SCHOOL OF GRADUATE STUSIES

DEPARTMENT OF CONSTRUCTION TECHINOLOGY AND MANAGEMENT

STUDY THE IMPACT OF MANGEMENT PRACTICE ON LABOR PRODUCTIVITY IN PUBLIC BUILDING CONSTRUCTION PROJECT, IN CASE OF ADDIS ABABA

By

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DECLARATION

I, Abriham Abiye, hereby declare that the study entitled "STUDY THE IMPACT OF MANGEMENT PRACTICE ON LABOR PRODUCTIVITY IN PUBLIC BUILDING CONSTRUCTION PROJECT, IN CASE OF ADDIS ABABA.'' I have carried out the study independently with the guidance and support of the research advisor Mr. Fikreselam G.

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ENDORSEMENT

This thesis has been submitted to Addis College, department of construction technology and management for examination with my approval as a university advisor.

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Abstracts

The objective of this research; is to examine how management practices affect the output of labor on building construction projects in Addis Ababa. The present study employs a methodology that involves the identification and analysis of management practice attributes derived from the literature review and distributed survey. The analysis of the identified attributes, respondents assigned relative weights to prioritize the attribute. Software; called SPSS 26 was used to conduct additional analysis on the gathered data. The study employed a quantitative research methodology to analyze the collected data. Various tools and techniques were utilized; including reliability analysis to ensure consistency in the data collected and a relative importance index (RII) to prioritize and rank the attributes based on the weighted average score provided by the respondents.

The findings of this study showed that project management skills (lack of experience in project management, not motivating Labor during or after work, lack of coordination among the construction parties influence labor productivity. Project management style strongly influences labor performance in building construction projects; unscheduled work orders; not effectively and efficiently use working hours per day. Communication errors among the stakeholders; are the most significant attributes of management practice, affecting construction labor productivity. So that, project managers need to update their management skills in order to maximize project productivity. They also need to minimize the management behavior that has an adverse effect on productivity and increase the positive management character. They do not have to be politicians; they have to be positive and have to motivate the workers to maximize project productivity. A competent project manager must continually improve themselves in order to meet new obstacles.

Key-words: Management practice, project management, construction productivity, construction management, Building Construction Labor Productivity

Abbreviations

Addis Ababa……AA

American Institute of Constructors……...AIC

Building Information Modeling management software…… BIM

Building Information Modeling……..... BIM

Construction Management……...CM

Construction project management……... CPM

Georgian calendar ……G.C

High Level of Affect……... HLA

High Level of Impact……... HLI

Human Resource Management……HRM

Information communication technology …...……...….……ICT

International standard serial number…...…….……ISSN

Just in Time……...……JIT

Labor productivity……..…LP

Low Level of Affect ……... LLA

Low Level of Impact ……LLI

Limited Liability Company ……. LLC

Medium Level of Affect ……. MLA

Medium Level of impact……...MLI

Organizational management……...……OM

Planning, organizing, leading and controlling ……... POLC

Project Manager ……...PM

Total Quality Management……...TQM

Relative importance index ……...RII

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Chapter one: Introduction

1.1 Background of the study

Ethiopia has reportedly experienced the largest population and economic growth in Africa over the past decade. Due to the country's rapid urbanization, demand for housing and other infrastructure occasionally increases dramatically. The capital of Ethiopia is Addis Ababa. The population of Addis Ababa is growing rapidly every year. According to the census of macrotrends research platform, 5,228,000 people lived in the Addis Ababa (Addis Ababa,Ethiopia Metro Area Population 1950-2024) this number is expected to reach 5,461,000, which means that Addis Ababa's population is expected to grow by 4.45% per year. Due to population growth, the city's population currently has a greater need for housing. In order to meet the housing needs of the urban population, the state promotes infrastructure and housing construction projects. Ethiopia invests billions of dollars annually in the building sector, and international companies are interested in their products because to the great demand for their knowledge and experience. Numerous studies and reports show that the building sector is essential to the nation's economic growth, and Addis Ababa is one of the cities where housing demand and population growth are correlated. Because construction projects are time- and money-constrained, highly diversified, and uniquely different, they require careful product management to preserve national economies and boost output. Various researches on the productivity of building projects has been carried out and documented globally, and several models have been constructed to identify the aspects that impact productivity (HASHEM AL, 1997). Rhumbix states that increasing worker productivity through the effective and efficient conversion of necessary resources into products determines the profitability of construction (Rhumbix, Rhumbix Product Release | May 2023, 2023). The workforce does, in fact, play a significant role in the seamless and continuous execution of construction projects. Having labor available at reasonable wages is essential to producing high-quality goods. In order to reduce the time and expense overruns associated with building projects, it is necessary to implement effective labor management practices, control employee problems, and enhance employee performance in (Best Practices for Managing Construction Labor in the Field, 2023). Thus, utilizing the specific data collection approach described in chapter three, methodology of

research, the study's goal is to determine the lower to top level management practices that impact labor productivity on building construction activity in Addis Ababa. Various research have been done to find out several factors that influence the construction productivity and the findings include the business culture, education level, tools and technologies used, values and ethics of the people and workers involved, politics, local laws and regulations governing the project, HR policies of the organization, importance given to the employee, religion of the people, their cultures, languages, (Tabtabai, et al., 2003) (Lanndon, et al., 2015).

1.2 Statement of problem

Because of its inherent complexity, the construction sector greatly depends on the efficient management of resources, especially labor, to complete projects on schedule. A key indicator in the construction industry, labor productivity is impacted by a number of variables, including management techniques. Gaining insight into the connection between labor productivity and management techniques is crucial to improving overall efficiency in the construction industry and project outcomes. Numerous studies indicate that the building industry is critical to the economic development of a country. Most construction projects in underdeveloped countries including Ethiopia have a long payback period, a high labor and capital cost, and a number of risks and uncertainties (Assefa, 2022) . Several studies show that a number of problems affect the labor productivity of building projects, such as inadequate work plans, a communication breakdown between daily laborers and stack holders, a shortage of materials, and others. Special consideration needs to be given to the efficient management of personnel performance in construction projects (Mahamid, 2013). The literature still lacks a thorough analysis of how management techniques affect labor productivity directly, despite the acknowledged significance of these practices in the construction industry. A comprehensive analysis that takes into account different management techniques and their combined impact on labor productivity is required, even though separate studies have looked at specific areas of productivity or management in the construction setting.

Thus, the purpose of this study was to determine how management practices affected labor productivity in a particular building construction project activity in Addis Ababa, Ethiopia.

1.3 Research Questions

- Which project managers' actions which affect labor productivity in the building construction sector?
- What aspects of the building construction business affect labor productivity?
- What are the most effective strategies for project managers to increase labor productivity in construction projects?

1.4 Objective of study

1.4.1 General objective

The general objective of study is to identify the management practices that impact labor productivity especially on public building construction projects in Addis Ababa.

1.4.2 Specific objectives

- To assess the management practice that affect labor productivity in public building construction project in Addis Ababa.
- To identify the factors that affects Building Construction Labor Productivity due to project managers' practice.
- To develop a framework for improving management practice related impacts on labor productivity building construction.

1.5 Significant of the study

This proposed study aims to investigate the impact of management practice on labor productivity. Management practice plays a great role in labor productivity in the construction industry. Managing construction projects is challenging; especially, building construction project management is more difficult as its activities are unique in nature and more specific, and they need special attention and concentration to manage all activity activities relatively like other construction projects. By nature, a project is timed and budgeted. It is limited by period of time and amount of money, respectively. To use the limited time and money of the project, an effective and efficient management system is needed. Hence, the study is significant is to identify the impact of act of management

system of managers that affect labor productivity in building construction project on selected activity; and to inform the development of effective management practice to maximize labor productivity in building construction project.

1.6 Scope of the Study

The scope of this study is limited to assessing which management practices influence labor productivity in building construction. Labor productivity in the construction industry is significantly affected by management practices. Their methods can make workers on construction projects more or less productive. Therefore, the study is limited to building construction projects as they involve various special activities that require special attention from managers so that the work can be carried out effectively and efficiently. This study focuses specifically on public building construction in Addis Ababa involving local contractors. Many studies have revealed that Ethiopian public building construction projects typically come in under budget and under schedule, etc. Accordingly, the primary goal of this research is to determine which management practices, such as those used at the first, middle, and highest levels of the project management team during building construction projects, have an impact on labor productivity.

1.7 Limitation of the Study

The researcher understands that constraints are expected while doing researches and would like to address them as such. The major constraints faced by the researcher whilst conducting this study were lack of previous study adequately published and documented data about construction project managers practice which would have been useful if found. Even the data found was not adequate. Other main factors were that company's project management system, identifying project status and funding sources.

1.8 Organization of the study

This work is divided into five main parts. The first chapter introduces the basic information of the research and serves as the introductory part of the research. Chapter 2 conducts a basic literature review on construction productivity issues and forms a conceptual framework for the study. The third chapter deals with the research design and methods.

The fourth chapter is the analysis of the results and the discussion of the results. The final section includes conclusions and recommendations were made.

Chapter I; Introduction; this part contains discussions on background, significance and application, statement of the problem, objective, scope and limitation and organization or contents of the study.

Chapter II; Literature Review; discuss general descriptions by different researchers about construction productivity based on previous publications. It is divided into different parts containing the concepts of construction productivity.

Chapter III; Research Methodology; covers the research methodology as one chapter. The methodological approach consists of the overall research strategy, the research instrument and the method of data analysis.

Chapter IV; Analysis and Discussions; this part contains results of the assessment of productivity on Ethiopian construction projects. It is divided into different parts containing findings on factors affecting labor productivity and the suggested approaches to improve labor productivity on building projects. It has also compared the factors affecting construction labor productivity with other countries' practice.

Chapter V; Conclusions and Recommendations; In the end, based upon the data collected and analyzed during the study period, conclusions and recommendations are forwarded.

Chapter Two: Literature review

2.1 Theoretical Framework

2.1.1 Construction Management

Construction management (CM) is overseeing three parties: owners, architect and the general contractor, and the overall project through the lens of the owner's interests. Therefore, construction management interfaces with all three parties in order to make sure the project is delivered on time and within its budget, if not ideally under budget (Landau, 2023). In order to accomplish the project's objectives and deliver it within the allotted budget and time frame, construction project management (CPM) involves planning and coordinating every aspect of the project from inception to conclusion. As the project is time and money-bound and involves interactions with other team members such as the architect, owners, contractors, and other stakeholders, project managers bear the responsibility of ensuring project performance (Robert and Wysocki, 2011). The technique of making sure that construction activities are carried out successfully and efficiently is known as construction management (CM). It involves resource administration, coordination, and management, as well as the physical construction process inside the built environment. It oversees the firm while managing the project in two dimensions. Consequently, the core of project management and business management is CM (Robert and Wysocki, 2011). Construction management oversees all facets of project advancement in construction projects. They are well-organized and provide all the necessary support to complete building construction projects on schedule, within budget, with high quality, and while maintaining worker safety. Construction managers need to be extremely well-organized, meticulous, and skilled communicators with a wide range of individuals (Peter Fewings and Christian Henjewele, 2019). They also need to comprehend all the involved parties.

2.1.2 Construction Project Management

A project involves the creation of something new. This often means in the business world making something that someone else wants and is prepared to pay for. The primary activity of the construction industry is the building of new structures or the restoration of existing ones for a variety of clients. Since the construction industry is primarily project-oriented,

the success of a construction company depends on the success of its projects (Peter Barrett and David Baldry, 2009). Tasks have due dates, which means they have to be finished on time, within budget, and with proper construction. The core of project management is ensuring the accomplishment of these goals. The following is how the Project Management Institute defines the field of project management: The art of project management involves employing contemporary management approaches to oversee and coordinate both people and material resources over the course of a project in order to meet established goals related to scope, cost, schedule, quality, and participation satisfaction (PMBOK®Guide, 2013). To ensure a project's success, project management thus seeks to plan, organize, and control. A project can be considered successful if it can demonstrate that its three main goals have been achieved. Time, cost, and quality are what could be referred to as the three graces of project management (Peter Fewings and Christian Henjewele, 2019).

2.1.3 Hierarchy of construction project managers

The hierarchy underlying every activity done by every individual working on a construction project or for a construction company is known as the management level. The project must be completed correctly, and this requires that every member of the project's management hierarchy carry out their responsibilities. As reviewed from there is management and non-managerial departments in a building project hierarchy, (Heather, 2013).

According to AIC in the construction world, effective project management is crucial, and understanding the roles and responsibilities of each team member is fundamental to that success (AIC, 2024). Having a firm backing and extensive knowledge of your entire construction team is crucial to press through challenging weeks or months on the path to completion. Remember, each role is staffed by another human being working hard to fulfill their commitments to the project. Construction managers must navigate a complex web of professionals, each contributing their unique expertise to projects. By recognizing the importance of clear communication, collaboration, and a well-structured project team, you can ensure the successful completion of projects while remaining effective, ethical, and professional (AIC, 2024) l. Teamwork is the key to successful construction projects.

Everyone on and off the job site is responsible for specific tasks that make the entire project flow smoothly (AIC, 2024). The hierarchy of construction project management includes the managerial and non-managerial departments. The managerial department includes the following: Top level management, Middle level management and Lower level management.

Top-level management, sometimes referred to as first-level management, is in charge of the construction project's organizational structure. Senior engineers from each department of the project as well as the project manager (PM) are involved in general construction projects, (Bartleby, 2013) Middle-level management: Junior engineers, superintendent engineers, field engineers, architects, and designers are all included in building projects. They serve as the foundation of the building project's organizational structure (Bartleby, 2013). Lower-level management**:** this level of authority in the construction project's organizational structure consists of subunits of masons and craftsmen. Laborers and machine operators are included in the non-managerial departments. The chief mason and the site supervisor supervise the laborer and unskilled workers. Every task related to building must be completed by laborers. The operation of machines is the responsibility of machine operators (Bartleby, 2013). The non-managerial department includes the laborers and machine operators. The laborers are the unskilled people who work under the site supervisor and head mason. The laborers are responsible for performing all the construction activities. The machine operators are also unskilled people. The responsibilities a of machine operator is to operate all the machinery used in construction like backhoe, bulldozer, roller, and so on and perform the tasks as prescribed by head mason or supervisor (Heather, 2013).

2.2 General Management practice

A single practice's influence, the impact of adopting practices jointly, and the effects of clusters or systems of complementary practices have all been evaluated in studies that look at the relationship between productivity and management practices. We examine operational management (OM) and human resource management (HRM) practices in this review. Just-in-time (JIT), lean manufacturing, information and communication technology (ICT), and total quality management (TQM) are a few examples of OM

techniques that center on a system's management. The recruitment, development, and management of personnel are the main areas of emphasis for HRM practices (Toby et al, 2005). Teamwork, empowerment, training, and growth are common HRM approaches (Testlify, 2023).

According to Wall and Wood, it is improbable that there is a single set of productivity-boosting management methods or ideas that apply to all situations. Expanding on this contingency approach; claim that the success of management methods varies depending on the organization and is influenced by the institutional environment in place (João Varajão and ALGORITMI, 2022). The literature is divided on the best way to quantify managerial techniques. All the studies have one thing in common: they all measure management techniques using many dimensions. Using objective kinds of measurement is exceedingly difficult since management techniques are fundamentally intangible. In order to make analysis easier at the plant, firm, industry, or national levels, measures are combined.

2.3 Construction project manager's practice

The definition of project management methods is a set of norms, processes, practices, and guidelines followed by practitioners of the field (PMI, 2013). Some of the methods regarded as best practices in construction projects include the integration of multiple schedules; schedule controlling techniques; mechanisms used in the preparation of site layouts; project start-up and completion procedures; and investigation of appropriate technologies. One area where productivity gains could be achieved by integration of management functions (Arditi and Krishna Mochtar, 1996). One of the greatest methods for raising productivity in industrial projects is the integrated timetable, as demonstrated by (Carlos et al., 2014). Scheduled overtime has a positive impact on productivity, as it builds the morale of employees. Hanna et al found that the shift schedule is effective as compared to overtime and over manning in reducing the project duration (Awad Hanna et al., 2008). The finest construction management techniques include thorough planning, putting in place a strong framework for managing construction projects, communicating often, adhering to building codes, managing construction sites well, embracing program management, and managing businesses well (Carl Haas and Tung , 2023). Every project manager will have their own workflows and preferences when it comes to their process,

accordingly, but there are some best practices that all construction project managers should follow 6 Construction Project Management Best Practice (Mohammad Reza Afshar,et al., 2017), (Demski, 2021)

- Manage expectations; According to industry surveys, over 50% of all construction projects fail due to numerous avoidable issues. One of the primary reasons construction projects fail is the project manager's incapacity to manage the expectations of builders, clients, and contractors. These three categories of people usually have somewhat different expectations regarding the course and outcome of the project (Mohammad Reza Afshar,et al., 2017). Construction project expectations can easily become unrealistic if project managers are not able to keep them under check. Establishing clear expectations for builders, contractors, employees, clients, stakeholders, and all other parties engaged in the project should be the first goal of a construction project manager (Demski, 2021).
- Document plans thoroughly; To ensure that the task group finishes the venture effectively, they genuinely should have made an arrangement that incorporates quantifiable and practical objectives. In any case, it is much more vital to record and make your arrangements noticeable. The consequence of arranging and documentation lays out the venture scope, determines the accentuation of the work, and gives exchange workers for hire and other related development specialists with an information base. Worker for hire certainty can be assembled and development tasks can be overseen all the more easily when venture plans are proven and factual and conveyed all through the undertaking. By including crucial information in their plans, construction businesses can avoid scope creep, maintain change control, keep project activities within budget and time, guarantee contractor safety, track job progress efficiently, enhance quality control, and more (Demski, 2021).
- Communicate effectively; Part of overseeing assumptions across groups is utilizing compelling correspondence to do as such. Imparting rapidly and really is significant in the realm of development the executives. Indeed, even little deferrals can bring about timetables being pushed back and more expenses caused. Development project directors are likewise entrusted with keeping definite notes

in regards to each part of the venture (Alan Griffith and Paul Watson, 2004). Assuming the development firm or workers for hire have inquiries concerning a task or the work that groups are planned to do, project chiefs ought to have the option to give answers immediately and precisely. This not simply gives entrust there of brain with the endeavor, yet it moreover helps project people to expect and settle issues before they become an issue. Development project directors frequently are liable for speaking with a few groups and getting everybody in total agreement can be a battle. An ascent in the generally high utilization of self-employed entities in development projects presents a lot of chances for breakdowns in correspondence. As a matter of fact, 36% of Americans presently make their living through free contracting, and your groups should be prepared to adjust (Demski, 2021). Keeping all individuals from the development group in total agreement is made conceivable with project the board programming. Project chiefs can utilize this product to report hours and materials as well as track, make due, and record some other data about the development cycle. The advantages of conveying really as a development project chief are expansive, influencing client and cost administration (Alan Griffith and Paul Watson, 2004).

- Utilize tech resources; for development project supervisors to convey really, they should use the tech assets that they have and show their groups how to do likewise. There are various ways that innovation can robotize and smooth out processes, which have been assessed to raise efficiency all around the world by around 1% each year. Project the board programming is additionally fit for coordinating data from past work like staff, materials, and expenses. This implies that development project directors who use tech assets for their potential benefit can make precise expectations with respect to valuing, material accessibility, timetables, and other adaptable reports (Alan Griffith and Paul Watson, 2004). A very much associated group can make notes on records and undertakings on their cell phone gadgets from anyplace so that updates can be conveyed across groups continuously. Aside from expanded efficiency, as supply binds keep on changing their methods as per late improvements in the tech space, computerized flexibility has turned into a critical

component to the proceeded with outcome of development project supervisors (Demski, 2021).

- Get insured; Development project chiefs typically work under an LLC or other corporate element whose risk protection stretches out to cover their obligations. However, all development project administrators really should convey their own business responsibility protection that covers blunders and oversights notwithstanding expert and general obligation. Protection is something that ought to never be neglected yet frequently is. For instance, as per late studies, the greater part of respondent's report that they chose not to put resources into an extensive insurance contract since it's excessively costly. Try not to let being uninsured be the destruction of your development the board business.
- Use customizable project management software; investing in scalable software is the best way to solve all of inefficiencies and pain spots in construction management. Using mobile software, can oversee tasks from every perspective from smart device. It is simple to stay in touch with teams and stakeholders whether at the office or on the job site. Some of indispensable features of project management software include:

- Check schedules and statuses from mobile devices
- Create, edit, and complete tasks
- Email reports and tasks
- Manage users and permissions
- Accounting integrations
- Secure storage for documents and other project data (Demski, 2021), (Alan Griffith and Paul Watson, 2004)

2.4 Construction productivity

2.4.1 General definition of productivity

Productivity is a multidimensional term, the meaning of which can vary, depending on the context within which it is used. However, there are common characteristics that tend to be embraced by the term. In industrial engineering, productivity is generally defined as the relation of output (i.e. produced goods) to input (i.e. consumed resources) in the

manufacturing transformation process Alazzaz and Whyte 2015; Chalker and Loosemore 2016; Ma and Liu 2018. However, there are several variations on this basic ratio, which is often too broad a definition to be useful in practice. Table 2-1 shows a number of these variations, created from examining the term from different perspectives (Thomas, 1991)

Table 1: Definition of Productivity

Productivity definition	Reference
Littre in 1883 defined productivity as the faculty to produce	(Littre´, 1883)
Productivity is mainly an issue of personal manner. It is an attitude that we must continuously improve ourselves and the things around us	(CENTER, 1958), (Björkman, 1992)
Productivity = units of output/units of input	(Chew, 1988)
Productivity =actual output/expected resources used	(Sink and Tuttle, 1989)
Productivity = total income/(cost + goal profit)	(Fisher, 1990)
Productivity =actual output/expected resources used	(Sink and Tuttle, 1989)
Productivity is defined as the ratio of what is produced to what is required to produce it. Productivity measures the relationship between output such as goods and services produced, and inputs that include labor, capital, material and other resources	Hill (1993)
Productivity (output per hour of work) is the central long-run factor determining any population's average of living	Thurow, (1993)
Productivity = the quality or state of bringing forth, of generating, of causing to exist, of yielding large result or yielding abundantly	(Koss and Lewis, 1993)

Productivity means how much and how well we produce from the resources used. If we produce more or better goods from the same resources, we increase productivity. Or if we produce the same goods from lesser resources, we also increase productivity. By "resources", we mean all human and physical resources, i.e. the people who produce the goods or provide the services, and the assets with which the people can produce the goods or provide the services	(Bernolak, 1997)
Productivity is a comparison of the physical inputs to a factory with the physical outputs from the factory	(Kaplan and Cooper, 1998)
Productivity= efficiency * effectiveness = value adding time/total time	(Jackson and Petersson, 1999)
Productivity = (output/input) * quality =efficiency * utilisation *quality	All- Darab, 2000
Productivity is the ability to satisfy the market's need for goods and services with a minimum of total resource consumption	(Moseng and Rolstadas,2001)

Mathematical definitions, on the other hand, can be used as the basis of performance measures, where the major aim is to improve (not to explain) productivity. Since it can be difficult to translate a verbal definition to a mathematical one, mathematical definition do not always reflect all the characteristics that represent the concept of productivity. Compromises are often made when mathematical definitions are formulated, which in turn means that they usually only show a part of the "true" meaning of productivity. (Broman, 2004) Suggests; that it is necessary to have a clear distinction between a concept and a particular mathematical definition attached to the concept, in order to effectively evaluate the characteristics of the mathematical definition. (Broman, 2004)points out the inherent similarities in many definitions of productivity; the basic content seems to be the same.

However, (ABBY GHOBADIAN, 2007) suggest that, within the similar definitions, there are three broad categorizations:

I. Output/input, the relationship between ratios of output to the inputs used in its production
II. A combination of efficiency and effectiveness
III. Includes any characteristics that makes the organization function better

Most definitions of productivity fall into one of three categories

i. The first is the economist/engineer definition: the ratio of outputs over inputs. An example of productivity under this definition would be the number of refrigerators produced this month.
ii. The second definition of productivity is a combination of efficiency (outputs/inputs) and effectiveness (outputs/goals). In this definition a company making refrigerators could measure productivity by a combination of the efficiency measure above plus an effectiveness measure, such as number of refrigerators divided by the objective or goal for the number to be produced that month.
iii. The third definition of productivity is the broadest and considers productivity as anything that makes the organization function better. In this definition, productivity would include not only efficiency and effectiveness, but also things like absenteeism, turnover, morale, innovation, etc.

The definition in this research is the first approach. That is, productivity is the ratio of outputs over inputs. Many definitions of the word "productivity" exist. For the basis of this study, the Merriam-Webster definition will be used. Merriam-Webster defines productivity as the quality or state of being productive. Labor productivity is typically measured as output per worker or output per labor-hour. Although there are endless definitions for productivity, they all refer to productivity as a comparison of input versus output. Productivity = Output/ Input. Increased productivity occurs when either 1. Output is constant, while input is reduced, and/or 2. Input is constant, while either the quantity or

quality of output has been increased or enhanced. Source: Handout of people and organization management

2.5 Construction project productivity

The study focuses on ways that improved management could increase the construction industry's output and cost-efficiency. Productivity is traditionally expressed as outputs divided by labor input units (Richard et al., 2006). Managers use a range of tactics to boost output, based on process optimization and scientific study. Task simplicity, motion, time, research, and technique analysis are some of these strategies. To further boost the productivity and cost-effectiveness of construction projects, project managers must engage in networking activities, planning strategies, economic analyzes, safety programming, quantitative management techniques, simulation, and computer use (Nunnally, 2007). Among many productivity measurement levels, there are three main productivity metrics accessible. Happening regularly, individual-case and cost analyzes are the three types of analysis. The increase in the average worker income has led to higher productivity development in countries since it increases national profits and tax revenues. The tendency is not consistent over time for a variety of reasons, such as unplanned training sessions, the regularity of skills development courses, and a drop in the number of participants: (Ayed Alqahtani and Andrew Whyte, 2015).

2.6 Labor productivity

2.6.1 Productivity measure

Establishing a standard productivity measure and benchmark for productivity in order to boost output is extremely challenging. Projects are often planned and estimated using past data and expertise. It is crucial to consider the various components, the differentiator, and the variables required for the project (Burgess, et al, 2017). Among many productivity measurement levels, there are three main productivity metrics accessible. Metronomic, individual-case, and cost analyses are the three types of analysis. The increase in the average worker income has led to higher productivity development in countries since it increases national profits and tax revenues. The tendency is not consistent over time for a variety of reasons, such as unplanned training sessions, the regularity of skills development

courses, and a drop in the number of participants: (Burgess,et al., 2016), (Mal and Mills, 2018).

2.6.2 Formula to measure labor productivity

The primary factor that determines the increase in a nation's material quality of life is the growth of productivity—output per unit of input. production per worker and production per hour are the labor productivity metrics that are most frequently used. The most often used indicator of a nation's material standard of living, output per person, and cannot increase steadily without output per worker growing steadily as well. When showing labor productivity by equation (Alexander, 2023)

$$\text{Labor productivity (lb.)} = \frac{\text{Output (total work done)}}{\text{Input (total manpower days consumed)}}$$

Where: - input is number of man- day consumed in achieved output

This formula is for work performed

Figure 1.1 Formula of Labor Productivity

Similar to this, the productivity of labor is determined on a daily, weekly, and monthly basis by dividing the total number of labor hours worked during the project's first, second, and third weeks. Productivity in the construction business is commonly understood to refer to labor productivity, measured in units of work or work hours. Hours of work per unit (unit rate), the inverse of labor productivity, is typically defined as the work completed divided by the number of workers assigned to the task during a given day, week, or month (Ali, July, 2022).

2.6.3 Labor Performance and Management Practices

Labor productivity can be defined as the number of work hours per unit of work. Increased productivity leads to a better schedule and cost performance. The implementation of sound management practices is necessary for a construction site to operate efficiently and meet scheduled requirements. It is vital to compile the body of information about effective site construction management techniques in one location and add new practices as needed in

order to increase labor efficiency and competitiveness in the construction sector. This is an attempt to fulfill this objective (Thomas,et al., 1945). According to (Rico & Cabrer-Borrás, (2021), target-setting and incentive management strategies are the most important and have a major impact on a firm's worker productivity.

2.7 Empirical review

2.7.1 Management Techniques that Affect Worker Productivity in Construction Projects

Many studies conducted around the world have shown that the main factors affecting the labor productivity of building construction projects are inadequate management systems at each stage of the project, including inadequate planning, insufficient funding, inadequate tools and equipment, delays in material delivery, and others. The study conducted by (Attar et al., 2012) was divided into three categories: small, medium, and large organizations. The most significant elements influencing labor productivity, after technological discovery, skill and training, labor organization, project uniqueness, and salary trends, were deemed to be project management capabilities (Attar et al., 2012), Studies have categorized the following elements that influence labor productivity: as an illustration, Labor productivity-affecting factors were divided into six groups by (Shashank et al., 2014): motivation, manpower, material/equipment, safety, managerial, and quality. According to (Raj Vijay Antony and Kothai , 2014) study, 75% of workers in construction projects are uncomfortable at work, and the study examined the effects of HRM practices on productivity and financial performance in the sector. (Hendrickson, 2000); Standardization of materials, machinery type, construction methods, and other factors can also have an impact on worker productivity. Eleven factors, including time, quality, safety, and managerial considerations; labor experience; project type; misunderstandings; external circumstances; motivation; material/tools; and natural causes, all affect labor productivity. They found that tracking worker productivity can help projects save money and time by reducing labor costs by 20% per floor without compromising job quality or safety, (Hendrickson, 2000) . As a conclusion, a number of studies show that various manager actions have an impact on a number of labor productivity activities in building construction projects. These include poor human resource management, delayed material delivery, low

payment, subpar construction techniques, poor communication, and subpar labor and project manager management skills. It may also lower labor productivity in less than four categories, including organizational, financial, physical, and socio-physiological.

2.7.2 Factors Associated with Project Manager's Behavior That May Affect Labor Productivity in Building Projects.

The manager's responsibility is to figure out how to elevate a team member's skill and talent to a higher level of performance. This concept does not imply manipulation in any way. Rather, the goal is to optimize human abilities, individually for each member of the team. It combines elements of science and art. Creative problem-solving is a manager's main task, and management is best understood as "the art of getting things done through the efforts of other people." Therefore, management principles are the ways in which you actually manage, i.e., accomplish goals through other people individually, in teams, or within organizations. The actions that "plan, organize, and control the operations of the basic elements of people, materials, machines, methods, money, and markets, providing direction and coordination, and giving leadership to human efforts, to achieve the sought objectives of the enterprise" are formally defined as the principles of management. Because of this, the management concepts are frequently taught or discussed through the use of the P-O-L-C framework, which stands for planning, organizing, leading, and controlling (Shashank et al., 2014), All organizational operations, including budgeting, planning, designing, financing, selling, accounting, and artistic presentation, require management; the more managers necessary, the larger the company. As a manager or a subordinate to a manager, and typically both, every employee in an organization is impacted by management principles, processes, rules, and practices (Mason, Talya, and Berrin, 2012).

Not all of a manager's time is spent managing. Some workers only carry out a portion of the duties that are classified as management; in this sense, they are primarily managers in certain contexts. When someone is tasked with preparing plans for a manager in an advising role, for instance, they are essentially making management decisions by selecting which of multiple options to offer the management. They are not, however, involved in the hiring, staffing, organizing, or overseeing processes, nor do they have any say over how the plan that was chosen from the list of suggestions is carried out. Since they accomplish most

tasks through others, independent consultants are also managers. They happen to be their clients, those others! Obviously, advisors and consultants become managers in the truest sense of the word if they have a staff of subordinates. Business plans must be created, employees must be hired, trained, arranged, and motivated, internal policies must be established to guide and facilitate work, and the group must be represented to parties outside the company (Raj Vijay Antony and Kothai , 2014).

Consequently, the analysis shows that the management strategies that have been found to have an impact on worker productivity in building construction projects include; (Aman Agarwal,Srijeet Halder, 2020) (Oluseyi Julius Adebowale and Justus Ngala Agumba, 2023)

- Supervision and performance monitoring and controlling style,
- Competence of project managers,
- Loss of productivity due to change order,
- Lack of capability of contractor's site management to organize on-site works,
- Adequacy of planning and risk management process,
- Project management style,
- Lack of coordination among the construction parties,
- Organizational culture and other related acts of managers,
- Ability of construction management,
- Experience of supervision,
- Communication factor,
- Selected method of construction,
- Rework order and
- Site management systems are some of reviewed influencing factors of labor productivity in construction (Wang, et al., 2013) (Chalker & Loosemore., 2016)

2.7.3 Framework for Enhancing Management Practice-Related Impacts on Labor Productivity in Public Building Construction Projects

The construction process may be interrupted or obstructed by the natural environment, the objective environment, and the subjective environment, all of which have an impact on construction schedule management in the traditional paradigm (Goldboro, Nova Scotia, 2007).The

software in the construction schedule of the BIM model and BIM5D is the head of schedule for the necessary equipment demand, capital requirements, resource requirements, and actual construction process. It also monitors the progress of the plan's completion in real time and makes efficient use of the materials and funds that are budgeted for the project. Based on global experience, the construction industry's usage of BIM technology raises net profit by 25% and the profitability index by 14% to 15%. Because construction costs were lowered, the investment's payback period was shortened by 17% and the project's cost was decreased by 30%. It is imperative that organizations wishing to transition to BIM have the ability to monitor and assess these benefits in order to guarantee the appropriateness of the BIM utilization process. This demonstrates that in order to be productive and effective in their management, project managers must either create new platforms or employ different modern technology (such as management software). Productivity multipliers for construction productivity are periodically assessed on a particularly constructed basis, taking into account the work characteristics (Xue et al., 2017).

As (Chanyalew1, 2022) studied the use, advanced technology to produce reinforcement bars rather than manual increases construction efficiency and lowered the risk of mishaps involving reinforcement bars yard personnel was investigated in Ethiopian. A different study strongly suggests that in order to enhance labor efficiency and make the process 34-56% more economical, small-scale equipment should be used while casting concrete on a building site, and performance should be routinely monitored. In the construction business, investigations into new technologies or technology transfer are crucial for improving project performance in line with globalization (Shashank et al., 2014). Literature explains how technology might increase task productivity on an individual basis. Be aware that although using technology can increase labor efficiency in general, doing so comes at a cost. Increasing labor productivity is not the ultimate objective. To boost labor productivity, for instance, capital investment in technology can be raised; but, when all costs and benefits are taken into account, this strategy may not be the best one. The secret to increasing productivity is to keep a consistent workflow rather than trying to maximize workload or do as many things as possible.

2.8 Ethiopian Construction Industry and labor productivity over view

Several studies indicate that the building construction industry is growing quickly on a global scale (Oladinrin, et al., 2012), (Ian Hamilton and d Oliver Rapf, 2020). International observers have

observed that the growth of the construction industry has coincided with the proliferation of construction corporations (Kwabena Anaman and Charity Osei-Amponsah, 2012). The building industry is one of the sectors now driving Ethiopia's industrialization and modernization (Ohno, 2011). According to a number of studies, the building sector in Ethiopia and globally contributes approximately 50% of total capital (Gelan, 2022). The Ethiopian Roads Authority conducted an examination of the domestic construction industry in 2000 and found that it is both the second largest employment in the country and a driving force behind innovation, technology, and overall development (Authority, 2000).

Numerous academics have shown that Ethiopia's construction sector serves as a springboard for the expansion of numerous other businesses. Particularly, construction projects need a lot of assistance from other industries. For example, they need diverse clay materials, metallic goods, cement, and cement products, etc. Thus, the expansion of these sectors will undoubtedly coincide with the building sector's growth. Comparably, when more homes were built or renovated, there was a corresponding rise in demand for furniture for the home, which inadvertently led to the expansion of the furniture market. Overall, the construction industry is a labor-intensive sector that can support large microbusinesses (Ethiopian Economic Association, 2006/2007).

The Federal Democratic Republic of Ethiopia's Industry Policy states that the nation's policies are placing a specific emphasis on the building sector. One of the three economic areas that the Ethiopian government has designated for special attention in order to promote the nation's economic development is the construction sector. Inadequate capital, a small and outdated fleet of vehicles, low levels of equipment availability and utilization, a lack of technical, managerial, financial, and entrepreneurial skills, a lack of experience and private sector participation in construction and consulting work, and a poor and inefficient use of labor-based road construction and maintenance technology nevertheless characterize Ethiopia's domestic construction industry (Oqubay, 2018).

The construction industry makes significant contributions to the Ethiopian economy, as seen by its percentage of the GDP, according to the Ethiopian Economic Association's fifth annual report on the Ethiopian Economy, which was released in March 2007. According to the research, Ethiopia has seen a rise in investment in the construction and upkeep of a number of infrastructure projects, including highways, airports, and residential and commercial buildings. As noted by the Ethiopian

Economic Association, the construction sector is playing a more noticeable role in generating job possibilities, particularly in urban areas (Oqubay, 2018).

An analysis of Ethiopia's construction sector productivity reveals that the management of building projects is not based on science (Bedada, 2022). Accordingly, previous research has proven that the majority of construction projects did not perform well. The likelihood of projects to be finished within the allocated time, budgeted cost, and quality standards established in the specification and contract papers were typically used to measure the performance of projects (Benti Gadisa and Hong Zhou, 2020). One major issue that reduces a construction project's overall performance is low worker productivity; therefore, moderate construction industry management practices are necessary to maximize labor productivity (Rabia Emhamd et al., 2020).

Ethiopia was included in a study conducted by (Chia, et al., 2010) to assess labor productivity in the construction industry across 79 chosen nations. For the estimation, the researcher used real (converted from purchasing power parities) and nominal construction expenditure from the World Bank's Report of 2005 International Comparison Programmer, as well as construction employment from the International Labor Organization's database of labor statistics (LABORSTA). According to the report's summary, Ethiopia was placed 76th out of 79 countries.

2.9 Research Gap

Numerous studies have been conducted in Ethiopia and around the world on the factors that affect labor productivity in building construction projects. These factors include incomplete designs, miscommunication between laborers and stakeholders, unfinished plans, material costs and quality, rework, company management systems, and more. Every element affects worker productivity in building construction projects differently. One of these is the role that managers play in the construction of buildings; hence, research is required to determine how management practices affect labor productivity in Addis Ababa's building industry.

2.10 Conceptual framework

The purpose of a conceptual framework for research is to outline the theoretical and practical significance of your subject as well as how your approach will address your research question (Ravitch and Riggan, (2016)). All jargon related to the variable is covered by the conceptual framework, which also provides an ingredient measure for the work that defines each variable and

connects them by specifying their boundaries (Soviadan, 2019);. The author's goal in this study is to determine how management practices affect labor productivity in Addis Abeba's building industry. The dependent and independent variable components and their indicators will be conceptualized, as seen in the picture below.

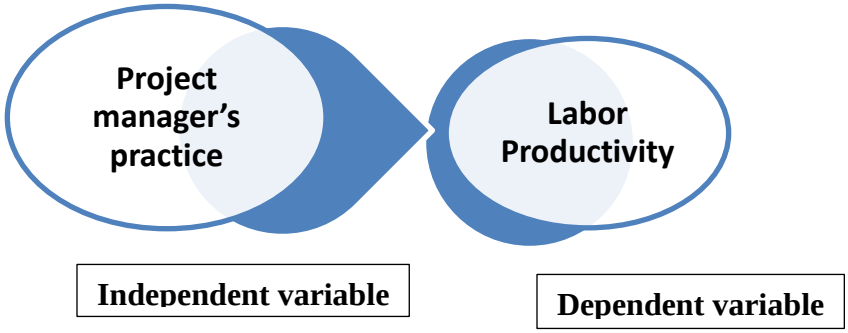

Figure 2: Conceptual framework

Chapter Three: Research Methodology

3.1 The Study Area

Identified area to study the scope is Addis Ababa, which is capital city of Ethiopia which is located in the western margin of the Ethiopian rift valley.

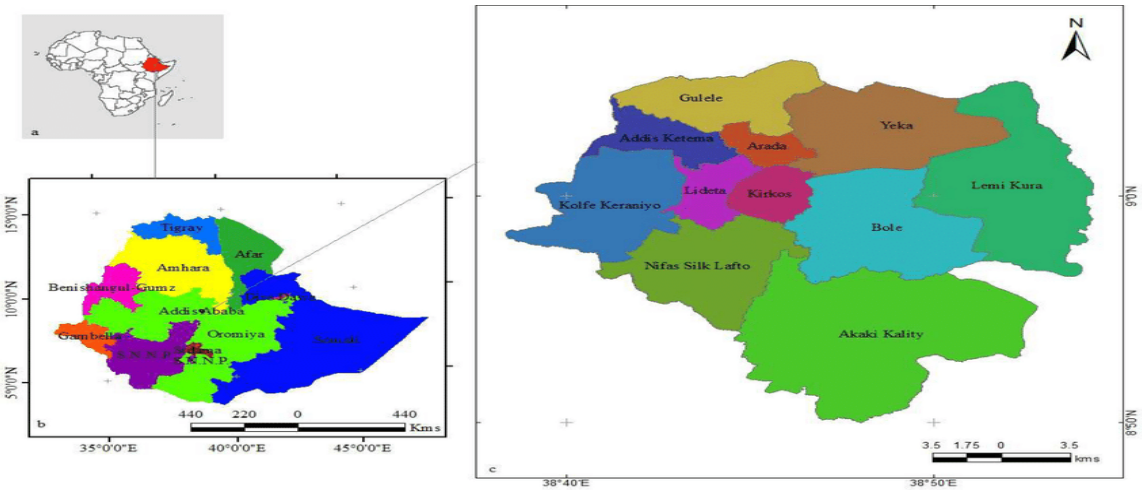

Figure 3: Map of Addis Ababa.

Source: Available from: Map-of-Addis-Ababa-with-Sub-Cities-Source-Ethio-GIS-2022_fig1_360988227

3.2 Research Design

This study applied descriptive design because it described the impact of management practice on labor productivity in building construction projects in Addis Ababa.

3.3 Source of Data

All necessary data were collected from experienced construction project participant at least two-year duration in project. The primary data was collected through structured questionnaire from public building construction project based on their contract amount and their status of performance above 75% in Addis Ababa and especially contracted with public contractors.

3.4 Sampling Design

In order to conduct this study, the random sampling was chosen; because, as stated by (Cooper and Schindler, 2003), a sampling frame defines a set of criteria from which a researcher can choose a sample of the target population.

3.4.1 Target Population

Nowadays, practically every building construction project in Addis Ababa has its own administrative personnel, including an engineering team (an office engineering team), an execution team (construction team), and other supporting personnel. A target population in quantitative research is a group of individuals or objects that the researcher examines and draws conclusions from the data gathered. The building construction stakeholders on the contractor side's top, medium, and bottom project managers' construction sites were the study's target population. People who oversee and direct labor performance in construction activities in Addis Ababa, Ethiopia, include project managers, execution team leaders, design teams, office and site engineers, construction supervisors, general foremen, and others; these individuals are particularly involved in public building construction projects. The participant needs have to work on building construction projects for longer than a year.

3.4.2 Sample Size Determination

The following formula was utilized by the author to generate a population sample that was statistically representative (Hogg, et al., 2013);

$$\mathrm{n} = \frac{\mathrm{m}}{1 + (\mathrm{m} - 1)/\mathrm{N}}$$

Where n, m, and N = sample sizes of the limited, unlimited, and available the population, respectively. On the other hand, m is estimated by

$$m = \frac{P(1-p)\,Z^2}{\mathcal{E}^2}$$

z = statistical value for the confidence level used, i.e., 1.645, 1.96, and 2.57, for 90, 95, and 99%confidence levels, respectively; P = degree of variance between the elements of population; and ε = maximum error of the point estimate.

Since the value of p is unknown, typical value of 0.50 is used so that a sample size that is at least as large as required to be obtained. By using a 95% confidence level, i.e., a 5% significance level, the unlimited sample size of the population, m, is approximated as follows (Hogg, et al., 2013);

$$m = \frac{0.5(1-.5)\ 1.96^2}{0.05^2} = 385$$

Consequently, for the total number of classified contractors under the all categories, i.e., N, of 105, the representative sample size of the population required, is determined as shown below:

$$n = \frac{385}{1 + \frac{385 - 1}{105}} = 83$$

A total of 83 questionnaires were completed by contractors, project managers, and experienced engineers on building construction site; questionnaires were collected based on budget and current status of projects. The overall response to the survey comprised a total of 76 completed questionnaires, representing approx. 82% response rate. The rest 18% were reject due different reason. The results have been achieved by continuous following-up.

3.4.3. Sampling Techniques

In order to conduct this study, the author used the random sampling approach because, as stated by (Cooper and Schindler, 2003), a sampling frame defines a set of criteria from which a researcher can choose a sample of the target population.

3.5 Method of Data Collection

The research instrument used in this research is questionnaire which was designed in such a way that it ensures to address the objectives of the study categorized by different parts. The first part of the questionnaire is targeted to gather information about the respondents and firms' profile; questions in this part were created to collect information such as job position, work experience and projects' contact information. The second part of the questionnaire aims to have data about the awareness and understanding on labor productivity in the construction projects. The third part contains the various aspects of productivity affecting factors to be rated by the respondents with respect to their frequency of occurrence and level of impact as well as the general experiences implemented to improve managers practice that impact labor productivity. The questionnaire was design based on the fact that they had to be simple, clear and understandable for the respondents and at the same time they should be able to be interpreted well by the researcher. The close ended questions had a number of choices of possible answers and the respondents selected whatever they feel was most appropriate. The closed ended questions were selected because they are easier to answer and assess.

3.6 Method of Data Analysis

Simple statistical methods were used in the examination, tabulation, and categorization of the data collected from the questionnaires, all in accordance with the measuring scale that was selected. the reader in understanding and to clearly illustrate the results, the majority of the findings were presented using tables, pie charts, and bar graphs. Linkert scales, which often employ integers in ascending or descending order to rank or rate data, were employed in this study as indicated in the tables below. Numerical labels are everything that the allocated numbers (1, 2, 3, 4, 5) represent.

Table 2: Linkart scale

Item	Strongly agree	agree	neutral	disagree	Strongly disagree
Link art Scale	5	4	3	2	1

The agree level in this study was ascertained using a Link art Scale measurement scale ranging from 1 to 5. Respondents were asked to rank the degree of agreement with the impact of management practices on labor productivity (5 being highly agreeing, 4 being agreeing, 3 being neutral, 2 being disagreeing, and 1 being strongly disagreeing). Relative relevance index (RII) was used to prioritize the traits and rank them based on the respondents' weighted average score. The acquired data were then analyzed using SPSS 26 software. The following equation was used to calculate a relative significance index (RII) for each element in order to analyze data using the Linkert scales.

$$\text{Relative importance index(RII)} = \frac{n1 + 2 * n2 + 3 * n3 + 4 * n4 + 5 * n5}{5(n1 + n2 + n3 + n4 + n5)}$$

where n1 represents the number of respondents who answered "strongly disagree", n2 represents the number of respondents who answered " disagree", n3 represents the number of respondents who answered "neutral", n4 represents the number of respondents who answered "agree" and n5 represents the number of respondents who answered "strongly agree".

3.7 Method of Data Presentation

The analyses of the data obtained from questionnaires have processed which involves simple statistical approach, examining, tabulating and categorizing based on the chosen measurement

scale. Most of the findings were presented in the form of tables, pie charts and bar graphs to clearly illustrate the result and to help to easily understand.

3.8 Validity and Reliability

3.8.1 Validity

"Validity" basically refers to the appropriateness of the measures used, the precision of the data analysis, and the generalizability of the conclusions, according to Saunders, M. et al. (2016). As per the authors, the validity of a questionnaire is determined by its ability to measure the specific items that it was intended to assess.

A variety of validity tests, including content validity, are available to show whether the instrument addresses the research questions. This was accomplished through pilot research with ten participants prior to the questionnaire being distributed. A group of respondents with relevant experience will receive the questionnaire so they can offer their input. To evaluate its content validity, the questionnaire—along with its purpose and research questions—was distributed to ten seasoned professionals who are now employed in the academic and construction industries. Following revisions in response to feedback, the questionnaire was subsequently distributed to the target audiences.

3.2.2 Reliability

(Schimmack, 2016)meaning that a study is deemed dependable if it yields the same results when replicated using a previous design. According to the authors, internal consistency is measured by Cronbach's alpha, which ranges from 0 to 1, and it indicates whether the items in the data collecting instrument evaluate the same concepts. In this study, the reliability of the questionnaire was assessed using this coefficient. For the SPSS linkart scale-style questions, a reliability test using Cronbach's Alpha was created. A scale's or test item's internal consistency can be evaluated using Cronbach's alpha coefficient. Put differently, validity refers to an instrument's ability to measure accurately, whereas reliability deals with the consistency of measurements. Prior to deploying the data collection instrument, the measures' validity and reliability must be evaluated (Joe Hair,et al., 2015). According to (Joe Hair,et al., 2015), the degree of consistency exhibited by a variable or group of variables with respect to the intended outcome is implied by reliability. A reliability analysis was employed to gauge a questionnaire's consistency. While there are other reliability test

techniques, Cronbach's alpha is thought to be appropriate for this particular investigation. Reliability is most commonly measured by Cronbach's alpha.

Table 3: Validity and Reliability Analysis

Case Processing Summary			
		N	%
Cases	Valid	10	100.0
	Excluded	0	.0
	Total	10	100.0
a. Listwise deletion based on all variables in the procedure.			

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.887	.883	31

Source: own data 2024

Chapter Four: Analysis and Discussion

4.1 Overview of Labor Productivity Practices of Contractors in Ethiopia

Questionnaires at the project level were created and sent to contractors in order to assess their general practices with regard to labor productivity at the level of their construction projects. In order to better understand how management practices, affect labor productivity on projects, a survey of a subset of building projects in Addis Ababa, Ethiopia, was conducted. Additionally, the study's goals are to evaluate management practices that have an impact on labor productivity, pinpoint potential contributing factors, and create a framework for enhancing management practices' effects on labor productivity in AA public building construction projects.

4.2 Demographic Characteristics of Respondents

The first part of the questionnaire was demographic information giving the general profile of respondents. In this study, age, gender, educational level, experience of respondents was analyzed. The results obtained from the structured questionnaires are presented on the table below from SPSS software.

Table 4: Demographic Characteristic of the Respondents.

Respondent Gender		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	52	68.4	68.4	68.4
	Female	24	31.6	31.6	100.0
	Total	76	100.0	100.0	

Respondent age		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	21-30 years	5	6.6	6.6	6.6
	31-40 years	49	64.5	64.5	71.1
	41-50 years	8	10.5	10.5	81.6
	above 50 years	14	18.4	18.4	100.0
	Total	76	100.0	100.0	

Experience		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2-5 years	9	11.8	11.8	11.8
	5-10 years	61	80.3	80.3	92.1

	above 10 years	6	7.9	7.9	100.0
	Total	76	100.0	100.0	

Educational status		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	diploma	31	40.8	40.8	40.8
	degree	23	30.3	30.3	71.1
	masters	22	28.9	28.9	100.0
	Total	76	100.0	100.0	

Respondent current working team		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	project manager	10	13.2	13.2	13.2
	supervisors	6	7.9	7.9	21.1
	Engineering staff (office engineer)	28	36.8	36.8	57.9
	executive (site engineering team)	24	31.6	31.6	89.5
	another supportive team	8	10.5	10.5	100.0
	Total	76	100.0	100.0	

Source: Own survey 2024

From the 76 respondents, 52 (68.4%) were male and 24 (31.6%) of the respondents were female, which ensures that there is satisfactory gender distribution on building construction projects. Out of the total 76 respondents, about 64.5% respondents' age between 31 to 40 years old; this indicates that majority of respondents are in maturity stage. The work experience of the respondents in the construction industry is assessed and found to be 61(80.3%) from 5 to 10 years. The overall profile implies that most of the respondents have adequate experience in construction firms. This indicates that the respondents could provide the required information for all items included in the questionnaire. Seeing the educational level of the respondents, 31(40.8%) are diploma holders, 23(30.3%) are first degree holders and 22(28.9%) were master's degree holders. This implies that the respondents are the right fit to read, understand and answer the questions. As is illustrated in the table above, almost all project staffs were participated.

4.3 projects back ground

4.3.1 Contract amount (ETB) of projects

The chart below shows that 68.4% of the respondents were handling projects with a contract amount of birr above 500 million, 26.3% of the respondents were handling projects with a contract amount of birr between 200-500 million and 5.3% of the respondents were handling projects with a contract amount of birr between 100-200 million and there is no project its contract amount is below 100 million on this study. Most of the respondents have projects with amounts of birr above 500 million; this indicates that most respondents administer huge projects having different types of work. In these types of projects, the involvement of labor to execute the works is high.

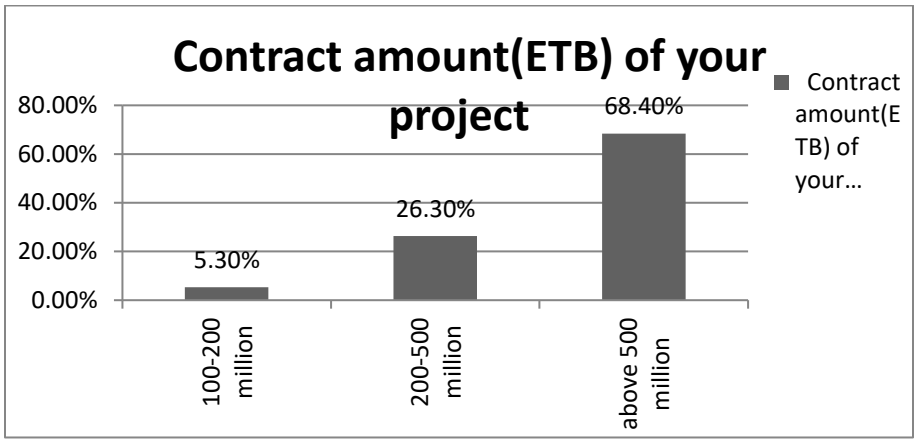

Figure 4: Contract amount of respondent's project. (Source: Own survey 2024)

4.3.2 Contract duration of your project (in year)

The pie chart and table below show that 64.5% of the project duration is above two years, 30.3% of the respondent's project contract duration is between 1 and 2 years and 5.3% of respondent's project is under a one-year duration. These indicate that most of the projects that are selected to study have an above two-year contract period of work.

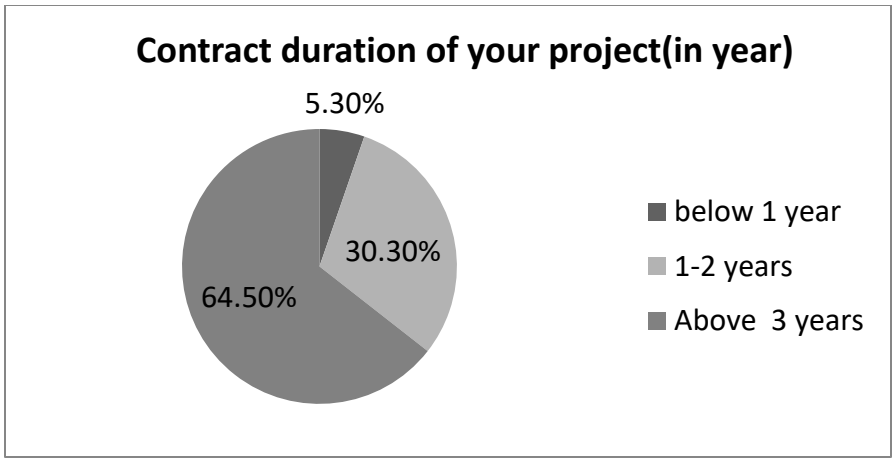

Figure 5: Contract duration pie-chart. Source: survey data

4.3.3 Progress/status of the projects

The survey data indicate that 19.7% and 21.1% of projects selected for the purpose of studies are behind schedule and over schedule respectively. The rest of 59.2% of respondents' projects are under schedule. The result of survey data is indicated under the figure below.

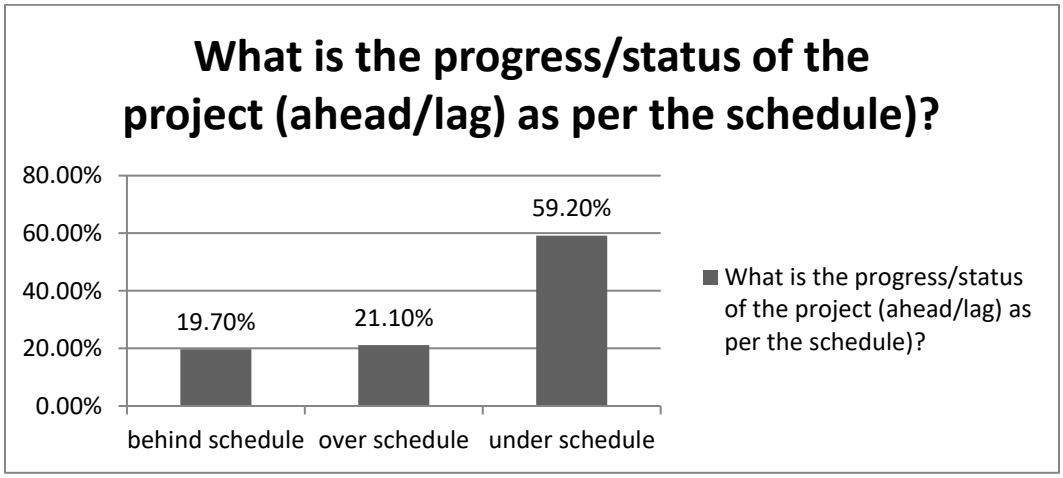

Figure 6: Progress/Status of the project. Source: survey data

4.4 Assessment of Worker Productivity in Building Construction Activities

4.4.1 Employed Labor Productivity Measurement Techniques

As survey data indicate, 33% of the respondents have a practice of measuring labor productivity. Hence, it is found out that “Output per worker hours” is implemented by 66.7% as an approach to

measuring labor productivity. The rest, 33.3 %, is correct to measure labor productivity based on "Jobs completed per jobs scheduled", if the work schedule is prepared based on reliable data.

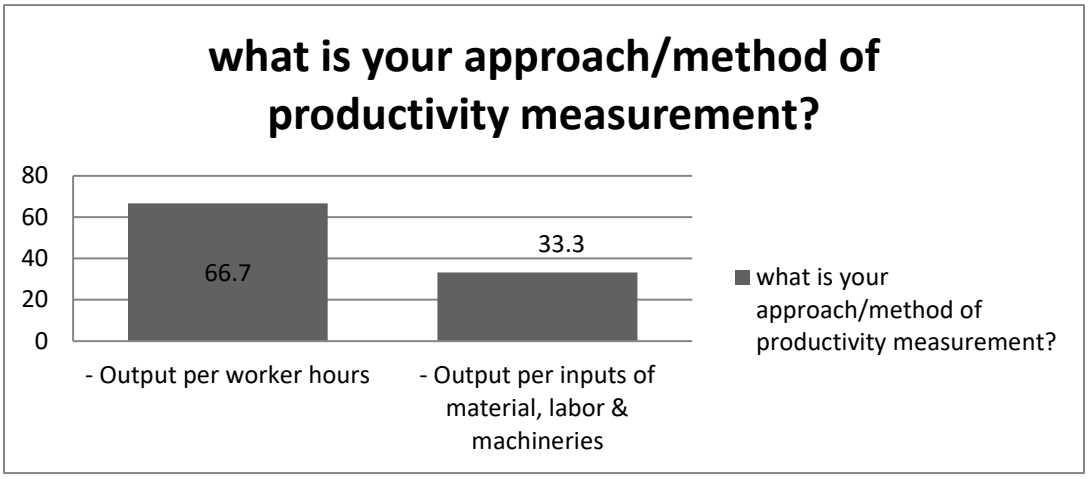

Figure 7: Approach/method of productivity measurement. Source: own survey data

4.4.2 Contractors' projects labor productivity measurement experience.

The assessment indicates that 56% of the respondents do not measure labor productivity for the following reasons from survey data. The reasons given by 20.9% of the contractors do not measure productivity due to lack of awareness, 41.9% of them are due to negligence, 11.6% of them believe that it is unnecessary, 14% due to scarcity of time, 2.3% believe it is expensive and believe.3% of the contractors believes that measuring of labor productivity is difficult to implement as shown under figure below.

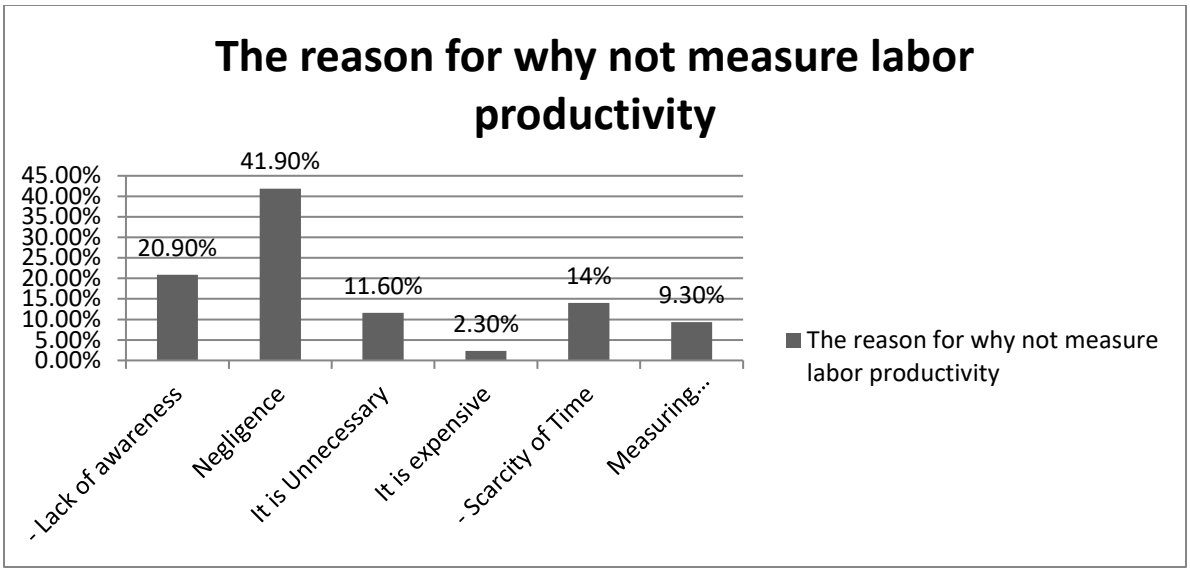

Figure 8:The Reason for why not measure labor productivity. Source: own survey data

4.5 Management practices that affect Building construction labor productivity of public building construction project.

After evaluating the key management practices that have the biggest impact on labor productivity, the authors divided the practices into three categories: project plan-related management practices, project management practices related to project management systems, and, finally, workforce and material management systems with their respective levels of impact. The first one is rated by considering all responses on inadequate project plan based on their RII ranking system.

4.5.1 I. Planning related practice that impact labor productivity.

Table 5: Respondent (RII rank) on planning practice.

I. project planning	RII	Rank	RII level of impaction
Management Planning practice positively impact to labor productivity of building construction project	0.901	1	High-level
Managers Planning inform day to day practice of your project	0.579	2	Medium- level
All level of management and stakeholders participate in the planning process on your project progress.	0.545	3	Medium- level
All management level of project that means; from top level (PM) to lower level or first level of management (Foreman) practically use plan on their daily activity.	0.376	4	Low level

Source: (own survey data)

Management Planning practice positively impacts on labor productivity of building construction projects with a value of RII=0.902632. 2) Managers Planning inform day to day practice of your project with a value of RII=0.578947, 3) all level of management and stakeholders participate in the planning process on your project progress with a value of RII=0.544737, 4) all management level of project that means; from top level (PM) to lower level or first level of management (Foreman) practically use plan on their daily activity with a value of RII=0.376316. The second group of management practice is the Inadequate Management system of the projects based on their RII ranking systems.

4.5.2 II. Project Management system that affects construction labor productivity in construction project.

Table 6: RII rank of respondents on Management system of the project

Source: (own survey data)

II. Management system of the project	RII	Rank	Level of impact
Project management skills (project managers' experience)	0.879	1	High-level
Not motivating Labor during or after end of work	0.876	2	High level
Lack of coordination among the construction parties influence labor productivity	0.871	3	High level
Project management style highly influences labor performance in building construction project.	0.865	4	High level
Unscheduled work order	0.863	5	High level
Not effectively and efficiently use working hour per day	0.860	5	High level
Communication error among the stakeholder) impact labor production in project	0.858	6	High level
Selection wrong method of construction	0.818	7	High-level

1)Project management skills (skill of project managers' with a value of RII=0.878947, 2) Not motivating Labor during or after end of work with a value of RII=0.773, 3) Project management style highly influences labor performance in building construction project and Lack of coordination among the construction parties influence labor productivity with their values of RII=0.871053, 4) Unscheduled work order with a value of RII=0.868421,5) Not effectively and efficiently use working hour per day with a value of RII=0.863158 and 6) Lack of equipment and

tools and Poor quality of material with a value of RII=0.863158, 7) Selection wrong method of construction.

4.5.3 III. Man power and Material management system

Table 7: (RII) of Man power and Material management system

III. Man power and Material management system	RII	Rank	Level of impact
Not Providing service on site like water, electricity, clinic and others	0.939	1	HLI
Not supplying necessary equipment as needed	0.889	2	HLI
Material unavailability on site as the schedule	0.853	3	HLI
Ordering overtime work without any plan of work or profit.	0.532	4	MLI
Wage level for labor that means not equally paying on the same level of work	0.513	5	MLI
Lack of supervision	0.495	6	MLI

Source; (survey data 2024)

The third one is Poor Man power and Material management system; Not Providing service on site like water, electricity, clinic and others with a value of RII=0.939474, Not supplying necessary equipment as needed with a value of RII= 0.889474, Material unavailability on site as the schedule with a value of RII= 0.852632, Ordering overtime work without any plan of work or profit with a value of RII=0.531579, Wage level for labor that means not equally paying on the same level of work with a value of RII=0.513158 and Lack of supervision with a value of RII= 0.494737

4.6 Factors that affect Building Construction Labor Productivity related with act of project managers.

4.6.1 Introduction

The survey of Contractors involved in the public building construction projects in Addis Ababa, Ethiopia is done for investigating major factors that influence labor productivity on the projects related with act of management body. Different studies grouped the factors that affect labor

productivity on construction industry such as management and control, project site condition, material related factor, finance related factor and so, on. In this study the author used management and control related factor that affect labor productivity specially on public building construction project and rated by respondents with respect to their level of effect are ranked by calculating using relative importance index (RII) and the impact is also studies and discussed below.

4.6.2 The attributes of management practices affecting construction labor productivity in AA public building construction project

productivity and how much of an impact they have, as determined by rating all responses are 1) Miscommunication between managers and labor, sub-contractors and other stakeholders RII=0.728947, 2) Improper planning with a value of RII=0.707895, 3) Corruption with a value of RII=0.700, 4) Selection method of construction RII= 0.6894745, 5)Not Controlling and Monitoring of Labor Activity by measuring their output RII= 0.676744 6) Ordering unexpected work RII=0.676316, 7) Not Motivating Labor RII=0.655263, 8) Improper work schedule with a value of RII= 0.650, 9) Improper resource allocation RII= 0.647368, 10) Incapability of project managers (RII=0.628947),11) Ineffective utilization of resource including manpower (RII=0.594737),12) Unscheduled Material supply (RII=0.581579) and 13)Not use customizable project management software on planning, monitoring and controlling phase of project (RII=0.560526.

Table 8: Relative importance index (RII) of Management practices affecting construction labor productivity

Management practice that affects labor productivity	**RII**	**Rank**	**Level of affecting LP**
Miscommunication between managers and labor, sub-contractors and other stakeholders	0.729	1	HLA
Improper planning	0.708	2	HLA
Corruption	0.7	3	HLA
Selection method of construction	0.689	4	MLA

Not Controlling and Monitoring of Labor Activity by measuring their output	0.677	5	MLA
Ordering unexpected work	0.676	6	MLA
Not Motivating Labor	0.655	7	MLA
Improper work schedule	0.65	8	MLA
Improper resource allocation	0.647	9	MLA
Incapability of project mangers	0.629	10	MLA
Ineffective utilization of resource including manpower	0.595	11	MLA
Unscheduled Material supply	0.582	12	MLA
Not use customizable project management software on planning, monitoring and controlling phase of project	0.560	13	MLA

Source: (own survey data 2024)

The results in Table 4.5 depict that the most important attributes of management practices negatively affecting labor productivity are: Miscommunication between managers and labor sub-contractors and other stakeholders; Improper planning; Corruption; Selection method of construction; Not Controlling and Monitoring of Labor Activity by measuring their output, Ordering unexpected work, Improper work schedule, Improper resource allocation and Incapability of project managers. On the other hand, results indicate that Ineffective utilization of resource including manpower, labor personal problems, Unscheduled Material supply, and Not use customizable project management software on planning, monitoring and controlling phase of project.

4.7 Framework for improving management practice related impacts on labor productivity in building construction project

Effective management is essential for a project's success in construction productivity. To finish a project on schedule and within the allotted budget, a project leader or any level of management team could transfer responsibility and make the appropriate decision at the appropriate moment. Every project needs the support of upper management and the appropriate culture to succeed, and these are two essential components. The present study enhanced the extant body of knowledge by

discerning and evaluating the influence of managerial strategies and tactics on the productivity of construction workers in building development projects.

By identifying the most important characteristics of management practices that have an impact on construction productivity in Addis Ababa, this study gave construction project managers a way to apply its findings to their projects and control low labor productivity problems. The public building construction project that is contracted with a public construction business and the analytical unit selected to carry out research and gather data at the project/site level covered the entire scope of the current study. Moreover, a single building construction project has been chosen for this investigation.

In the building industry; labor productivity is regarded as the primary value-adding function. The purpose of this study was to determine how management practices affected the productivity of construction labor in building projects and to prioritize these practices based on the contractor's viewpoint.

In this study, the author identified 31 impacting factors of management practice that influence building construction labor products in Addis Ababa, Ethiopia, based on a careful review of literature and suggestions from local experts in building construction. The current data indicate that, nowadays in Ethiopia, there are different profit-based public contract companies assigned by the government to conduct different public and private construction projects, including building construction projects for different public purposes. Most of the projects used in the study are huge. Their contract amount is more than one-half billion birr; The author believes that the size of the projects was a challenge. It needs a more experienced management team; so, the project management team must be wise to manage such a project to make it effective, and they must be responsible for each and every operation of labor productivity. In order to identify problem areas and suggest solutions, contracting companies must perform productivity studies at the activity/operation level. These studies must include an examination of factors influencing labor productivity as well as labor productivity measurement. Detailed task descriptions for an activity/operation must be provided by an individual or group. In order; to increase the efficacy and precision of cost estimation for upcoming projects, contracting firms are also urged to save past productivity study data from finished projects. Training sessions and seminars on the subjects that would increase construction project productivity are required.

The goal of the training program should be to increase participants' competency with project scheduling tools like primavera and Microsoft Project.

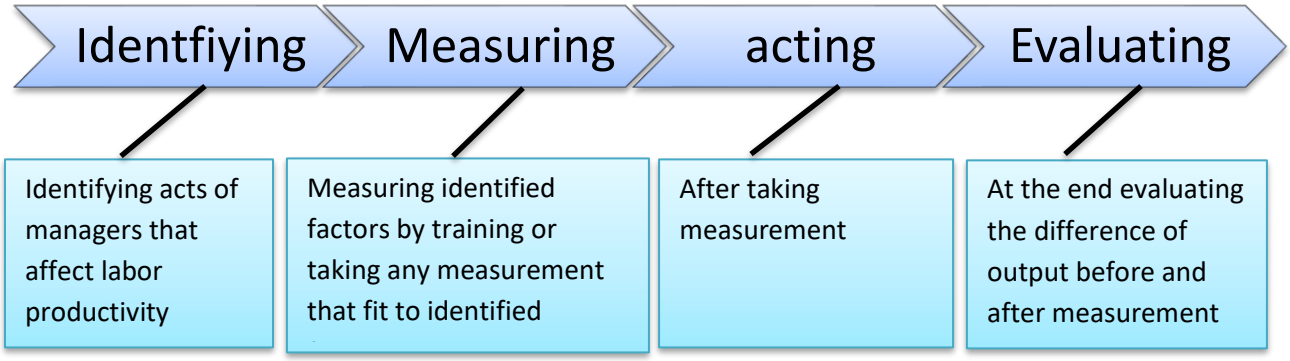

Figure 9: Framework for improving management practice

Enhancing techniques for analyzing productivity and enhancing productivity on building sites should also be a focus of the training program. To enhance the abilities and skills of craftspeople working on building projects, more trade schools that specialize in teaching construction trades such as block work, formwork, painting, plastering, plumbing, etc. are required. Contracting firms should work harder to take advantage of the technological transfer and optimal use of benchmarking that other industrialized nations have accomplished.

Chapter Five: Conclusion and Recommendations

5.1 Conclusion

In a building project, labor productivity and administration are crucial. The factors that affect employee efficiency and its overall impact on the project are essential to the success of any construction project. To better understand the components of labor productivity management, a survey of the literature was done. The fundamental framework upon which every construction project is built is project management. These studies seek to evaluate the effects of management practices, locate the primary variables that influence labor productivity (LP) in building construction projects through the actions of project managers, and create a framework for enhancing management practices that affect labor productivity. In order to conduct this study, the author divided project managers' practices into three categories in order to evaluate the effects on labor productivity: planning, project management system, and system for managing labor and materials. Processes that result in improved project performance when carried out well are known as best management practices.

Over 90% of respondents believed that planning practices had a beneficial impact on the labor productivity of building construction projects when the study was concluded. These suggest that respondents are aware of the need to plan for the day-to-day labor performance of construction projects. While a moderate percentage of respondents generally agreed that their project planning influences the day-to-day operations of the project, the resets indicated that they were unsure about how this was the case.

A moderate percentage of respondents believed that all levels of management, from lower to higher project managers, participate in the planning process, while a low percentage of respondents thought that all levels of management use planning to improve daily performance. These suggest that a majority of project management teams do not consistently employ planning in their daily operations to enhance labor productivity in building construction projects.
The project's achievement is dependent upon multiple factors, and it is feasible to finish the project within the budget and time constraints set forth. It needs a committed management team under the direction of an experienced leader who can carefully consider the authority to make decisions that will best serve the project and make the appropriate choices on time. Any project's ability to succeed is largely dependent on the dedication of the upper echelons of management and the

existence of a suitable management culture. Through the identification and analysis of the effects of management practices and procedures on building construction project productivity, this research contributed to the body of information already in existence.
The study's findings, according to the author, can be applied by construction project managers to control low labor productivity and delays in project completion. These attributes include applying the planning process to project progress, managers planning at a medium level of description for day-to-day operations, ordering overtime without a work plan or profit in mind, setting a wage level for labor that does not equate to paying workers equally for the same amount of work, and identifying factors that have been found to affect labor productivity in building construction. Miscommunication between managers and labor, sub-contractors, and other stakeholders Improper planning, corruption, selection methods for construction, Not controlling and monitoring labor activity by measuring their output, Ordering unexpected work, not motivating labor, Improper work schedule, Improper resource allocation, Incapability of project managers, Ineffective utilization of resources, including the workforce, Unscheduled material supply, not uses customizable project management software in planning, and not monitoring and controlling the labor of projects are the most significant acts of project managers that affect labor productivity.

5.2 Recommendations

- "Site management needs to be aware of the many traditional and evolving concepts and practices within construction that impact the company and project site organizations with which they are involved," according to the study's findings. A few recommendations based on the study, have been sent by the author. It is recommended that building, construction project managers take a serious approach to measuring labor productivity. They should; also have to attend workshops and training sessions to broaden their knowledge, as incompetence and ignorance have been found to be the main reasons why productivity in building construction projects is not measured.
- Contractors should pay particular attention to difficulties pertaining to material shortages, poor job progress monitoring, and incomplete amenities (the site sewerage line, power supply, and water supply). In order to, reduce their effects on labor productivity, frequent equipment damage and a lack of motivation

- To reduce their effects on labor productivity, the consultants should pay particular attention to the following issues: incomplete and inaccurate drawings; delays in inspections and instructions; changes to work orders or variations; and delays in decision-making.
- In order of effectiveness, author suggests the following labor-improvement strategies: timely supply of materials and equipment; use of work plans and schedules; effective and strong communication between stakeholders; continuous monitoring of project progress; acquisition of complete drawings and specifications; labor motivation; and subcontracting work.

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Appendix

Survey Questionnaire

Addis College

SCHOOL OF GRADUATE STUDIES

DEPARTMENT OF CONSTRUCTION TECHINOLOGY AND MANAGEMENT

Researcher information: -Name: Abriham Abiye; Email: - abri1982abi@gmail.com

phone +251967416594

Survey questionnaire

Dear sir/ madam

I am studying a master's degree program at Addis College, and I am interested in collecting my graduation research paper questionnaire data on the title "impact of management practice on building construction labor productivity on some selected activity," in the case of public building construction in Addis Ababa, Ethiopia. I assure you that the study is conducted for academic purposes only and for partial fulfillment of the requirements of the Masters of COTM. I am interested in collecting the data as you are rich in data which is more important for my research. Please do not leave any elements blank. Thank you!

Section one: kindly tick (√) your demographic information in the box indicated behind the information.

1. Your gender

- Male ☐
- Female ☐

2. Your age

- 21-30 year ☐
- 31-40 year ☐
- 41-50 year ☐
- Above 50 year ☐

3. Your Experience

a. 2-5years ☐

b. 5-10 years ☐

c. Above 10 years ☐

4. Your educational status

a. Diploma. ☐

b. Degree ☐

c. masters ☐

d. PhD ☐

5. Your current working team.

a. Project Manager ☐

b. Supervisor ☐

c. Engineering(office) staff ☐

d. Execution (site engineering) staff ☐

e. other supportive staff ☐

Section 2: in similarly way your project information

1. Contract amount (ETB) of your project

a. below 100 million ☐ c. 200-500 million ☐

b. 100-200 million ☐ d. > 500 million ☐

2. Contract duration of your project (in year)

a. < 1 year ☐ b. 1-2 years ☐ c. > 2 years ☐

3. What is the progress/status of the project (ahead/lag) as per the schedule)?

a. Behind schedule c. under schedule

b. over schedule d. not know

Section 2: General question based on labor productivity on building construction activity

1. Would you rank generally about labor performance on your project?

a. very bad ☐ b. bad ☐ c. neutral ☐ d. good ☐ e. very good ☐

2. Would you rate the impact of labor productivity on the project performance?

a. Very low ☐ b. low ☐ c. medium ☐ d. High ☐ e. very high ☐

3. Do you measure labor productivity in your building construction project?

A, Yes B, No

4. If you say yes for question no.3, what is your approach/method of productivity measurement?

- Output per worker hours
- Output per inputs of material, labor & machineries
- Jobs completed per Jobs scheduled
- Other, (please specify) ……

5. If you say No for question no.3, what could be your reason?

- Lack of awareness
- Negligence
- It is Unnecessary
- It is expensive
- Scarcity of Time
- Measuring productivity is difficult to implement
- Other, (please specify) ……

Section 3: Question based on goal or objective of the study:

A: Assessment of the management practice that influence labor productivity in AA public building construction project.

In this section, please mark in the table below with (√) sign by kindly considering the impact of management practice on building construction labor productivity.

Key scale: 1= strongly disagree (SD) , 2 Disagree = 3 = neutral 4= Agree (A) and 5 = Strongly Agree (SA)

	Statement	**5(SA)**	**4(A)**	**3(N)**	**2(SD)**	**1(SD)**
	I. Inadequate planning					
1.	Management Planning practice positively impact to labor productivity of in my building construction project					
2.	Managers Planning inform day to day practice of project					
3.	All level of management and stakeholders participate in the planning process on your project progress?					
4.	All management level of project that means; from top level (PM) to lower level or first level of management (Foreman) practically use plan on their daily activity.					

	II. Management system of the project					
	Project management style highly influences labor performance in building construction project.					
	Lack of coordination among the construction parties will influence labor productivity					
	Not motivating Labor during or after work					
	Selection wrong method of construction					
	Project management skills (lack of experience on project management					
	Communication error among the stakeholder					
	Unscheduled work order					
	Not effectively and efficiently use working hour per day					
	III. Man power and Material management system					
1.	Material unavailability on site as the schedule					
2.	Not supplying necessary equipment as needed					
3.	Wage level for labor that means not equally paying on the same level of work					
4.	Not Providing service on site like water, electricity, clinic and others					
5.	Ordering overtime work without any plan of work or profit.					
6.	Lack of supervision					

B: Factors that may affect Building Construction Labor Productivity related with behaver of project managers.

In similar way, please indicate your best by using sign (√) on table shown below. Where SA= strongly agree, A= agree, D= Neutral, D = Disagree, SD= strongly disagree

	Statement	5(SA)	4(A)	3(N)	2(D)	1(SD)
	Project mangers' incapability					
	Improper planning					
	Improper resource allocation					
	Improper work schedule					
	Not use customizable project management software on planning, monitoring and controlling phase of project					
	Selection method of construction					
	Corruption					
	Miscommunication between managers and labor, sub-contractors and other stakeholders					
	Unscheduled Material supply					
.	Ineffective utilization of resource including manpower					
.	Not Controlling and Monitoring of Labor Activity by measuring their output					
.	Not Motivating Labor					
.	Ordering unexpected work					

Thank you!