Analysis of the Proportion of Project Resources in the Construction of High-Rise Buildings in the Sarbagita Region

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Abstract. In a construction project, determining the amount of the proportion of costs for resources must be precise. Given that the allocation of costs for project resources during the construction period is the largest, so if there is an inaccuracy in the calculation of this proportion, it can result in losses in the project. So far, estimators calculate project costs based on experience in the field, while an overview of the amount of allocation for resources does not exist. This study aims to calculate the proportion in the form of a percentage of the cost of these resources so that it can be used as a reference. The project resources consist of material resources, human resources, and equipment resources, each of which is determined in proportion based on the total project cost. The review is limited to building projects, namely high-rise hotels with a project value of more than 50 billion rupiah. The method of this research is to conduct secondary data analysis through the calculation of the needs of each project resource, followed by entering the unit price of work. The determination of project resources is greatly influenced by the type, level of difficulty, and technology used. The proportion of project resource use in several buildings in the SARBAGITA area is on average as follows: (1) Materials 64.45%, (2) Wages 24.75%, (3) Tools 7.64%, and (4) subcontractors 3.17%. This percentage is the total value of the project. The proportion of use of material resource needs, tools, wages, and subcontractors is greatly influenced by the type of building construction, material specifications, and work contracts.

Keywords: Cost, Construction Project, Resources

1 Introduction

Project resources are the capabilities and capacities used in construction projects, which are known as 5M (man, money, material, method, machine), so the existence of these resources needs to be managed as well (Mangare et al., 2012). The final result of this planning will be used as a basis for controlling labor, materials, and tools during the implementation of the project so that it is hoped that any deviations from the planning will be quickly known (S, 2016). Proportion is something related to size with the size of all aspects of work and certain parts that are made standard (Pur, 2019). For

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contractors, the financial benefits that will be obtained depend on how far their ability to estimate costs, while for consultants, the figure is submitted to the owner as a proposal for the best amount of costs for various uses according to the development of the project and to a certain degree, its credibility is related to the correctness and accuracy of the proposed figures (Muzayanah, 2008). Material problems and equipment damage are some of the risks faced in building projects (Hernandi & Tamtana, 2020). Materials are an important component in determining the cost of a project. The use of materials in the field often causes considerable material residues. Therefore, the use of materials is managed as efficiently as possible so as not to cause much material waste (Fajar et al., 2018). In every construction project, the use of materials is the most important part that has a large percentage of the total project cost. In road construction projects, the percentage of material costs with other costs has the highest weight, which is 60.41% (Mufardis et al., 2021a). In the construction of simple buildings, material costs are also high at 61.83% (Hawari et al., 2021). The aspects of human resources in question include aspects of work competence, work motivation, work loyalty, and work discipline (Willy & Sekarsari, 2020). The use of heavy equipment in construction work can make work easier and faster, it greatly affects cost-effectiveness and work time efficiency (Erwin, 2022). The implementation budget plan is the actual cost used by contractors in the field during the project until the activity is completed (Munaiseche et al., 2022).

2 Methodology

This study uses a quantitative descriptive method, namely determining the price of project resource components, materials, labor wages, and tools. The research method used is a field survey to obtain data on the price of materials, tools, and labor. This study analyzes project data in the form of a Cost budget plan and unit price analysis, to determine the need for these resources. Several studies related to project resources have been conducted, but only on one object. Warehouse construction has a percentage of material costs of 66.053%, equipment costs of 9.263%, and labor costs of 17.895% (Apdeni et al., 2022). The volume of each activity item affects the number of activity resources needed during the project (Ngurah et al., 2021). The delay in project implementation is greatly influenced by materials, methods, environment, and human resources (Dewi et al., 2023). The source of data in this study is primary data obtained through field surveys. Field surveys are carried out to obtain material prices and wholesale prices per unit of work. Secondary data in this study are RAB and analysis of the unit price of work. This data is used to calculate the quantity of project resources needed, namely materials, labor, and tools. This secondary data is obtained through the submission of a data request letter to the intended company. The focus of this research is to analyze the types and needs of project resources in building projects in the SARBAGITA Area. The main requirement is to determine the proportion or percentage of costs required per component of a project's resources. In this case, what is analyzed is materials, labor, and tools. Material components are analyzed starting by determining the type of material needed, quantity, and total cost based on the quantity and price of the material unit. Likewise, for the labor component, the analysis begins by determining the type of labor needed, the quantity, and the total cost based on the quantity and price

of the labor unit. The components of the appliance are calculated based on the method of using the appliance, i.e. by owning it or by renting it. The cost of the tool is determined based on the rental days in the implementation of the project. In every construction project, the use of materials is the most important part that has a large percentage of the total project cost. The proportion of costs in the scope of reconstruction, human resources is 10.68%, materials 60.41%, and tools 9.26%. The road project in the scope of rehabilitation has a proportion of human resource costs of 0.97%, materials 58.48%, and tools 21.35% while road projects have an increase in the proportion of human resource costs of 0.85%, materials 57.50%, and tools 20.49% (Mufardis et al., 2021b).

3 Result and Discussion

3.1 Result

Project resources are a means to run a project in order to achieve project goals and objectives effectively and efficiently. Construction project resources consist of several types including cost, time, human resources, materials, and also equipment used in the implementation of the project, in utilizing resources appropriately, a resource management management system is needed. Resources are needed to carry out the work that is a component of the project. The construction project reviewed in this study is a building in the SARBAGITA area.

The building project reviewed in this case is the construction of a hotel in the West Denpasar area. This building consists of a Reception, Lounge, and Hotel building. The value of this project is IDR 68,841,000, excluding VAT. To calculate the project resource requirements, the data analyzed is RAB and Unit Price Analysis. The building project reviewed in this case is the construction of a hotel in the South Kuta area, Badung. This building consists of the main building and restaurant. The value of this project is IDR 8,700,000, excluding VAT. The building project reviewed in this case is the construction of a Resort and Spa. The scope of work is structural work. The value of this project is IDR 40,135,000,000, excluding VAT. The building project under review in this case is the construction of a hotel. Scope of work is structural and architectural work. The value of this project is IDR 2,013,000,000, excluding VAT.

3.2 Discussion

Each component of the project resources has been carried out, the next is a recap of the project resource needs in one of the buildings in Denpasar. The percentage of project resource requirements to project value is 66.17% for materials, 24.83% for wages, 6.61% for tools, and 2.39% for subcontractors.

Table 1 Recapitulation of project source needs of one of the buildings in Denpasar.

No	Description	Total (IDR)	Persentase
1	Material	45,553,787,334	66.17%
2	Labour Cost	17,094,793,755	24.83%
3	Machine	4,548,237,600	6.61%
4	subcontractors	1,644,420,864	2.39%
		68,841,000,000	

Each component of the project resources has been carried out, the next is a recap of the project resource needs in one of the buildings in Badung.

Table 2. Recapitulation of project source needs of one of the buildings in Badung

No	Description	Total (IDR)	Persentase
1	Material	5,331,854,860	61.03%
2	Labour Cost	1,952,521,868	22.35%
3	Machine	881,430,000	10.09%
4	subcontractors	571,329,000	6.54%
		8,737,000,000	

The percentage of project resource requirements to project value is 61.03% for materials, 22.35% for wages, 10.09% for tools, and 6.54% for subcontractors.

Based on the project value of IDR 40,135,000,000 for structural work, an analysis of the calculation of project resource needs is carried out starting with a recap of the quantity of work, as shown in the following figure. After completing the work quantity recap, continue by determining the type and need of project resources. Each component of the project resources has been carried out, the next is a recap of the project resource needs in one of the buildings in Gianyar.

Table 3. Recapitulation of the source needs of one of the buildings in Gianyar

No	Description	Total (IDR)	Persentase
1	Material	25,858,559,250	64.43%
2	Labour Cost	10,824,661,350	26.97%
3	Machine	2,902,123,960	7.23%
4	subcontractors	550,272,000	1.37%
		40,135,000,000	

The percentage of project resources needs to the project value is 64.43% for materials, 26.97% for wages, 7.23% for tools, and 1.37% for subcontractors. Based on the project value of IDR 2,013,000,000 for structural and architectural work, an analysis of the calculation of project resource needs was carried out starting with a recap of the quantity of work. After completing the work quantity recap, continue by determining the type and need of project resources.

Each component of the project resources has been carried out, the next is a recap of the project resource needs in one of the buildings in Tabanan.

Table 4. Recapitulation of project source needs for one of the buildings in Tabanan

No	Description	Total (IDR)	Persentase
1	Material	1,211,959,790,20	60.20%
2	Labour Cost	635,754,531,73	31.58%
3	Machine	106,600,000,00	5.30%
4	subcontractors	58,901,743,85	2.93%
	Total	2,013,216,065,77	

The percentage of project resources needs to the project value is 60.20% for materials, 32.58% for wages, 5.30% for tools, and 2.93% for subcontractors.

Based on the results of the analysis of the percentage of project resource use in each building, it is continued to calculate the proportion of building buildings as shown in Table 5.

Table 5. Recapitulation of the use of project resources in each region

Resources	Denpasar	Badung	Gianyar	Tabanan	Average
Material	66.17%	61.03%	64.43%	66.17%	64.45%
Wages	24.83%	22.35%	26.97%	24.83%	24.75%
Tool	6.61%	10.09%	7.23%	6.61%	7.64%
Subcontractor	2.39%	6.54%	1.37%	2.39%	3.17%

Based on the recapitulation of the use of material resources, wages, tools and subcontractors in the SARBAGITA area (Denpasar, Badung, Gianyar, Tabanan) is averaged, the following proportions are obtained: materials (64.45%), wages (24.75%), tools (7.64%), subcontractors (3.17%).

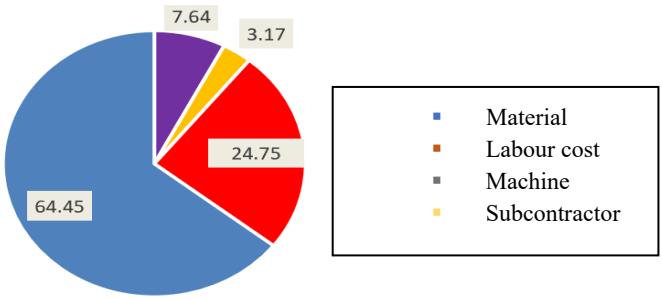

Figure 1. Proportion of project resource usage

4 Conclusion

The proportion of project resource use in several buildings in the SARBAGITA area is on average as follows: (1) Materials 64.45%, (2) Wages 24.75%, (3) Tools 7.64%, and (4) subcontractors 3.17%. This percentage is to the total value of the project. The proportion of use of material resource needs, tools, wages and subcontractors is greatly influenced by the type of building construction, material specifications, and work contracts

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