



Construction Project Progress Calculation: Unveiling Weighted Reality for Enhanced Transparency and Stakeholder Confidence

Safiqul Islam^{a*}

^a Additional Chief Architect, BRAC. Email: safiqul@uap-bd.edu

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ABSTRACT

Construction projects inherently intertwine physical progress with financial implications. Traditional progress calculation methods often struggle to capture this dynamic accurately, leaving stakeholders confused and questioning their investment security. This paper critically examines limitations of existing approaches and proposes a novel solution: weighted progress for activities and packages, combined with exclusion of upfront payments from financial calculations. This fosters transparency and stakeholder confidence by presenting a clearer and more reliable picture of project advancement.

1. Introduction

For stakeholders in construction projects, accurate visibility into progress through both physical and financial metrics is paramount. However, traditional methods frequently fall short, failing to depict the nuanced interplay between these domains. Percentage of completion, despite its simplicity, suffers from neglecting the varying significance of individual activities (Flanagan & Flanagan, 2014). Earned Value Management (EVM), while offering insightful comparisons, can be daunting for smaller projects and susceptible to inaccuracies inherent in initial estimations (PMI, 2017). Milestone-based methods, though understandable, overlook work completed between milestones, potentially distorting progress representation. These limitations, along with neglecting weighted progress, financial obfuscation through upfront payments, subjectivity, and limited applicability, leave stakeholders navigating a labyrinth of confusion and inaccuracies.

2. Limitations of Current Methods: Unveiling the Cracks in the Foundation

Conventional progress calculation methods exhibit various limitations, each contributing to a lack of precision and transparency in project reporting.

A. Percentage of Completion

One widely used method expresses progress as a percentage of completed activities. However, this simplicity masks a critical flaw: it fails to account for the varying significance of individual tasks. Imagine comparing the installation of a complex HVAC system to painting a wall – assigning them equal weight paints a distorted picture of true advancement.

B. Earned Value Management (EVM) (PMI, 2017)

EVM, a sophisticated methodology, tracks earned value against planned value and actual cost. While offering valuable insights, EVM's complexity can be daunting for smaller projects, and its reliance on accurate estimations can amplify inaccuracies in the initial plan.

* Corresponding author: Safiqul Islam, Additional Chief Architect, BRAC

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C. Milestone-Based (Lowe & Kerzner, 2015)

This method marks progress by achieving pre-defined milestones. Though simple to understand, it overlooks work completed between milestones, potentially creating misleading gaps in the progress report. Further, reliance on subjective milestone definitions can introduce discrepancies.

D. Common Pitfalls

Despite their varied approaches, these conventional methods share common pitfalls:

- **Neglecting Weighted Progress:** They fail to consider the varying importance of activities, leading to misleading representations. A 90% completion rate for low-impact tasks may mask minimal progress on critical path activities. (Dikmen, Birgitte, & Le-Hoai, 2008)
- **Financial Obfuscation:** Upfront payments and advance purchases cloud the true financial picture tied to completed work, inflating progress and eroding stakeholder trust.
- **Subjectivity and Inaccuracy:** Reliance on subjective assessments and estimations can introduce inaccuracies, further muddying the waters.
- **Limited Applicability:** The complexity of some methods restricts their use to larger projects, leaving smaller ventures without adequate tools.

3. Proposed Approach: Illuminating Weighted Progress and Financial Clarity

The proposed approach presents a paradigm shift in addressing the shortcomings of traditional methods. By integrating weighted progress for activities and packages and excluding upfront payments from financial calculations, this approach offers a robust framework for accurate project assessment.

A. Weighted Physical Progress

Unveiling the true nature of project progress necessitates moving beyond simplistic approaches and embracing the concept of weighted physical progress. This methodology breaks down the project into smaller, more manageable entities, assigns them appropriate significance, and aggregates the progress accordingly, offering a much clearer and more accurate picture of advancement.

1. **Package Segregation: Granularity Breeds Clarity** (Heizer, Render, & Munson, 2011)

The first step involves meticulously dividing the project into distinct packages, each with a dedicated budget. Imagine a large construction project encompassing building foundations, erecting the structure, and installing

interior finishes. Instead of treating these as one monolithic entity, dividing them into separate packages allows for :

- **Granular Analysis:** Each package can be analyzed independently, enabling a closer examination of progress within specific areas and identifying potential bottlenecks or areas exceeding expectations.
 - **Precise Representation:** By focusing on smaller, more defined segments, progress reporting becomes more accurate and meaningful, avoiding the misleading generalizations associated with treating the entire project as a single unit.
2. **Activity Cost Identification: Weighting Significance within the Package**

Within each package, the next step involves identifying the cost of each individual activity relative to the overall package budget. This seemingly simple act holds immense importance:

- **Inherent Weight Assignment:** By associating a cost with each activity, we inherently assign it a weight reflecting its significance within the package. A complex HVAC installation costing 20% of the package budget naturally assumes greater importance than painting walls, costing only 5%.
 - **Contextual Importance:** This weighting acknowledges the varying significance of activities within the bigger picture. Imagine completing 90% of minor tasks but neglecting critical path activities – traditional methods would paint a distorted picture of actual progress. By considering cost as a proxy for importance, we present a more realistic representation.
3. **Weighted Activity Progress: Transforming Percentages into Nuanced Contributions**

Once each activity's cost-based weight is established, we progress to calculating its weighted progress value. This involves multiplying the activity's completion percentage by its relative weight (cost/package budget). This seemingly simple calculation yields a powerful transformation:

- **Nuanced Understanding:** Instead of simply reporting that an activity is 80% complete, we now understand how much that 80% contributes to the overall package progress based on its inherent significance. This shift from raw percentages to weighted contributions paints a much clearer picture of actual advancement.
- **Prioritizing Key Tasks:** Activities with higher weights contribute more significantly to overall progress. By highlighting their progress through weighted values, we prioritize key tasks and ensure attention is focused on areas with the greatest impact.

4. Package and Project Progress: Aggregating Insights into a Holistic View

Having calculated the weighted progress of individual activities within each package, we can now determine the overall progress of the package itself. This involves summing the weighted progress values of all activities within that package. This provides a clear and accurate assessment of how far that specific segment of the project has genuinely advanced.

Finally, to obtain the cumulative project progress, we multiply the progress of each package by its weight (package budget/total project budget) and sum the results. This final figure, appropriately weighted by the significance of each package within the project's broader context, presents a holistic and nuanced view of overall project advancement.

By embracing this multi-step approach to weighted physical progress, we move beyond the limitations of traditional methods and unlock a new level of transparency and understanding. This allows stakeholders to make informed decisions based on a genuine representation of project advancement, fostering trust and collaboration while ultimately enhancing project success.

B. Unveiling True Financial Progress:

Eradicating Upfront Payments: All upfront payments, including advance payments and imported equipment costs, are meticulously excluded from financial progress calculations. This ensures that the focus remains solely on the financial progress tied to completed work. By eliminating artificially inflated progress metrics, stakeholders can trust that financial indicators accurately reflect tangible project advancements.

Running Bill Scrutiny: True financial progress is assessed by considering only the amount paid through running bills, which represent payment for completed work. This direct link ensures a clear and accurate representation of financial advancement, untainted by non-contributory elements. Stakeholders can rely on this measure as a faithful reflection of the actual financial state of the project.

4. Building on Solid Ground: Essential Considerations

- Progress is only officially recognized upon the completion of physical work at the construction site. Imported equipment stored on-site does not contribute to progress until it is installed and operational.
- This approach can be seamlessly integrated with established methodologies like Earned Value Management (EVM). Leveraging tools like the Cost Performance Index (CPI) and Schedule Performance Index (SPI) provides further insights

into project dynamics (PMI, 2017).

- **Integration with Advanced Technologies in Construction Management:** Recent advancements in construction management technologies have paved the way for more accurate progress tracking. Integrating Building Information Modeling (BIM) and real-time project monitoring tools can enhance the precision of weighted progress calculations. This integration allows for dynamic adjustments based on live data, providing a more responsive and adaptive approach to project management (Lu, et al., 2020).

5. Conclusion: Transparency, Confidence, and Informed Decision-Making

Traditional progress calculation methods often leave stakeholders adrift in a sea of inaccuracies and confusion. By embracing weighted progress for activities and packages, while meticulously excluding distorting factors from financial calculations, our proposed approach offers a beacon of clarity. This enhanced transparency fosters:

- **Stakeholder Confidence:** Armed with a clear and accurate picture of progress, stakeholders can make informed decisions based on reality, fostering trust and collaboration.
- **Informed Decision-Making:** Understanding the true state of physical and financial progress empowers stakeholders to make timely and effective decisions, mitigating risks and optimizing project outcomes.
- **Streamlined Project Management:** By eliminating ambiguity and obfuscation, our approach facilitates smoother project management, allowing managers to allocate resources effectively and address potential roadblocks proactively.
- **Enhanced Communication:** Transparency breeds trust and open communication between all stakeholders, fostering a collaborative and solution-oriented environment.
- **Reduced Disputes:** Misunderstandings arising from opaque progress reports can lead to costly disputes. Our approach minimizes these conflicts by providing a shared understanding of project advancement.

6. Further Research

This paper lays the foundation for further research into the practical implementation of the proposed approach. Future studies could investigate:

- Developing standardized frameworks for activity cost identification and weight assignment.
- Integrating this approach with existing project

management software for seamless data analysis.

- Conducting case studies to evaluate the effectiveness of this method in real-world construction projects.
- Exploring Innovations in Project Transparency: Research into emerging technologies such as blockchain in construction project management is essential for establishing tamper-proof transparency. Blockchain's decentralized and secure nature can potentially address concerns related to data integrity and ensure a reliable audit trail for progress reporting (Bakhtyar, et al., 2019).
- Cross-Industry Insights for Progress Assessment: Drawing insights from related industries, such as aerospace and manufacturing, can contribute to a more comprehensive understanding of progress assessment methodologies. Cross-industry studies may reveal transferable practices that can be adapted to construction projects, enhancing the robustness of progress evaluation (Shtub, et al., 2018).

By building upon this foundation, we can ensure that construction projects navigate the path to success transparently and collaboratively, for the benefit of all stakeholders.

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