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The application of project management in residential housing construction (greenland housing case study) PT. kalimantan global property

Bela Barus[1], Surahman[2], Indri Rachmawati[3], Fatimah[4], Andi Esveranza[5]

[1,3]Samarinda State Polytechnic, Indonesia

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ABSTRACT

This study examines the application of project management in the construction of a two-story 72/90 type house in the Greenland Housing area by PT Kalimantan Global Property. The construction of a house, even though it is small-medium scale, still has high complexity, including budget constraints, tight schedules, and limited human resources. Therefore, effective project management is needed to ensure the efficiency and effectiveness of construction implementation. A qualitative descriptive case study is the research methodology employed, and data is gathered through project document analysis, interviews, and observation. The study's findings show that using the Program Evaluation and Review Technique (PERT) and the Critical Part Method (CPM) methods can help plan, control, and evaluate project time more accurately. The project was successfully completed within 128 days of a total planning of 240 days without significant delays, with cost efficiency and good quality of work results. This study proves that a project management approach based on the network method can improve project performance, even for the construction of medium-scale houses. These findings emphasize the importance of systematic documentation, utilization of project management tools, and structured supervision as key factors for the success of construction projects.

Corresponding Author:

Indri Rachmawati
Samarinda State Polytechnic
Samarind, Indonesia
Email: indrirachmawati3850@gmail.com

INTRODUCTION

The construction of residential houses is one of the construction activities that requires good planning, organization, and control in order to achieve the project goals effectively and efficiently Adolph, (2016). In its implementation, house construction projects often face various challenges, such as time delays, cost overruns, and the quality of work that is not in accordance with specifications. Therefore, the implementation of project management is very important to ensure that each stage of development can run as planned (Pamungkas et al., 2024).

This manual data management is not only time-consuming, but also risks causing errors in recording and decision-making Supiana et al., (2025). Therefore, a more structured and automated data management system is needed to improve work efficiency and minimize the potential for errors that can affect the overall success of the project.

In general, a project in network analysis is a series of activities that aim to produce a unique product and are only carried out in a certain period of time (temporarily). A work network analysis method widely used by practitioners such as PERT (Sigit et al., 2024; Stummer & Zuchi, 2010) and CPM (*Critical Path Method*). The difference between the PERT and CPM methods is that the PERT method uses activity oriented, while the CPM method uses event oriented. In activity oriented, arrows will show activities or work with several oriented, while event oriented is the main focus of an activity. The CPM method is also commonly used for construction projects (Dwi & Aftoni, 2022; Sigit et al., 2024).

Research related to project management generally focuses on large-scale construction, such as high-rise buildings and road infrastructure. However, special studies on the construction of small-medium scale residential houses, such as two-story 72/90 type houses, are still limited. In fact, projects like this have their own complexities, such as budget limitations, tight implementation times, and limited manpower. Many implementers still rely on field experience without the application of systematic project management principles. Therefore, more in-depth studies are needed to bridge the gap between theory and practice in the field (Rosytha, 2025).

The object of this research is the construction of a two-story 72/90 type simple house. This can be seen from the lack of documented planning, the absence of integrated work scheduling, and the lack of use of management tools such as *Work Breakdown Structure* (WBS) or network diagram. As a result, project implementation tends to rely on field experience and spontaneous decisions, which has the potential to cause work delays, wasted costs, and difficulties in quality and time control. The absence of this managerial approach is a challenge in ensuring the efficiency and success of development as a whole. This study aims to analyze the construction of 72/90 type houses using CPM & PERT methods to improve the efficiency and timeliness of the project. Faith, (2017) CPM helps identify critical paths that define the minimum duration of the project, making it easier to focus on surveillance. While PERT considers three-time estimates (optimistic, realistic, and pessimistic), it is suitable for managing uncertainty. The combination of the two supports more accurate planning and better risk control (Kaming et al., 1997; Prasetiya & Patriadi, 2025).

Literature Review, According to Surahman et al., (2024), states that CPM assumes that the duration of activities in a project is known and can be used to shorten the duration of the project by allocating more resources to some important activities. The four types of time terminology used in the CPM implementation process include: (1) the earliest start time. (2) the latest start time. (3) the end time of the initial list. (4) the latest end time.

A comprehensive literature review of residential construction risk factors (40 journals) highlights timing, cost, quality, and external factors as critical risks; risk management frameworks consistently emphasize the importance of scheduling controls (Nurhasanah et al., 2025). Further analysis of Perdana & Sari, (2022) reveled that the combination of PERT-CPM can reduce the cost and duration of the Citraland Palu housing project. Together, these studies validate applying CPM with crashing and probabilistic enhancement in small to medium scale residential projecs. This study extends that foundation to the two story 72/90 house type, integrating CPM and PERT to strengthen time, cost, and risk controls (Kurniawan & Mulyono, 2024; Saepudin et al., 2023).

On the other hand, (Amani & Safarzadeh, 2022; Kasapo, 2018) emphasized that good risk management through the identification, assessment, and control process is a key element in managing the uncertainty of construction project. Project management is a crucial element in the construction industry, especially in residential construction. The application of effective project management principles can improve the efficiency of time, cost, and quality of development results. According to project management, it includes planning, organizing, implementing,

controlling, and completing projects systematically to achieve preset goals. Additionally, a major factor in the project's success is the project manager's proficiency, as expressed by the one who emphasizes the importance of knowledge, skills, and attitudes in project management. Nilawati et al., (2025) Sadiq & Saraswati, (2022).

A project's work items that are assential to its ultimate completion are referred to as CPM. This implies that a work that is part of the key work will not be completed on time, which will result in delays in the project's completion date (Sholeh et al., 2021).

One aspect of project management is planning, which seeks to guarantee that work may proceed in accordance with the established objectives with minimal deviations. The methodical attempt to establish standards that align with the planning goals is known as project control. Analyze the potential for standards and project deviations, then design and assess implementation with established standards (Surahman et al., 2024).

Careful planning and proper scheduling are the main foundations in the implementation of construction projects. The PM method is often used to identify critical paths and optimize project duration. In achieving the goals set for a project, there are limitations known as Triple Constraints or three constraints, namely cost/budget, time/schedule, and quality (Sometimes et al., 2024).

Each activity is completed earlier than the normal duration by skipping activities for a certain amount of budget. Therefore, if the duration of the project completion is not satisfactory, certain activities will be skipped to be able to decide on the project in a shorter duration. CPM can estimate the duration required to carry out project activities and can set priorities for activities that must be supervised efficiently so that activities can be completed according to plan. This method is called a critical path, because this method will form a network of critical trajectories that must receive special attention (Sa'adah et al., 2021).

One of the goals of the construction service business is to make a profit. However, in every construction service business activity, two things will always appear side by side. These two things are the existence of the leisure to gain and the risk of suffering losses, either directly or indirectly Risk is the sum of the likelihood or frequency of a threat occurring and the severity of the event's effects. An integrated study of the probability of an event happening and its impact in terms of its magnitude and importance is known as risk assessment (Stuart et al., 2021)

Although small-scale residential construction projects, such as the type 72/90 house, appear simpler compared to large-scale infrastructure, they are still highly vulnerable to external risk factors. Weather conditions, fluctuations or delays in material supply, and licensing dynamics often become unpredictable variables that can disrupt scheduling, increase costs, and reduce quality. These external risks significantly contribute to the overall complexity of the project and highlight the importance of adopting systematic project management approaches such as CPM and PERT to anticipate, control, and mitigate potential disruptions.

RESEARCH METHOD

This research employs a case study methodology in conjunction with a qualitative descriptive technique. The site of the study is the Greenland Housing project developed by PT. Kalimantan Global Property. The main object of the study is the construction of a two-story 72/90 type house, focusing on the process of planning, implementing, and controlling the project. Data was collected through direct observation at the project site, semi-structural interviews with the project implementers, and analysis of technical documents such as project reports, work drawings, and implementation schedules. The analysis technique is carried out qualitatively descriptively, starting from data reduction, presentation of data in the form of narratives and diagrams, to drawing conclusions Mashuri et al., (2022). To enhance rigour, our methodology incorporated proven guidelines from contruction management research, including careful determination of

interview sample sizes, clear participant selection criteria, and transparent documentation of qualitative analysis stages (Hansen, 2021).
Table 1. Presenting job identity data on type 72/90 house construction projects.

***Table 1**. Project work identity*

Identity of Work	
Name of workmanship	Simple House Construction Projects
Company	PT Kalimantan Global Property
Type work	Construction of type 72/90 houses
Land	60 square meters
Work location	Jl. M. Said jln Ramania Rt.13 Loa Bahu Sungai Sungai Samarinda Village
Pembangunan	1 house
Type of Workmanship	Job order
Planning	240 days
Current	128 days
Land area	72 m

To improve the credibility of observation and interview data, several strategies were applied. Triangulation was used by cross-checking information from different data sources such as project documents, direct site observations, and interviews with multiple technical implementers to ensure consistency. Member checking was conducted by confirming the interview results with the respondents to validate the accuracy of the interpretations. In addition, detailed field notes and audio recordings were maintained to provide a transparent audit trail. These efforts were designed to minimize researcher bias and ensure that the data accurately represent the realities of the project implementation process.

RESULTS AND DISCUSSIONS

Data collection

This research began with a data collection process. In this process, interviews and direct observations were carried out in the project managed by PT Kalimantan Global Property located at Perumahan jl. M. Said Jln Ramania Rt. 13 Sungai Kunjang Village, Samarinda. The time for data collection is taken on February 19, 2025.

Project identity in table 1. It has been very well completed and shows an achievement that deserves to be appreciated, especially in terms of punctuality. There is no delay in completing tasks, either in individual or collaborative processes. This reflects a high level of discipline, effective time management, and professional responsibility that each team member takes seriously. This success is not solely due to a well-designed system, but also thanks to dedication, solid coordination, and consistent collective work spirit from the beginning to the end of the process. Each individual is able to manage their tasks optimally without sacrificing quality or completion time. This condition is an important indicator that careful planning, targeted implementation, and commitment to deadlines can create a productive and results-oriented work culture. Punctuality is not only a technical achievement, but also shows the integrity and professionalism of the entire team in carrying out its responsibilities.

In practice, the application of the network method also faces several limitations. First, data availability is often incomplete, as project documentation may not fully capture the actual sequence or duration of activities. Second, unexpected field conditions such as weather changes, supply delays, or labor shortages can cause deviations from the planned network schedule. Third, the complexity of accurately estimating activity durations sometimes leads to discrepancies between planned and actual timelines. These limitations were overcome through adaptive measures in field practice, such as revising the schedule periodically, reallocating resources to critical activities, and integrating real-time monitoring tools to update progress. The combination

of structured planning using CPM/PERT with flexible field adjustments allowed the project to maintain efficiency and achieve its targeted completion despite practical challenges.

Job Network

Based on the results of the study, it shows that the type 72/90 house construction project requires several workers, namely foremen, head builders, and workers.

Project Completion Time

The results of the interview with the foreman were known that the completion of this project was planned to take 128 days.

Recapitulation of Material Necessity

Table 2. Recapitulation of Material Needs

No.	Uraian Material	No.	Uraian Material
1	Meranti Board	20	Concrete iron
2	Meranti Beam	21	Clear Glass 5 mm
3	Beam Wheel 10/10	22	Land of Urug
4	Beam 5/10	23	Sand Sand
5	Beam 5/7	24	Sand tide
6	Beam Wheel 8/8	25	Shoe soles
7	Papan Ulin 2/20	26	Coral rock
8	Plywood size 9 mm	27	Red brick
9	Gypsum Board 6 mm	28	Natural stone
10	Kalsi Board 4 mm	29	Semen
11	Grc Board 4 mm Thick	30	Wood mini
12	Ceramic Tiles 40x40, 20x20, 20x25	31	Asiaapaint interior wall paint
13	Nail of all sizes	32	Cat tembok exterior
14	Zinc nails	33	Thiner A special
15	Paku skropp	34	Wall Plaster
16	Small plywood nails	35	Minyak Bakesting
17	Bendrat Wire	36	Dempul
18	Kuas	37	Atap Sakura Roof
19	Zincalume Roof		

Job Activities

Table 3. Job Activities

Yes	Job Activities	time
1	Preliminary employment	3 days
2	Earthworks	6 days
3	Foundation work	6 days
4	Couple work and stucco	44 days
5	Concrete work	18 days
6	Door and window work	11 days
7	Easel and roof work	21 days
8	Work of the ceiling frame and ceiling cover	6 days
9	Paint job	4 days
10	Installation and electrical work	6 days
11	Sanitation work	7 days
12	Miscellaneous work	18 days
13	Finishing work	128 days

Work Activities and Expenses

Table 4. Work Activities and Expenses

No.	Job Name	Production
1.	Job Description	IDR 2,572,800.00
2.	Earthworks	IDR 9,856,880.00
3.	Foundation Work	IDR 24,250,050,00

4.	Couple's work and Stucco	IDR 74,312,353.40
5.	Concrete Works	IDR 136,261,859.55
6.	Door and window work	IDR 26,068,000.00
7.	Easel and roof work	IDR 20.240.382,50
8.	Work of the ceiling frame and ceiling cover	IDR 21,290,064,80
9.	Paint-paint jobs	IDR 34,934,103.60
10.	Electrical installation work	IDR 20,150,000.00
11.	Sanitation work	IDR 11,470,692.00
12.	Miscellaneous work	IDR 53,302,883.15

Employee Salary

Table 5. Employee Salary

No.	Employee name	Total daily salary
1	Pur (head builder and foreman)	IDR 220,000,00
2	Luki (tukang)	IDR 170.000,00
3	Squirrelly (Squirrel)	IDR 170.000,00
4	Yotno (ordinary worker)	IDR 135,000.00
5	Luki (Ordinary worker)	IDR 135,000.00

Work Overview

Figure 1. Work Overview

Analysis of the series of simple house construction activities type 72/90

Table 6. Recapitulation of Project Activities

No	Types of activities	Activity symbols	Duration (normal days)	Duration (quick time)	prodeccesor
1	Preliminary employment	A	3	3	-
2	Earthworks	B	6	6	2
3	Foundation work	C	6	6	7
4	Couple work and stucco	D	44	44	35
5	Concrete work	And	18	18	13
6	Door and window work	F	11	11	17
7	Easel and roof work	G	21	21	47
8	Work of the ceiling frame and ceiling cover	H	6	6	54
9	Paint job	I	4	4	77

10	Installation and electrical work	J	6	6	58
11	Sanitation work	K	7	7	69
12	Miscellaneous work	L	18	18	62

Table 6. Presenting data on work activities in simple house construction projects type 72/90 starting from work to other work. Based on the results of the recapitulation of project activities in table 6. The researcher continued the analysis by compiling a normal time duration work network using the CPM method. The house construction project is planned with an estimated 128 working days.

Compiling a Network Diagram

Considering normal time data and simple house construction project activities type 72/90. Created a network diagram showing the sequence of project activities. Simple house construction project activities type 72/90.

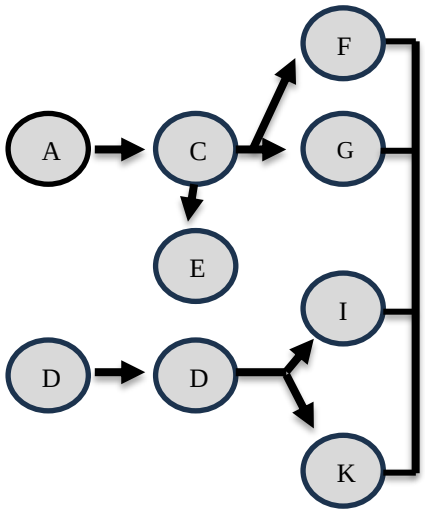

Figure 2. *Network Diagram*

Critical Path Description

Based on the illustration shown in figure 2. Optimal activity duration scheduling can be achieved by utilizing the attached Gant Chart. The chart provides a systematic visualization of the sequence and duration of each activity, making it easier to plan and manage time efficiently.

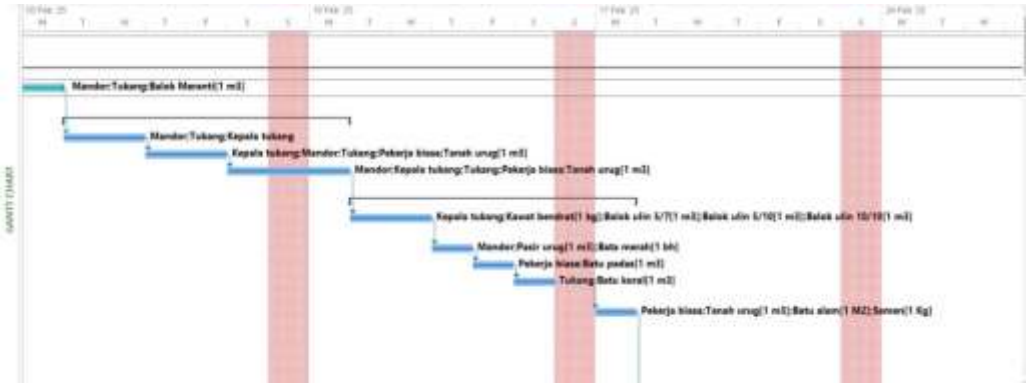

Figure 3. *Gantt Chart*

Figure 3. Shows the sequence of activities in a simple house construction project type 72/90. This path covers all important processes in house construction, starting from the

preliminary stage, earthworks, foundation work, beams, roofs, walls, and floors, and installation of frames, ceilings, sprinkling, sanitation, electricity, construction, to miscellaneous work. Critical paths greatly determine the successful completion of projects on time. Any delay in any of the activities in the critical line will directly affect the overall project schedule, as there is no time allowance on these activities.

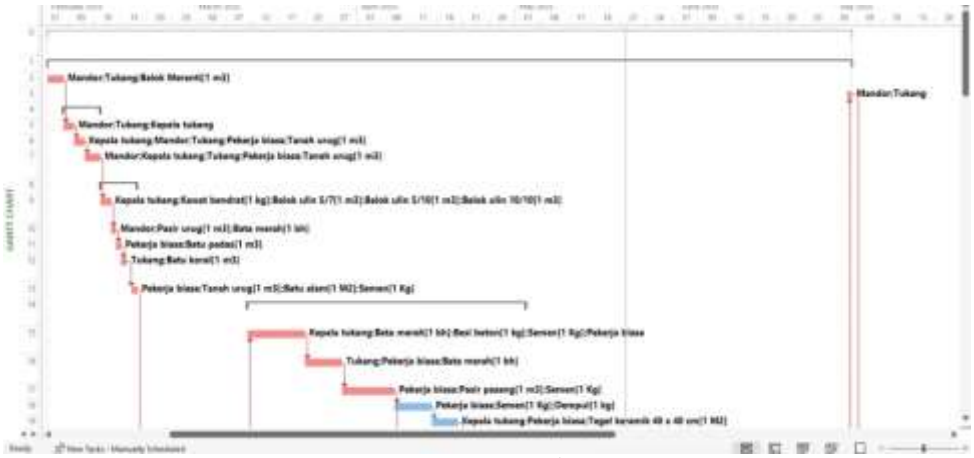

Figure 4. Gantt Chart

The process of identifying crisis paths in the type 72/90 simple house construction project, followed by the calculation of the duration for each activity, using a network diagram approach with normal time. The main difference in this method lies in the way the total duration of the implementation of the series of activities is calculated as a whole. In a normal time network diagram, the project's critical path is consistently assigned through the following sequence of activities. A-B-C-D-E-F-G-H-I-J-K-L.

Based on the order of the critical paths, the estimate is the completion of the type 72/90 simple house construction project using CPM. To determine the fastest turnaround time, the duration of each activity is summed in aggregate along the critical path.

CONCLUSION

This research aims to build a Type 72/90 simple house in a greenland residential area by PT Kalimantan Global Property has been carried out in accordance with the planned that has been set. This 72/90 type house is designed to meet the needs of comfortable, functional, and affordable housing for the middle class. The construction process is carried out by paying attention to building quality standards, time efficiency, and environmental sustainability principles. From the stage of land preparation, construction of the main structure, to finishing, the entire process is carried out in stages with strict supervision to ensure the quality and safety of the building. The selection of quality building materials and professional labor are factors that support the success of this project. There are efficiencies obtained in this project, including: (1) Time efficiency: timely completion of projects with good duration management of activities; (2) Cost efficiency: optimal budget control without excessive waste on materials and labor; and Process efficiency: coordinated coordination and distribution of organized tasks through systematic planning and implementation of critical pathways. This study emphasizes the importance of applying project management principles comprehensively, even at the scale of residential construction, to ensure project success in terms of time, cost, and quality. From a practical standpoint, the application of CPM and PERT methods in other micro and medium-scale projects offers valuable guidance for small contractors who often face limitations in human resources and technology. First, the methods should be

simplified into easily understandable network diagrams and Gantt charts, so that they can be applied without requiring advanced software. Second, training project managers and foremen in basic scheduling techniques can significantly improve time and cost control. Third, combining CPM and PERT with regular progress monitoring allows contractors to anticipate delays and reallocate resources effectively, even under constraints. Finally, adopting digital tools with low complexity—such as spreadsheet-based templates—can serve as an affordable yet powerful alternative to specialized project management systems. These recommendations highlight that structured methods like CPM and PERT can still be highly beneficial in small-scale settings if adapted to the capacity of local contractors.

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