

Addis Ababa University

College of Business and Economics

School of Commerce

Analysis Cost Overruns in Manufacturing Projects:

Causes, Consequences, and Mitigation Strategies

In the case of Yirgalem Addis Textile Factory

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Date: June 14, 2024

DECLARATION

I declare that this research project is my original work and was never presented in other universities for the award of any degree.

Dawit Tesfaye

Signature _____

Date _____

CERTIFICATION

This is to certify that this research project report titled analyzing cost overruns in manufacturing project: causes, impacts, mitigation strategies in the case of yirgalem addis textile factory submitted for partial fulfillment of the requirement for the award of master's degree in project management is prepared by Dawit Tesfaye under my supervision. To the best of my knowledge, it is an original work and not submitted to any university for any purpose.

I recommend that the student submit to the department.

Dr. Adane Atara	_____	_____
Name of Advisor	Signature	Date

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Approved by Board of Examiners

_____	_____
Internal Examiner	Signature
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External Examiner	Signature

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ABBREVIATIONS AND ACRONYMS

RII - Relative important index

EVM - Earned Value Management

EHAC - Estimated Hour at completion

SPSS - Statistical software for social sciences

AGOA – African Growth and Opportunity Act

ABSTRACT

The manufacturing industry is growing in recent years in Ethiopia. These industries undertake many kinds manufacturing projects and these projects are affected by cost overruns. Project cost overruns occur when the actual cost of a project exceed the estimated cost of a project. The objective of this study is to analyze cost overrun in manufacturing projects: causes, impacts and mitigation strategies in the case of yirgalem addis textile factory. To achieve the objective of this study, primary data such as questionnaire and interviews were used. Survey type of research design was used in this study. The data gathered were analyzed using descriptive statistics and inferential statistics. The findings of this study indicate that the main causes of cost overrun in textile manufacturing projects were scope change, labor issue, material price fluctuations, and government regulations. The consequence of cost overrun on manufacturing projects which were identified by the study were wastage of resources, financial problems, project delays, project abandonment. Enhanced project management capability, risk and contingency planning, implementation of cost monitoring and control measures were the mitigation strategies. The study's recommendations are the scope of the project must be defined clearly and communicated to stakeholders, proper cost estimation of cost, monitoring and controlling cost, communicating the cause of cost overrun to all project stakeholders.

Key words: Cost overrun, causes, consequences, mitigation strategy, Textile factory, manufacturing projects

CHAPTER ONE: INTRODUCTION

1.1. Background of the study

Cost overrun denotes the phenomenon when the project's actual cost exceeds the estimated cost (Invernizzi et al., 2017). Cost overruns can be defined as when the project objectives have not been achieved within the estimated budget (Dlakwa and Culpin, 1990). A cost overrun, also known as a cost increase or budget overrun, involves unexpected costs incurred in excess of budgeted amounts due to an under estimation of the actual cost during budgeting. Cost overrun should be distinguished from cost escalation, escalation is avoided with an anticipated growth in a budgeted Due to change in the government policy, price increase due to transportation cost, and force majeure reasons. (Lulla, Balakumar, Anwaya, 2017). Common causes of cost overrun can be poor initial cost estimation, scope change, unexpected delays in project schedules, inadequate project planning, Ineffective project management practices, issues related with labor, issues with material and equipment, Poor communication, external factors beyond the project's control (Abedi, Fathi, & Mohammad, 2011).

Some of the impacts of cost overrun on projects include (1) wastage of resources that could have been used more effectively due to inefficient allocation of resources (2) financial problems which makes it challenging to secure additional foreign or domestic credit facilities to cover the increased costs (3) Economic justification by leading to questions about the project's viability and benefits (4) Project delays (5)Disputes and Litigation between project stakeholders leading to litigation and additional costs to resolve conflicts(6)Project abandonment (Gbahabo and Ajuwon, 2017). Other impacts can be low quality, scope creep, dissatisfaction of the team. Delay can occur if resources are diverted from other project to control the cost overrun.

The strategies that can be taken to mitigate cost overruns are (1) enhanced project management capability (2) Reference class has proven to be a more accurate and successful way of controlling cost overruns especially the type arising from optimism bias(Flyvbjerg,2003; Odeck, 2004). (3) Computer-Aided Cost Estimating and Forecasting Models and tools are now available giving modern cost engineers an advantage over issues of cost overrun (Ahiaga-Dagbui and Smith, 2012). (4)Risk and contingency planning is a very common cost overrun mitigating measure ((Baccarini 2005). Contingency plans are not based on any estimation technique but rather on a rule of thumb

calculation. They are usually an additional cost allowance on the project by a certain percentage above the based cost estimate based on the experience of the project cost engineer (European commission DG XVI, 1998).(5) Prequalification of contractors has been proven to be an effective way of controlling project overruns by screening out bidders with doubtful capability who tend to strategically misrepresent project cost in order to unduly gain contract approval(Siemiatycki, 2015).(6) Use of Public-Private Partnerships can be employed as a mechanism in controlling the frequency and magnitude of cost overruns(Siemiatycki,2015; Kostka and Anzinger,2015).

1.2. Statement of the Problem

Yirgalem Addis Textile former adey abeba textile is one of the biggest factories in addis ababa located at nefas silk subcity and was established in 1961G.C. Since then it has undergone through various rehabilitation and expansion projects and employee's capacity building programs to improve its capacity and competitiveness in export and domestic markets. Currently it is producing different types of blankets, t-shirts, pyjamas, home cloths, work wears, uniforms, and underwear. The company provides knitting and dyeing services using modern circular and flat knit machineries.

Yirgalem Addis textile factory faced cost overruns while undertaking different manufacturing projects. This cost overruns created a problem in its profitability, delays in delivering projects, unsatisfied stakeholders. There is a gap in the literatures that identifies the specific causes, quantifies the impacts, and provides effective mitigation strategies for addressing cost overruns in manufacturing projects.

The problems observed were manufacturing projects such as the expansion project which aimed to add more lines (machines) to increase productivity to the garment plant did not complete with the estimated cost. Another manufacturing project dyeing water treatment was abandoned after completing one phase of the project because of cost overrun. There was also another project to acquire a large plotter (marker) which was completed without getting the appropriate software to run the machine smoothly because of cost overrun.

The purpose of the study is to analyze the root causes of cost overruns in manufacturing projects, assessing their impact on project performance, and developing practical mitigation strategies to help project managers proactively manage cost overruns and improve project outcomes.

The study will review existing literature on cost overruns in manufacturing projects, construction projects and infrastructure projects, choose those applicable to the textile manufacturing industry. By synthesizing findings from previous research on construction projects cost management and infrastructure project assessments, the research will contribute valuable insights to enhance cost management practices within the textile manufacturing industry.

1.3. Objectives of the Study

The following are the objectives of the study:

I. Analyzing the factors contributing to cost overruns in manufacturing projects at yirgalem addis textile factory
II. Assess the consequence of these factors on project costs in yirgalem addis textile factory
III. To identify interventions needed on how to mitigate cost overruns and improving cost management in projects at yirgalem addis textile factory

1.4. Research Questions

1. What are the primary causes of cost overruns in manufacturing projects in Yirgalem Addis Textile Factory?
2. How do cost overruns impact manufacturing projects in Yirgalem Addis textile factory?
3. What are the most effective mitigation strategies to prevent cost overruns in manufacturing projects specifically in Yirgalem Addis Textile factory?

1.5. Significance of the Study

The significance of the study in analyzing cost overruns in manufacturing projects is that it helps in reducing the impact on project success. Studying the root causes of cost overruns, manufacturing companies take action so as to improve their budgeting, cost management, risk management for project success and better project outcomes.

Studying impact of cost overruns on manufacturing projects helps in managing stakeholder expectations, better decision making, project prioritization, and resource allocation. It also helps in understanding the effect of cost overruns on stakeholders, customers and suppliers.

Mitigation strategies for cost overruns provides practical recommendations for manufacturing plant in order to mitigate cost overrun. Implementing the strategies, manufacturing company can reduce cost overruns for a better performing project and better profitability.

1.6. Scope of the Study

The main focus of this study is identify the root cause of cost overruns, their impact on manufacturing projects and mitigation strategies. There are many types of manufacturing companies. The study concentrates only on manufacturing companies especially Textile Factory specifically Yirgalem Addis Textile Factory PLC. It does not study other manufacturing companies.

1.7. Organization of the Study

The study report will be divided into five chapters. Introduction, background, statement of the problem, objectives of the study will be included in the first chapter. The second chapter will deal with related literature review. Chapter three will contain research methodology which presents research design, data collection and analysis. The findings of the study will be discussed under chapter four. Recommendations, conclusions will be discussed under chapter five.

CHAPTER TWO: LITERATURE REVIEW

Introduction

The manufacturing industry in Ethiopia has been growing rapidly in recent years and with the government actively promoting the sector as key driver of economic development. The textile industry is one of the largest in Ethiopia's manufacturing sector, with companies producing a range of products including clothing, home textiles and industrial fabrics. (Mahlet Ademe, 2023).

One of the challenges faced by the manufacturing projects in the manufacturing industry is the rising of raw materials which leads to cost overruns. The cause of this challenge is due to supply chain issues and heightened demand in certain sectors. This results in lower profit margins and pushing manufacturers to reevaluate their sourcing strategies. (Slyman, 2024).

2.1. Conceptual Literature review

2.1.1 Project Cost

Project cost refers to the total expenses incurred in building or manufacturing to meet project objective. (Chen, Yu, Liu, 2021). It encompasses the cost of project resources, manufacturing and execution, including materials, labor and machinery. (Fang, 2019). Cost estimation involves calculating the expenses of all necessary resources, influenced by quality choices, risks, procurement, management competence, construction methods, and funding availability. Efficient methods like batch file establishment and parameter setting streamline project cost compilation, reducing redundancy and improving accuracy. Overall, project cost is a crucial aspect managed to ensure projects are completed within budget constraints while meeting quality and time requirements.

2.1.2 Cost overrun

Cost overrun, also known as budget overrun, is the scenario when the cost of a project or business tends to increase than what was it budgeted for and can be due to the increased cost due to improper budgeting or underestimation of the actual cost on account of some unforeseen scenarios which was not accounted for during the process of budgeting. (Srivastav, 2024). Knut Samset (2010) mentions, in his book the problem of cost that cost overruns in textile manufacturing projects can stem from various factors such as inaccurate initial cost estimates, unexpected price fluctuations in raw materials, and inefficient project management practices. Cost overrun is the amount by which actual cost exceeds estimated cost, with cost measured in the local currency, constant prices,

and against a consistent baseline. Overrun is typically measured in percent of estimated cost, with a positive value indicating cost overrun and a negative value underrun. Size, frequency, and distribution of cost overrun should all be measured as part of measuring cost overrun for a certain investment type. (Bent Flyvbjerg, Atif Ansar, Alexander Budzier, Søren Buhl, Chantal Cantarelli, MassimoGarbuio, Carsten Glenting, Mette Skamris Holm, Dan Lovallo, Daniel Lunn,11 Eric Molin, Arne Rønnest, Allison Stewart, Bert van Wee, 2018).

2.1.3 Importance of cost overrun

Cost overrun is a big issue in projects universally. It impacts project success and performance significantly. The factors that contribute to cost overrun include error in estimation, design change, delays in payments, wrong project timelines.(Puteri, Dhiu, Purba, 2022). Cost overruns are related to inappropriate resource management like money, materials, machinery, and man power which leads to financial issues.(Algahtany, 2021). Understanding and controlling the factors is important to mitigate undesirable effects, enhance cost control measures, and improve performance (Adilen, Saad, Bahamid, Alboush, 2019). For the successful completion of a project within the specified time, budgets, acceptable quality, it is important to identify the root causes of cost overruns and develop a mitigation strategy.

2.1.4 Cost Overrun measurement, frequency, size

The methods used to measure cost overruns are Relative important index (RII) which uses questionnaire and opinions from experts to determine factors contributing to cost overruns. (Bhawsar, Joshi, Choudhary, 2016). Earned Value Management (EVM) and Cost Performance index are used to detect project overruns.(Annamalaisami, Kuppuswamy, 2021).The other method used to measure cost overruns is Estimated Hour at completion (EHAC) index. It analyzes labor productivity and putting it into forecasting methods and it includes disruptions that affect final project costs. (Xue Wang, 2022).

In the case of Nigeria the magnitude of cost overrun is higher with public project than private projects. (Furkhan, Mohammed, Jameel, Chadee, 2023). Due to Design issues, material price fluctuations, poor project planning road infrastructure projects frequently face cost overruns.(Mtallib, 2019). Developing countries in their construction projects frequently experience cost overrun which exceeds double their estimated cost. (Herrera, Sanchez, Castaneda, Porras, 2020).

2.2. Empirical Literature Review

2.2.1 Causes of cost overrun

According to a study conducted by cueto, caldas, viacava, Quiroz, and Alvarez. (2020), the cause of cost overrun in implementation of lean manufacturing project in small textile company was overtime which contributed to 19% impact. The cause of cost overrun, according to (Zhao, 2012), during the manufacturing project of Boeing 787 were poor management, R&D investment, delay, risk sharing model, suppliers, lack of training. The root cause of cost overruns in large projects, including manufacturing projects like textile is primarily attributed to factors originating from the external environment affecting the project and organization.(Simushi, A.Wium, 2020).

Roshdi,Ismail,Wahab (2023) found out that cost overruns in manufacturing projects, particularly in oil and gas fabrication, are often due to mismanaged resource allocation leading to issues with machines, man power, methods, money, and materials. Bruggen and Luft's , (2016) study show that cost overruns in manufacturing projects like textile can be caused by initial cost understatements in project proposals and escalation of commitment when actual costs exceed expectations.

According to Flvbjerg (2011), the root cause of cost overruns in manufacturing projects like textile is optimism, where planners underestimate risks like project complexity and scope changes during decision-making. Cost overruns in manufacturing projects like textiles can occur due to firms bidding below true costs to secure contracts leading to persistent cost overruns. (Chen, Smith, 2001).

Yashini (2020) study shows that the cost overruns in textile manufacturing projects can can be caused by product errors, excess work-in-progress, inefficient processes, which can be minimized through lean tools like Poka-Yoke, TPM, and OEE. Cost overruns in textile manufacturing projects can be caused by factors like poor management, supplier performance, productivity planning, fluctuating output, and maintenance deficiencies identified in fabric process industries. (Sivakumar, Prakash, Navaneethakrishnan, 2015).

The study which was conducted by Tesfaye, Alemu, Abaye (2020) shows that the main causes of cost overrun in industrial park development projects in Ethiopia are additional works, time delay, inadequate preplanning, material price increase, machinery & labor cost increase.

According to Herrera, Sanchez, Castaneda, and Porras (2020), cost overruns are caused by several reasons that are related to different project aspects, stakeholders, and even external variables. cost overruns are originated from factors related to: problems with designs, failures in planning and programming activities, contractor deficiencies in project management and execution, unnecessary and inadequate intervention by owners, problems related to equipment and materials, changes in scope, delay in activities, country's political situation. According to the authors, the ten most important and frequent cost overrun factors were (1) 'failures in design', (2) 'price variation of materials', (3) 'inadequate project planning', (4) 'project scope changes', (5) 'design changes', (6) 'unrealistic contract duration', (7) 'inadequate bidding method', (8) 'legal issues', (9) 'late decision making by the owner', and (10)'political situation'. Five stakeholders' groups responsible for the cost overrun phenomenon occurrence were (1) contractor, (2) designer and consultant, (3) external agent, (4) owner, and (5) supplier and subcontractor. The authors also suggest that the cost overrun phenomenon could be widely mitigated through modifications and greater controls to traditional processes developed in the project's early stages. On the other hand, the factors 'price variation of materials', 'inadequate bidding method', 'legal issues' and 'political situation' also have a strong influence; however, their mitigation is more complex due to the mitigation actions might require changes in legislation, in addition to economic and political events related to high volatility and uncertainty.

Alkhatib, Altarazi 2019 in their studies on paper-machine-building projects Suggest that Order changes, unrealistic contract duration, shortage in labor, poor technical and material resources management, poor risk management and supervision, unforeseen site conditions, and slow decision making; were found to impose most significant effects on cost overruns and schedule slippage in construction projects

Design errors, project life, and complexity were found to be crucial factors for cost overruns in big machine building projects such as airplane and naval ships building projects. Design issues are one of the main factors of cost overruns. Complexity is projects is one of the main root causes of project overruns.

The study which was conducted by Widiaputra and Arumsari 2021 shows that the dominant factor causing cost overrun were material, implementation and employment relationships, project documents, and finance groups. The mitigation strategies they identified were quality control in

the field must be good, selection of professional workforce, and building good relations between parties.

The findings by Abdel-Monem, El-Mohr, El-Dash, (2022) depicts that the top five cost overrun causes were inflation and fluctuation of construction resources, inaccurate cost estimates, poor cost control, poor owner's financial status, and work scope change. During the construction stage, the contractor deals with thousands of construction activities and their related resources; materials, labors, equipment, and subcontactors, which makes the contractors subject to numerous risks of different natures that cause cost overruns.

Miheret,(2023) found out that the major causes of cost overruns in construction projects are poor planning and scheduling, inadequate material estimation and unreasonable delays, project delay, bankruptcy, decreased financial returns, and loss of reputation. The consequences of cost overruns are delay in project completion, contractor bankruptcy, decreased profitability, loss of reputation. Frimpong, Oluwoye, Crawford,(2003) argue that the main causes of cost overrun in construction of groundwater projects are payment difficulties from agencies, poor contractor management, material procurement, poor technical performances, and escalation of material prices. They found out that 75% of projects exceeded the original project schedule and cost whereas only 25% were completed within the budget and on time.

A study conducted on causes of cost overrun by Mansfield et al (1994) in Nigeria indicates that the most important variables causing construction delays and cost overruns are poor contract management, financing and payment of completed works, changes in site conditions, shortage of materials, imported materials and plant items, design changes, subcontractors and nominated suppliers. Cost overruns are also caused by factors such as price fluctuation, inaccurate estimates, delays, additional work. In the UK, the study by Olawale (2010) revealed that the causes of cost overrun are design changes, risks and uncertainties, inaccurate evaluation of project time/duration, complexity of works and non-performance of subcontractors.

According to Ameh et al. (2010), the cause of cost overrun in construction industry are lack of experience of contractors, cost of material, fluctuation in the prices of materials, frequent design changes, economic stability, high interest rates charged banks on loans and mode of financing, bond and payments as well as fraudulent practices and kickbacks.

In the study conducted by Memon et al. (2010), the main causes of cost overrun in large projects are cash flow and financial difficulties faced by contractors, contractor's poor site management and supervision, inadequate contractor experience, shortage of site workers, incorrect planning and scheduling. Fetene (2008) identified the main causes of cost overrun in construction project. They were inflation or increase in the cost of construction materials, poor planning and coordination, change orders due to enhancement required by clients, excess quantity during construction. The top ten causes of cost overrun according to a study by Lielti, Berhane, Zeru, Bizuneh, (2023) on water supply project in Ethiopian are Design errors and changes, Lack of consistency between bill of quantities and drawings, Shortage of construction materials and electromechanical equipment in local market, Inconstancy of the price of materials, change order, Delay in material delivery, Inadequate design supervision, Executive bureaucracy in the client's organization, Poor communication between contractor and other parties, Client's shortage of finance or delayed payments to contractors. Design changes, lack of experience of project type and location were the main causes of cost overrun in addition to governmental delay, severe weather conditions and design changes. Sweis, Rumman, Hussein, Dahiyat. (2013).

2.2.2. Impact of cost overrun

Zhao, (2012) study shows that during the manufacturing of boing 787 project, the impact of the cost overrun was the loss of $10 billion, 7% order cancellation, bad stakeholder relationship, loss of market share.

Cost overruns in textile manufacturing projects lead to reduced competitiveness. Implementing lean tools like standardized work can reduce operating costs, defects, and lead times, enhancing competitiveness and profitability. (Tapia-Cayetano, Barrientos-Ramos, Maradiegue-Tuesta, Raymundo-lbanez, 2020).

Cost overruns in textile manufacturing projects can vary in significance, potentially impacting profitability and project success. (Samset, 2010).

According to Soviana and Herlina (2022) cost overrun can lead to delays in textile project timelines due to factors like material price increases.

Cost overruns can lead to delays in textile projects by affecting budget allocations for resources, potentially causing disruptions in the supply chain and project execution. (Sharma, 2021). Leu,Lu

Linwu, (2023) indicate that cost overrun can delay textile project timelines by impacting financial profitability, project completion, quality, and stakeholder satisfaction.

Cost overrun in textile projects can impact timelines by causing delays due to inaccurate cost estimation, frequent design changes, and scope modifications, leading to re-estimations and additional costs.(Gunduz, Maki, 2018).

According to Dlamini and Cumberlege (2021), cost overruns negatively impacts contractual stakeholders. The roles, responsibilities, duties, and competencies of project managers have a direct impact on successfully completing construction projects without cost overrun or delay. Mukuka, Aigbavboa and Thwala (2015) found out that the impact of cost overruns to the client implies added costs to the agreed contract sum, resulting in less returns on investment. Temesgen and Denamo (2021) identified less return on investment for the client, high price of sugar for end-user, abandonment and termination of projects as the main impacts of time and cost overrun.

According to Bentil, Nana-Addy, Asare, Fokuo-Kusi (2017), the impact of cost overrun in building construction projects in Ghana are abandonments of building construction projects, inability to secure project finance, high cost of securing project finance due to added risk, additional investment risk, loss of reputation of contractors and consultants, less return on investment, loss of investment in the construction industry, non-sustainability of the industry, slow rate of national growth and inability to deliver value to clients. Gbahabo and Ajuwon (2017) identified the impact of cost overrun in infrastructure procurement in developing countries as allocative inefficiency of scarce resources, further delay, Loss of job and income, contractual disputes, Negative public perception, claims and litigation to project failures and total abandonment.

2.2.3. Mitigation strategies

Operating cost overruns in textile manufacturing projects can be reduced by implementing lean manufacturing with standardized work. (Tapia-cayetano, Barrientos-Ramos, Maradiegue-Tuesta, Raymundo-lbanez, (2020)).

Improved cost estimation methods and external quality assurance can reduce cost overruns, enhancing project performance. This approach can help mitigate delays in textile projects by managing costs effectively.(IEEE, 2022).

According to Marti (2019), strategies to mitigate textile project cost impacts include analyzing environmental impact, evaluating risks for health, assessing technical performance alternatives, and providing policy recommendations for safer finishing technologies. Investment in high-tech machinery to reduce labor costs, balancing RD investments, and managing complexity can mitigate textile project cost impacts effectively in the industry. (Christoffersen, Malhotra, Russel, 2003).

Olwale and Sun (2010) categorized the mitigation measures according to the broad function they measure; Preventive, Predictive, Corrective, and organizational. According to Sohu, Abdullah, Nagapan (2018), the most significant mitigation measures are sufficient funds for project should be allocated, client should make strategic planning before starting of project, Favored contractor should not be appointed by client, contractors should be awarded on merit basis, proper decisions should be made on time, laws and regulations of framework, proper assessment of construction site should be done, adequate funds should be kept for each running project. Memon, Karim, Rahman(2013) studied controlling cost overrun factors construction projects in Malaysia and suggest that effective strategic planning, proper project planning and scheduling, effective site management and supervision, frequent progress meeting, proper emphasis on past experience, use of experienced subcontractors and supplies, use of appropriate construction methods, using up-to-date technology utilization, clear information and communication channels, frequent coordination between the parties, perform a preconstruction planning of project tasks and resources, developing human resources in the construction industry, comprehensive contract administration, systematic control mechanism, improving contract award procedure by giving less weight to prices more weight to the capabilities and past performance of contractors as mitigation measures. The most effective mitigation measures according to Jongo, Tesha, Kasong, Teyang, S.Lyimo (2019) in Dar-Es-Salaam are effective project planning and scheduling, controlling design change, effective coordination and communication between parties, having accurate cost estimate, appointing competent site and project manager, comprehensive contract administration, ensuring prompt resolution in design change queries, issues and authorization report, efficient and effective planning for solving identified risks, ensuring on the timely availability of finance.

The study conducted by Morena, Amoah (2021) in south Africa construction companies show that effective planning, accurate estimate, tracking status of the project, use of scheduling tools,

an inspection of works, communication, site meetings, proper methods of construction and evaluation of work completed as the mitigation strategies. A study on Malaysian building projects by Ullah, Sohu, Nagapan, Khan, and Abdullah (2018) found out 31 mitigation strategies to control cost overruns for a selected 10 causes of cost overrun. Each cause of cost overrun has 3 mitigation strategies. For Example, improper planning has three possible mitigation strategies which are ensuring effective planning at early stages of the project, all parties should understand their work and consider true constrains of market and logistics planning.

2.3. Research Gaps

As can be seen from the literature review, cause of cost overruns are not uniform in manufacturing industries especially in textile manufacturing industry. There is also a gap in the literatures that most of the researches conducted on manufacturing projects are not in developing countries like Ethiopia.

2.4. Conceptual Framework

Identifying the causes of cost overrun is important in order to prevent the impact of cost overrun in the case of yirgalem addis textile factory. These causes may be inaccurate cost estimation, Poor project management, unforeseen events, Price fluctuations and current exchange changes, scope change. The impacts may include financial issues, delays, unsatisfied stakeholders, Resource allocation issues. Good project management, accurate cost estimation, managing suppliers, contingency planning, cost monitoring, good communication with stakeholders can be the mitigation strategies.

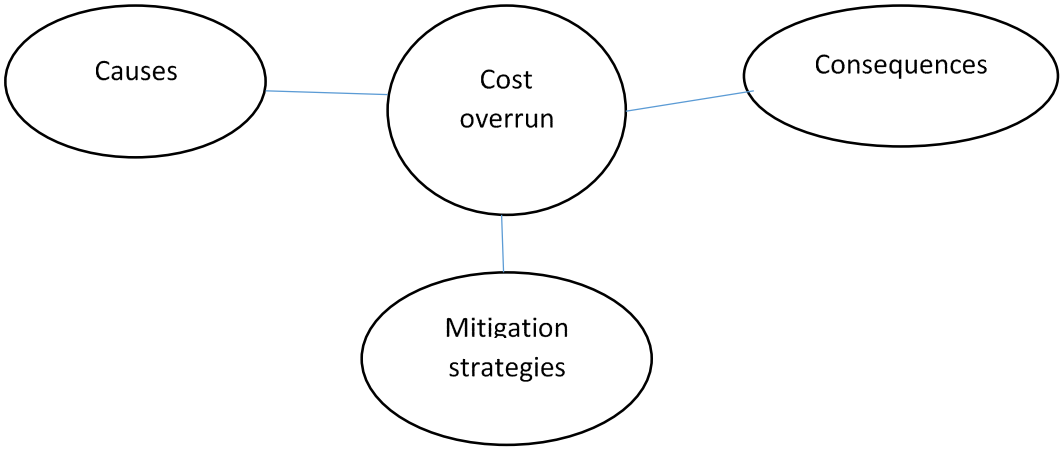


Figure 1. **Conceptual Framework**

CHAPTER THREE: RESEARCH METHODOLOGY

Introduction

This chapter discusses the research design used in this study, the method data collection, the target population, how sample was taken from the target population, the source of data, how data was data analysis, validity, reliability, and ethical consideration while conducting the research.

3.1. Research Design

A survey type of research design is used in this study. This study uses qualitative data. This study provides an understanding of the causes of cost overrun and their impacts in manufacturing projects. Data were collected through questionnaires and interviews. The questionnaires were used to gather information on their opinions and experiences related to cost overrun in manufacturing projects. The first step in the research was selecting the sample from the target population. It was followed by Questionnaire design where clear and relevant structured questions were developed. The third step was data collection where questionnaires were distributed to and face to face interviews. Data Analysis was the fourth step where the collected data is analyzed to draw conclusions and make inferences the causes and impact of cost overruns that involves descriptive statistics. The Fifth step was reporting the findings of the research clearly and concisely to stakeholders.

3.2. Source of Data and Method of data collection

To understand cost overruns in yirgalem addis textile factory primary data was used which includes

I. *Interviews*: key stakeholders involved in manufacturing projects, project managers, engineers, production people, procurement personnel, senior management were interviewed. The interview captured what their perspectives on the factors contributing to cost overruns, the impact of those overruns, and the solutions for improvement.
II. *Questionnaire*: Questionnaire were distributed to some of the employees who are involved in the manufacturing process in order to gather their experience with cost overruns, their observations on inefficiencies and what they suggest for improvement. It contains both open ended and closed ended questions on cost overruns.

3.3. Population, Sampling Method, and Sampling Size

The target population contains 40 respondents who were involved in the manufacturing project like project managers, engineers, production supervisors, procurement personnel, senior management. Since it is less than 100, the sample size is the total population.

3.4. Data Analysis

Quantitative data analysis: The quantitative data analysis gathered from the questionnaire closed ended questions were analyzed by a descriptive statistical methods to identify trends and patterns in cost overruns. Tabulation, Frequencies and percentages, mean, standard deviation are used to describe the data. The software used to analyze the data was SPSS (Statistical software for social sciences).

Qualitative data analysis: The data gathered from interviews and open ended questions were analyzed in order to identify recurring issues, key observations, and different perspectives from the respondents. This helps in understanding experiences of those involved and get a deeper understanding of the causes of cost overruns.

3.5. Validity and reliability

In order to ensure that the data collected during this study are valid, different checks were made. The methods that were used to collect data were first tested, clear procedures to collect data were used, multiple sources of data were used, data collected were compared to existing literature, and bias was checked during data collection to control them.

3.6. Ethical Consideration

This study will protect research participants by ensuring the information they provide are kept confidential and be used only for this research. This study will not put participants at risk. This study first checked the willingness of the participants so that there are protected during data collection. This study protected the anonymity of individuals and their roles who participated in this research.

CHAPTER FOUR: DATA ANALYSIS AND INTERPRETATION

Introduction

The data that were collected through questionnaire and interview are presented in this chapter. Descriptive analysis method was used to describe the data using frequency, mean and standard deviation. 40 questionnaire was distributed and 31 of them were fully completed and sent back. The response rate was 77.5%.

4.1 Demographic Information of the respondents

In the following the table, a frequency analysis was performed on respondents age, respondents work experience, respondents education level. This data was then interpreted below each table.

Gender

	Frequency	Percent
Male	23	74.2
Female	8	25.8
Total	31	100
Education		
Diploma	5	16.1
Degree	24	77.4
Masters	2	6.5
Total	31	100
Work Experience		
Below 5 years	3	9.7
6 – 10 years	10	32.3
11- 15 years	10	32.3
Above 15 years	8	25.8
Total	31	100

Table 4.1 Demographic information

4.1.1 Respondents' Gender

Table 4.1 shows that most of the respondents in this study are Males. They constitute 23 (74.2%) of the total respondents in this study. 8 (25.8%) of the respondents are females. Males participated much more than woman in this survey.

4.1.2 Respondents by Education

It can be seen from the table that the majority of the respondents are BA/BSc degree holders. They constitute 24 (77.4%) of the total respondents. This helps in getting a more quality and educated response. It makes the conclusion of the study more accurate. The master's degree holders are only 2 (6.5%). Compared to the degree holders they are very few in number. The diploma holders in this study are only 5 (16.1%). This shows that participants in this study are more educated and do have a higher level of education.

4.1.3 Respondents by Work Experience

Table 4.1 shows that the majority of the respondents in this study do have experience between 6 to 15 years. Respondents which do have 6 to 10 years' experience constitute 10 (32.3%) and those respondents whose experience level between 11 and 15 are also 10 (32.3%). This helps the study to get more accurate responses since the respondents are experienced and do have a lot of knowledge in manufacturing project especially in textile industry.3 (9.7%) of the respondents do have experience below 5 years. Since their number is small compared to others, the effect is less. The respondents that do have above 15 years' experience are 8 (25.8%). They are one fourth of the respondents and they influence the study since they do more knowledge about the projects than the other group of respondents.

4.2 Descriptive Statistics

4.2.1 Causes of Cost overrun

Causes of Cost Overrun	Mean	Standard Deviation
Poor initial cost estimation can be the cause of cost overrun	4.2581	.99892
Scope change causes cost overruns	4.7419	.44480
Unexpected delays in project schedules causes cost overrun	4.6774	.47519
Inadequate project planning can be a cause of cost overrun	4.3871	.71542
Ineffective project management practices contribute to cost overrun	4.3548	.87744
Issues related with labor can be a cause of cost overrun	4.2903	.78288
Issues with material and equipment can be a cause of cost overrun	4.4194	.84751
Poor communication can be a cause of cost overrun	4.5161	.50800
Fluctuations in inflation and currency exchange rates leads to cost overrun	4.6129	.49514
Average Mean and Standard Deviation	*4.4731*	*0.6828*

Table 4.4 Mean and standard deviation of Causes of cost overrun

From table 4.4, it can be seen that the respondents agree that the listed items are the causes of cost overrun in manufacturing projects in yirgalem addis textile factory. Scope change with 4.7 mean is the top cause of cost overrun with deviation 0.44. This low standard deviation indicates that there is a high level of agreement among respondents on the cause of cost overrun. It is followed by unexpected delays in project schedules with mean of 4.67 and 0.47 deviation. The third cause of cost overrun is in this case is fluctuations in inflation and currency exchange rates with mean 4.6 and a deviation of 0.49. Poor communication with a mean of 4.5 is the fourth cause of cost overrun with a standard deviation of 0.5, The fifth cause of cost overrun in this case is Issues with material and equipment has a mean of 4.41 and standard deviation of .84. This high standard deviation shows that there is a low agreement among respondents, inadequate project planning with mean of 4.38 and standard deviation of 0.71, Ineffective project management practices with a mean of 4.35 and deviation of 0.87, Issues related with labor with a mean of 4.29 and standard deviation of 0.78, Poor initial cost estimation with a mean of 4.25 and a standard deviation of .99 are the cause of cost overrun in manufacturing project respectively. The standard deviation of .99 shows that there is less agreement among respondents.

4.2.2 Impacts of cost overrun

Impacts of Cost overrun		
	Mean	**Standard Deviation**
Wastage of resources can be the impact of cost overrun	4.6452	.55066
Financial Problems can be the impact of cost overrun	4.6129	.49514
The impact of cost overrun can be project delays	4.5484	.50588
Project abandonment can be the impact of cost overrun	4.3548	.79785
Average Mean and Standard Deviation	4.5403	.5873

Table 4.5. Mean and Standard deviation of Impacts of cost overrun

An average mean of 4.54 and a standard deviation of 0.58 indicates that the respondents strongly agree that cost overrun has an impact on manufacturing projects in yirgalem addis textile factory. Wastage of resources and financial problems with a mean of 4.6 and standard deviation of 0.5 and 0.49 are the top impact of cost overrun while project delays with 4.5 mean and .50 standard deviation is the third top impact of cost overrun in this case. The fourth impact of cost overrun in this case is project abandonment with a mean of 4.35 and a standard deviation 0.79. The standard deviation of 0.79 indicates that there is less agreement on that project abandonment is the impact of cost overrun. The lowest standard deviation 0.49 indicates that there is a high agreement that financial problems in the impact of cost overrun in this study.

4.2.3 Mitigation strategies for cost overrun

Mitigation Strategies		
	Mean	**Standard Deviation**
Enhanced project management capability can be mitigation strategy for controlling cost overrun	4.6452	.48637
Risk and contingency planning can be a mitigation strategy	4.7419	.44480
Implementation of cost monitoring and control measures prevents cost overrun in manufacturing projects	4.6774	.47519
Average mean and standard deviation	4.6881	0.4687

Table 4.6. Mean and standard deviation of Mitigation strategies for cost overrun

There is also on average a strong agreement with a mean of 4.6 and a standard deviation of 0.46 that the mitigation strategies listed on the above table can help in reducing cost overrun in manufacturing projects in the case of yirgalem addis textile factory. A mean of 4.7 indicates that there is a high level of agreement that Risk and contingency planning is the best mitigation strategy in this case and a standard deviation of 0.44 shows that there is high level of agreement among respondents that risk and contingency planning is the best strategy for reducing the impact of cost overrun. There is also a high agreement with a mean of 4.67 that Implementation of cost monitoring and control measures as a mitigation strategy and a standard deviation of 0.47 shows that there is also a strong agreement among the respondents. Enhanced project management with a mean of 4.64 and a standard deviation of .48 is the third alternative to a mitigation strategy with a strong agreement and also a strong agreement among the respondents.

4.3 Regression Analysis

4.3.1 Normality Test

A normality test was performed to check whether the independent variables and dependent variable is normally distributed using SPSS. Both Kolmogorov-Simirnov and Shapiro-wilk normality test was conducted. The result shows that most of the independent variables were not normally distributed with a value less than .05. The test also showed that the independent variables for the consequence of cost overrun were not also normally distributed. The normality test shows that the dependent variable and one dependent variable were normally distributed.

4.3.2 Multicollinerity Test

Variance inflation factor (VIF) and tolerance was used in testing multicollinearity. A value of VIF less than 10 shows that there are no multicollinearity and a low value of tolerance shows that there is multicollinearity. For the independent variables for the causes of cost overrun, there was no multicollinearity problem. For the consequence of cost overrun, the two independent variables show multicollinearity with a value above 10.

4.3.3 Linear Regression Analysis

After a regression analysis was conducted to analyze the factors contributing to cost overruns on project costs, the results are presented and discussed in this section. After checking for multicollinearity, multiple regression was used to estimate cost overrun from the predictor independent variables Scope change(cause2), Ineffective project management practices(cause 5), Issues with material and equipment(cause7). A regression analysis using SPSS resulted in a significance value of $p > 0.05$ which is not a good fit for the model as can be seen in table 4.3.2. The R^2 shows a value of 0.78 which shows that 78% of the variation in the cost overrun is explained by scope change, ineffective project management practices and issues with material and equipment. The regression model cannot be accepted since it is not significant.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.883[a]	.780	.121	.78446

Table 4.3.1

Coefficients for the factors of cause of cost overrun

Model		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	1.308	5.566		.235	.853		
	Cause2	1.462	1.009	.781	1.449	.385	.756	1.323
	Cause5	-1.385	.923	-.740	-1.500	.374	.903	1.108
	Cause7	.077	.266	.151	.289	.821	.802	1.246

Table 4.3.2

The regression equation to determine cost overrun from the predicator variables can be written as

Cost overrun = 1.308 + (1.462) X SC – (1.385) X IMPP + (0.77) X IME

Where SC is Scope change, IMPP is Ineffective project management practices, IME is Issues with material and equipment.

- For one unit increase in number of scope change, cost overrun increases by 1.462 percent.
- For one unit increase in ineffective project management practices cost overrun ,cost overrun decreases by 1.462 percent.
- For one unit increase in the number of issues with material and equipment , the cost increases by 0.77 percent.

4.4 Qualitative analysis and discussion

The data gathered from open ended questions and interviews were analyzed using Microsoft Excel. The responses of open ended questions were entered into excel and then themes were identified. Six Managers were interviewed and they were well educated and do have more than ten years' experience in Manufacturing factories. According to most respondents, the main causes of cost overrun in yirgalem addis textile manufacturing projects were inflation, poor planning, and other government sanctions like AGOA, resource allocation issues, financial problems and technical challenges. The interviewed managers agree that lack of foreign currency, lack of experience, under estimation of resources, labor cost are also the main causes of cost overrun in their manufacturing projects. Effective communication, comprehensive planning, waste and time management, accurate cost estimation were the main mitigation strategies suggested by the interviewed managers and the responses from open ended questions. The responses gathered from open ended questions and interviews show that the impact of cost overrun in manufacturing projects in yirgalem addis textiles were project delays, quality issues, incomplete deliverables.

CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Introduction

This chapter presents summary of the findings, conclusion, recommendations, research limitations and areas of further research.

5.1 Summary of findings

The objective of this study was to identify the primary causes of cost overruns in manufacturing projects, the impact of cost overrun in manufacturing projects, and the most effective mitigation strategies to prevent cost overruns in manufacturing project specifically in yirgalem addis textile factory.

The major findings of this study were

1. Poor initial cost estimation, scope change, unexpected delays in project schedules, inadequate project planning, ineffective project management practices, issues with labor, issues with material and equipment, poor communication, fluctuations in inflation and currency exchange rates are the major cause of cost overrun in manufacturing project in yirgalem addis textile factory with an mean score of 4.4 and standard deviation of 0.68.

2. According to the respondents, enhanced project management capability, risk and contingency planning, implementation of cost monitoring and control are the major mitigation strategies to reduce the impact of cost overrun with an average mean score of 4.6 and an average standard deviation of 0.46 in manufacturing projects in a textile industry.

3. Wastage of resources, financial problems, project delays, project abandonment are the impacts of cost overrun in a manufacturing projects in yirgalem addis textile factory. According to the respondents of the study the average mean score for impacts of cost overrun is 4.54 and an average score of standard deviation of 0.58.

4. According to the respondents at yirgalem addis textile factory, the major cause of cost overrun was scope change in manufacturing projects. It has a mean value of 4.7 and a standard deviation of 0.44.

5. Wastage of resources was the impact of cost overrun in manufacturing projects in yirgalem addis textile factory. It scored 4.6 mean and 0.5 standard deviation.

6. Risk and contingency planning is effective mitigation strategy in manufacturing projects in yirgalem addis textile factory. According to the analysis, it scored mean value of 4.7 and a standard deviation of 0.44.

7. According to the respondents, external factors such as policy change by the government, sanctions by other governments like the AGOA, inflation, security and peace can be the cause of cost overrun in the textile manufacturing industry.

8. In order to reduce the impact of cost overrun which is caused by fluctuations in raw material prices Inventory management, forecasting, holding stock at lower price, just in time inventory management can be used.

9. The methods that should be used to prevent cost overrun in manufacturing projects could be accurate and professional feasibility study must be prepared, process control, contingency planning

5.2 Conclusion

This study shows that manufacturing industries especially textile industry face cost overrun in their manufacturing projects. This study identified the causes of cost overrun, investigated what the impact of cost overrun were and the mitigation strategies to reduce cost overruns in manufacturing projects. Scope change in manufacturing projects, delays, poor cost estimation are the main cause of cost overrun in yirgalem Addis textile factory. The impact of cost overrun in manufacturing project in yirgalem Addis textile factory were identified as Resource wastage, financial issue, project delays and project abandonment. The mitigation strategies which were suggested by the respondents were improving project management capability, risk and contingency planning, implementation of cost monitoring and control.

5.3 Recommendation

Based on the findings of the study, the following are recommended

- The company is advised to study all project costs, use cost estimation experts, use past cost data from similar projects, plan contingency for cost, monitor cost and adjust estimates to reduce cost overruns that arise from inaccurate cost estimation.
- To reduce the impact of cost overrun which is caused by scope change, the company is recommended to define the scope in detail to avoid misunderstandings with stakeholders and to minimize scope changes. The company should communicate the scope of the project to the customers clearly and document it. When scope changes are requested, the company is recommended to allow by evaluating their importance and their impact.
- The company is advised to monitor inflation and fluctuations in exchange rate in order to reduce the impact of cost overrun in its manufacturing projects. They also are recommended to evaluate the impact of cost of material, labor.
- In order to decrease the impact of delays on costs, the company is advised to identify source of delay and prepare a project schedule that includes contingencies.
- The company is recommended to establish transparent communication among stakeholders in order to minimize cost overruns that results from poor communication.

5.4 Research Limitation and Areas of Further Research

This study might be limited to by the availability of complete data on project cost data, production information, impacts of costs information and accessibility of accurate data from yirgalem addis textile factory. The other limitation of the study is that it is a single case study. This makes it hard to generalize the findings of the study since the differences between manufacturing processes and the condition of the market of other textile factories. Further research can be done on multiple textile factories to identify common trends and best practices.

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Annex

Questionnaire

Analyzing cost overruns in manufacturing projects: causes impacts mitigation in the case of yirgalem addis textile factory

General Instruction: Please answer the following questions by filling the blanks, checking the boxes, answering open ended questions.

Part I: Background Information

Please provide general information about yourself

1. Please state your name(Optional) _____
2. Position: _____
3. Gender: Male ☐ Female ☐
4. Age Range: Below 25 ☐ 25 – 35 ☐ 36 – 45 ☐ 46 – 50 ☐ above 50 ☐
5. Educational Background
   Certificate ☐ Diploma ☐ Degree ☐ Masters ☐ PHD ☐
6. Work Experience in manufacturing company
   Below 5 years ☐ 6 – 10 years ☐ 11 – 15 ☐ above 15 years ☐

Part II: Closed ended Questions

Please Tick the appropriate box for the following statements 1 for strongly disagree, 2 disagree, 3 Undecided, 4 agree, 5 strongly agree.

Causes of Cost overrun	1	2	3	4	5
Poor initial cost estimation can be the cause of cost overrun	☐	☐	☐	☐	☐
Scope change causes cost overruns	☐	☐	☐	☐	☐
Unexpected delays in project schedules causes cost overrun	☐	☐	☐	☐	☐
Inadequate project planning can be a cause of cost overrun	☐	☐	☐	☐	☐
Ineffective project management practices contribute to cost overrun	☐	☐	☐	☐	☐
Issues related with labor can be a cause of cost overrun	☐	☐	☐	☐	☐
Issues with material and equipment can be a cause of cost overrun	☐	☐	☐	☐	☐
Poor communication can be a cause of cost overrun	☐	☐	☐	☐	☐
Fluctuations in inflation and currency exchange rates leads to cost overrun	☐	☐	☐	☐	☐

Impacts of Cost overrun

wastage of resources can be the impact of cost overrun	☐	☐	☐	☐	☐
Financial Problems can be the impact of cost overrun	☐	☐	☐	☐	☐
The impact of cost overrun can be project delays	☐	☐	☐	☐	☐
Project abandonment can be the impact of cost overrun	☐	☐	☐	☐	☐

Mitigation strategies for cost overrun

Enhanced project management capability can be mitigation strategy	☐	☐	☐	☐	☐
For controlling cost overrun					
Risk and contingency planning can be a mitigation strategy	☐	☐	☐	☐	☐
Implementation of cost monitoring and control measures prevents	☐	☐	☐	☐	☐
Cost overrun in manufacturing projects					

Part III: Open Ended Questions

Please answer the following questions

1. What are some common causes of cost overrun in your manufacturing projects?

2. Briefly describe a situation where inaccurate cost estimates caused a cost overrun in manufacturing projects.

3. How do cost overruns impact timelines and deliverables in your manufacturing projects?

4. What strategies do you use to mitigate the risk of cost overrun in your manufacturing projects?

5. What strategies do you use to control fluctuations in raw material prices?

6. How do bad communication contribute to cost overrun in manufacturing projects?

7. What methods should to be used in manufacturing process to prevent cost overrun?

8. How do market fluctuations and supply chain issues lead to cost overrun?

Part IV: Interview questions

1. What is your educational background and years of experience in manufacturing?
2. What measure do you take to mitigate cost overruns?
3. What do you think causes cost overruns in manufacturing projects?
4. What do you think are the impacts of cost overrun in manufacturing projects?
5. How do you handle cost overruns?
6. How do you identify cost overruns in your manufacturing projects?
7. How do you communicate cost overruns to stakeholders (Customers)?