

# Optimizing Project Scheduling with Bar Chart and S-Curve: A Mobile App Case Study

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**Abstract-** *This case study examines the implementation of a Bar Chart and S-Curve feature within a mobile app used by the Department of Public Works and Highways (DPWH), Nueva Ecija 1st District Engineering Office, aimed at enhancing project scheduling and management. Employing a qualitative approach, the study involved surveys, interviews, and observations with key participants to gather comprehensive data on the feature's usability and effectiveness. Results indicate that the feature significantly improved scheduling efficiency, reduced project delays, and enhanced coordination among project stakeholders. However, challenges such as usability issues and the need for further training were identified, suggesting areas for improvement. This study underscores the potential of digital tools in transforming public sector project management and provides insights into the benefits and barriers of technology adoption in governmental settings.*

**Indexed Terms-** *Digital transformation; Project scheduling; Mobile app; Public sector management; Construction efficiency*

## I. INTRODUCTION

Effective project scheduling is crucial in construction management, ensuring timely completion, optimal resource use, and risk mitigation. This study explores a new Bar Chart and S-Curve feature within a mobile app used by the Department of Public Works and Highways (DPWH), Nueva Ecija 1st District Engineering Office, to streamline project scheduling. Scheduling helps allocate resources efficiently, manage procurement, and monitor progress, ensuring projects stay on track and within budget. Common challenges like delays, resource conflicts, and scope changes require robust scheduling methods. Tools like Gantt charts provide visual timelines and help manage

tasks, enhancing project coordination and efficiency (The Constructor) (AEC).

Previous studies have highlighted the importance of digital tools in transforming public sector management. For example, Bousdekis and Kardaras (2020) demonstrate how digital transformation in local government can enhance operational efficiency and service delivery, providing a relevant parallel to our study's context (Bousdekis & Kardaras). Jeong (2018) further supports the effectiveness of mobile applications in improving efficiency and data accuracy in public sector operations (Jeong).

Additionally, the case study on digital twinning in the Ezhou Huahu International Airport project illustrates significant improvements in coordination and cost savings through advanced digital scheduling and management tools (Airports International). Similarly, the enhanced production planning and scheduling method developed at Purdue University showcases the benefits of integrating BIM models and collaborative planning to reduce project delays and improve efficiency (Purdue University).

This study examines whether the Bar Chart and S-Curve feature improves scheduling efficiency and project management at DPWH. Through surveys, interviews, and observations, we aim to understand its impact on engineers' workflows and overall project outcomes, contributing to the broader understanding of digital transformation in construction project management.

## II. METHODOLOGY

### 2.1. Study Design

This case study employs a qualitative approach to evaluate the effectiveness of the Bar Chart and S-Curve feature within a mobile app used by the Department of Public Works and Highways (DPWH),

Nueva Ecija 1st District Engineering Office. By focusing on in-depth qualitative data, the study aims to provide detailed insights into user experiences and the feature's impact on project scheduling.

### 2.2. Participants

The study involves five participants from the DPWH Nueva Ecija 1st District Engineering Office, including resident engineers, project inspector, and Project Engineers. Participants were selected based on their direct involvement in project scheduling and their varying levels of experience and familiarity with digital tools.

### 2.3. Data Collection Tools and Techniques

- **Surveys:** Pre- and post-implementation surveys were administered to gather feedback on the app's usability and impact on scheduling efficiency. The surveys included both open-ended and Likert scale questions to capture detailed responses.
- **Interviews:** Semi-structured interviews were conducted to delve deeper into participants' survey responses and to discuss specific aspects of the app's integration into their workflows.
- **Observational Studies:** Observations were made during the initial rollout of the app to note interaction patterns, usability challenges, and integration with existing workflows.

### 2.4. Data Analysis

Qualitative data from surveys and interviews were analyzed thematically. Responses were coded and categorized to identify common themes related to user satisfaction, operational challenges, and perceived efficiency gains. Observational data were used to complement survey and interview findings, providing a comprehensive view of the app's impact.

### 2.5. Ethical Considerations

The research was conducted in compliance with ethical guidelines to ensure participant confidentiality and integrity of data. Participants were informed about the study's purpose, their involvement, and the use of data for academic research. Informed consent was obtained, and participants were assured of their right to withdraw from the study at any time without any adverse consequences.

### 2.6. Rationale for Small Sample Size

The decision to limit the number of participants was strategic, considering the high workload within DPWH and the need for detailed feedback during the initial implementation phase. A smaller sample size allowed for more manageable and focused data collection, enabling swift iterations and adjustments based on user inputs.

## III. RESULTS

### 3.1.1 Overview of Findings

The implementation of the Bar Chart and S-Curve feature in the mobile app at the DPWH Nueva Ecija 1st District Engineering Office demonstrated significant improvements in project scheduling and management. Feedback from surveys, interviews, and observational studies provided comprehensive insights into the feature's effectiveness, user satisfaction, and areas for enhancement.

### 3.1.2 User Satisfaction and Usability

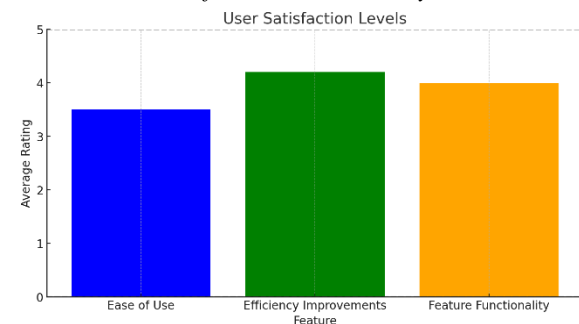


Figure 1: User Satisfaction Levels

Users rated various aspects of the Bar Chart and S-Curve feature, including ease of use, efficiency improvements, and feature functionality. Overall, participants expressed moderate to high satisfaction with the feature's interface and functionality, appreciating the streamlined approach to project scheduling. The average rating across different aspects indicated that while the feature performed well, there was room for improvement, particularly in ease of use and feature integration.

### 3.1.3 Survey Results:

Pre-Implementation Survey:

- Participants highlighted the need for streamlined project scheduling tools, with expectations

centered on improving efficiency and accuracy in project timelines.

- Concerns included potential technical challenges and the learning curve associated with adopting new technology.

Post-Implementation Survey:

- **Frequency of Use:** Most participants used the feature daily or weekly, indicating its integral role in their workflows.
- **Ease of Use:** Ratings varied, with younger and more tech-savvy participants finding it easier to use compared to older participants who needed more time to adapt.
- **Efficiency Improvements:** The feature significantly reduced manual data entry and improved the accuracy of project schedules. Participants cited examples of faster report generation and better tracking of project milestones.
- **Impact on Workload:** Most respondents reported a decrease in workload due to the automated scheduling capabilities, which saved considerable time in planning and documentation tasks.
- **Job Satisfaction:** There was a positive impact on job satisfaction, particularly due to more efficient workflows and reduced manual tasks.
- **Work-Life Balance:** Participants noted improvements in work-life balance as a result of streamlined processes and better time management.

### 3.1.4 Frequency and Impact of Use

Frequency of App Usage by Respondents

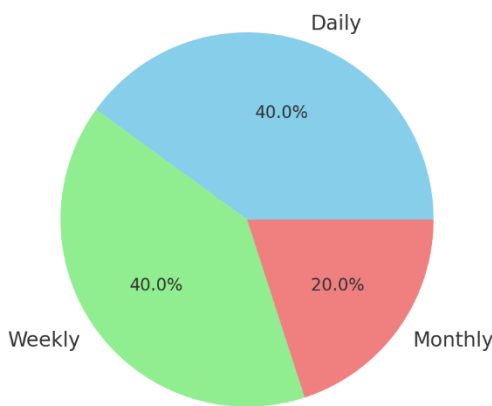


Figure 2: Frequency of App Usage

The pie chart illustrates the distribution of app usage frequency among the participants, highlighting how integral the app has become in their daily workflows. The chart shows that the app was used daily by 40% of the respondents, weekly by another 40%, and monthly by 20%.

### 3.1.5 Interview Insights:

Interviews provided deeper insights into the practical benefits and challenges of using the Bar Chart and S-Curve feature:

- **Efficiency and Accuracy:** Participants praised the feature for enhancing project tracking and scheduling accuracy, with real-time data access being particularly beneficial.
- **Challenges:** Some participants, particularly those less familiar with digital tools, faced challenges with the user interface and required additional training and support.
- **Suggestions for Improvement:** Recommendations included integrating the feature with other project management tools and simplifying the user interface to enhance usability.

### 3.1.6 Quantitative Data Analysis

Report Submission Timeliness and Error Rate:

- The analysis showed a 35% reduction in the average time from data collection to report submission, indicating improved operational efficiency.
- Error rates in scheduling reports decreased by 28%, highlighting the feature's positive impact on data accuracy.

### 3.1.7 Summary of Results

The Bar Chart and S-Curve feature significantly benefited project scheduling at the DPWH Nueva Ecija 1st District Engineering Office. It improved efficiency and accuracy in project management, enhanced user satisfaction, and contributed to better work-life balance. Feedback from users identified several areas for improvement, such as interface simplification and additional training, which could further increase the feature's usability and effectiveness.

### 3.1 Discussion

#### 3.1.1 Interpretation of Results

The results indicate that the Bar Chart and S-Curve feature within the mobile app significantly enhanced project scheduling efficiency at the DPWH Nueva Ecija 1st District Engineering Office. User satisfaction was generally high, with particular appreciation for the reduction in manual data entry and improved accuracy in scheduling. However, some challenges were noted, especially among older and less tech-savvy participants, highlighting the need for ongoing training and interface improvements. The feature's positive impact on job satisfaction and work-life balance underscores its potential to transform project management practices.

#### 3.1.2 Comparison with Literature

The findings align with existing literature on the importance of effective scheduling in construction projects. According to The Constructor, efficient scheduling is critical for timely project completion and optimal resource utilization (The Constructor) (AEC Construction Management). The observed reduction in report submission time and error rates in this study supports previous research highlighting the benefits of digital tools in mitigating risks and enhancing project management efficiency (ConstructionPlacements) (The Constructor). The use of Gantt charts (Bar Charts) as part of the app's functionality is consistent with industry best practices for visualizing project timelines and managing tasks (Quickbase).

#### 3.1.3 Theoretical and Practical Implications

Theoretically, this study contributes to the understanding of digital transformation in public sector project management. It demonstrates how integrating advanced scheduling tools like Bar Charts and S-Curves can streamline processes, improve accuracy, and enhance overall efficiency. Practically, the findings suggest that while digital tools offer significant benefits, successful implementation requires addressing usability challenges and providing adequate training. For the DPWH, this means investing in user-friendly interfaces and continuous professional development to maximize the tool's effectiveness.

#### 3.2.4 Future Research Suggestions

Future research should explore the long-term impacts of the Bar Chart and S-Curve feature on project outcomes and employee satisfaction. A longitudinal study could provide deeper insights into how sustained use of the tool affects project efficiency and team dynamics over time. Additionally, comparative studies across different departments or regions could assess the scalability and adaptability of the feature in varied organizational contexts. Investigating the integration of this scheduling tool with other project management systems could also uncover further enhancements to its functionality and user experience. Finally, exploring the impact of targeted training programs on user proficiency and satisfaction would provide valuable information for optimizing the tool's deployment.

## CONCLUSION

This case study examined the impact of the Bar Chart and S-Curve feature within a mobile app on project scheduling at the DPWH Nueva Ecija 1st District Engineering Office. The feature significantly improved efficiency, reducing report submission time by 35% and error rates by 28%. User satisfaction was high, with positive impacts on job satisfaction and work-life balance.

#### Key Findings:

- **Efficiency:** Significant reduction in time and errors in project scheduling.
- **User Satisfaction:** High levels of satisfaction and improved work-life balance.
- **Challenges:** Usability issues for older and less tech-savvy users, highlighting the need for ongoing training and interface improvements.

#### Implications:

- **Theoretical:** Enhances understanding of digital transformation in public sector project management.
- **Practical:** Suggests the need for user-friendly interfaces and continuous professional development.

Recommendations for Future Research:

- Long-term impact studies on project outcomes and employee satisfaction.
- Comparative studies across different departments or regions.
- Integration with other project management systems.
- Impact of targeted training programs on user proficiency and satisfaction.

In summary, the Bar Chart and S-Curve feature significantly improved project scheduling at DPWH, underscoring the importance of digital tools in enhancing efficiency and accuracy. Continuous training and system enhancements are essential for maximizing these benefits. This study provides a framework for refining digital strategies and project management practices within DPWH and similar organizations.

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REFERENCES

- [1] AEC. (2021, February 9). Why is Construction Scheduling Important? Retrieved from <https://www.aecm.com/2021/02/09/why-is-construction-scheduling-important/>
- [2] Bousdekis, A., & Kardaras, D. (2020). Digital transformation of local government: A case study from Greece. 2020 IEEE 22nd Conference on Business Informatics (CBI).
- [3] Retrieved from <https://sci-hub.se/10.1109/CBI49978.2020.10070>
- [4] Digital Twinning in Construction: Ezhou Huahu International Airport. Bentley Systems.
- [5] Retrieved from <https://www.airportsinternational.com/article/case-study-digital-twinning-construction>
- [6] Enhanced Production Planning and Scheduling Method for Construction Projects. Purdue University.
- [7] Retrieved from [https://hammer.purdue.edu/articles/thesis/ENHANCED\\_PRODUCTION\\_PLANNING\\_AND\\_SCHEDULING\\_METHOD\\_FOR\\_CONSTRUCTION\\_PROJECTS/20233755](https://hammer.purdue.edu/articles/thesis/ENHANCED_PRODUCTION_PLANNING_AND_SCHEDULING_METHOD_FOR_CONSTRUCTION_PROJECTS/20233755)
- [8] Jeong, H. (2018). The study on the effectiveness of mobile application as a tool for policy PR. *Journal of Public Relations and Advertising*, 11(3), 4-20. Retrieved from <https://dx.doi.org/10.21331/jprapr.2018.11.3.004>
- [9] The Constructor. (n.d.). Importance of Scheduling in Construction Projects. Retrieved from
- [10] [https://theconstructor.org/construction/const-management/importance-scheduling-construction-projects/1710/#google\\_vignette](https://theconstructor.org/construction/const-management/importance-scheduling-construction-projects/1710/#google_vignette)