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# INDUSTRY READINESS FOR INFLATION ADJUSTED DATA DRIVEN COST ESTIMATION IN SRI LANKAN CONSTRUCTION INDUSTRY

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## *ABSTRACT*

*Accurate cost estimation at the tendering stage is essential for the financial success of construction projects. However, in the Sri Lankan construction industry, significant discrepancies are often observed between bid price and final contract price, primarily due to economic volatility and limitations in traditional estimation practices. This study aims to examine current cost estimation practices and assess the industry's readiness to adopt inflation adjusted data driven cost estimation models. A mixed method was adopted and a questionnaire survey was used for the data collection, The questionnaire was distributed to 75 construction professionals, and 40 valid responses were received. The questionnaire collected both quantitative and qualitative data, which analysed using descriptive and content analysis techniques. The findings indicate that traditional cost estimation methods are widely used in Sri Lankan construction industry, while the adoption of software-based tools remain limited. The results further reveal that a majority of respondents perceive a considerable difference between bid price and final contract price. Despite this, there is a strong positive perception towards adopting data driven cost estimation models, with most respondents recognising the importance of incorporating inflation adjusted approaches to improve estimation accuracy. However, several challenges were identified, including limitations in historical data availability, economic instability and lack of technical expertise. The study highlights the need to address these challenges to facilitate the adoption of advanced cost estimation approaches. It contributes to both practice and research by providing insights into industry readiness and identifying key areas for future development in the Sri Lankan construction industry.*

***Keywords:*** *Cost Estimation; Data-Driven Cost Estimation; Inflation Adjustment; Construction Industry; Sri Lanka.*

## 1. INTRODUCTION

Cost estimation forms the basis of the financial framework of construction projects from their inception stage (Dehabadi et al., 2017), where it acts as the foundation for assessing

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the financial feasibility of a project and facilitates proper resource planning (Ibrahim & Elshwadfy, 2021). An accurate cost estimate prepared at the tender stage plays a critical role in overall project success and supports various stakeholders in the construction process. Based on the pre-tender estimate, clients can evaluate project viability, secure funding, and establish realistic budgets (Ahlawat & Singh, 2025). For contractors, accurate cost estimation assists in preparing competitive bids, allocating resources effectively, and managing risks associated with cost overruns and market fluctuations (Plebankiewicz, 2018).

Discrepancies between bid price and final contract price represent a persistent and multifaceted challenge in the construction industry (Mbachu & Cross, 2015). These discrepancies arise from a wide range of factors, including scope variations, project delays, and unforeseen site conditions (Ahlawat & Singh, 2025). Such deviations are further intensified by macroeconomic conditions (Nabil, 2024). In countries such as Sri Lanka, where inflation is high and economic fluctuations are frequent, final contract price tend to escalate significantly beyond the estimates made at the tender stage (Fonseka et al., 2024). Projects with longer durations are particularly vulnerable to changes in material prices, labour rates, and statutory levies (Ballesteros-Pérez et al., 2019). When projects extend over several years, even modest annual price increases can accumulate into substantial cost overruns (Welde & Odeck, 2017). This time dependent vulnerability remains a major concern in the Sri Lankan construction industry, where delays in project implementation are common due to funding constraints, political instability, and administrative inefficiencies (Lakruwan & Mudalige, 2025). As project duration increases, the likelihood of significant deviation between final contract price and bid price also increases (Catalão et al., 2021).

Traditional cost estimation methods commonly adopted in the Sri Lankan construction industry are largely based on subjective judgements, which are prone to human errors in calculation (Anireddy, 2024). Furthermore, these traditional approaches are limited in their ability to capture real time market dynamics and inflationary effects, and their limited reliance on historical data reduces their effectiveness in volatile economic conditions. Although Musarat et al. (2024) developed a forecasting model capable of capturing inflation trends and predicting final contract price, the study was conducted in the context of the Malaysian construction industry. Similarly, Jassim et al. (2025) proposed a model incorporating inflation adjustment factors for preliminary cost estimation in Iraq. However, as highlighted by Thiruchelvam and Uduwage (2025), countries face unique challenges when adopting practices from different contexts due to variations in economic, regulatory, and industry conditions.

Despite the growing interest of research on inflation adjusted data driven cost estimation models, there remains a significant gap in relation to the Sri Lankan context. Prior to developing such models tailored to Sri Lanka, it is essential to assess the readiness of the industry to adopt inflation adjusted, data driven cost estimation models. Therefore, this study aims to examine current cost estimation practices in the Sri Lankan construction industry and explore the industry's readiness to adopt data driven cost estimation models to improve the accuracy of final contract price estimation. In this study, inflation adjusted data driven cost estimation refers to the use of historical project cost data and inflation related variables to estimate final contract price. The approach relies on analysing patterns and relationships within available data to generate cost predictions that reflect changing

economic conditions. To achieve the aim of the study, following objectives were formulated.

1. To examine current cost estimation practices in the Sri Lankan construction industry.
2. To examine industry perceptions and challenges associated with adopting inflation adjusted data driven cost estimation models in Sri Lanka.

# 2. LITERATURE REVIEW

## 2.1 COST ESTIMATION IN CONSTRUCTION PROJECTS

The relationship between bid price and final contract price constitutes a fundamental concern in construction project management and economics (Farshidpour et al., 2021). Each of these cost measures serves a distinct purpose throughout project procurement, execution, and completion stages, yet their interconnection determines the financial success and overall viability of construction projects (Dehabadi et al., 2017). The term bid price refers to the total price proposed by a contractor at the tender stage to complete a project, including both direct and indirect costs associated with the project (Uduwage-Don et al., 2023). Whereas the final contract price refers agreed contract sum between the client and contractor after incorporating all approved variations, adjustments, and contractual provisions during the project (Alshibani et al., 2024). However, in practice, the bid price estimated at the tender stage often deviates from the final contract price at the completion stage due to a range of influencing factors.

## 2.2 FACTORS CONTRIBUTING TO COST DEVIATIONS

The difference between bid price and final contract price is widely recognised as a persistent issue in the construction industry. These variances arise from a combination of project specific and external factors that undermine the accuracy of cost estimation and ultimately influence project financial outcomes (Sayed et al., 2020). Project specific factors include scope changes, design modifications, delays in execution, and unforeseen site conditions (Yussef et al., 2018; Gilb, 2012), while external factors include institutional influences and macroeconomic conditions.

In the Sri Lankan context, macroeconomic conditions remain one of the most critical factors contributing to discrepancies between bid price and final contract price (Fonseka et al., 2024). Inflationary pressures, currency depreciation, and fluctuations in interest rates directly affect the assumptions made during the tendering stage (Tembo et al., 2023). Furthermore, the recent economic crisis experienced in Sri Lanka has resulted in significant increases in the prices of key construction inputs such as cement, steel, and fuel. Consequently, bid prices prepared under earlier economic conditions often become outdated and unsustainable as projects progress under changing market conditions (Thilakshan et al., 2023). Additionally, the depreciation of the local currency increases the cost of imported materials, thereby raising overall construction expenditure (Martyshev et al., 2023). Therefore, greater attention is required during cost estimation to address factors contributing to cost deviations. In particular, given the fluctuating nature of the Sri Lankan economy, proper consideration of macroeconomic conditions becomes essential.

### 2.3 LIMITATIONS OF TRADITIONAL COST ESTIMATION METHODS

Traditional cost estimation methods refer to both formal and informal approaches used to forecast construction costs (Anireddy, 2024). Formal methods include techniques such as BOQ based estimating (Agyefi-Mensah & Nani, 2025), elemental estimating (Soutos & Lowe, 2011), and unit rate estimating (Chandra & Polley, 2024), while informal approaches rely primarily on proprietary experience (Anireddy, 2024), expert judgement (Ranadewa et al., 2018). and supplier quotations (Perluka, 2024). Although these methods are widely used in the Sri Lankan construction industry, they present several limitations. Subjective judgements are prone to human error (Anireddy, 2024), while reliance on historical data limits the ability to respond to rapidly changing market conditions (Musarat et al., 2024). Moreover, fluctuations in import duties, exchange rates, and fuel prices introduce significant uncertainty into cost forecasts, particularly when using traditional estimation approaches (Thilakshan et al., 2023). These methods often do not adequately account for inflation related effects, which reduces their reliability in volatile economic environments.

Therefore, transition towards cost estimation models which systematically convert available information into structured estimates that account for project characteristics, complexity, time factors, and external economic variables is essential (Capano et al., 2020). Such predictive modelling reduces financial uncertainty, improves the accuracy of cost planning, and supports proactive cost control throughout the project lifecycle (Jassim et al., 2025).

### 2.4 APPLICATION OF INFLATION ADJUSTED DATA DRIVEN COST ESTIMATION MODELS

Cost estimation models are generally based on the assumption that project costs are correlated with identifiable variables such as project size, material requirements, contract duration, and labor intensity (Kankate & Gurani, 2024). By utilizing historical datasets, statistical models can identify patterns and relationships that may be applied to predict costs for new projects (Farshidpour et al., 2021). Common analytical techniques include cost indexing, factor-based adjustments, and unit rate analysis, where project components are quantified and multiplied by corresponding cost parameters (AlTalhoni et al., 2024). In particular, inflation adjusted models aim to incorporate economic indicators to better reflect future cost conditions and improve prediction reliability (Musarat et al., 2024). Despite these advancements, the application and adoption of inflation adjusted, data driven cost estimation models remain underexplored in the Sri Lankan context.

Given that Sri Lanka frequently experiences cumulative price escalations, especially in long term construction projects, examining industry readiness and identifying potential opportunities for adopting inflation adjusted data driven cost estimation models may provide significant benefits to project stakeholders.

## 3. RESEARCH METHODOLOGY

The study adopted mixed method approach. The target population of this study consists of construction industry professionals, namely quantity surveyors, architects, and engineers, who are involved in cost estimation, tender preparation, and cost management in construction projects within the Sri Lankan construction industry. The sample frame includes construction professionals with a minimum of three years of experience in cost

estimation or project cost management in Sri Lankan construction projects. The minimum experience threshold of three years was considered appropriate as, within the Sri Lankan construction industry, professionals are typically exposed to cost estimation during the early stages of their careers under supervision. This ensures that respondents possess practical familiarity with cost estimation practices while maintaining an adequate and representative sample size. In addition, the study adopted both consultant and contractor perspectives, as these stakeholders are directly involved in cost estimation, tender preparation, and cost management activities, thereby providing comprehensive insights into current estimation practices and the readiness for adopting inflation adjusted, data driven cost estimation models. A purposive sampling technique was employed to capture views from respondents who are aligned with the study objectives and meet the sample frame criteria of having a minimum of three years of experience in cost estimation or project management within the Sri Lankan construction industry. Figure 1 outlines the research design of the study.

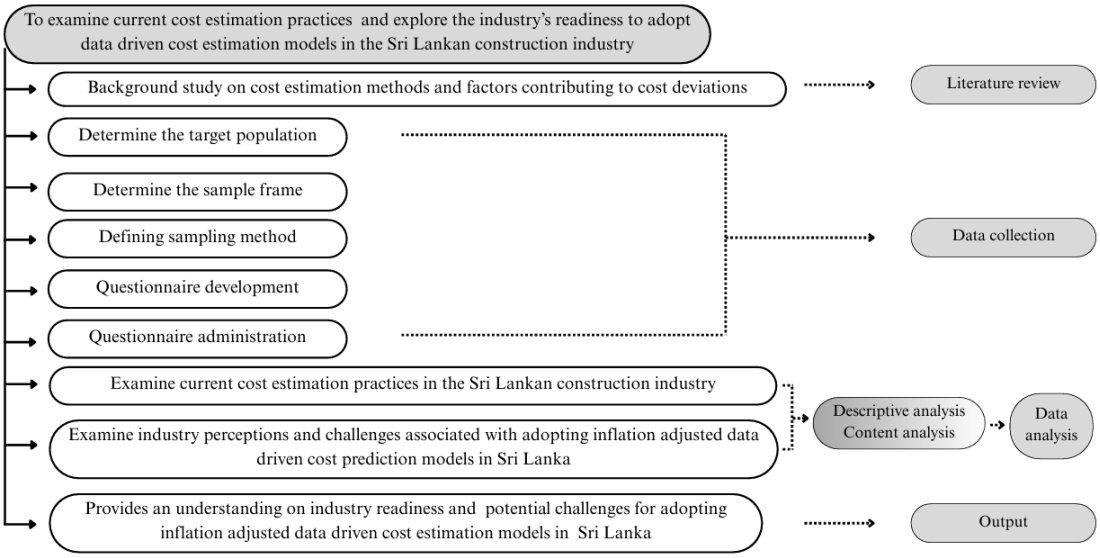


*Figure 1: Research design*

A structured questionnaire was used as the data collection instrument due to its ability to capture the views of a large set of respondents within a relatively short period (Thiruchelvam & Uduwage, 2025). The questionnaire was distributed to 75 construction professionals through online platforms such as email, LinkedIn, and WhatsApp to enhance accessibility for respondents. The collected responses were analysed using both descriptive analysis and content analysis. Descriptive analysis was used to summarise and describe the data related to current cost estimation practices and industry readiness for adopting inflation adjusted data driven cost estimation models in Sri Lanka through frequencies, charts, and mean values. In addition, open ended question was used to collect respondents' views on the challenges associated with adoption of inflation adjusted data driven cost estimation models in Sri Lanka. These responses were analyzed using content analysis, where qualitative data were grouped into key themes representing the challenges associated with adoption.

# 4. RESULTS AND DISCUSSION

## 4.1 RESPONDENTS' DEMOGRAPHIC INFORMATION

The questionnaire was distributed to 75 construction professionals who align with the defined sample frame, and 40 valid responses were received, resulting in a 53% response rate. Taherdoost and Madanchian (2024) highlighted that an average response rate of 51% is considered sufficient for online surveys in business and management-related studies. Since the response rate of this study exceeds the identified threshold, the sample size can be considered adequate for the analysis.

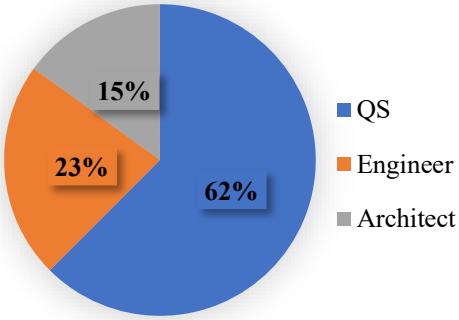


*Figure 1: Respondents' profession*

As presented in Figure 2, data were collected from three categories of construction professionals, namely Quantity Surveyors (QS), Engineers, and Architects, representing 62%, 23%, and 15% of the respondents, respectively. Among these, Quantity Surveyors constitute the majority of respondents. This is justifiable as QS professionals are more directly involved in cost estimation activities compared to engineers and architects, whose involvement in this specific area is relatively limited.

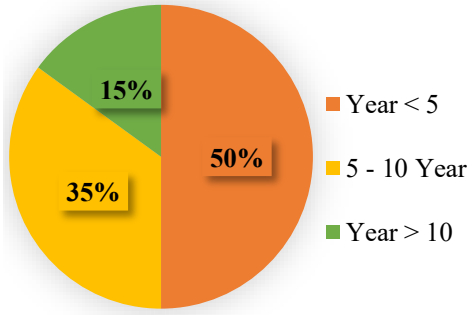


*Figure 2: Respondents' experience*

Figure 3 illustrates the years of experience of the respondents, where all respondents possess at least a degree in a relevant field. Moreover, the demographic analysis indicate that the respondents have a satisfactory level of knowledge and industry experience, enabling them to understand and respond to the questionnaire in a reliable manner.

## 4.2 CURRENT COST ESTIMATION PRACTICES IN THE SRI LANKAN CONSTRUCTION INDUSTRY

Current cost estimation practices followed in the Sri Lankan construction industry at the tendering stage to forecast final contract price were gathered from questionnaire responses and are illustrated in Figure 4.

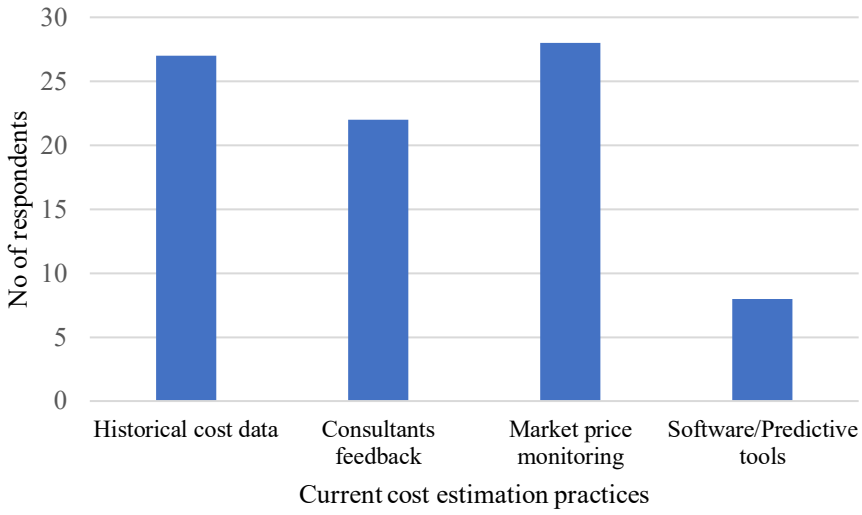


*Figure 3: Current cost estimation practices in the Sri Lankan construction industry*

As indicated in Figure 4, market price monitoring including collecting and regularly updating prices from suppliers, contractors and labour market is identified as most commonly adopted cost estimation practices in Sri Lankan construction industry. This is followed by the use of historical cost data and consultant feedback. These findings indicate that construction industry professionals tend to rely more on experience based approaches and real time market information when preparing cost estimates. In contrast, the use of software or predictive tools remains significantly low, suggesting limited adoption of advanced or data driven approaches in cost estimation when compared to traditional methods such as market price monitoring, historical data utilisation, and consultant based inputs.

Furthermore, respondents were requested to indicate the level of alignment between bid price and final contract price. The results reveal that only 20% of respondents perceived a very close alignment between bid price and final contract price, while the remaining 80% indicated a considerable difference between the two. This suggests that, although traditional estimation methods are widely practised in the Sri Lankan construction industry, they may not adequately capture the factors influencing final contract price.

Overall, the findings highlight that existing cost estimation practices, which are largely based on traditional approaches, show limitations in achieving close alignment with final contract price. This indicates the need to explore the adoption of data driven cost estimation models.

## 4.3 INDUSTRY PERCEPTIONS AND CHALLENGES ASSOCIATED WITH ADOPTING INFLATION ADJUSTED DATA DRIVEN COST ESTIMATION MODELS IN SRI LANKA

Respondents' perceptions regarding the use of data driven cost estimation tools as a method to improve cost estimation accuracy were collected through the questionnaire survey. The findings indicate that nearly 95% of respondents expressed a positive attitude towards the use of data driven cost estimation models in construction cost estimation, while the remaining 5% provided neutral responses, with no respondents indicating disagreement.

Similarly, for the specific question related to the adoption of inflation adjusted data driven cost estimation models in the Sri Lankan construction industry, a consistent trend was observed, where respondents were clearly provided with the definition of the inflation adjusted data driven cost estimation model to ensure informed responses Approximately 98% of respondents indicated that the use of inflation adjusted, data driven cost estimation models is essential for improving cost estimation accuracy, while only 2% expressed disagreement.

These findings suggest that there is a strong positive perception and willingness among industry professionals towards the adoption of inflation adjusted, data driven cost estimation models in the Sri Lankan construction industry

### 4.3.1 Challenges Associated with Adoption of Inflation Adjusted Data Driven Cost Estimation Models in Sri Lanka

Although the findings indicate a positive perception towards adoption, respondents also highlighted several challenges associated with implementing inflation adjusted, data driven cost estimation models in Sri Lanka. These challenges are presented in Figure 5.

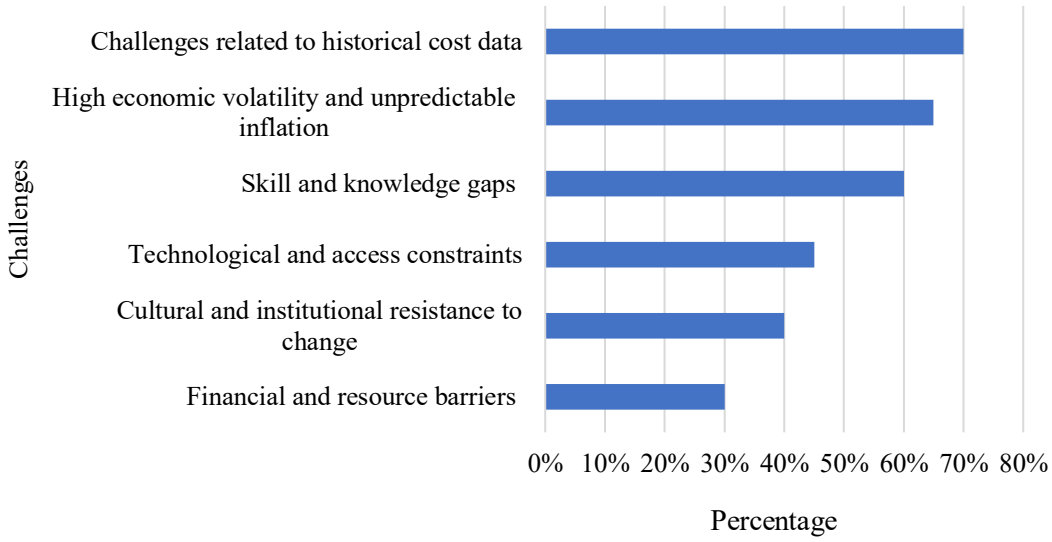


*Figure 5: Challenges associated with adoption of inflation adjusted data driven cost estimation models*

As illustrated in Figure 5, six major challenges were identified by the respondents. Among these, challenges related to historical cost such as data availability and quality were identified as the most critical. Respondents highlighted that fragmented, non digitalised, and inconsistent records limit the ability to develop reliable and robust

models. As noted by AlTalhoni et al. (2024), historical cost data serves as a primary input for cost estimation models. Therefore, the lack of accurate and structured data might become a significant barrier. Further, high economic volatility and unpredictable inflation were identified as another major challenge. Frequent fluctuations and delays in updating official price indices in Sri Lanka can reduce the reliability and stability of cost forecasts. In addition, a lack of skills and knowledge in data analytics, statistics, and machine learning among construction professionals was identified as a key constraint. This limitation affects the ability of industry practitioners to effectively adopt and utilise data driven approaches. Similarly, technological and accessibility constraints were recognised as significant challenges, particularly for small and medium sized firms. The high cost of specialised software and limited digital infrastructure can restrict the adoption of advanced cost estimation tools. Moreover, cultural and institutional resistance to change was highlighted as a challenge, as the Sri Lankan construction industry largely depends on expert judgement in cost estimation. Transitioning from experience based approaches to algorithm based decision making may therefore face resistance. Finally, financial and resource constraints were identified as another barrier, as the initial investment required for system development, validation, training, and maintenance can be substantial, particularly for smaller organisations.

## 4.4 DISCUSSION

The findings of this study provide significant insights into current cost estimation practices and the readiness of the Sri Lankan construction industry to adopt inflation adjusted data driven cost estimation models. As shown in Figure 4, traditional cost estimation methods, particularly market price monitoring and historical cost data usage remain the dominant cost estimation practice in Sri Lanka. This is consistent with Anireddy (2024), who notes that construction cost estimation in developing contexts remains largely judgment-driven due to limited integration of analytical tools and structured data systems. Such reliance on traditional methods may contribute to the observed mismatch between bid prices and final contract prices, where 80% of respondents reported considerable deviations. This indicates that existing approaches may not fully capture dynamic cost variations in volatile market conditions.

In contrast, the limited use of software-based or predictive tools further highlights the relatively low level of technological maturity within the Sri Lankan construction industry. Similar trends have been reported in prior research, which notes that the adoption of digital and predictive cost estimation techniques remains slow in developing construction sectors due to limited digital integration and fragmented data systems (Abu-Khader, 2023). Despite these constraints, the findings reveal a strong conceptual acceptance of inflation adjusted data driven cost estimation models among industry professionals. This suggests a notable awareness - implementation gap. This aligns with existing literature which emphasizes that data driven and inflation adjusted models enhance forecasting reliability by incorporating economic fluctuations (Jassim et al., 2025; Musarat et al., 2024).

Mainly six barriers identified in this study for the adoption of inflation adjusted data driven cost estimation models in Sri Lankan construction industry particularly barriers related to availability and quality of historical cost data, economic instability, and lack of technical skills (Figure 5). Addressing these challenges may support the successful implementation of inflation adjusted, data driven cost estimation models in the Sri Lankan

construction industry and improve the alignment between bid price and final contract price. Based on the findings of this study, industry practitioners may consider developing inflation adjusted, data driven cost estimation models and conducting pilot testing using real construction projects to evaluate their accuracy and applicability. In addition, government and policymakers may facilitate adoption by providing training programmes and financial assistance to enhance industry capacity. Furthermore, this study contributes to the existing body of knowledge by highlighting the need for future research. Subsequent studies may focus on identifying and evaluating suitable strategies to overcome the challenges associated with adopting inflation adjusted, data driven cost estimation models in Sri Lanka.

# 5. CONCLUSIONS

This study examined current cost estimation practices in the Sri Lankan construction industry and evaluated the industry's readiness to adopt inflation adjusted, data driven cost estimation models. The findings reveal that traditional cost estimation practices, particularly market price monitoring, historical data utilisation, and consultant based inputs, remain dominant at the tendering stage. However, these approaches show limitations in achieving close alignment between bid price and final contract price, as highlighted by the significant discrepancies reported by the respondents. Given the limitations of traditional methods, the study identified a strong positive perception among industry professionals towards the adoption of data driven cost estimation models. The majority of respondents acknowledged the importance of incorporating inflation adjusted models to improve cost estimation accuracy, especially in the context of economic volatility in Sri Lanka. However, several challenges were identified that may hinder effective adoption. These include issues related to the availability and quality of historical cost data, high economic uncertainty, limited technical expertise, technological constraints, resistance to change, and financial barriers. Addressing these challenges is important to facilitate the transition towards more advanced cost estimation practices in Sri Lanka. Furthermore, the findings of this study may also be relevant to other developing countries with similar construction industry characteristics. Future research may be extended to identify suitable strategies to overcome the challenges associated with adopting inflation adjusted, data driven cost estimation models in Sri Lanka. Overall, the adoption of such models has the potential to enhance the reliability of cost estimation and improve project financial outcomes.

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