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ABSTRACT. *The construction industry trendy many developing countries, including Pakistan, requires significant investment, and budget overruns are a communal problem. The construction sector in Pakistan is facing significant challenges related to cost overruns, which are affecting all stakeholders involved in government-funded building construction projects. To recognize the precarious causes of cost overruns, a literature review was conducted, and the results of a survey in developed countries were analyzed. The main causes of cost overruns in building construction projects in developed nations were discovered to be poor planning, inaccurate project cost estimation, high resource costs, a skilled labor shortage, high construction material prices, high land prices, contractor financial difficulties, owner delays in making progress payments for completed works, contracts given to the lowest bidder, change orders during construction, and ineffective project management. The two biggest risk factors for budget overruns during construction were change orders and contracts chosen by the lowest bidder. To achieve sustainable development in the construction industry in Pakistan, effective management of client, contractor, and labor-related risks is essential. The goal of this literature review is to analyze the most critical factors influencing to cost overruns in building projects. The literature focuses on articles published in highly reputable journals within the last decade.*

Keywords: Building Projects, Cost Overrun, Developing Countries, Critical Factors.

1. INTRODUCTION

Cost overrun is a significant issue in the building projects, where the project goals are not achieved within the predictable budget. Studies have found that cost overruns remain a widespread problem in mutually developed and developing countries, with some under developing countries experiencing overruns exceeding 100% of the estimated project cost due to poor resource management. The construction sector is a crucial sector for the economy and development of many countries, including Pakistan, as it contributes significantly to the national income and generates employment [1]. Despite its importance, the construction sector in Pakistan is not operating at its full potential, but it remains a prime interest for the country's economy. Cost is a crucial aspect of any construction site projects. However, cost overrun have become a common occurrence in the construction industry worldwide, and it is essential to study this issue further to mitigate it in the future. It is expected that the total cost of a project will exceed the original budget because cost overruns have become the norm rather than the exception in the construction industry [2]. Cost overrun is characterized as an instance where the actual sum of money spent exceeds the project's estimated cost.

It is significant to remember that cost overrun factors are not limited to one specific phase of the project, but rather can occur throughout the entire project life cycle. Thus, it is important early detection and treatment of these elements on in the planning phase in order to minimize their impact on the project budget. Additionally, understanding the unique factors contributing to cost overrun in a specific country or region can assist project participants in developing tailored strategies to address them. By taking appropriate actions to mitigate these factors,

project participants can work towards achieving project success and meeting the desired project objectives within the allocated budget. This paper aims to determine and examine the key elements that have the greatest impact on cost overruns in construction projects [3]. It is well-established that the factors causing cost overruns vary from country to country due to the unique circumstances of each country's construction sector. Therefore, this study aims to provide a comprehensive understanding of the factors that lead to cost overruns, and their relative importance, to help project stakeholders and decision-makers better manage and control project costs.

2. CLASSIFICATION OF COST FOR CONSTRUCTION PROJECTS

The sector of construction is a complex sector that involves the use of a wide range of resources and activities, including labor, equipment, materials, and technology. The cost of these resources and activities plays a significant role in responsible the overall cost of a construction project. In order to manage and control costs effectively, it is essential to be fully aware of the various kinds of construction costs [4]. Construction costs can be classified varying according to the viewpoint and purpose of the classification. One of the most common ways of classifying construction costs is based on the stage of the construction project. Pre-construction, construction, and post-construction are the three main phases of a construction project [5]. The costs associated with each stage of the project can be classified as the costs incurred before, during, and after construction.

Pre-construction costs are incurred before the construction phase begins and include expenses related to the planning and design of the project. These costs typically include fees for architects, engineers, and other design professionals, as well as expenses related to obtaining permits, conducting environmental assessments, and conducting feasibility studies [6]. Construction costs refer to the expenses incurred during the actual construction of the project. These expenses consist of labour, equipment, material, and overhead costs. Labor costs include wages and salaries for the construction workers, while equipment costs include expenses related to the use of heavy machinery and tools. Material costs include the cost of building materials such as concrete, steel, wood, and glass. Post-construction costs refer to the expenses incurred after the construction phase has been completed [7]. These costs include expenses related to the maintenance and upkeep of the completed project, as well as costs associated with any repairs or renovations that may be required in the future.

Table 1. Different Types of Cost in Building Projects [8].

Author	Type of Cost	Explanation
Khodeir et al.	Direct Cost	Direct costs include labor, materials and equipment.
Amini et al.	Indirect Cost	Indirect costs include overhead, administration, and insurance.
Alekya et al.	Soft Cost	Soft costs include design, permits, and inspection fees.
Dikmen et al.	Contingency Cost	Contingency costs can be used to cover additional costs, such as cost overruns, or to pay for unexpected events, such as weather delays or design changes.
Herrando et al.	Fixed Cost	Fixed costs are usually associated with indirect costs and include items such as rent, salaries, and insurance.
Awodie et al.	Variable Cost	These are costs that change with the amount of work performed.

Direct costs and indirect costs are the two primary categories of construction expenses. Direct costs are expenses that are easily measurable and directly related to the construction project. Labor, material, and equipment costs are a few examples of direct costs. Costs known as indirect costs are expenses required to complete the project but not directly related to the construction project [7]. Examples of indirect costs include general overhead expenses, insurance costs, and marketing expenses. Construction costs can also be classified based on their variability. Variable costs are costs that change based on the level of activity or production, whereas the cost of fixed assets does not change with the level of activity. Examples of variable costs in the construction industry include labor costs, material costs, and equipment costs, the costs of rent, insurance, and property taxes are examples of fixed costs [9].

2.1 CLASSFICATION OF COST OVERRUN FACTORS FOR CONSTRUCTION PROJECTS

Cost overruns in construction projects can be attributed to various factors that can be broadly classified into technical, economical, managerial, political, project resources, and environmental factors. Technical factors are related to the design, specifications, and construction methods used in the project. Changes in design, poor workmanship, inadequate testing, and unforeseen site conditions are some examples of technical factors that can contribute to cost overruns [10]. Economic factors are related to the economic environment in which the project is being carried out. Changes in the cost of materials, labour, and equipment, inflation, and currency fluctuations are some examples of economic factors that can contribute to cost overruns [11]. Managerial factors are related to the management of the project. Poor project planning, inadequate supervision, poor communication, and ineffective project control are some examples of managerial factors that can contribute to cost overruns [12]. Political factors are related to the political environment in which the project is being carried out. Changes in government policies, political instability, and corruption are some examples of political factors that can contribute to cost overruns [13].

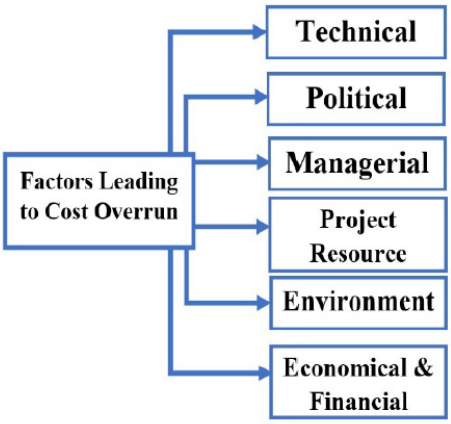

Figure 1: Classification of Cost Overrun factors

Project resources factors are related to the availability and management of resources, such as financial and human resources, and physical resources. Shortages of skilled labour, inadequate funding, and poor equipment management are some examples of project resources factors that can contribute to cost overruns [13]. Environmental factors are related to the physical environment in which the project is being carried out. Weather conditions, natural disasters, and environmental regulations are some examples of environmental factors that can contribute to cost overruns [14].

3. CRITICAL FACTORS LEADING TO COST OVERRUN FOR CONSTRUCTION PROJECTS

In this section, the focus is on identifying the factors that are responsible for cost overruns in construction projects. Previous studies, such as those by Dikmen et al. [8] have identified four factors that contribute to cost overruns. These include modifications to the design, poor planning, erratic weather, and changes in the price of building materials. Researchers have also discovered a number of additional factors; the 13 most important are discussed below.

The inadequate estimation of the initial cost of a project is the most significant factor influencing cost overruns, according to Gates et al. [15] project cost inflation is another cause of increasing costs. Geographical differences, as well as varying subcontractor contracts, can impact the inflation of materials, equipment, and labor costs. When inflation rises, interest rates follow, leading to increased costs. Additionally, according to Herrando et al. [16] poor planning and limited management experience can result in slower project progress, causing indirect costs to rise. The fluctuation of prices of materials is a major contributor to cost overruns as it makes accurate cost estimation difficult. Additionally, unexpected site conditions that are only discovered after excavation can require costly

redesigns, according to Chadee et al. [17] Site condition changes can also increase costs for machinery and supplies. Poor or unrealistic design, often caused by inexperienced designers, can also lead to cost overruns, as noted by Alsolami et al. [2]. In some cases, parties intentionally underestimate project costs in order to obtain project approval, a serious issue identified by Ammar et al. [18].

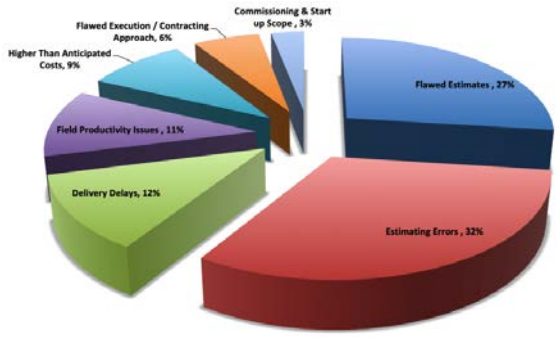

Figure 1: Factors Affecting Cost Overrun

There are several other factors that cause construction projects to go over budget. These include the owner brief being altered frequently, errors and omissions in the bills of quantities, contractual claims such as time extensions with cost claims, contractor inexperience, inappropriate construction tools and techniques, and force majeure. When the owner brief changes frequently, it can lead to design changes and delays in the construction process, which in turn can cause cost overruns. Bills of quantities with omissions and mistakes can also result in underestimation of costs, leading to cost overruns [19]. Contractual claims, such as extensions of time with cost claims, can also result in additional costs for the project. Lack of experience for contractors can lead to mistakes and delays, causing additional costs. Unsuitable construction equipment and methods can also lead to inefficiencies and delays, adding to the project's costs. Finally, force majeure events, such as natural disasters, can cause delays and damage, leading to additional costs for the project [5].

4. CRITICAL COST OVERRUN FACTORS IN BUILDING PROJECTS

Any construction project must account for cost, but this is a crucial risk that frequently arises, particularly in developing nations where it can exceed 100% of the projected budget. The lack of control over construction costs can put pressure on investments, increase construction costs, and affect decision-making [2]. Therefore, identifying the factors contributing to cost overrun is crucial in order to avoid and minimize such problems. Cost overruns can render a project unfeasible due to the increase in project cost. While Cost overrun is a significant issue in developing countries, it is also prevalent in global construction projects. Even large construction projects are susceptible to cost and schedule overruns. Typically, an increase in project cost exceeding 15% is considered as cost overrun. Therefore, the acceptable range for cost overrun is usually between 0 and 15% [18]. Building projects frequently experience cost overruns, which occur when actual project costs exceed budgeted costs. It is a crucial problem that could have a big impact on the project's overall success, including the project's quality, timeliness, and profitability. Numerous things, such as poor planning, scope changes, design flaws, project delays, and unanticipated problems, can result in cost overruns.

The reasons behind and effects of cost overruns in construction projects have been studied in various studies. 90% of 258 transport infrastructure projects analyzed by Awodie et al. [20] that were located all over the world had cost overruns. The study also identified a number of factors, such as optimism bias, political interference, and contractual issues that contribute to cost overruns. Similarly, a study by Chadee et al. [17] examined the reasons behind cost overruns in Taiwanese public construction projects. The study found that the most significant factors contributing to cost overruns were design changes, unexpected site conditions, and inaccurate cost estimates. Another study by Dikmen et al. [4] examined cost overruns' effects on building projects in Nigeria. The study found that cost overruns had negative impacts on project completion time, quality, and profitability. The study also identified inadequate planning, poor project management, and inadequate funding as the main causes of cost overruns in building projects in Nigeria. To mitigate the risks of cost escalation in construction projects, project managers need to adopt effective

project planning and management strategies. These strategies include accurate cost estimating, effective risk management, and continuous monitoring and control of project costs. Additionally, project managers need to adopt a proactive approach to identify and address potential sources of cost overruns early in the project's life cycle.

Table-2: Cost Overrun Projects in Pakistan

Sr. No	Organization	Project Name
1	Government	Dasu Hydropower Project
2	Government	Motorway M-4
3	Government	Metro Bus Service Peshawar
4	Government	Orange Line Train
5	Government	Overhead Bridge(Okara Bypass)
6	Private	Al-Madina Housing Society
7	Private	ABL Tower Lahore
8	Multinational	Unilever (Raftaar Projecs)
9	Semi-Government	Pak-Arab Refinery Limited

4.1 SHORTLISTED COST OVERRUN FACTORS OF BUILDING PROJECTS

Cost overruns in construction are not limited to developing countries, as they are a global issue that has been exacerbated by the recent global financial crisis. As such, they represent a significant challenge for the development of the construction industry and have become a common occurrence. To summarize the main conclusions of the paper, it can be noted that the factors contributing to cost overruns in construction projects can vary from country to country depending on the specific situations of the building construction industry in each location. Financial issues are the most frequently cited factors across different studies, while planning-related factors tend to be more significant in developing countries and material-related factors in developed countries [21]. Environmental factors were generally perceived as less serious contributors to cost overruns by scholars, and therefore deemed less important in this regard.

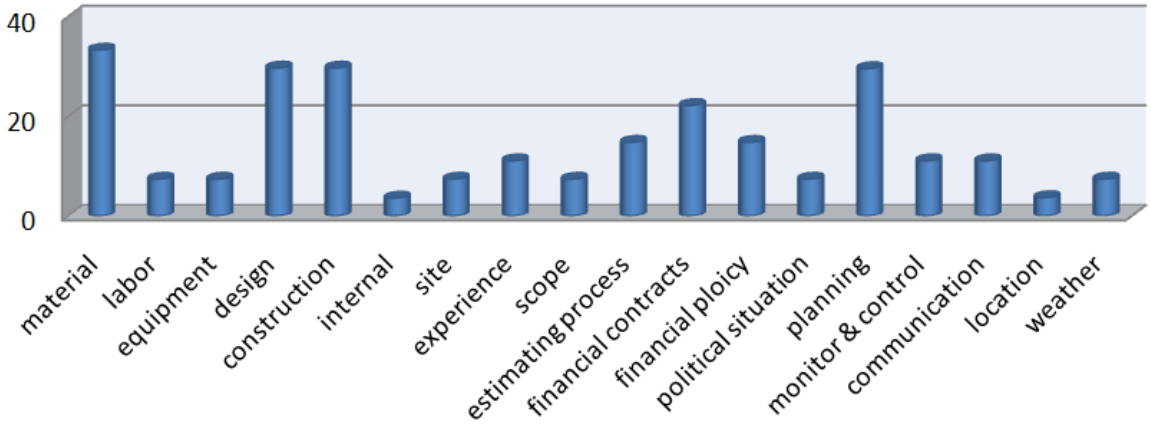

Figure 2: Previous Studies in World Wide

Previous studies have determined the top five categories of factors that cause cost overruns in building construction projects, as shown in the table. Numerous developing nations, including Ethiopia, Uganda, Ghana, Nigeria, Indonesia, Thailand, India, Pakistan, Kuwait, Jordan, and KSA, participated in the studies. The findings indicated that material, planning, design, construction, and financial contracts are the factors that have the greatest influence on the likelihood of cost overruns [22]. The studies also revealed that financial worries are the most prevalent factor across all categories. The top five priority categories are compared in the table in terms of how cost overruns are produced globally and in developing countries. They are listed in descending order.

Table 3: Ranking the various cost overrun factors through comparison

Sr. No	World Wide	Developing Countries
1	Planning	Material
2	Financial Contracts	Planning
3	Estimating Process	Design
4	Design	Construction
5	Construction	Financial Contracts

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