Strategies to Supply Cost Surviving During Project Implementation During the Covid-19 Pandemic By Small Scale Construction Service Providers in Bali

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Abstract. Project cost expansion is an actual (unanticipated) amount of expenditure that exceeds budgets, estimates, or cost targets. Swelling of costs can occur due to errors in each part of the construction phase of activities. Construction project activity is a temporary activity that lasts for a limited period, allocating specific resources. It is intended to produce products whose quality criteria have been clearly outlined. Some limitations must be met: the costs (budget), the schedule (time), and the quality. The three rules above actually attract each other, which means that if you want to improve the product's performance that has been agreed upon in the contract, generally it must be followed by improving the quality. In turn, it results in increased costs so that they exceed the budget. During the Covid-19 pandemic that hit Indonesia, especially Bali, the development sector experienced a decline. However, this does not happen to all small-scale construction service actors in Bali. Some construction service providers can still carry out construction even though rules bind them regarding health protocols. During the implementation of development during a pandemic, several factors cause cost overruns so that the initial budget undergoes a significant change. Some strategies can be done to reduce cost overruns, namely by good project management from planning to project implementation. The management stage in question is preparing and considering the initial planning, costs, schedule, and the team involved in project implementation.

Keywords: Strategy, Cost Overruns, Projects, Construction

1 Introduction

The Covid-19 virus pandemic that hit Bali had a significant impact on people's lives. The Corona outbreak has forced construction service actors to revise the development plans that have been made. Targets were realistically adjusted, assumptions were changed according to current circumstances, and short-term program priorities were mainly shifted to address the Covid-19 pandemic. In the context of accelerating development to restore economic conditions, several small-scale construction service actors can still act like experiencing several obstacles that cause cost overruns. So, it is necessary to analyze the factors that drive cost overruns while working on projects during the Covid-19 pandemic. After the factors causing the cost overruns

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are known, the implementation strategies that can be taken are determined to reduce the cost overruns.

Theoretical Review

The project is an effort or activity organized to achieve important goals, objectives, and expectations using the available budget and resources completed within a certain period (Nurhayati, 2010). So, in simple terms, the project can be interpreted as a complex business that is completed efficiently, timely, and according to the expected quality. The main objective of the project is to satisfy the needs of service users. In general, there are 3 (three) project objectives that directly often become obstacles in project implementation, including cost, quality, and time. The project budget must be completed at a cost that does not exceed the budget. In essence, the cost factor will determine how much the cost will be spent on a project. Swelling of project costs can occur due to errors in each part of the construction stage activities.

To keep costs down, you usually have to compromise on quality and schedule. If the cost or time spent exceeds the estimated amount, it is said to be swelling. The larger the project size, the greater the potential for swelling (Soeharto, 1997). The definition of cost overrun is an additional burden that causes total costs to increase or even reduce profits. It can also be interpreted as an actual (unanticipated) expenditure that exceeds the budget, estimate, or target cost. In project finance, cost overrun is the amount of funding or capital expenditure to complete the project that exceeds the estimate. Although this situation does not necessarily guarantee that the project will fail, it will complicate the project's success as expected in terms of finance.

2 Research Methods

To solve the problems that occur in this study used data sources in the form of primary data with data collection methods using interviews and questionnaires. The data obtained is in the form of the importance of the factors that affect cost overruns and strategies to reduce the cost overruns during project implementation during the Covid-19 pandemic carried out by small-scale construction service providers.

To solve related problems, the number of respondents used in this study was 25 respondents. After collecting data using a questionnaire, the next step is the data analysis process. The activity stage in data analysis is systematically compiling the data obtained from the results of the questionnaire. Data analysis was carried out using the Analytical Hierarchy Process (AHP) method.

The AHP method is used to make effective decisions on complex problems by simplifying and accelerating the decision-making process by solving the problem into its parts, arranging these parts or variables in a hierarchical arrangement, assigning numerical values to subjective considerations. About the importance of each variable and synthesize these considerations to determine the variable that has the highest priority and act to influence the situation's outcome. This method assesses the importance of decision alternatives under specific criteria so that the scoring of each option is obtained using particular scales.

3 Results and Discussion

Calculation of the Weighting of the Factors that Cause Cost Swelling Thirteen main factors influence the cost overruns experienced by small-scale construction service actors in Bali while carrying out projects during the Covid-19 pandemic. These factors consist of:

An increase in material prices = A
Dimensional error/size of work in execution = B
Low labor productivity = C
Error in choosing the working method = D
Unsuitable material specifications = E
Incorrect cost estimate = F
Late/lack of materials and materials = G
Theft of materials/materials = H
Material damage = I
High price/rental of equipment = J
Untimely payment method = K
Schedule delay due to weather effect = L
Frequent delays in work = M

Algebraic Matrix

Pairwise comparisons and reciprocal (opposite) of respondents' answers with 78 comparisons. Make a pairwise comparison matrix by describing each element's relative contribution or influence to each goal or criterion at the level above. Comparisons are made based on the "judgment" of decision-making by assessing the level of importance of an element compared to other factors.

Table 1. Algebraic Matrix

Factors	A	B	C	D	E	F	G	H	I	J	K	L	M
A	**1,000**	1,084	1,136	0,860	1,070	0,747	1,200	0,990	1,196	1,072	1,376	0,935	0,975
B	0,922	**1,000**	1,069	0,928	1,138	0,868	1,128	1,167	1,078	1,008	1,506	1,052	1,125
C	0,880	0,935	**1,000**	0,905	1,061	0,826	1,136	1,340	1,245	1,196	1,426	1,032	1,057
D	1,162	1,078	1,105	**1,000**	1,137	0,914	1,196	1,268	1,427	1,179	1,438	1,077	1,194
E	0,934	0,879	0,943	0,879	**1,000**	0,762	0,898	1,020	0,925	0,770	1,032	0,778	0,824
F	1,339	1,152	1,211	1,094	1,313	**1,000**	1,105	1,418	1,302	1,147	1,512	1,216	1,182
G	0,833	0,886	0,880	0,836	1,113	0,905	**1,000**	1,042	1,010	1,050	1,050	0,934	0,963
H	1,010	0,857	0,746	0,789	0,980	0,705	0,960	**1,000**	0,908	0,986	0,904	0,781	0,547
I	0,836	0,928	0,803	0,701	1,082	0,768	0,990	1,101	**1,000**	0,855	1,143	0,922	0,891
J	0,933	0,992	0,836	0,848	1,298	0,872	0,952	1,014	1,170	**1,000**	1,292	1,009	0,956
K	0,726	0,664	0,701	0,695	0,969	0,661	0,953	1,106	0,875	0,774	**1,000**	0,843	0,829
L	1,070	0,951	0,969	0,929	1,286	0,822	1,071	1,280	1,085	0,991	1,186	**1,000**	1,103
M	1,025	0,889	0,946	0,837	1,214	0,846	1,039	1,827	1,123	1,046	1,207	0,907	**1,000**
TOTAL	**12,671**	**12,295**	**12,347**	**11,302**	**14,661**	**10,696**	**13,629**	**15,574**	**14,344**	**13,074**	**16,070**	**12,485**	**12,645**

Matrix Normalization

This normalized matrix or normalized relative weight is a relative weight for each element in each column compared to the number of each component (Asja, 2013).

Table 2. Matrix Normalization

Factors	A	B	C	D	E	F	G	H	I	J	K	L	M	TOTAL	Eigen vector
A	0,079	0,088	0,092	0,076	0,073	0,070	0,088	0,064	0,083	0,082	0,086	0,075	0,077	1,033	**0,079**
B	0,073	0,081	0,087	0,082	0,078	0,081	0,083	0,075	0,075	0,077	0,094	0,084	0,089	1,058	**0,081**
C	0,069	0,076	0,081	0,080	0,072	0,077	0,083	0,086	0,087	0,092	0,089	0,083	0,084	1,059	**0,081**
D	0,092	0,088	0,089	0,088	0,078	0,085	0,088	0,081	0,099	0,090	0,089	0,086	0,094	1,149	**0,088**
E	0,074	0,071	0,076	0,078	0,068	0,071	0,066	0,066	0,064	0,059	0,064	0,062	0,065	0,885	**0,068**
F	0,106	0,094	0,098	0,097	0,090	0,093	0,081	0,091	0,091	0,088	0,094	0,097	0,093	1,213	**0,093**
G	0,066	0,072	0,071	0,074	0,076	0,085	0,073	0,067	0,070	0,080	0,065	0,075	0,076	0,951	**0,073**
H	0,080	0,070	0,060	0,070	0,067	0,066	0,070	0,064	0,063	0,075	0,056	0,063	0,043	0,848	**0,065**
I	0,066	0,075	0,065	0,062	0,074	0,072	0,073	0,071	0,070	0,065	0,071	0,074	0,070	0,908	**0,070**
J	0,074	0,081	0,068	0,075	0,089	0,082	0,070	0,065	0,082	0,076	0,080	0,081	0,076	0,997	**0,077**
K	0,057	0,054	0,057	0,062	0,066	0,062	0,070	0,071	0,061	0,059	0,062	0,068	0,066	0,814	**0,063**
L	0,084	0,077	0,079	0,082	0,088	0,077	0,079	0,082	0,076	0,076	0,074	0,080	0,087	1,040	**0,080**
M	0,081	0,072	0,077	0,074	0,083	0,079	0,076	0,117	0,078	0,080	0,075	0,073	0,079	1,044	**0,080**
TOTAL	**1,000**	**1,000**	**1,000**	**1,000**	**1,000**	**1,000**	**1,000**	**1,000**	**1,000**	**1,000**	**1,000**	**1,000**	**1,000**	**13,000**	**1,000**

The maximum lambda value is obtained from the algebraic matrix multiplied by the eigenvectors in the first iteration.

Table 3. Maximum Labda Value Calculation

1,000	1,084	1,136	0,860	1,070	0,747	1,200	0,990	1,196	1,072	1,376	0,935	0,975		0,079		1,036
0,922	1,000	1,069	0,928	1,138	0,868	1,128	1,167	1,078	1,008	1,506	1,052	1,125		0,081		1,062
0,880	0,935	1,000	0,905	1,061	0,826	1,136	1,340	1,245	1,196	1,426	1,032	1,057		0,081		1,063
1,162	1,078	1,105	1,000	1,137	0,914	1,196	1,268	1,427	1,179	1,438	1,077	1,194		0,088		1,154
0,934	0,879	0,943	0,879	1,000	0,762	0,898	1,020	0,925	0,770	1,032	0,778	0,824		0,068		0,888
1,339	1,152	1,211	1,094	1,313	1,000	1,105	1,418	1,302	1,147	1,512	1,216	1,182		0,093		1,217
0,833	0,886	0,880	0,836	1,113	0,905	1,000	1,042	1,010	1,050	1,050	0,934	0,963	x	0,073	=	0,954
1,010	0,857	0,746	0,789	0,980	0,705	0,960	1,000	0,908	0,986	0,904	0,781	0,547		0,065		0,851
0,836	0,928	0,803	0,701	1,082	0,768	0,990	1,101	1,000	0,855	1,143	0,922	0,891		0,070		0,911
0,933	0,992	0,836	0,848	1,298	0,872	0,952	1,014	1,170	1,000	1,292	1,009	0,956		0,077		1,000
0,726	0,664	0,701	0,695	0,969	0,661	0,953	1,106	0,875	0,774	1,000	0,843	0,829		0,063		0,817
1,070	0,951	0,969	0,929	1,286	0,822	1,071	1,280	1,085	0,991	1,186	1,000	1,103		0,080		1,044
1,025	0,889	0,946	0,837	1,214	0,846	1,039	1,827	1,123	1,046	1,207	0,907	1,000		0,080		1,049

The results of these multiplications are then added together, so the maximum lambda value is 13,047. Meanwhile, the value of the consistency ratio (CR) is 0.003. The determination of element weights or priority setting in each hierarchy is carried out through an iteration process (matrix multiplication), the iteration is carried out continuously until the result of the difference between iterations is 0.000 or does not change (= 0), the iteration value obtained is then a priority order. The difference between the eigenvector values in the first and second iterations can be seen in the following table:

Table 4. The Difference Between the Eigenvalues Of The Vector

Faktor	**Eigen vector iterasi pertama**	**Eigen vector iterasi kedua**	**Selisih**
A	0,0794	0,0794	0,0000
B	0,0814	0,0814	0,0000
C	0,0815	0,0815	0,0000
D	0,0884	0,0884	0,0000
E	0,0681	0,0681	0,0000
F	0,0933	0,0933	0,0000
G	0,0731	0,0731	0,0000
H	0,0652	0,0652	0,0000
I	0,0698	0,0698	0,0000
J	0,0767	0,0767	0,0000
K	0,0626	0,0626	0,0000
L	0,0800	0,0800	0,0000

M	0,0804	0,0804	0,0000
Jumlah	1,0000	1,0000	

Ranking of Cost Swelling Factors

The weight of the elements is obtained from the value of each eigenvector in the second iteration, which is expressed in percentage weights to determine the ranking based on the largest to the lowest eigenvector values. Based on the priority weight of each factor, the priority of the factors that most influence the cost overruns experienced by small-scale construction service actors in Bali is obtained while working on projects during the pandemic. The ranking results of each factor are presented in the following table:

Table 5. Weighting and Ranking of Cost Swelling Factors

	Factors	Weight	Ranking
A	There is an increase in material prices	0,0794 (7,94%)	7
B	Dimensional error / size of work in execution	0,0814 (8,14%)	4
C	Low labour productivity	0,0815 (8,15%)	3
D	Error in choosing the working method	0,0884 (8,84%)	2
E	Specification of unsuitable materials	0,0681 (6,81%)	11
F	Incorrect cost estimate	0,0933 (9,33%)	1
G	Late/lack of materials and materials	0,0731 (7,31%)	9
H	Material theft	0,0652 (6,52%)	12
I	Material damage	0,0698 (6,98%)	10
J	High price/rental of equipment	0,0767 (7,67%)	8
K	Untimely payment method	0,0626 (6,26%)	13
L	Schedule delay due to weather	0,0800 (8,00%)	6
M	Frequent job delays	0,0804 (8,04%)	5
	Total	1,0000 (100%)	

Strategies to Reduce Cost Swelling

The implementation strategy aims to anticipate the possibility of cost overruns if, in the future, a similar situation occurs, such as a pandemic that causes project implementation to experience cost overruns. To solve problems that cause cost overruns can use the Pareto Rule. ome of the Pareto Principal benefits are sorting and selecting the main problem into smaller parts to focus on its improvement efforts, identifying and sorting according to priority or the most significant factor, enabling better utilization of limited resources.

Based on the results of data analysis, evaluation of the priority factors that affect project implementation costs, the most influential factors are as follows:

Incorrect cost estimates.

Error in choosing the working method.

Low labour productivity.

Based on the results of interviews with respondents, can do several strategies to reduce the occurrence of cost overruns as a result of these three factors, including:

Incorrect cost estimate

Recheck the site before estimating the price.

Survey material prices and wages first before making an estimate.

Controlling and re-checking the list of price analysis and work volume.

As an alternative option to reduce cost overruns, an estimator can be used.

Error in choosing the working method

Before doing work, it is mandatory to do a job simulation (job mock-up), then note which method is more effective and according to the estimated budget.
Choose specialists in their fields (to avoid wrong methods).
Using the services of a competent supervisor (at least field implementers and surveyors).
Low labour productivity
The need to conduct labour briefing activities before starting work.
Making the most practical and most accessible method for labour.
Routinely and periodically provide training for less-skilled workers.
It is necessary to supervise work targets to prevent too relaxed and undisciplined workers at work.
Giving rewards to the workforce if the productivity target is achieved.

4 Conclusion

Based on the data analysis that has been carried out, of the 13 factors that cause cost overruns during project implementation during the Covid-19 pandemic, three main factors have the most influence, namely inaccurate cost estimates, errors in choosing work methods, and low labour productivity. Therefore, the project implementation strategies undertaken to reduce cost overruns that occur during project implementation include:

Recheck the site before estimating the price.
Survey material prices and wages first before making an estimate.
Controlling and re-checking the list of price analysis and work volume.
As an alternative option to reduce cost overruns, an estimator can be used.
Before doing the work, it is mandatory to do a job simulation (job mock-up), then note which method is more effective and according to the estimated budget.
Choose specialists in their fields (to avoid wrong methods).
Use the services of a competent supervisor (at least field implementers and surveyors).
The need to conduct labour briefing activities before starting work.
Develop the most practical and most accessible method for the workforce.
Routinely and periodically provide training for less-skilled workers.
It is necessary to supervise work targets to prevent too relaxed and undisciplined workers at work.
Giving rewards to the workforce if the productivity target is achieved.

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