Evaluation of a construction management software: "Progresi"

Muhammad Aziz¹ and Toriq Ghuzdewan*²

¹Department of Civil and Environmental Engineering, Faculty of Engineering, Universitas Gadjah Mada, Jl. Grafika No. 2, Yogyakarta, Indonesia

Abstract. The number of project management software developed is increasing which encourages better project management practices. Reluctance to use software may be due to a lack of understanding of software applications, considering software to be complex and impractical, or because it is perceived as expensive. This paper aims to evaluate "Progresi" as a project management software created by a local developer, specifically aimed at managing construction projects in Indonesia. A simulation is carried out based on real project data, to find out the features of the software and its potential use for construction project management. The research results show that “Progresi” produces Gantt charts, S-curves, budget tables, and resource tables. Its unique feature is that it accommodates the concept of unit price analysis for cost budgeting, provides a menu for safety management, generates daily project reports, and can be used to store photos and documents neatly and easily accessible which are useful for project audit purposes. Suggestions that can be given for improving this software are the need to provide a formal software manual, supplement it with network planning, and improve the appearance of Gantt charts and tables to make it look more professional.

1 Introduction

The number of project management software is increasing which is driving better project management practices. The use of software provides benefits, including facilitating better team communication and collaboration, more controlled resource management, easier reporting, more organized project data, enabling remote management, better budget management, and better process standardization [1]. Project managers need accurate, fast, and neat information, to assist in making decisions to achieve project goals efficiently and effectively. Even so, there are still many projects that are managed conventionally without software for several reasons, such as difficulty or ignorance with the software, features that do not meet the requirements, are expensive, impractical, or take a long time to operate the software [2]. Some managers prefer to use spreadsheets for project management instead of project management software [3]. Consideration is needed on whether using software will help project management, then what software should be chosen. This paper aims to evaluate a relatively new project management software, namely Progresi, made by a domestic developer, which is specifically aimed at managing construction projects in Indonesia. As a new program, Progresi is not well known yet and has not been widely used in practice. Evaluation of the software in this paper is carried out by conducting simulations based on real projects to determine the software operation and results. This paper describes the features of the software, its potential uses, and suggestions for improvement.

2 Project management software

Project management software is a computer program intended to assist a project manager and his/her teams in managing projects, creating work plans, monitoring, controlling, and reporting, from the beginning to the end of the project. Project management software facilitates integrated access to information for time management, resource scheduling, budget management, work assignments, quality control, reporting, documentation, communication, and collaboration. Project management software can increase efficiency and facilitate transparent project management for all parties involved [3]. Examples of popular project management software are Microsoft Project and Primavera. Microsoft Project was developed by Microsoft which can be used to create schedules, monitor progress, and manage project costs and workload. Primavera developed by Oracle Corporation provides project management, scheduling, risk analysis, resource management, control, and collaboration features.

There are many project management software with various criteria, including self-hosted and cloud-based [3]. Self-hosted means that the software is installed on company computer servers and information is accessed from a central location. Cloud-based means having an online location that can be accessed through an internet browser from any computer at any time. Cloud-based is increasingly being used instead of self-hosted. There is also PMS which is open source, where development can be created by anyone to improve performance, among others are OpenProject, Focalboard, ProjectLibre, etc. PMS prices vary in the form of a subscription or licensing.

*Corresponding author: toriq@ugm.ac.id
for example, the subscription for Asana is $10.99 per month, Basecamp is $11 per month, Celoxis is $22.50 per month, MS Project is 156,400 IDR per month [4-5].

Project management software features vary from simple to complex. Features that match the needs of the project are very important when choosing software so that it can be implemented properly [6]. Project management software's common features include work management, resource management, Gantt charts, budget and expense management, time tracking, and collaboration. Other features include a web-based interface, personal dashboard, project dashboard, budget tracking, calendars, schedules, time tracking, task lists, task assignments, resources allocation, document database, risk management, discussion boards, notifications, advanced reporting, customizable charts, and graphics, mobile device support, and professional support [3]. Cicibas et.al. (2010) evaluate the features of ten project management software, namely Assembla, BaseCamp, DotProject, GanttProject, LiquidPlanner, Artemis View, Open workbench, Open Proj, Primavera, and MS Project based on 17 criteria, namely task schedule, resource management, collaboration, time tracking, estimation, risk assessment, change management, project analysis/reporting, document management, communication tools, process development method, portfolio management, access control, quality management, web-based, license, and issue tracking, found that not all of the software has the seventeen criteria [6].

Some main features commonly found in Project management software are [7]:

- **Gantt chart**
  Gantt charts, also called bar charts, are scheduling by making a table containing a list of activities and horizontal bars showing the start and end of activities. The entire bar shows the total project time. The bar chart has the advantage of being easy to make and understand, but the disadvantage is that it cannot show the critical path. Fig. 1 shows a Gantt chart consisting of a list of activities description, duration or calendar units, and the bars that show the start and finish of activities.

![Fig. 1. Gantt charts](image1)

- **Network schedule**
  The network schedule is usually in the form of a Precedence Diagram Method (PDM) where activities are represented as nodes on a graph with arrows showing the relationships between activities. There are four kinds of relationships between activities, namely finish-to-start (FS), finish-to-finish (FF), start-to-start (SS), and start-to-finish (SF). Finish-to-start is the most frequently used relationship in PDM. Fig. 2 shows the network schedule in the form of PDM.

![Fig. 2. Network diagram](image2)

- **Critical Path Method (CPM)**
  CPM shows the fastest time duration that a project can achieve by sorting the series of work activities with the longest total time. This method is usually obtained from network planning analysis based on dependency relationships between project activities, using the concepts of predecessors and successors.
Earned value

Earned value is a method for evaluating costs and time by using the concepts of budgeted cost of work schedule (BCWS), budgeted cost of work performed (BCWP), actual cost of work performed (ACWP), schedule variance (SV), and cost variance (CV). Negative SV and CV values indicate poor performance, while positive values indicate good performance. Fig. 3 shows the graphic of earned value.

![Fig. 3. Earned value [8].](image)

Cost report

A cost report is a financial document that shows planned costs and expenses so that the variance can be known, whether the project is on a budget or over budget. Fig. 4 shows an example of a cost report from MS Project.

![Fig. 4. Cost reports [9].](image)

3 Progresi

Progresi is a construction project management software created by a local developer. As other project management software, Progresi can be used to create project plans and project monitoring in real-time based on data, visuals, and analysis, and with cloud technology, which can be used in an integrated manner by all stakeholders to achieve project cost, quality, time and K3 targets. Progresi software is web-based and can be used on computers, Android, and IOS. There are two versions namely Progresi and Progresi Lite. The features provided include project planning, daily reports, cost management, and safety. The subscription price for Progresi is 2,000,000 IDR per month or 18,000,000 IDR per year [10].
To use Progresi, you can visit its website, i.e., https://progresi.co.id, then click the APP menu and log in using your username and password (Fig. 5). Next, running the program consist of filling in the project identity, inputting resource data (materials, tools, labor), planning (budgeting, schedule, and safety plan), and monitoring and reporting. Cost planning with Progresi has been adapted to construction management practices in Indonesia, namely using the unit price analysis (AHS) format. For Progresi time planning, use the Gantt chart method with the Predecessor to determine the relationship between jobs. Progresi also provides safety planning in which facilities input potential hazards, risk analysis, and anticipation.

Fig. 5. Progresi website.

Progresi outputs include bar charts, S curves with earned value, daily reports, project documentation, discussion, and notification. Daily reports contain data such as logistics, arrivals of materials, and their usage, the number of daily workers in the form of tables and graphs, mobilization and demobilization of equipment, daily weather whether it is sunny or rainy, field constraints, and safety. The report also contains problems that have occurred, those that have been resolved or not yet, and safety performance. Progresi also provides a discussion forum and notification containing notes on discussions that have been carried out and their documentation. Notifications in the form of information on important events such as activities that will start or late or material that will be delivered, safety issues, etc. Progresi has quite complete features and supports construction project management. The software also has the uniqueness of accommodating the concept of unit price analysis for making cost estimations.

4 Research method

This paper uses a simulation, using real project data that will be inputted into the software to run it so that the operation and results of the software can be known. The procedure to evaluate the software are as follows [11]:
- Reviewing the software instructional manual
- Carrying out tutorial exercises
- Inputting project data
- Discussing the software features

5 Results

5.1 Software manual

The software manual of Progresi is not yet formally available. In this study, the instruction for using the software was obtained from the presentation’s material by the Progresi team.

5.2 Running the software “Progresi”

To run Progresi, the first step is to fill in the project identity, such as the project name, location, and client name. The next step is to fill in the resource data which consists of material, labor, equipment, and safety data. Then carry out an analysis to develop a work plan, in the form of a schedule, budget plan, and safety plan. The work plan will be used as a guideline for implementation and monitoring and control. Reports that can be made by Progresi include work plan reports, daily reports, material usage reports, and project updates so that a project evaluation can be carried out, whether the project is going according to plan or not. Fig. 6 shows the process for running the Progresi software.

Fig. 6. The process of running Progresi.

To run Progresi in this paper, data from a real project, namely the Oil Fuel Terminal project, especially for the foundation work which consists of preparatory work and civil works are employed. Table 1 shows the list of works, unit prices, and volume of work. This data will be used to input the name of the activities, and resources (materials, equipment, labor) so that it can be used to create work plans for cost and time. In addition to these data, project schedule data from the case study was also obtained which was originally in the form of MS Excel format as a reference in compiling a schedule with Progresi.

5.2.1 Project identity

Project identity input is the first step in Progresi. Fig. 7 shows the project identity which consists of the project name, address, photo, value, client, start and end date, and other data.

5.2.2 Input resources

Project resources consist of materials, labor, and equipment needed to carry out the project. In Progresi, resources are inputted in the Master Data menu. Material information includes material name, volume, and unit
price. Equipment data includes the name of the equipment, its numbers, the status of the equipment (leased or owned), and the condition of the equipment (new or second). Manpower information contains data about the type of workers (masonry, carpenters, blacksmiths, or labor) and their daily wages. Fig. 8 shows an example of material data.

<table>
<thead>
<tr>
<th>No.</th>
<th>Task</th>
<th>Unit price (IDR)</th>
<th>Bill of Quantity</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>Diesel hammer crawler crane mobilization</td>
<td>47,403,409.00</td>
<td>2</td>
<td>Unit</td>
</tr>
<tr>
<td>1.2</td>
<td>Spun pile (PCA 400) mobilization</td>
<td>1,162,950.00</td>
<td>756</td>
<td>m</td>
</tr>
<tr>
<td>2</td>
<td>Civil work</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.1</td>
<td>Land preparation work</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.1.1</td>
<td>Land clearing 240m x 91m</td>
<td>43,618.00</td>
<td>13519.2</td>
<td>m²</td>
</tr>
<tr>
<td>2.1.2</td>
<td>Excavated coal soil</td>
<td>124,278.00</td>
<td>13386.2</td>
<td>m²</td>
</tr>
<tr>
<td>2.1.3</td>
<td>Pile up (temporarily) former coal excavations</td>
<td>31,069.00</td>
<td>13386.2</td>
<td>m²</td>
</tr>
<tr>
<td>2.2</td>
<td>Foundation tank capacity of 1000 kl (T2)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.2.1</td>
<td>Pile erection</td>
<td>8,424,359.00</td>
<td>18</td>
<td>point</td>
</tr>
<tr>
<td>2.2.2</td>
<td>Bowplank installation</td>
<td>35,242.00</td>
<td>54</td>
<td>M</td>
</tr>
<tr>
<td>2.2.3</td>
<td>Siring stone foundation 1:3</td>
<td>815,529.00</td>
<td>48.27</td>
<td>m³</td>
</tr>
<tr>
<td>2.2.4</td>
<td>Landfill under the tank slab</td>
<td>183,595.00</td>
<td>129.77</td>
<td>m³</td>
</tr>
<tr>
<td>2.2.5</td>
<td>Pile Driving Analyzer (PDA) pile test</td>
<td>2,763,897.00</td>
<td>12</td>
<td>point</td>
</tr>
<tr>
<td>2.2.6</td>
<td>PVC pipe drains under the foundation</td>
<td>4,321,635.00</td>
<td>1</td>
<td>set</td>
</tr>
<tr>
<td>2.2.7</td>
<td>Work floor, 1:3:5, and 5 cm thick</td>
<td>799,919.00</td>
<td>13.36</td>
<td>m³</td>
</tr>
<tr>
<td>2.2.8</td>
<td>Pole head reinforcement</td>
<td>7,315,727.00</td>
<td>18</td>
<td>point</td>
</tr>
<tr>
<td>2.2.9</td>
<td>Tank foundation slab reinforcement</td>
<td>210,523,641.00</td>
<td>1</td>
<td>Ls</td>
</tr>
<tr>
<td>2.2.10</td>
<td>Tank foundation slab formwork</td>
<td>2,857,240.00</td>
<td>20.48</td>
<td>m³</td>
</tr>
<tr>
<td>2.2.11</td>
<td>Floor slab casting, ready mix K-25</td>
<td>2,833,495.00</td>
<td>61.87</td>
<td>m³</td>
</tr>
</tbody>
</table>

Table 1. Work list of the fuel oil terminal project.

Fig. 7. Project identity.
5.2.3 Project planning

After inputting resources, work planning can be carried out which consists of planning costs, time, and safety.

- Cost plan

Cost planning analysis is carried out by determining the name of the work and its constituent resources. Fig. 9 shows the cost plan as a list of work and analysis of the unit price and the cost after being multiplied by the unit price.

Unit price analysis is a common practice in construction project management in Indonesia as specified in the Regulation of the Minister of Public Works and Public Housing number 1/2022 for project cost calculation. Table 3 shows an example of the unit price analysis calculation for foundation work. The table shows the need for labor, materials, and equipment needed to do the foundation work of 1 m³. The results of the unit price analysis are multiplied by the volume of work, then the foundation costs will be obtained.

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Code</th>
<th>Unit</th>
<th>Coefficient</th>
<th>Unit Price (IDR)</th>
<th>Total price (IDR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>POWER</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Worker</td>
<td>L.01</td>
<td>Person/Day</td>
<td>1.500</td>
<td>600.00 pos</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stone masons</td>
<td>L.02</td>
<td>Person/Day</td>
<td>0.750</td>
<td>335,000.00 m³</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chief handyman</td>
<td>L.03</td>
<td>Person/Day</td>
<td>0.075</td>
<td>34,700.00 btg</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Foreman</td>
<td>L.04</td>
<td>Person/Day</td>
<td>0.075</td>
<td>1,073,700.00 unit</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TOTAL MANPOWER</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>MATERIAL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Split stone</td>
<td></td>
<td>m³</td>
<td>1.200</td>
<td>660.00 pos</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Portland cement</td>
<td></td>
<td>kg</td>
<td>202.000</td>
<td>3,350,000.00 m³</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tide sand</td>
<td></td>
<td>m³</td>
<td>0.485</td>
<td>1,073,700.00 unit</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TOTAL PRICE OF MATERIALS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>TOOLS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>The sum of A+B+C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>Overhead &amp; Profit (Example 15%)</td>
<td></td>
<td></td>
<td></td>
<td>15% D (maximum)</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>Unit price for workers (D+E)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
- **Gantt chart**
  
  Fig. 10 shows the Gantt chart created by Progresi. The Gantt chart is a list of jobs in the far left column, followed by columns for activity duration, start and end dates, and a bar chart. This Gantt chart is not like a conventional bar chart because it is equipped with arrow lines that show the relationship between activities.

- **Safety plan**

  Progresi also provides facilities for creating safety plans. Fig. 11 shows the safety plan form to input the name of the activity, hazards, potential accidents, anticipation through elimination, substitution, engineering control, use of Personal Protective Equipment, and other safety devices.

![Gantt chart]

**Fig. 10.** Gantt chart.

**Fig. 11.** Safety plan.

### 5.2.4 Monitoring dan controlling

Progresi can be used to record the progress of implementation and compare it with the plan so that it can be seen whether it is according to plan or not and can be controlled. Some reports that Progresi can generate for monitoring and control include an updated Gantt chart, S-curve, number of workers, use of materials, and progress summary.

- **S-curve**

  The S-curve (Fig. 12) consists of the planning curve (BCWS), the performance achievement curve (BCWP), and the actual cost curve (ACWP). The chart also displays cost performance (CV) and time performance (SV) indicators to evaluate the time and cost performance.

- **Number of daily workers**

  The daily worker's chart (Fig. 13) shows the number of workers every day so that the fluctuations in the number of workers can be evaluated. The graph also displays the maximum limit of the number of workers as a budget control allocated for worker costs.

- **Use of materials**

  Fig. 14 shows a table of materials consisting of the type of material, the amount purchased, the amount used, and the amount remaining so that it can be used to monitor material availability.
- **Progress Summary**
  The progress summary (Fig. 15) contains project performance information based on SPI and CPI indicators. The bottom of the summary contains information about achievements for each job.

![Progress Summary Diagram](image)

*Fig. 12. S-curve.*

- **Project problem reports**
  The project problem report (Fig. 16) contains a record of unresolved and resolved issues. Also, safety management issues contain safety plans and reports in the event of an accident and risk anticipation.

![Project Problem Reports](image)

*Fig. 13. Numbers of daily workers.*

*Fig. 14. Use of material.*
Weather report

The weather report (Fig. 17) is a daily report on weather conditions whether sunny, drizzly, or rainy. Project documentation containing photos uploaded at the time of submission of daily reports is collected in the project gallery.

Project Documentation

Project documentation is used to store project documents and photos, from start to finish so they can be properly archived, and easy to report and find when needed. Fig. 18 shows an example of project photos stored in the project gallery.
Discussion

Progresi is a construction project management software that is adapted to the needs or practices of construction project management in Indonesia, including the use of the unit price analysis format which is a common practice in Indonesia. This software was made by a local developer, so it is appreciated as an achievement in developing a product that is suitable for the needs of the domestic industry. Progresi is also cloud-based so it can be used online via the internet.

Like other project management software, Progresi can create work plans and can be used for project monitoring and reporting. The work plan consists of time, cost, and safety plans. The schedule is in the form of a Gantt chart and an S curve. The Gantt chart is equipped with arrow lines that show the relationship between activities so that the critical path can be shown. The S curve uses the concept of earned value with three curves BCWS, BCWP, and ACWP. Unlike MS Project and Primavera, Progresi network schedule is not yet available. The cost plan is prepared based on the concept of Unit Price Analysis which is commonly used in construction projects in Indonesia. Resource planning consists of planning materials, labor, and equipment. While the safety plan is used to identify the risk of work accidents, risk analysis, and risk response.

Monitoring with Progresi is carried out by measuring work performance periodically, daily, or weekly. Monitoring is carried out by inputting the volume of work and resources. Resource inputs include data on the arrival of materials, equipment, and the number of workers per day. Progresi also facilitates monitoring of weather conditions and important events during the project, including work accidents. Monitoring results are in the form of reports, such as work progress, cost performance, time performance, safety performance, daily reports, material reports, labor, equipment, project problems, and project documentation/photos. The Progresi application also provides a discussion forum to discuss project progress and problems with related parties and provides notifications to remind important events.

Conclusion

Progresi is a project management software intended for construction project management in Indonesia. Progresi can be used to develop work plans, monitor and report projects. Progresi can be used on PC, android, or iOS. Progresi is cloud-based so it can be accessed online. Input - process - output in Progresi as in other project management software, where the input is resources, the process consists of an analysis of cost, time, and safety plans, while the output is in the form of monitoring and control reports. Progresi accommodates construction
project management practices in Indonesia using a unit price analysis format that is not found in other project management software. Daily reports such as reports on materials, labor, equipment, weather, field problems, and project photo documentation according to the needs of construction project management. Weaknesses of Progresi include not providing a formal software manual, the network schedule feature does not yet exist, and the appearance of the graphics needs to be improved to make it look professional like in MS Project and Primavera. Research on the implementation of Progresi software on real projects needs to be done to find out the practicality of its use and the problems encountered. On the other hand, software prices may need to be considered in order to be more competitive in the software market. Progresi has the potential to assist construction project management by facilitating better communication and coordination between project stakeholders.

References

11. J.D. Wit, W. Herroelen, European Journal of