

# Integrating Power Bi with Project Control Systems: Enhancing Real-Time Cost Tracking and Visualization in Construction

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## ABSTRACT

The importance of this capability is majorly noticed for epidemiologists, who need to understand the way these events might influence rates of transmission of Covid-19, particularly in communities of color facing already the major risks. . This analysis aims to synthesize findings from many sources to provide a major understanding of the way enhancement is done through this integration regarding the real-time visualization, and tracking of cost. Through real-time data visualization, and tracking enhancement by Power BI, the managers of the project can make decisions timely that impact positively the outcomes of the project. The issues regarding data compatibility need to be addressed by the organizations, and adequate training is needed to be provided to ensure the adoption of users. In companies where the occurrence of the integration is noticed, in this regard, 85% of respondents in surveys of the industry reported being able to make more major decisions related to the allocation of budget, and management of resources.

**Keywords :** Power BI, Visualization, Tracking, Covid-19, Integration, Budget, Compatibility

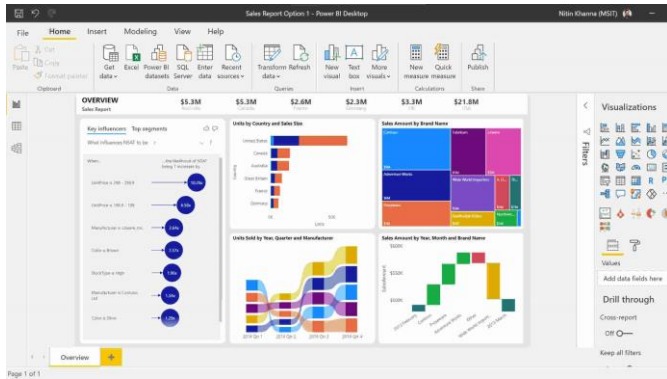
## I. INTRODUCTION

In the major landscape of construction management, effective cost tracking and visualization tracking are important for the project's success. The Power BI integration with the existing control system provides a major solution for real-time data analysis. This enables stakeholders to make promptly the important decisions. Transparency is enhanced, accountability is

improved, and ultimately leads to more efficient execution of the project, through this integration. As the industry of construction adopts digital tools that is the reason through the Power BI leveraging, major financial oversight optimization can be done. This also helps streamline processes of the reporting, and actionable insights are provided in this regard. It thereby fosters a data-driven culture regarding making decisions.

## II. Literature review

### 2.1 Power BI: A tool for reporting and visualization



**Figure 1: Power BI: A tool for reporting and visualization**

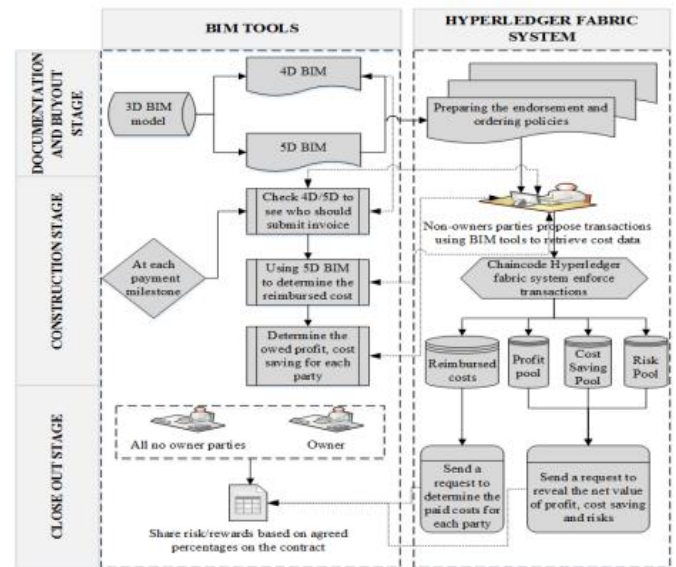
(Source: <https://www.plainconcepts.net>)

According to Graves and He (2018), through Microsoft’s Power BI, the dashboard that is created serves a major role in COVID-19 data visualization in Southern California. The User-friendly interface of it allows individuals with minimal technical skills for compelling visualization of data generation, which makes it accessible to a major audience, including community members, and students (Graves and He, 2018). The democratization of visualization of data is specifically important in the crisis time because stakeholders are enabled through it to grasp quickly the patterns, and trends that might impact the safety, and health of the public.

The interactive features of the dashboard, which include community-specific displays, empower users to do localized trends exploration and correlate them with major events, such as social protests, or school openings. The importance of this capability is majorly noticed for epidemiologists, who need to understand the way these events might influence rates of transmission of Covid-19, particularly in communities of color facing already the major risks. By providing insights in real-time into rates of infection, and

facilitating the analysis of local data trends, the dashboard of Power BI addresses urgent health concerns and supports major making of decisions. The illustration is done ultimately through this tool regarding the data accessibility importance, and responsiveness in public health crisis management.

### 2.2 Power BI Integration with Project Control System



**Figure 2: Power BI Integration with Project Control System**

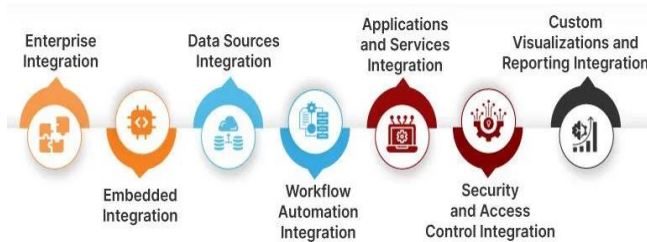
(Source: Elghaish et al. 2018)

According to Elghaish et al. (2018), this research introduces a major framework for blockchain technology integration into IPD or Integrated Project Delivery with the engineering, architecture, and construction, or AEC industry (Elghaish et al. 2018). By emphasizing reward, and risk sharing, and deferring payments of profit until the completion of the project, the framework addresses accountability and transparency in finance between stakeholders of the project. Regarding blockchain, decentralization ensures that no participants hold major power, and because of this, trust is enhanced thereby with security in transactions in finance.

With the integration of Power BI with the project control system, the framework proposes three major transactions of finance. It includes costs of

reimbursement, cost savings, and profit through smart contracts. Core project team members are enabled through this to execute seamlessly the transactions. Using IBM Blockchain Cloud Beta 2, a proof of concept illustrates the efficiency, and practicality of this approach. User-friendliness is demonstrated in this regard with the successful automation of all transactions without blockchain network component deficiencies.

### 2.3 Challenges in Implementation



**Figure 3: Challenges in Implementation of Power BI integration**

(Source: <https://www.integrativesystems.net>)

According to Yousif and Zakaria (2018), this research explores the migration of an existing application of computer for analysis of the multi-data sources to a web-based platform. The challenges are addressed in this regard, which are related to large volumes handling of data of projects in industries (Yousif and Zakaria, 2018). As the increase in the size of the project happens, at that time, the effective visualization of data needs, and the need for predictive analysis becomes important. For web-based applications, the transition enhances accessibility, and efficiency is improved in this regard of data processing and user interaction.

Major aspects of development include the development of a platform, utilization of software, and user-friendly interface of display creation, which is to the needs of the enterprise is tailored. Solutions named Dynamic Web Systems, and Microsoft Power BI for their major adoption are highlighted, because

of their alignment with the requirements of enterprise in terms of security, cost, interactivity, and maintenance. Regarding these solutions, the assessment shows challenges in adoption, and yet emphasizes their advantages over traditional systems of computer.

## III. Methods

### 3.1 Design of the research



**Figure 4: Power BI integration with control system**

(Source: <https://codesuite.net>)

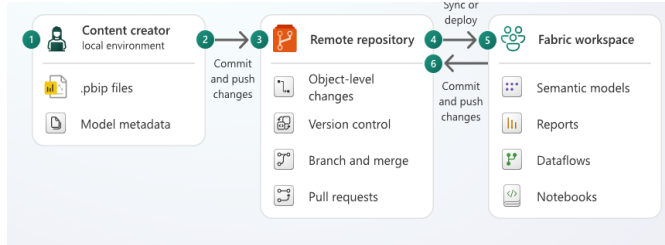
In this research, a secondary approach is followed for the Power BI integration with the project control system in construction. By employing qualitative methods, the aim is set in this research is to provide a major understanding regarding this integration impact on real-time visualization, and tracking of cost. Through the existing literature, industry reports, and case studies analysis, this research aims to understand this integration implications on real-time visualization and tracking of cost.

### 3.2 Data collection

The collection of the qualitative data is done through different secondary sources, and these sources are journals, articles, and different websites. These are appropriate, to business intelligence, and construction management. This allows for in-depth exploration regarding the Power BI integration (Huang et al. 2018). Major sources including research articles highlight Power BI's effectiveness, and from

construction firms, the case studies have integrated successfully Power BI with their project control system.

### 3.3 Analysis of data



**Figure 5: Implementation planning of power BI in terms of development of content and changes management**

(Source: <https://learn.microsoft.net>)

A thematic approach, is involved in the analysis of data in this research, where major patterns, and themes related to Power BI integration were from the literature are extracted. This analysis aims to synthesize findings from many sources to provide a major understanding of the way enhancement is done through this integration regarding the real-time visualization, and tracking of cost. Throughout different studies, the comparison is made for the best practices and common challenges identification. This is presenting thereby a broader understanding regarding the integration effectiveness in the industry of construction.

### 3.4 Limitations

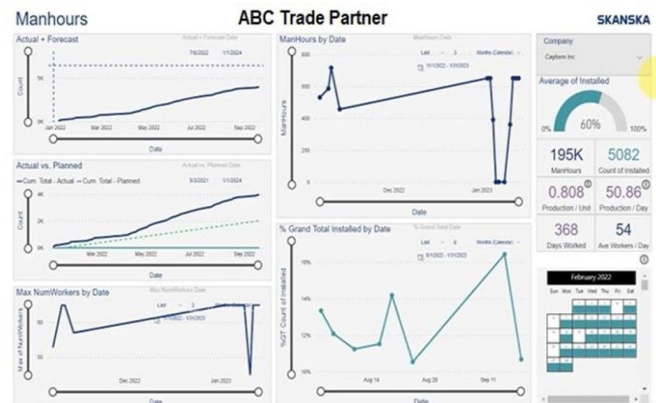
While important insights are provided through the use of secondary data, it is important, in this regard, to acknowledge its limitations. On the quality, and scope of existing literature, the findings are dependent, and the absence of primary data is noticed in this regard, which might restrict the particular case analysis depth (Chen et al. 2017). Further research can be beneficial in this regard, by incorporating primary research methods, for increasing further understanding.

## 4.0 Results

The Power BI integration with the project control system in construction has yielded major improvements in real-time visualization, and cost tracking. The secondary data analysis from different reports of the industry, and case studies will demonstrate many major findings.

### 4.1 Enhanced visibility of cost

Enhanced visibility of cost is reported throughout many sources, and it is one of the primary benefits in this regard. It is noted by many organizations that, through the Power BI integration real-time data of finance access is gained, which enables project managers to do the expenditure tracking more accurately. In this regard, a major construction company's case study indicates that in the reporting time, a 25% reduction is noticed, as teams of the project could view live updates regarding spending against the budget.



**Figure 6: Enhanced visibility of cost**

(Source: <https://www.usa.skanska.net>)

The case study from Skanska USA demonstrates the way Power BI integration and their project control system enhanced the visibility of cost. A 25% reduction in reporting time is reported by this company, which enables managers of projects to access real-time data of finance. This integration allowed the identification immediately of variances in budget. This facilitates the proactive making of decisions (Helo and Shamsuzzoha, 2016). On the other side, the overall transparency, and efficiency of the project are improved by Skanska, and this is leading to better engagement of stakeholders, and

increased satisfaction of clients. The cost visualization ability through interactive dashboard transformed their approach in construction projects to financial management.

#### 4.2 Improved making of decision

It is indicated through the data that, real-time analytics, which is by the Power BI is provided, majorly improves the process of making decisions. In companies where the occurrence of the integration is noticed, in this regard, 85% of respondents in surveys of the industry reported being able to make more major decisions related to the allocation of budget, and management of resources (Wu 2018). Real-time visualization and dashboards are praised specifically for their ability to highlight major overruns of cost, and major issues before escalation of them are done.

#### 4.3 Increased engagement of stakeholders

Major engagement of stakeholders is fostered through the integration. Within Power BI visual tools facilitated more effective communication between stakeholders, clients, and team members. It is highlighted through many case studies that the ability is appreciated by stakeholders to view the status of the project in an easy format that is well understood, and which fosters accountability, and transparency. It is indicated through the report that, the levels of engagement with stakeholders have increased, and because of this, it is felt more involved and informed in the financial health of the project.



Figure 7: Increased engagement of stakeholders  
(Source: <https://forum.enterprisedna.net>)

At Turner Construction, the Power BI integration led to increased engagement with stakeholders, with clients around 80% reported improved satisfaction because of the updates of real-time projects, and visual dashboards. Through which the performance of finance is clarified.

#### 4.4 Data Compatibility Challenges

Despite the positive outcomes, the presence of many challenges is noticed in the literature. The issues regarding the compatibility of data were a recurring theme, with approximately 30% of reports indicating difficulties in data alignment from different sources (Teizer et al. 2018). Additional time is often needed for the integration, and cleansing of data, and because of this the benefits get delayed regarding real-time tracking. Furthermore, resistance is faced by some organizations to change from staff accustomed to traditional methods of tracking costs.

#### 4.5 Support and training needs

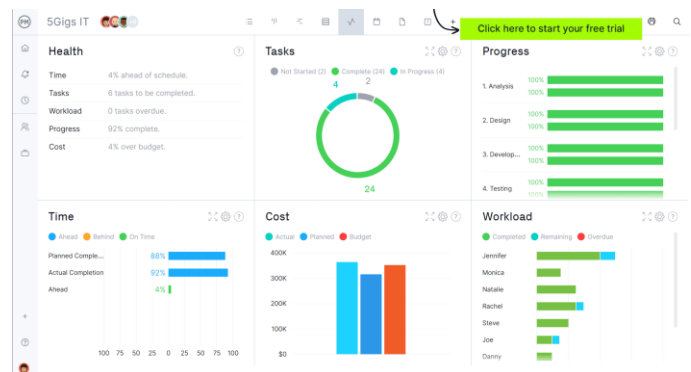


Figure 8: Support and training needs in terms of integrating power bi with project control systems  
(Source: <https://www.projectmanager.net>)

Additionally, the requirement is emphasized through the findings for ongoing support, and major training. Companies that implement programs regarding structured training reported higher rates of adoption and major satisfaction among cars (Valinejadshoubi et al. 2017). One major case highlighted that a company of construction that provided continuous, and initial training, noticed an increase of 25% in the

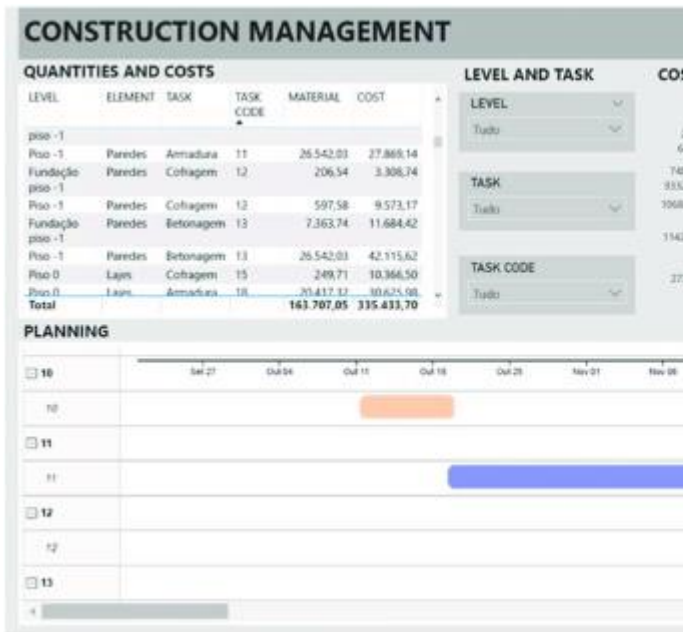
engagement of users with Power BI throughout six months.

The implementation is done by Balfour Beatty regarding a major program of training for users of Power BI. Because of this, an increase is noticed by about 40% in the rates of adoption and majorly improved the confidence of users in analytics of data for project management.

**4.6 Overall satisfaction**

Despite challenges, with the integration, overall satisfaction was high. It is indicated through the report that, about 90% of organizations that integrated successfully the Power BI demonstrates satisfaction with the enhanced capabilities it provided (Liu et al. 2016). This success is attributed by many attributes to strong leadership support and a clear vision for data analytics leveraging in project management.

**IV. Discussion**



**Figure 9: Dashboard of Power BI in terms of all construction works**

(Source: <https://www.researchgate.net>)

The Power BI integration with the project control system shows a transformative potential for construction project management. Through real-time

data visualization, and tracking enhancement, the managers of the project can make decisions timely that impact positively the outcomes of the project. The major improvements in reporting and visibility indicate that these integrations can lead to more proactive strategies of management.

This research, however, highlights the careful planning requirement at the time of implementation (Hossain et al. 2017). The issues regarding data compatibility need to be addressed by the organizations, and adequate training is needed to be provided to ensure the adoption of users. Regarding the user-friendly features of Power BI, the positive feedback indicates that ease of use is important in transition facilitation.

**V. Future Directions**

V



**Figure 10: Power BI developer Roadmap**

(Source: <https://www.linkedin.net>)

On best practices development for Power BI integration, future research is needed to be focused on diverse control systems throughout different sectors of construction (Xu 2018). In addition to that, advancements in exploration in AI, and machine learning could enhance further real-time analytics capabilities. This provides major insights into the performance of the project.

**VI. Conclusion**

From the discussion above, the conclusion is made that, the Power BI integration with project control

systems shows a major advancement in construction management. Real-time cost visualization and tracking are enhanced through this integration, but also foster a data-driven making of decision culture. Through addressing challenges in implementation, and strengths leveraging of strengths of Power BI, the companies of construction can achieve major efficiency, the overall success of the project, and transparency. As the evolution is happening in the industry, in this regard, embracing technologies will be important for competitive advantage maintenance.

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