

Construction Process Business Model Strategy to Fulfil the Working Contract at PT Uniteda Arkato

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ABSTRACT

This study aims to (1) analyze the appropriate business model at PT. Uniteda Arkato, (2) To analyze how to increase the production of stockpiling dams to achieve the target of the work contract, (3) To analyze to determine rational production capability standards. The population in this study is the contract PT. Uniteda Arkato, totaling four contracts. Analytical method used in this research is the Canvas Business Model, Critical Path Method (CPM), and Line Balancing. The results of the study found that with the appropriate canvas business model, companies can compete with companies that have been developing for a long time, Critical Path Method (CPM) can determine critical path that exists during construction process and line balancing analysis makes the production process more efficient. From low production, there is a tendency for delays in the time agreed in the contract. As a result of this delay, the company suffers from possible loss of penalty penalties in addition to the production level that is not achieved will lead to an increase in costs, especially overhead costs.

Keywords: Canvas Business Model, Critical Path Method (CPM) and Line Balancing.

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I. INTRODUCTION

The construction industry makes an essential contribution to a country's economy through the ability to absorb unskilled, semi-skilled, and skilled workers. The number of companies engaged in the construction service industry from 2018 to 2020 has increased by 1,268, an average growth of 422 companies per year based on BPS data (2021). One of the drivers of the increasing construction industry in Indonesia is the government's plan for infrastructure development from 2015 to 2024.

PT. Uniteda Arkato (UA) is a company engaged in the construction industry. PT Uniteda Arkato does not yet have a clear business model and competitive strategy to remain competitive in the construction industry. In carrying out business activities, both production and services, always try to build relationships with customers. The stronger the relationship with the customer, the stronger the company's position in a competition, efforts to bind it can be done by providing good service (aspects of the market economy), or by entering into cooperation contracts (legal and legal aspects).

PT. Uniteda Arkato strives to satisfy customers by always fulfilling obligations and carrying out the contents of the contract agreement with PT. Daelim-Wika-Waskita (DWW-JO) in the construction of the Karian dam to meet the needs of clean water and hydroelectric power plants, with specified time and quality standards. Agreement which a standard obligation must be satisfy customers, in this case, PT. Daelim-Wika-Waskita (DWW-JO), a company PT. Uniteda Arkato must work on the Karian dam work according to the time and quality standards that have been agreed in the cooperation contract, it turns out that the time given which is

written in the contract is still below the predetermined target time and we can see from the following picture:

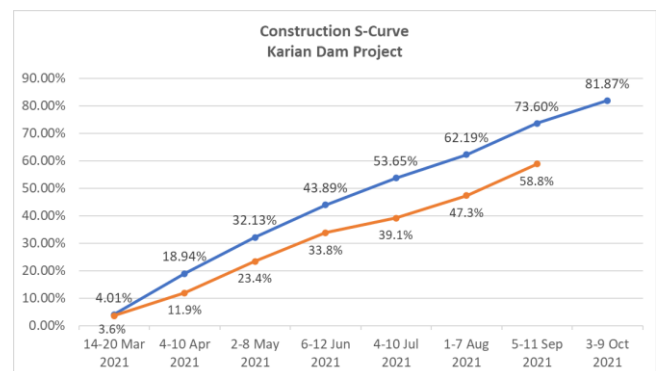


Fig. 1. Construction of S-Curve PT. Uniteda Arkato.

From low production, there is a tendency for delays in the time agreed in the contract, which can be seen in Fig. 1. As a result of this delay, the company suffers from possible losses on final fines. In addition, the production level that is not achieved will lead to an increase in costs, especially "Overhead" costs. The same thing also happened in the research on the construction of the UI Rusunawa project as shown in Fig. 2 where there is a tendency for project completion delays (Stephanie & Dinariana, 2019).

Based on the production process data at PT. Uniteda Arkato's lack of achievement is in line with research (Aulady, 2016; Ma'mury, 2017; Prasetya, 2018; Prisilia, 2018; Suttedjo, 2019; Hamidah, 2019; Syairudin, 2020; Wasito, 2021; Ariqsyah, 2021), which found that there was a delay in completion of the time specified in the contract because the construction production target was not achieved.

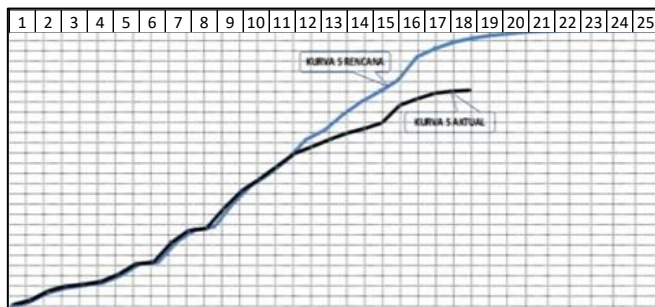


Fig. 2. Planned and Actual S-Curve of Rusunawa UI Project (Stephanie & Dinariana, 2019).

II. METHODOLOGY

This research uses an approach and quantitative approach or Mix Method. The time research will be conducted in January 2022, located at the Karian Dam Project – PT. Uniteda Arkato. The identification of variables in this research is used to help determine the data collection and technical tools. This research involves the dependent and independent variables as follows: a. Copyright Variable: Employment Contract. b. Independent Variables: Strategy, Business Model, Production Process.

Variable Employment Contract. Work is claimed to be a legal relationship between 2 individuals or two parties, supported that one party has the proper to demand one thing from the opposite party and therefore the other party is duty-bound to meet the contract (Setiawan, 2016). **Variable Strategy.** Strategy is that the basic choices and actions created by prime management and enforced by all levels of the organization within the context of the organization' goals (Siagian, 2016). **Business Model Variables.** The business model could be a tool to explain the essential brooding about however organizations create, deliver and capture price (Osterwalder and Pigneur, 2010). **Production method Variables.** Production is all activities in making or adding to the employment of products or services, that production factors are needed (Sumarti & Soeprihanto, 2015).

A population is an object or subject with certain characteristics and qualities that have been determined to be carried out and conclusions are drawn (Sugiono, 2019). The population in this study is a work contract that opens four contracts, namely Earthwork, Spillway, Tunnel, and Embankment. The sample is part of the population with certain characteristics. The sample used is a saturated sample, which is to make a sample if all members of the population are sampled, if the population is comparatively little, or if wish to form generalizations with terribly small errors. Another term for the saturated sample may be a census, wherever all the population is sampled (Sugiyono, 2019).

To obtain the data needed as a basis for research, the authors collect data from the field using 2 methods, namely:

- Observation is a process of direct observation of what is happening in the field so that the author can strengthen the existing data.

- Documentation is a data collection technique by collecting various existing documents such as work contract documents, work plans, and production results.

III. RESULT AND DISCUSSION

PT. Uniteda Arkato is one of the largest heavy equipment rental companies in Indonesia, with more than 28 years of experience. The core business of PT. Uniteda Arkato is hiring and supplying heavy equipment for various markets, such as civil construction works, infrastructure, road construction, oil and gas, mining, forestry, and others. As a company that continues to grow, PT. Uniteda Arkato expands business opportunities to other areas and improves customer service. This achievement was achieved by establishing a subsidiary company PT. Uniteda Arkato.

The construction of the Karian Dam as one of the National Strategic Projects abbreviated as PSN in Lebak Regency requires a land area of at least 2,226 hectares with a water capacity of 314.7 million M³ and an effective capacity of 207.5 million M³. With such an area, the Karian Dam will subsequently become the third largest dam after the Jatiluhur Dam and the Jatigede Dam (KPPIP, 2019).

In this study, the objects of research are four contracts owned by PT. Uniteda Arkato includes earthwork, embankment, spillway, and diversion tunnel, while the respondents in this study are managers and engineers who work at PT. Uniteda Arkato–Karian dam project.

A. Business Model Canvas (BMC)

Improving business models is very important for the success of the company which allows the company to be able to adapt to changes in the market and an increasingly competitive business environment. In addition, improving the business model can also improve and build the company's internal organization (Casadesus & Ricart, 2010).

Organizational development efforts can be done by making improvements to the elements that are weaknesses in the organization or company. This condition makes companies have to develop their resources, assets, and human resources to be better, so they can survive in face change and competition. Improvement canvas business model by the company is carried out by identifying the nine elements of BMC using a SWOT analysis conducted by interview, in order to obtain a new business model (Hindarwati & Arifin, 2015).

B. Line Balancing

This research was conducted at PT. Uniteda Arkato is one of the companies engaged in construction. On the production line of stockpiling work at Main dam PT. Uniteda Arkato, the production process occurs in 17 workstations. The sequence of the production process starts from the material loading process to the embankment process.

The results, as shown in Table I, can be explained as follows:

- Path efficiency = 44.89%;
- Balance delay = 55.11%;
- Number of stations = 17 workstations.

The results, as shown in Table II, can be explained as follows:

- Path efficiency = 84.8%;
- Balance delay = 15.2%;
- Number of stations = 9 workstations.

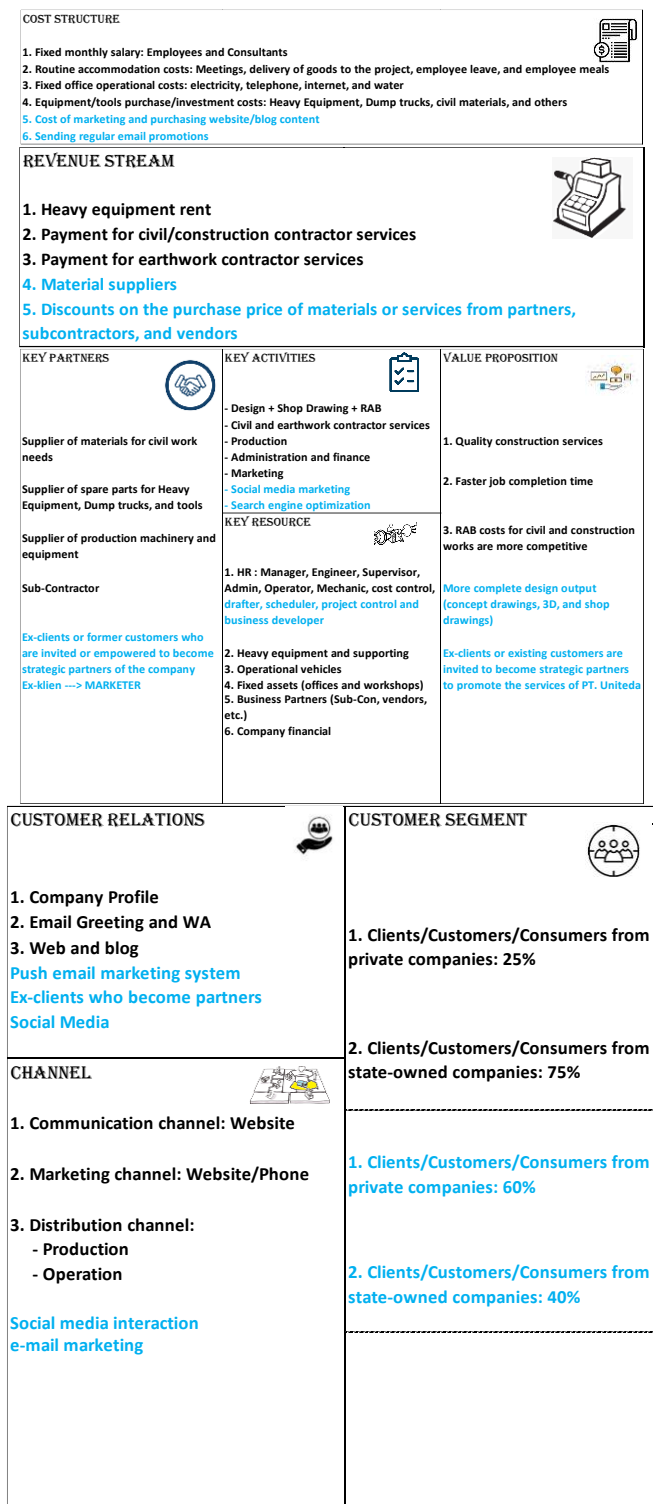


Fig. 3 Improvement of the business model canvas of PT. Uniteda Arkato.

TABLE I: TRACK EFFICIENCY AND WORK STATION BALANCE DELAY IN INITIAL CONDITIONS

Work Stations	Cycle Time	Largest Cycle Time	Track Efficiency (%)	Balance Delay (%)
Core material Embankment (Zone 1)				
1	86	396	21.72%	78.28%
2	199	396	50.25%	49.75%
3	51	396	12.88%	87.12%
4	367	396	92.68%	7.32%
Fine Filter material Embankment (Zone 2)				
1	229	396	57.83%	42.17%
2	223	396	56.31%	43.69%
3	200	396	50.51%	49.49%
4	48	396	12.12%	87.88%
5	115	396	29.04%	70.96%
Coarse Filter material Embankment (Zone 3)				

Work Stations	Cycle Time	Largest Cycle Time	Track Efficiency (%)	Balance Delay (%)
1	396	396	100.00%	0.00%
2	138	396	34.85%	65.15%
3	258	396	65.15%	34.85%
4	200	396	50.51%	49.49%
5	49	396	12.37%	87.63%
6	116	396	29.29%	70.71%
Rock material Embankment (Zone 4)				
1	253	396	63.89%	36.11%
2	94	396	23.74%	76.26%
				44.89%
				55.11%

TABLE II: TRACK EFFICIENCY AND WORK STATION BALANCE DELAY AFTER REPAIR

Work Stations	Cycle Time	Largest Cycle Time	Track Efficiency (%)	Balance Delay (%)
Core material Embankment (Zone 1)				
1	335	396	84.60%	15.40%
2	367	396	92.68%	7.32%
Fine Filter material Embankment (Zone 2)				
1	229	396	57.83%	42.17%
2	223	396	56.31%	43.69%
3	364	396	91.92%	8.08%
Coarse Filter material Embankment (Zone 3)				
1	396	396	100.00%	0.00%
2	396	396	100.00%	0.00%
3	365	396	92.17%	7.83%
Rock material Embankment (Zone 4)				
1	347	396	87.66%	12.34%
				84.80%
				15.20%

C. Critical Path Method (CPM)

The value of the results or implementation performance in Table III below uses data on the actual costs incurred for the work that has been carried out. Actual Cost of Work Performance (ACWP) is obtained from PT. Uniteda Arkato in the Karian dam project. The cost of work at the time of reporting is according to the budget. The Budget Cost of Work Performance (BCWP) was obtained from PT. United Arkato. The cost of work has been scheduled to completed within specified duration. The Budget Cost of Work Scheduled (BCWS) is obtained from the employment contract.

After identifying the volume and work items between the plan and realization, then the time for the plan and realization of the work is identified and the time for the implementation plan for the rest of the work that has not been realized is shown in Table IV.

After knowing the volume and time of the remaining work that has not been realized, then rescheduling or rescheduling of the remaining work is carried out. The remaining work that has not been realized is then made into a scheduling model accompanied by network planning. The volume used is the remaining volume of the plan and the time here is assumed to be a maximum according to the contract time limit, which is 23 weeks.

Rescheduling the remaining work and its network planning form. In this CPM, 8 tracks are made, namely:

- Hoarding Work zone 1 (Core Material);
- Zone 2 Stockpiling Works (Fine Filter Material);
- Zone 3 Stockpiling Works (Coarse Filter Material);
- Zone 4 Stockpiling Work (Rock Material);
- A.C Wearing Course & A.C Binder Coarse;
- Prime Coat;
- Tack Coat;
- Aggregate Class A and B.

TABLE III: EARNED VALUE CALCULATION RECAPITULATION

No	Week	BCWS	BCWP	ACWP	SV	CV	SPI	CPI
		(1)	(2)	(3)	(4)=(2)-(1)	(5)=(2)-(3)	(6)=(2)/(1)	(7)=(2)/(3)
1	1	342,458	295,220	384,401	-47,238	-89,181	0.86	0.768
2	2	675,898	630,539	758,224	-45,359	-127,685	0.93	0.832
3	3	1,012,001	884,583	1,023,960	-127,418	-139,377	0.87	0.864
4	4	1,192,854	973,050	1,125,181	-219,804	-152,131	0.82	0.865
5	5	1,524,345	1,293,900	1,501,324	-230,445	-207,424	0.85	0.862
6	6	1,801,183	1,507,128	1,744,458	-294,055	-237,330	0.84	0.864
7	7	2,080,068	1,666,778	1,923,437	-413,290	-256,659	0.80	0.867
8	8	2,365,661	1,869,642	2,129,391	-496,019	-259,749	0.79	0.878
9	9	2,642,533	2,013,663	2,295,505	-628,870	-281,842	0.76	0.877
10	10	2,981,026	2,274,297	2,564,755	-706,729	-290,458	0.76	0.887
11	11	3,278,588	2,490,005	2,811,560	-788,583	-321,555	0.76	0.886
12	12	3,624,618	2,786,137	3,116,223	-838,481	-330,086	0.77	0.894
13	13	3,937,308	3,001,510	3,364,635	-935,798	-363,125	0.76	0.892
14	14	4,241,536	3,192,075	3,587,779	-1,049,461	-395,704	0.75	0.890

- Analyze the value of the results at week 14.

-> A negative SV value means the project has a time delay.

-> A negative CV value means that the project expenditure is greater than the planned budget.

- Analysis of work progress in week 14.

-> SPI value less than 1 means the project is running behind schedule.

-> CPI value less than 1 means the project expenditure is greater than the planned budget

TABLE IV: CORRECTED RESIDUAL WORK VOLUME AND COST RECAP

Description of work	Uom	Rem. Vol	Rem. Budget	Weight (%)
- Embankment Main dam				
Embankment Zone-1(Core)	Cu.M	10,387	629,891,459	8.06%
Embankment Zone-2(Fine filter)	Cu.M	9,683	308,716,489	3.95%
Embankment Zone-3(Coarse Filter)	Cu.M	4,530	371,148,285	4.75%
Embankment Zone-4(Rock) At	Cu.M	46,038	1,711,292,288	21.90%
- Asphalt Concrete Pavement				
A.C Wearing Course	Sq.M	10,924	1,313,667,823	16.81%
A.C Binder Course	Cu.M	659	1,553,229,047	19.88%
Tack Coat	Lit.	1,390	24,612,295	0.32%
Prime Coat	Lit.	13,879	316,027,107	4.04%
Aggregate Class A, 30-40Mm,	Cu.M	2,312	564,661,774	7.23%
Aggregate Class B, 30-50Mm	Cu.M	4,359	1,019,602,737	13.05%

TABLE V: WORK REMAINING

No	Description of Work	Weight (%)	Weeks									
			15	16	17	18	19	20	21	22	23	
- Embankment Main dam												
A	Embankment Zone-1(Core)	8.06%	2%	2%	2%	2%	2%					
B	Embankment Zone-2(Fine filter)	3.95%		1%	1%	1%	1%					
C	Embankment Zone-3(Coarse Filter)	4.75%		1%	1%	1%	1%					
D	Embankment Zone-4(Rock) At	21.90%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
- Asphalt Concrete Pavement												
E	A.C Wearing Course	16.81%									8%	8%
F	A.C Binder Course	19.88%									10%	10%
G	Tack Coat	0.32%									0%	
H	Prime Coat	4.04%								4%		
I	Aggregate Class A, 30-40Mm,	7.23%							7%			
J	Aggregate Class B, 30-50Mm	13.05%						13%				
Total			100.00%	4%	6%	6%	6%	19%	10%	6%	21%	21%
Cumm. Total				4%	10%	16%	23%	42%	52%	58%	79%	100%

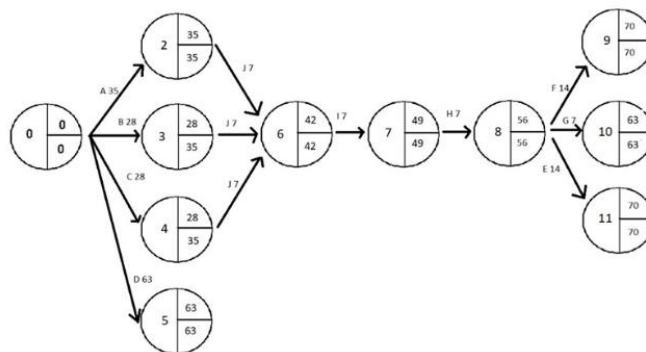


Fig. 4. CPM Network.

TABLE VI: ACCELERATED WORK

No	Description of Work	Weight (%)	Weeks									
			15	16	17	18	19	20	21	22	23	
- Embankment Main dam												
A	Embankment Zone-1(Core)	8.06%	2%	2%	2%	2%						
B	Embankment Zone-2(Fine filter)	3.95%	1%	1%	1%	1%						
C	Embankment Zone-3(Coarse Filter)	4.75%	1%	1%	1%	1%						
D	Embankment Zone-4(Rock) At	21.90%	4%	4%	4%	4%	4%	4%				
- Asphalt Concrete Pavement												
E	A.C Wearing Course	16.81%							17%			
F	A.C Binder Course	19.88%							20%			
G	Tack Coat	0.32%							0%			
H	Prime Coat	4.04%							4%			
I	Aggregate Class A, 30-40Mm,	7.23%						7%				
J	Aggregate Class B, 30-50Mm	13.05%						13%				
Total			100.00%	8%	8%	8%	8%	24%	45%	0%	0%	0%
Cumm. Total				8%	16%	24%	31%	55%	100%	100%	100%	100%

Zone 4 (Rock) embankment work setting aside 21.90% weight in this plan will be accelerated to 42 working days, while for aggregate classes A and B setting aside 19.28% weight will be accelerated to 7 days, and embankment work for zone 1 setting aside 8.06 weight. accelerated to 28 days.

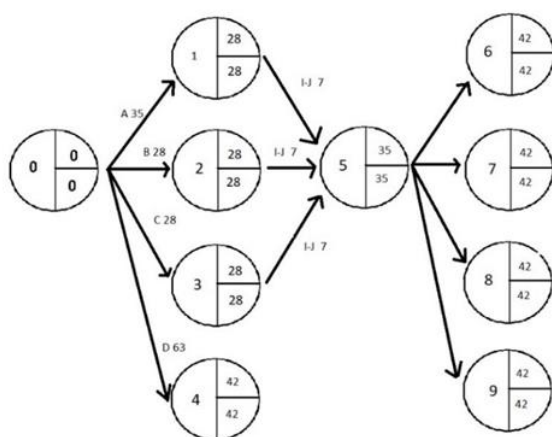


Fig. 5. CPM network with acceleration.

Fig. 5 shows the work after the crash with the CPM method, the new critical path became 42 days from the initial plan of 63 days. In this study, in carrying out the acceleration of the co

impletion of project work using the addition of the number of workers and additional working hours (overtime) using a shift system. The use of this shift system is very necessary to overcome the ineffectiveness of work implementation because it is limited by the size of the project.

IV. CONCLUSION

Based on the improvement of BMC (Business Model Canvas), PT. Uniteda Arkato must make some changes and improvements in the BMC, namely Ex-Clients can be invited or empowered to become strategic business partners in the company (Marketer). Several human resources must be equipped, especially in the contractor division, such as cost control, drafter, scheduler, project control, business developer, and contract manager. Doing social media interaction and email marketing to customers. Changing the customer segment scheme to focus more on private companies. Increase productivity and efficiency of resources

so that the prices offered are more competitive and do not cause losses for the company.

Based on the analysis of CPM (Critical Path Method) at PT. Uniteda Arkato concluded as follows, obtained the critical path for the activities at PT. Uniteda Arkato is Hoarding Work zone 1 (Core Material), Stockpiling Work zone 4 (Rock Material), A.C Wearing Course & A.C Binder Coarse, Prime Coat, Tack Coat, Aggregate Class A and B. Work after a crash using the CPM method gets a path new critical to 42 days from the initial plan of 63 days. In carrying out the acceleration of the completion of project work by adding the number of workers and adding working hours (overtime) using a shift system. The use of this shift system is very necessary to overcome the ineffectiveness of work implementation because it is limited by the project area.

From the results of the analysis achieved through the Ranked Positional Weight (RPW) method, the conclusion regarding the balance of the main dam hoarding trajectory is that the working time between work stations is more evenly distributed so that the balance of the work station trajectories is increased. Improving the efficiency of the path from the initial condition of the company, which is 44.89% up to 84.80% and is shown by a smaller balance delay compared to the arrangement so far carried out by the company from 55.11% down to 15.20%.

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