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### RESEARCH ARTICLE

#### CONSTRUCTION BUDGET AND ITS IMPACT ON CONSTRUCTION COSTS IN TIMES OF SANITARY CRISIS IN CORPORACIÓN SANTA MARÍA

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#### Abstract

In order to determine the impact of the construction budget on the construction costs of the Santa Maria Corporation SAC-2020, an applied research was carried out, qualitative approach, non-experimental design and correlational scope, the sample are works executed in times of health crisis; the school buildings No. 81540 San Francisco de Asis and No. 80638 Americo Aguilar Celis, in the province of Viru. The study technique used was documentary analysis and the instrument was a record card. The data obtained were processed to evaluate the incidence of the variables by means of statistical tables; where it was found that 4.29% additional materials were used for the first work and 4.33% additional for the second, with respect to the budget; in the case of direct general expenses, 18.75% and 23.33% respectively, additional to the estimate. It is concluded that the construction budget has a negative impact on the construction costs of Corporación Santa María SAC-2020 in times of sanitary crisis, observing relevant variations between the estimated and executed costs, not obtaining the expected profit margin; noting that in the case of the first project the profit margin is only 10% of the estimate and in the second project it is 0%.

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#### Introduction:-

One of the industrial sectors with greater movement of money at national and world level is the construction sector, since it covers several service projects for society; besides being considered one of the most dynamic of the economy involving other industries necessary for its execution contributing to the economic development of our country in recent years; but due to the global health crisis budgets were altered strongly affecting the rise in construction costs causing losses of raw materials, rising prices, low performance of labor and decrease in their profits.

Peru is no stranger to the situation, as it has been observed that the execution of construction projects would have a cost variation, with an increase of approximately 20% due to the new health policies and their enforcement, preventing COVID-19 infections and the deterioration of materials during the isolation period. The Peruvian construction sector was one of the most affected by the COVID-19 crisis. April showed the lowest drop in economic activity at 90.4%, a contraction higher than that of the total GDP (-39.9%). During the months of August and

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September, a slow recovery is evidenced, this is due to the reactivation of private projects in the residential sector. The case is different with respect to the progress of public projects, since they remained on the negative side (-3.1%) and no good deployments are expected in the last months of the year. (IPE, 2020)

Corporación Santa María S.A.C. is a company located in Trujillo. It was incorporated on September 29, 2006 and offers various services in the areas of engineering, construction and mining such as: preparation of plans, construction of road works, urban projects, buildings, electricity, sanitation and irrigation arrangements, assembly of industrial plants and machinery, etc.; which in recent months has shown an increase in construction costs of current works.

The cause of this problem may be inefficient planning management, failure to foresee future risks, lack of human resources in the area, noncompliance with the company's MOF, and poor management of the construction budget. As well as the sanitary crisis that has been strongly affecting the construction sector, since, due to the emergency decrees requesting mandatory immobilization, the works were stopped causing deterioration of some materials and at the moment of reactivating the works, they had to be subject to the protocols required by the government, altering the budgets.

#### **ProblemStatement:**

Does the construction budget affect the construction costs of Corporación Santa María S.A.C. 2020?

#### **Main objective:**

Determine the impact of the construction budget on the construction costs of Corporación Santa María SAC - 2020.

#### **Specific Objectives:**

- i. To analyze the work budgets of the Santa Maria Corporation.
- ii. Identify the construction costs of the Santa Maria Corporation.
- iii. To determine Santa Maria Corporation's compliance with its activities.

#### **Studyhypothesis:**

The construction budget has a negative impact on the construction costs of Corporación Santa María S.A.C. 2020.

#### **Theoretical framework:**

Melo et al., (2020), elaborated an investigation "impact of the covid-19 pandemic in the private construction sector in Colombia". Where it is evidenced that 37% of the construction companies surveyed, spent between 5% and 10% to comply with health protocols. It was concluded that 49% of the works were delayed due to the pandemic, which caused an increase in their costs and a decrease in the results of the contracts.

Brito and Ramírez (2019), set the objective of "analyzing the variations of the cost budget, based on planning and its impact on the results of the company UNICOL S.A.". In the results obtained from the questionnaire applied, it can be deduced that 71% state that they always present considerable variations between budget and actual cost; concluding that the company does not have personnel trained in budgeting, which is negatively influencing profitability.

Avila and Utra (2018), in their article entitled "The operations budget, an experience in construction works in Cuba". It could be concluded that the proposed stages for budget control favor in the improvement of economic results, being beneficial for the organization to carry out the execution of the designated work, as well as having the correct information to carry out the budget stages.

Salazar (2018), aims to "determine the budgets and construction costs of the Zural construction company that help to know the reliability of the internal processes"; having as a conclusion the non-compliance of budget due to mismanagement and ignorance in the calculation of costs; resulting difficult to obtain a good control of real costing affecting the expected profit.

Pinto and Rodriguez (2019), investigated the "Evaluation of the programmed and executed budgets of the works of the company Inversiones y Servicios Bugatti S.A.C. during the period 2017 and 2018, Chimbote". It was concluded

that the variation arose from a cost overrun in the executed budget; that is, more was spent than what had been programmed, being an amount of S/ 289,262.31.

Abanto (2018), studied with the objective of "knowing if the fulfillment of work budgets has an impact on production costs"; concluding that the entity delivers its economic proposal with amounts lower than those offered in the market in order to win the bidding obviating several details of costs and expenses necessary for the development of the project.

**Independent variable: Construction budget**

"To talk about a work budget it is necessary to apply steps such as planning, executing, controlling and evaluating, being fundamental axes that will lead to the success of the organization that applies it, by complying with it, it will be possible to achieve the goals set and more than that, the proper use of the materials to be used". (Salazar, 2016, p.47) quoted by Abanto (2018, p.9)

**Dependent variable: Cost of production**

"The cost is represented by the total invested money necessary to acquire and produce a good or service, regardless of the classification that can be given to them; it is also of great support in the control of resources and productive elements. The construction sector classifies costs into direct cost and indirect cost". (Beltrán, 2012) quoted by Salazar (2017, p. 28)

**Type of investigation:**

Applied correlational-causal

**Research design:**

Non-experimental-transversal

**Sample:**

For the analysis of the study, the budget records and actual construction costs of the works were used:

-Rehabilitation of school premises No. 81540 San Francisco de Asís, sector Tanguchedistrict of Chao, Virú province, La Libertad region.

-Rehabilitation of school building No. 80638 Américo Aguilar Célis, El Porvenir sector, Chao district, Virú province, La Libertad region.

**Data collection techniques and instruments**

Documentary analysis-Registration form

**Results:-**

**Table 1:-** Work budget summary - Rehabilitation of school building No. 81540 San Francisco de Asís, Tanguche-Chao-Virú sector.

<i>Initial construction budget</i>	<i>Amount S/</i>	<i>%</i>
Direct material	502,476.52	60.87%
Direct labor	215,347.08	26.09%
Direct overhead	57,425.89	6.96%
Indirect overhead	14,356.47	1.74%
Profit margin	35,891.18	4.35%
Total	825,497.14	100%

Note: This table shows the budget for the work, where Corporación Santa María S.A.C. provided the information from the technical file issued by the District Municipality of Chao.

**Table 2:-** Work budget summary - Rehabilitation of school building No. 80638 Américo Aguilar Célis, El Porvenir-Chao-Virú sector.

<i>Initial construction budget</i>	<i>Amount S/</i>	<i>%</i>
Direct material	198,638.73	65.22%
Direct labor	66,212.91	21.74%
Direct overhead	19,863.87	6.52%

Indirect overhead	6,621.29	2.17%
Profit margin	13,242.58	4.35%
Total	304,579.38	100%

Note: This table shows the budget for the work, where Corporación Santa María S.A.C. provided the information from the technical file issued by the District Municipality of Chao.

Table 1 and 2 show the initial budgets for the rehabilitation works of school building No. 81540 San Francisco de Asís and school building No. 80638 Américo Aguilar Célis, where Corporación Santa María S.A.C. was awarded in a bidding process called by the Chao District Municipality; it can be observed that the construction company intends to obtain a profit margin of S/. 35,891.18 for the first school building and S/. 13,242.58 for the second one. In addition, it can be seen that of the 100% budgeted in both works, the highest amount was used for direct materials (60.87% and 65.22%, respectively), followed by direct labor, direct general expenses and the lowest amount was used for indirect general expenses (1.74% in the case of the San Francisco de Asís work and 2.17% in the Américo Aguilar Célis work).

**Table 3:-** Summary of cost of construction of school building - Rehabilitation of school building No. 81540 San Francisco de Asís, Tanguiche-Chao-Virú sector.

<i>Construction cost</i>	<i>Amount S/</i>	<i>%</i>
Direct material	524,011.23	63.76%
Direct labor	215,347.08	26.20%
Direct overhead	68,193.24	8.30%
Indirect overhead	14,356.47	1.75%
Total construction cost	821,908.03	100.00%

Note: This table shows the actual construction cost for the year 2020, where Corporación Santa María S.A.C. provided the information from the records.

**Table 4:-** Summary of cost of construction of school building - Rehabilitation of school building No. 80638 Américo Aguilar Célis, El Porvenir-Chao-Virú sector.

<i>Construction cost</i>	<i>Amount S/</i>	<i>%</i>
Direct material	207,246.40	68.04%
Direct labor	66,212.91	21.74%
Direct overhead	24,498.78	8.04%
Indirect overhead	6,621.29	2.17%
Total construction cost	304,579.38	100.00%

Note: This table shows the actual construction cost for the year 2020, where Corporación Santa María S.A.C. provided the information from the records.

Tables 3 and 4 show the summary of construction costs at the end of the construction of the two school buildings located in the Chao district. In the first table we see that of the 100% of the cost, 63.76% was used in direct material, 26.20% in direct labor, 8.30% in direct overhead and 1.75% in indirect overhead. While in Table 5, which corresponds to the Américo Aguilar Célis School building, of the 100% of the construction cost, 68.04% was used for materials, 21.74% for labor, 8.04% for direct overhead and 2.17% for indirect overhead. It is important to mention that in these tables the profit margin item of the budget was not considered since it is not part of the cost components; all the information shown in these tables was provided by the management department in detail, since they do not have a specialized program that contains the cost database.

**Table 5:-** Fulfillment of the work budget - Rehabilitation of school building No. 81540 San Francisco de Asís, Tanguiche-Chao-Virú sector.

<i>Valorization</i>	<i>Monthly progress</i>		<i>Total cumulative progress</i>	
	<i>Programmed S/</i>	<i>Executed S/</i>	<i>Programmed S/</i>	<i>Executed S/</i>
N°1	29,864.78	158,159.06	29,864.78	158,159.06
N° 2	85,866.15	168,231.27	115,730.93	326,390.33
N° 3	236,095.35	131,537.26	351,826.28	457,927.59
N° 4	242,940.89	217,627.48	594,767.17	675,555.07

N° 5	110,036.57	114,594.63	704,803.74	790,149.70
N° 6	71,708.77	35,347.43	776,512.51	825,497.14
N° 7	48,984.62		825,497.14	
Total	825,497.14	825,497.14	825,497.14	825,497.14

Note: This table shows the schedule of activities and progress according to the work planning.

This table shows valuations, where we can see a schedule of execution of the work in stages, in this case the work of San Francisco de Asís had established seven valuations where it began in February and ended in August 2020, but due to the paralysis of the construction sector in March, being its restart in August as long as it complied with the protocols required by the government; This work was finally completed in November, it was possible to comply with the delivery within the year thanks to the fact that in the month of February more progress was made than requested and in the case of the month of March the workers remained on site during the quarantine order, achieving progress in excess of what was indicated.

**Table 6:-** Cumplimiento del presupuesto de obra- Rehabilitación del local escolar n° 80638 Américo Aguilar Célis, sector El Porvenir-Chao-Virú.

Valorization	Monthly progress		Total cumulative progress	
	Programmed S/	Executed S/	Programmed S/	Executed S/
N°1	15,805.28	54,281.38	15,805.28	54,281.38
N° 2	40,436.05	62,077.70	56,241.33	116,359.08
N° 3	102,060.63	94,044.83	158,301.96	210,403.91
N° 4	58,206.95	94,175.47	216,508.91	304,579.38
N° 5	39,111.77		255,620.68	
N° 6	36,259.18		291,879.87	
N° 7	12,699.51		304,579.38	
Total	304,579.38	304,579.38	304,579.38	304,579.38

Note: This table shows the schedule of activities and progress according to the work planning.

In the case of this project, activities were scheduled to begin in February and were to be completed in August 2020, but due to the aforementioned reasons, accelerated progress was made in February and March, restarting in August and finishing in the following month of September; this was possible by adjusting time and performance.

**\*Incidence of the construction budget on the construction costs of Corporación Santa María.**

**Table 7:-** Estimated budgets with actual costs - Rehabilitation of school building No. 81540 San Francisco de Asís, Tanguiche-Chao-Virú sector.

Description	Construction budget		Actual cost		Variation	
	S/	%	S/	%	S/	%
Direct material	502,476.52	60.87%	524,011.23	63.48%	21,534.71	4.29%
Direct labor	215,347.08	26.09%	215,347.08	26.09%	0.00	0%
Direct overhead	57,425.89	6.96%	68,193.24	8.26%	10,767.35	18.75%
Indirect overhead	14,356.47	1.74%	14,356.47	1.74%	0.00	0%
Profit margin	35,891.18	4.35%	3,589.12	0.43%	-32,302.06	90%
Total	825,497.14		825,497.14			

Note: This table shows the variation between the budget and the actual cost of the work.

It can be seen in this table that at the end of the execution of the work of the San Francisco de Asís school building, the construction company Santa María S.A.C. shows a variation of the estimated budget for the rehabilitation of the school where the programmed amount for the purchase of direct material was S/ 502,476.52 ending with an actual cost of S/ 524,011.23, being the variation of S/ 21,534.71, determining that in this item an additional 4.29% of the projected amount is used. The same happens with the cost of direct general expenses where the projected amount was S/. 57,425.89 while the executed amount was 68,193.24, having a difference of S/. 10,767.35, being 18.75% additional to the estimated amount. In the case of the profit margin, there was a 90% decrease, with only an amount of S/. 3,589.12 remaining.

**Table 8:-** Estimated budgets with actual costs - Rehabilitation of school building No. 80638 Américo Aguilar Célis, El Porvenir-Chao-Virú sector.

<i>Description</i>	<i>Constructionbudget</i>		<i>Actual cost</i>		<i>Variation</i>	
	S/	%	S/	%	S/	%
Direct material	198,638.73	65.22%	207,246.40	68.04%	8,607.68	4.33%
Direct labor	66,212.91	21.74%	66,212.91	21.74%	0.00	0.00%
Direct overhead	19,863.87	6.52%	24,498.78	8.04%	4,634.90	23.33%
Indirect overhead	6,621.29	2.17%	6,621.29	2.17%	0.00	0.00%
Profit margin	13,242.58	4.35%	-	-		
Total	304,579.38		304,579.38			

Note: This table shows the variation between the budget and the actual cost of the work.

In the Rehabilitation of school building No. 80638 Américo Aguilar Célis, the variation between the work budget and the actual cost can also be observed, where the amount allocated for direct material was S/ 198,638.73, but at the end of the execution it was S/ 207,246.40, being 4.33% additional to the estimated amount. In the case of direct general expenses, the budgeted amount was S/ 19,863.87 and the actual amount was S/ 24,498.78, resulting in an additional 23.33% of the projected amount. Finally, in this project, the profit margin is affected in its totality with 0%.

### Conclusions:-

- i. It is determined that the construction budget has a negative impact on the construction costs of Corporación Santa María S.A.C 2020 in times of sanitary crisis, observing relevant variations between the estimated and executed costs, not obtaining the expected profit margin, where only in one of the works 10% of the profit margin is preserved, the difference being used to cover extra costs.
- ii. The budget for the rehabilitation works executed by Corporación Santa María S.A.C-2020 during the pandemic was obtained from the technical file, in detail for each item to be carried out, considering the largest amount destined to direct material being S/ 502,476.52 for the San Francisco de Asís school building and S/ 198,638.73 for Américo Aguilar Célis; followed by labor, direct and indirect general expenses, in addition to considering the profit margin.
- iii. The construction costs of Corporación Santa María S.A.C 2020 suffered variations due to poor budget management, loss and deterioration of material, where finally the amount used was S/. 524,011.23 for the San Francisco de Asís school building and S/. 207,246.40 for Américo Aguilar Célis; also during the months of stoppage, the contract of the resident engineer and watchman continued, causing an increase in direct overhead costs.
- iiii. Santa María S.A.C. 2020 Corporation's activities were halted in March and reactivated in August by order of the government, postponing the delivery of both works; even so, progress is indicated for early delivery.

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