either by open or closed questions was represented qualitatively and descriptively. After all the outcomes and findings of deliberations they were further analyzed and presented accordingly.

3.5 Data Collection Process

In data collection process there was collection of information's from different sources. From the sources questionnaires and interview were conducted. The primary data was the source for this study that was done by interviews, structured questionnaires, not only that also secondary data played a role for collection of information from literatures, reports and published materials.

3.6 Data Analysis

Once the raw data which are collected from questionnaire (open and closed type) and interview were on hand, quantitative and qualitative methods of data analysis were used. Data's were analyzed in percentages, mean, median, mode, standard deviation, severity index and frequency index with explanations and lastly interpreted. The researcher used visual aids such as tables to aid the reader in understanding the paper.

The data's collected through above techniques were analyzed to identify practice of CCM in Ethiopia, to identify the factors affecting CC and their impact on CCM by severity index frequency method. Then categorize data's, give codes and finally getting to data entry while processed. In analyzing data dummy tables were used, there was cross tabulations and frequency counts.

$SI\% = \sum_{a=1}^{5} a\left(\frac{n}{N}\right) * 100/5$

Whereas;

- SI is the % of severity index
- a is the constant expressing weight for each response range from (1 to 5 constantly)
- n is frequency of the responses
- N is total member of respondents

$FI\% = \sum_{a=1}^{5} a\left(\frac{n}{N}\right) * 100/5$

Whereas;

- FI is the % of frequency index
- a is the constant expressing weight for each response range from (1 to 5 constantly)
- n is frequency of the responses
- N is total member of respondents

Importance Index: the importance index for each response was calculated by the function of both severity and frequency index to rank the responsible practices, factors and their impacts, which is:

II= (FI% * SI %) /100

Whereas;

II= is importance index

3.7. Validity and Reliability

3.7.1 Reliability

Before applying statistical tools, testing of the reliability of the scale is very much important as it shows the extent to which a scale produces consistent result (consistency but not accuracy) if measurements were made repeatedly. This is done by determining the association between scores obtained from different administrations of the scales. Its value varies from 0 to

1 but the satisfactory value is required to be more than 0.6 for the scale to be reliable (Cronbach, 1951). In this study, the Cronbach's alpha scale is used as a measure of reliability of the scales and a Cronbach's alpha value of the tool for this study was **1 > 0.9**. It was found excellent by fulfilling the criteria and accepted for using tools as reliable.

$$a = (n/n-1)(SD^2x - \sum_{i=1}^{n} SD^2i) / (SD^2x)$$

Where;

n= number of items

SD^2x =variance of the total test scores

SD^2i = variance of the individual item score

α Value	Level
$0.9 \leq \alpha \leq 1.0$	Excellent
$0.8 < \alpha \leq 0.9$	Good
$0.7 < \alpha \leq 0.8$	Acceptable
$0.6 < \alpha \leq 0.7$	Questionable
$0.5 < \alpha \leq 0.6$	Poor
$0.0 < \alpha \leq 0.5$	Unacceptable

3.7.2 Validity

Validity refers to the extent to which a measure adequately represents the underlying construct that it is supposed to measure. The researcher has selected participants purposively. This technique used for the researcher to select a sample using their expertise that is useful for the research and to gain detailed knowledge about a specific phenomenon. The researcher conducted pilot studies to establish trust and respect with the respondents. About the key informant questionnaire, understanding between the researcher and subjects had been created; hence, a more cooperative atmosphere, which increases the validity of the subjects' responses. Such kind of understanding improves the level of trust between the researcher and subjects, which, in turn, increases the validity of answers received.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1. Introduction

This chapter consists of results from the selected four construction sectors to investigate construction continuity management strategy in Ethiopia. Data's were collected through questionnaire and interview in selected populations (Adama city construction administration authority, Oromia construction cooperatives, and Arsi zone construction authority) and their response is putted in detail description and discussion.

This research study was conducted by purposive sampling technique, to obtain intended respondents who are expected to have the relevant information of the study. The samples for this study were selected personnel's within the selected population which are 4 in total (1 contractor, 2 General Managers and design control and approval committee respondent). Data was collected through questionnaire and interview. The analysis process is done by degree of severity (Extreme severe, More severe, Severe, Less sever, and no effect) and impact rate of frequency (Always occur, Highly occur, Moderately occur, Never occur) maximum to minimum.

4.2. Respondents Profile

Table 4.1: Respondents profile

No	Sex	Job position	Educational Status	Experience (year)
1	M	Design control and approval committee	BSc/ degree	3
2	M	General manager	Masters degree	3
3	F	General manager	Masters degree	3
4	M	Design and building supervisor	BSc/ degree	4

5	M	contractor	BSc/ degree	5

4.3. Practice of construction continuity management strategy

Respondents are asked if/ whether the Construction Continuity Management Strategy is applicable in their organization depending on different criteria's and their response was no, it is not applicable. But all construction sectors works on post crisis response means after some crisis occur they try to give solution on that. The solutions used to make the construction projects to go forward at the time of crisis that is not pre-crisis response. These post crisis response include give access to loan if the contractor don't have enough financial power to complete the project, control of trade unions over material prices by grouping of cities , renewal of license, and writing permission letter for getting construction materials.

Table 4.2: Applicability of construction continuity management strategy

Criteria's	**Adopted**				**Not adopted**			
Construction continuity plan					√			
Resource and budget assignment					√	√	√	√
Roles and responsibility of stakeholders					√	√	√	√
Recovery strategy					√	√	√	√
Assess risks					√	√	√	√
					√	√	√	√
Construction impact analysis					√	√	√	√
Implemented continuity strategy					√	√	√	√
Construction continuity management framework					√	√	√	√
Recovery plan					√	√	√	√
Training and communication between					√	√	√	√

stakeholders on construction continuity management								

The above table shows different criteria's for the applicability of Construction Continuity Management Strategy. According to the responses gathered from the selected sectors by questionnaire, it indicates that criteria's (Construction continuity plan, Construction impact analysis, Implemented continuity strategy, Construction continuity management framework, Recovery plan, and Training and communication between stakeholders on construction continuity management) are not applied or adopted within four sectors. This means the overall result for the applicability is zero.

The other question through interview showed below in table 4.2, indicate respondents response to continuity if or whether applying Construction Continuity Management Strategy is advantageous, their awareness and willingness to CCMS.

Table 4.3: Responses on willingness, awareness, and advantage on CCMS

	Extreme severe	More severe	Severe	Less severe	% of SI	Rank
Application of construction continuity management strategy				√√√√	25	4
Awareness to construction continuity concept			√√√	√	56.25	3
Willingness to Construction Continuity Management Strategy	√	√√	√		75	2

Advantage of applying Construction Continuity Management Strategy	√√√√				100	1

The result from the severity index table shows application of the construction continuity management strategy is = 25%, this means there is low or insufficient applicability of Construction Continuity Management Strategy with in Ethiopian construction sector. The second result is awareness on Construction Continuity = 56.25%, this indicates the awareness on Construction Continuity is not enough (medium) between the selected respondent, these also shows there is also lack of awareness when we go up to down. But their willingness for CCMS is high or 75%, all construction sectors have willingness to continuity if it is applicable, they all agree that it is advantageous for all organization to be effectively operational and the advantage of applying construction continuity is 100% acceptable with in all selected construction sectors.

4.4. Factors affecting Construction Continuity Management

Results from interview for factors affecting construction continuity in Ethiopia are pandemic like COVID -19, Security or wars with in country, Life expectancy with in a country, Increase in material cost, and Shortage of construction materials are stated.

In general the factors affecting construction continuity are given to respondents and their answer from questionnaire described below.

Table 4.4: Impact rate of factors

Factors	ES	MS	S	LS	SI (%)	Rank
Organizational alertness and preparedness	√√√	√			93.75	2
Management support	√√	√	√		81.25	4
Training and awareness	√√	√√			87.5	3

Financial support	√	√√	√		75	5
Construction materials	√	√	√√		68.75	6
Construction continuity plan and risk analysis	√√√√				100	1
Roles and responsibilities of stakeholders	√	√		√√	56.25	8
Stakeholders relationship	√	√	√	√	62.5	7
Off-site storage		√	√√	√	50	9

From the above table SI value showed impact rate of factors. The highest SI value is 100% means agreed as the factors have severe negative impact on construction sectors. That is construction continuity plan and risk analysis. The second highest value is 93.75% which is organizational alertness and preparedness. The third value for rate impact of factors is 87.5% training and awareness. The fourth is management support which is 81.25%, the fifth value is 75% for financial support, 6^{th} = Construction materials with 68.75%, 7^{th} = Stakeholders relationship with 62.5%, 8^{th} = Roles and responsibilities of stakeholders with a value = 56.25, and the least value is 50% which is offsite storage.

Impact rate of Organizational alertness and preparedness shows as the construction sectors are not well prepared and alertness to construction continuity is low therefore, the impact is severe /high/ on construction sectors. Construction materials also have severe impact because construction projects consume high amount of materials for their execution. If construction materials become rare or if shortage occurs the price will increase and workers can't be accessed to these materials to construct. The third is construction continuity plan and risk analysis, this means due to low practice of continuity with in construction sectors there is also no continuity plan that consist the ways how to achieve continuity and risk analysis to make construction projects to be well prepared before risk occurrence is also not adopted in all selected sectors therefore if risks are not well known they cause delay and disruption to construction projects.

Management support is one way for the continuity practice to be adaptable. If management gives support to construction continuity by finance, create continuity plan after risks analysis by top managerial groups then creating construction continuity management strategies for achieving continuity of projects. Roles and responsibility of stake holders start in the creation of the continuity strategies then after creating all stake holders roles and responsibilities have to be stated in the written form. Off-site storage is for being prepared in the time of shortage. The stored materials can be accessed easily. Training and awareness also have negative impact; this means if the practice of continuity is not well understood the need for the continuity can't be increased. Therefore giving awareness and training to stakeholders with in construction sector plays a vital role for improvement on continuity. The final is relationship between stakeholders, this relationship used for working together on creating a continuity plan, for projects continuity and to share ideas between them.

4.5. Impact of factors affecting construction continuity on construction industry

Table 4.5: Impact of factors affecting construction continuity

Impact	Description
Cause material cost escalation	If continuity of construction is not well adopted due to the above factors materials cannot be accessed easily and their price can escalate time to time. This also can result for builders to be interrupted because if the first estimated price of one project is not the same as the time after disruption it can be difficult.
delay of projects	This means if the continuity in construction can't be achieved many projects activities forced to be quite.
Increase idleness workers	With in construction projects (contractors, daily labors, forman, engineers…) can loss their job and didn't get money for their life period.

Decrease countries GDP	The construction sector is one backbone for countries; therefore the monetary input from projects can't be transferred to government by means of tax also by growth in projects value.

To take as example in Adama city over 700 large projects are stopped during the pandemic time. In these projects all type of contractors are participated from general contractors to partnerships. These include; General Contractor Grade 1 (GC-1), Building Contractor (BC-1), GC-2, BC-2, GC-3, BC-3, Total from Grade 1-3 and Grade 1-10 were participated. The major projects include Expressways (mainly two known Addis – Adama and Adama - Awash), Roads that relate the city to others and inside the city that include asphalt and coble (110), Schools (governmental and private = 10) water ditches (30), Hospitals and pharmacy (3), Residential buildings (>350 in number), Hotels, mixed use buildings (>50), and civil purpose governmental projects (50) are examples. During pandemic unemployment rate increased by 15.1%, GDP reduced by 40%, income of labors reduced by 2.6%, and 61% of job loss occurred and contractors forced to stay at home.

Table 4.6: Negative impact of factors affecting CCM

Impact	AO	HO	MO	NO	FI (%)	Rank
Delay of project	√√√	√			93.75	1
Increase idleness of workers	√	√√√			56.25	5
Decrease countries GDP	√√	√√			87.5	2
Cause material cost escalation	√	√√	√		75	4
Decrease productivity	√√	√	√		81.25	3

The result from table 4.6 showed negative impact of factors affecting CCM. It is calculated using frequency index method and the highest impact show delay of project = 93.75%, the second is decrease countries GDP = 877.5% this id due to when projects can't be operational

there is no income with Tax to government therefore it decrease countries GDP, the third frequency index value is decreasing productivity, means during crisis the functionality of construction sectors become low also projects can be quieted for some period of time and productivity will go down and 4th = causing material cost escalation = 75%, these impact is seen mainly during pandemic because there was close ups of transportation system and supply chain was difficult and the last value = 56.25% that is increasing idleness of workers, the idleness comes when projects stopped and during pandemic there was no choice for idleness.

4.6. Advantages of construction continuity management strategy

Advantages of construction continuity management strategy are;-Increase revival chance of construction industry after the crisis occurred, Decrease delay in projects, Increase quality of projects, Optimize life expectancy, Reduce idleness/ job idler, and Reduce material cost escalation.

4.7. Methods to achieve construction continuity

The other answers given by respondents for how to achieve construction continuity are stated in table 4.6

Table 4.7: Methods to achieve construction continuity

Methods	Description
Opening access to loan for the owners and contractors.	This helps to minimize financial incapability to get into projects because the need to construct projects can be achieved through this method.
Prepare and control cost of materials by trade unions.	This preparation of price of material helps to reduce improper escalation of material price that come from individual group's control.
Prepare law and regulations for the construction sector.	Written laws and regulations have to be written and get to work accordingly.

By giving focus and devising awareness on construction continuity	Give training and increase awareness to all stakeholders within the construction sector.
Increase number of the construction material manufacturing industries and open access to raw materials like by tax minimization on imported raw materials	This can be also by devising supply chain of material, and diversify the number of factories for construction materials.
Be aware and make to know of the rights and responsibilities of all stake holders	All stakeholders should know their rights and responsibilities of their own to act accordingly.
Discussion of stake holders	This is done between clients like municipalities, contractors, engineers, trade unions, fabrics and also all stake holders have to be informed and well aware about construction continuity management strategies.
Material cost decision making by government	To decrease improper material cost escalation due to individuals and groups control over price the government should be decision maker.

Additionally the answer raised on motivating our own innovation for construction sector was as follows;-

Using of innovation in Ethiopian context is not an easy task because the innovated new materials like replacement materials need high cost during the manufacturing, they need machineries that can't be easily accessed, and also they are only advantageous if there is mass production. But the reality is manufacturing industries use imported innovated materials as a replacement material.

4.8) Framework for Construction Continuity Management Strategy

The purpose of the BCM framework is to provide a detailed, informed, holistic and structured approach.

4.8.1Process for Construction Continuity Management Strategy

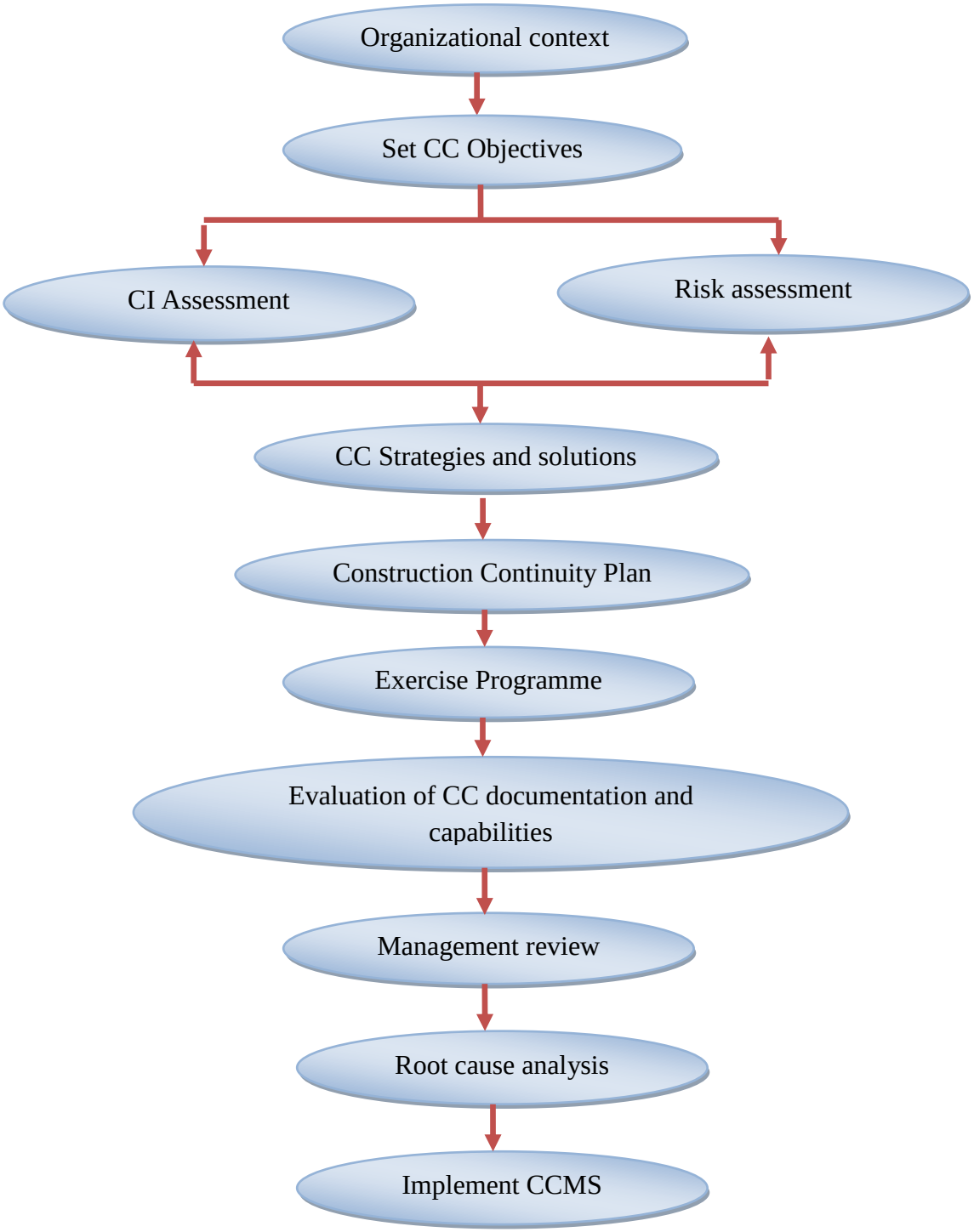

Fig 4.1: Process of CCM

Organizational context or understanding of the organization includes two parts. These are internal and external context that have positive or negative impact on the organizations. Internal context includes maturity level, organizational culture, resource availability, equipment, and consistency (if the processes are uniform or not). External context includes suppliers, customers, shareholders, regulators, environmental consideration and political condition.

4.8.2Framework for Construction Continuity Management Strategy

The conceptual frame work includes managerial levels. Which are Top managerial level (Executive groups), Directorial level and the managerial level (bottom managerial level).

Crisis Management Team Commander The chair of the crisis response group, or crisis management team commander (CMTC), will oversee the development and implementation of the company's Business Continuity Management Plan, as well as its separate components, including the IMP. The CMTC will also be responsible for ensuring that plans are distributed and that appropriate levels of education, training, evaluation, and rehearsals are conducted prior to a crisis event occurring. The CMTC will be responsible to the chief executive officer (CEO) in all matters related to preparing for and dealing with a crisis situation. The CMTC typically makes executive decisions.

The crisis team coordinator (CTC) supports the functional activities of the CMTC and will conduct quality assurance checks on policies, plans, and procedures on a scheduled basis, or following a crisis event. The coordinator will also ensure that the plan has been distributed and disseminated appropriately, particularly for oversees or high-risk operations. Accountable for scheduling and evidencing training and testing of the plan, the coordinator will also prepare the Crisis Control Center or Tactical Operations Center for use. The CTC may also monitor political and security risks as they affect the company and its business activities, tracking risks and alerting management to possible threats.

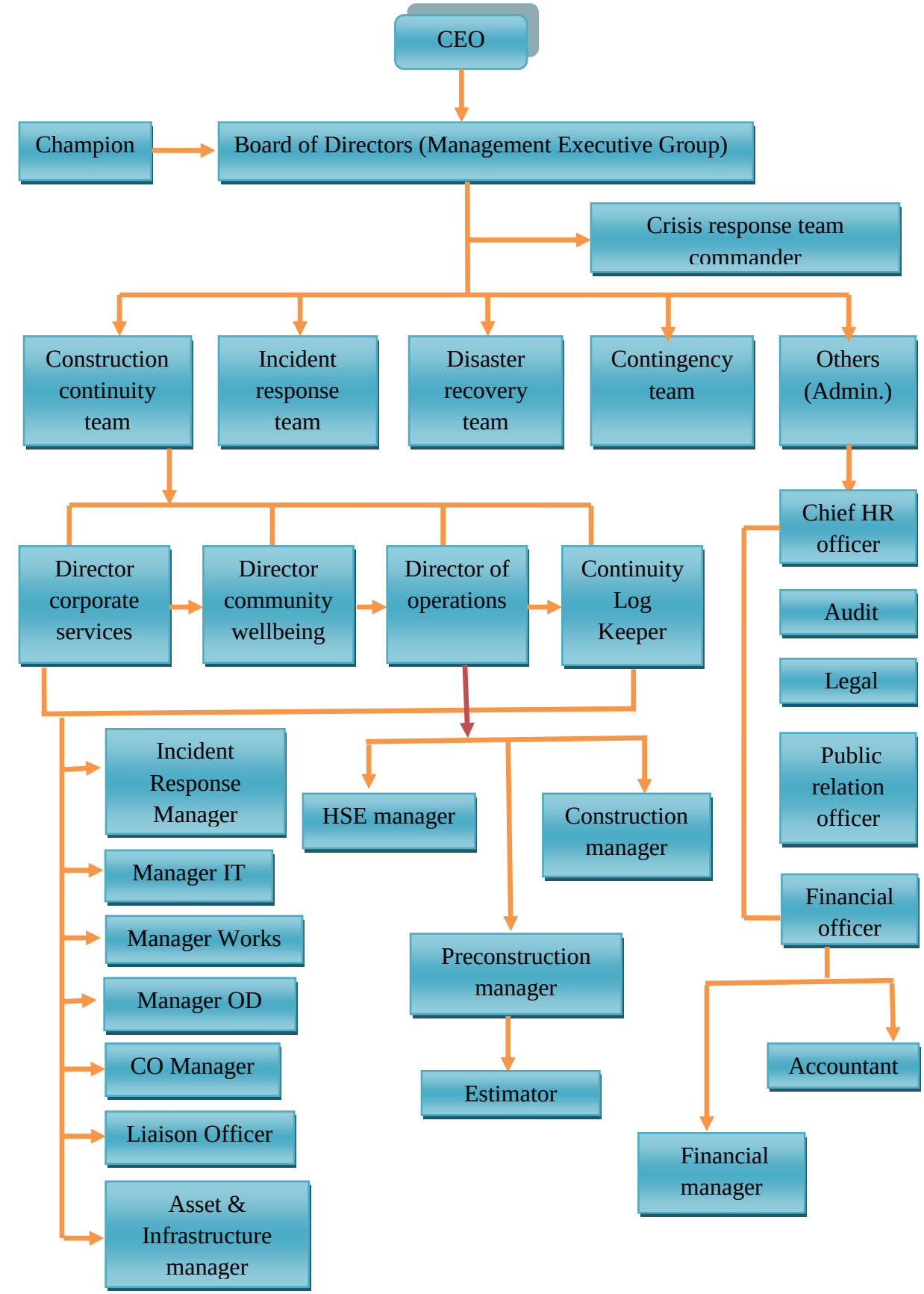
CEO
Champion
Board of Directors (Management Executive Group)
Crisis response team commander
Construction continuity team
Incident response team
Disaster recovery team
Contingency team
Others (Admin.)
Director corporate services
Director community wellbeing
Director of operations
Continuity Log Keeper
Chief HR officer
Audit
Legal
Public relation officer
Financial officer
Incident Response Manager
Manager IT
Manager Works
Manager OD
CO Manager
Liaison Officer
Asset & Infrastructure manager
HSE manager
Construction manager
Preconstruction manager
Estimator
Accountant
Financial manager

Fig. 4.2: Conceptual frame work for CCM

The **Deputy Chief Executive** is the lead for construction continuity within the council and is responsible for the:

1. Review and development of the council's Construction Continuity Policy in line with industry best practice and the organization's priorities,
2. Monitoring standards and compliance with Policy,
3. Provision of support and guidance to senior managers,
4. Production of the organization's overarching CCP using analysis and assessment work completed within individual service level construction continuity plans.

Continuity team leader is responsible officer for construction continuity

Construction Continuity Coordinator – CA/CI Consultant (BCC/CA);- will be responsible for implementing the CCM policy and will be the main point of contact for businesses and residents. The BCC will be provided by the Contract.

Administrator/ Construction Inspection (CA/CI) Consultant;- The chief responsibilities of the BCC/CA include, but not limited to, the following:

- Providing routine updates on the implementation of the BCMP to the City PM,
- Setting up and maintaining a twenty-four hour telephone line with after-hour answering service,
- Directing customer requests to the BCL/Contractor and ensuring adequate execution and service,
- Ensure that the BCL/Contractor is maintaining accessibility to all businesses for Clients
- Ensuring notices and updates are provided and distributed by the BCL/Contractor,
- Maintain records, conduct investigations, and address all needs of residents and businesses as well as incidents, inquiries, complaints, concerns, etc. for the duration of construction.

Source Incident Response Team (IRT). A trained local incident control team or manager who might be first on site, or in close proximity to start to bring control to the crisis event.

Project IRT; -An incident response trained manager or team who will take from local responders the control over gathering information and controlling the tactical aspects of the crisis event.

Program Crisis Response Team (CRT). Is a trained senior incident manager who might manage multiple aspects of the crisis event and mobilize local outsourced support, bridging the gap between incident management and crisis management.

Corporate CRT;- is a senior-level crisis managers who will deal with strategic needs and issues for the company as a whole. They will sanction procurements and deal with public relations issues, as well as senior government agencies and special support groups.

The physical and risk security manager; - is responsible for risk management advice as well as physical security measures and the management of security personnel and resources. This manager is typically the chief security officer (CSO) of a company and will provide both strategic and tactical advice and guidance to the CMTC, if the security manager is not undertaking that appointment himself or herself

The technical security manager: - is responsible for the technical aspects of security, providing specialist advice and guidance on technology systems that might be used as part of the contingency plan and crisis management response procedures.

The special response team (SRT):- can provide companies with invaluable assistance in supporting the establishment of an immediate management focal point at the beginning of a crisis situation, managing emergency requirements on behalf of the company, advising local managers on response protocols and decision-making requirements, and ensuring that accurate information and support requests are channeled quickly and effectively back to corporate offices.

The administration manager: - is responsible for taking action on the logistical and procurement aspects of a crisis response, allowing other participants to focus on strategic or tactical activities that will rely on adequate administrative support. The administration manager may have responsibility for resource and procurement plans,

The liaison officer (LO):- is responsible for interfacing with any external agencies needed to support the immediate response to an incident, as well as sustained support for long-term crisis events.

Manager organization development (OD); - is responsible for giving training to construction continuity team leader and for its members, and give general awareness on continuity to staffs. Also report number of staff trained, status of continuity plan completion, report number of plans tested and result of testing.

Conclusions and Recommendations

Conclusions

The main objective of the study was to investigate construction continuity management strategy. For the investigation primary and secondary data were used. From these methods questionnaires and interview are the main source for the result of the study. Depending on the results conclusions are sated as follows:

All construction sectors with in Ethiopia are not adopting / do not practice the construction continuity management strategy. The indications are there is no applicability of continuity plan, risk analysis, implemented strategy on continuity, framework for construction continuity management strategy, and also training and communication on continuity are not practiced. Awareness to continuity is not enough and willingness to construction continuity management strategy is high in all sectors by stating as it has high advantage for construction projects.

Factors affecting construction continuity in Ethiopia are COVID -19, Security or wars with in country, Life expectancy with in a country, Increase in material cost, and Shortage of construction materials. The highest impact of factors SI value is 100% means this factors have severe negative impact on construction sectors. That is construction continuity plan and risk analysis. The second highest value is 93.75% which is organizational alertness and preparedness. The third value for rate impact of factors is 87.5% training and awareness.

The consequences from factors affecting construction continuity are escalation of material cost, delay of projects, increase idleness workers, and decrease countries GDP. Construction continuity management strategy has many advantages like it increase revival chance of construction industry after the crisis occurred, decrease delay in projects, increase quality of projects, optimize life expectancy, Reduce job idler, and reduce material cost escalation.

Methods to achieve continuity of projects include; opening access to loan for the owners and contractors, prepare and control cost of materials by trade unions, prepare law and regulations

for the construction sector, give focus and devising awareness on construction continuity, increase number of the construction material manufacturing industries and open access to raw materials like by tax minimization on imported raw materials, be aware and make to know of the rights and responsibilities of all stake holders, discussion of stake holders and material cost decision making by government.

Finally the practice of construction continuity management strategy is vital for construction industry, and it needs governmental focus on the application by seeing its advantage for the country.

Recommendation

Recommendation to government;-

1. Series governmental focus on continuity; the government has to give focus on construction continuity first. Because its concept have to be devised by starting from it for the advantage of the country growth,
2. Devise the manufacturing industry of construction material; means adding of the numbers of manufacturing industries,
3. Increase and motivate innovation of construction materials and give financial support for innovators; this has great value to use locally produced materials that have less cost with high quality related to imported ones. If construction materials produced locally it can reduce escalation and make to be well availed. So, the builders can get access to build their projects more easily.
4. Governmental decision making on material cost; depending on the last three years materials price was even become triple than the other years. One cause was materials are handled by the merchant groups and they can decide on the price that was not formal and force builders to quite their projects. Because the first estimated price of the project is not fitted with the price after the project started,
5. Know demand and supply for devising for regional requirement; this uses for making proper division of construction materials and Stockpiling and replacing; some construction materials can be stockpiled for longer period like steels. But some of

them cannot be stockpiled for longer period like cement, therefore by categorizing the materials this can be worked. Therefore materials like cement can be stockpiled then replaced by the time.

Recommendation to stakeholders (managers, contractors, and engineers):-

1. Prepare continuity plan; preparing continuity plan needs top managers inclusion, also contractors, and other planning teams,
2. Risk analysis; means of assessing risks on construction sector,
3. Prepare continuity strategies; this is preparing the way of achieving continuity of construction projects,
4. Give training and awareness to all stakeholders; all stakeholders have to be aware of continuity concept first and training have to be given,
5. Know roles and responsibilities of their own; knowing the roles and responsibilities make all stakeholders to act accordingly, and
6. Discuss with each other on continuity of projects; have a time of discussion on continuity to share ideas on it.

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QUESTIONNEIRE

1. Is construction continuity management strategy applicable in your organization? Fill the following table to show if or whether to show construction continuity is practiced.

Criteria's	Adopted	Not adopted
Construction continuity plan Resource assignment Budget assignment Roles and responsibility of stakeholders Recovery strategy Assess risks		
Construction impact analysis		
Implemented continuity strategy		
Construction continuity management framework		
Recovery plan		
Training and communication between stakeholders on construction continuity management		

Yes ☐ No ☐

2. What are the advantages and disadvantages of applying construction continuity management strategy in construction industry?

_____

_____

_____

3. If yes, how is the applicability of the strategy and can it be said the government or other sectors apply on the ground base?

High ☐ Medium ☐ Low ☐

4. How is the awareness of Construction Continuity in construction organizations?

High ☐ Medium ☐ Low ☐

5. How is the desideration/ necessity of Construction Continuity Management Strategy for construction industry?

High ☐ Medium ☐ Low ☐

6. Rate your willingness to applying Construction Continuity Management Strategy in your organization.

High ☐ Medium ☐ Low ☐

7. If no, what should be done for the future of construction depending on its advantage?

8. Who is responsible for creating construction continuity management strategy?

Government ☐ Contractors ☐ Managers ☐ All stake holders ☐

9. What are the factors affecting construction continuity?

10. Rate the extent of the impact of factors affecting construction continuity management stated in the following table.

Factors	severe	medium	low
Organizational alertness and preparedness			
Management support			
Training and awareness			
Financial support			
Resources			
Construction continuity plan and risk analysis			
Roles and responsibilities of stakeholders			
Stakeholders relationship			
Off-site storage			

11. What are the consequences if construction continuity management strategy can't be achieved?

12. How to overcome the factors affecting construction continuity?

13. How to achieve the construction continuity in construction industry?

14. Who is affected by the consequences from construction continuity if it is not practicable? And how?

Government ☐ Contractor ☐ Client ☐ Workers ☐ Engineers ☐ All ☐

_____

_____

_____

15. What about motivating innovation, balancing supply and demand of material relatedness for continuity of construction?

_____

_____

_____