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OPTIMIZING THE AIR TRANSPORT OPERATIONS OF INDONESIAN NATIONAL ARMY-AIR FORCE ON OVERCOMING THE IMPACT OF THE FUTURE NATURAL DISASTERS

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ABSTRACT
The disaster relief action principles would be do it promptly, by all means, and at any cost. These principles also implemented in the quick response action during the operation of search and rescue for the disaster victims of tsunami waves in Aceh a few years ago. For this pupose, the Indonesian National Army deployed an air transfortation operation as a military operation other than war duty. It taok place for three months carrying million of ton cargos and passengers to and fro the disaster areas at Aceh and North Sumatra Province. Although, behe fing in the disaster relief principles, but along with the limitation and searcity of resources, it is not a taboo to work efficiently even in the disaster relief programs. For that reason, the purpose of the research is to find out wether the air transportation operation carried out by the Indonesian Air Force at that time have already performed efficiently. This information could be obtained by obserbing the aircraft movement us during the operation. The information to be compared with the result of simulation of marginal utility mode. As the conclusion is the forms of aircraft movement pattern in efficiently or the optimal condition.
Keywords: military operation other than war, air transportation operation, disaster relief, optimation.

INTRODUCTION

The potential for natural disasters in Indonesia is widespread in dozens of thousands of islands, so relief and rescue measures during the emergency response and evacuation period are mostly based on air transport. The emergency and evacuation period is critical because it involves the search and rescue, rescue, evacuation and evacuation of victims. Air transport in this case is expected to be held effectively in utilizing the time and opportunities available. The effectiveness of the operation of air transportation is determined by several factors, especially by the availability of necessary conveyance, legislative support, agent readiness or cargo/passenger, and optimization of the movement of conveyance. In relation to the Indonesian National Army-Air Force (*TNI-AU*)'s role in Military Operations In addition to the War (OMSP) of recent years, research has focused on the availability and optimization of air movement movement in Aceh disaster management in 2004 which took the longest time.

The objective of this research is to know whether the operation of air transport within the framework of OMSP in Aceh on 27 December 2004 until 27 March 2005 has been done

optimally. Optimal in this case is intended that the weight of cargo / passengers that can be transported at most with the least amount of aircraft movement that takes place in the shortest time. From the knowledge gained, trying to find how optimal conditions can be achieved in the same situation with the event in question. Then, the findings can be used to formulate optimal air transport operating patterns. Thus, the emergency work environment in the face of disasters in an emergency way as well as it is done that is important tasks are completed no matter how much costs to be incurred, a working atmosphere that allows tasks to be completed with a minimum cost. This frame of thinking is visualized in Figure-1.

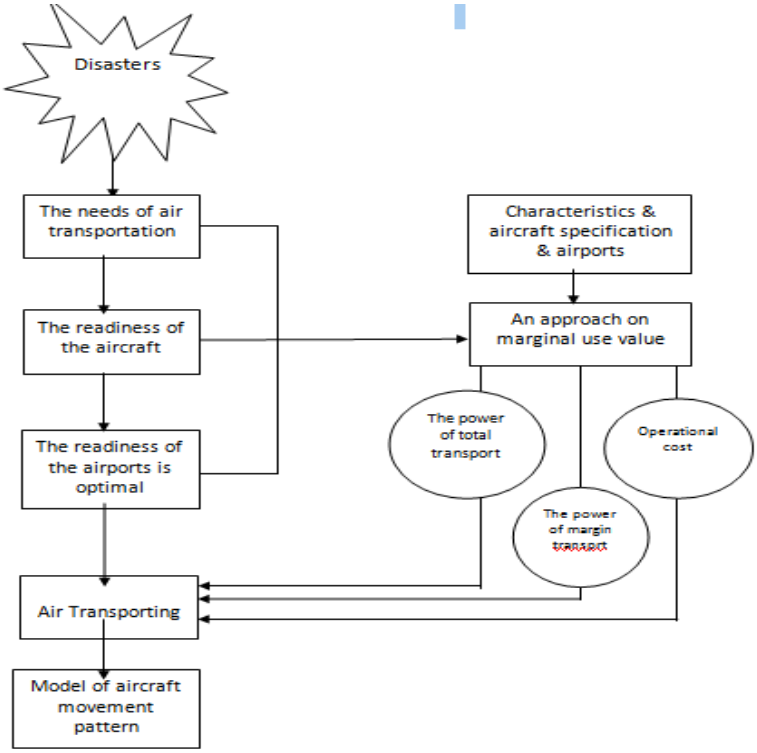

Figure-1. Conceptual Framework

Military Operations Other Than War

Every country can be assured seeking to have high-tech alutsista, a more professional personnel capability, backed up with a troop degree that is ready to go to war with its neighboring country. Such strategies are not wrong, but need to be balanced with efforts to improve threat or disruption preparation that are not classified as physical war between countries, as known as military operations other than war. The military operations other than war focuses on preventing war, resolving conflicts, promoting peace, and supporting civilian governments in the face of crisis. Another term for operations other than war

is also known as Peace Support Operations (PSO). Peace Support Operations does not involve the use of threat of violence, but rather prioritize the provision of humanitarian assistance and disaster relief. In PSO, military forces synergize with other institutions or organizations especially those related to diplomacy, economy, government, even politics and religion. Peace Support Operations have core principles, such as: a) Clarity: The operation commander should be able to set clear goals; b) Unity of Action: The operation commander needs to equate the views of various group; c) Legitimacy: Peace Support Operations are considered successful if the government determines the PSO's policy; d) Restrictions: The mission of Peace Support Operations needs to be specified; e) Safety: All operations always contains risks. In Indonesia, Peace Support Operations is the task of the Indonesian National Army, in addition to the task of war operations of the UU No: 34/2004 on Indonesian National Army, stated that Peace Support Operation covers: a) overcoming armed separatist movements, b) overcoming armed insurrections, c) overcoming terrorism, d) securing the borders, e) securing a strategic virtual object, f) implementing world peace, g) helping the government, h) assisting the police department security duties, i) helping to overcome natural disasters, j) supporting and helping accidents, refugees, and humanitarian assistance.

METHOD

Population and Sample

In this study the object is the movement of aircraft to and from the disaster site. The disaster sites are Sibolga, Sinabang, Meulaboh, Calang, Banda Aceh, Sabang, and Lhok Sumawe; While as aju base is Medan, Banda Aceh, and Sabang; As well as the main base is Jakarta, Malang, Pekan Baru, and Batam. During the emergency phase deployed various types of aircraft such as C-130 Hercules, F-27 Fokker, F-28 Fokker, CN-235 Casa-Nurtanio, C-212 Casa, AN-12 Antonov, AN-32 Antonov, Nomad, Helicopters such as BO-105 Bolkow, MI-8 Mil, and SA-330 Puma, from various agencies such as *TNI-AU*, *TNI-AD*, *TNI-AL*, and private, *PT. Suba Air Perdana, PT. Indo Asia, PT. Aero Speed Indo, and PT. Aeronusa*. As the sample used the flight network consists of *Halim Perdanakusuma* (Jakarta) - *Polonia* (*Medan*) route and *Medan - Sibolga, Medan - Cut Nyak Din Meulaboh, Medan - Iskandar Muda (Banda Aceh), Medan - Maimun Saleh (Sabang)* and *Medan - Lhoksumawe*. All of them cover only the aircraft of *TNI AU* consisting of nine C-130 Hercules, two F-27 Fokker, two CN-235 Casa-Nurtanio, and two C-212 Casa.

Data Collection Techniques

The main data sources are literature and secondary data. The first required bibliographic data on the characteristics and specifications of aircraft from aircraft manufacturer publications. Second, data on aircraft maintenance and use of *TNI- AU* documents. Third, the data on regulation is obtained from the prevailing laws and regulations. Secondary data on the implementation of air transport operations to tackle natural disasters in *Aceh* 2004-2005 was obtained from air force unit and interviews with several *TNI-AU* officials.

Data Analysis Techniques

To calculate the optimal level or highest achievement, a marginal utility approach is used. According to Gossen, the law of diminishing marginal utility or more of a product is consumed, the additional value of the obtained is getting smaller. The additional value for each consumed one unit of product is called the marginal use

value. Thus, the more a product is consumed, its marginal marginal value is smaller (see Figure-2).

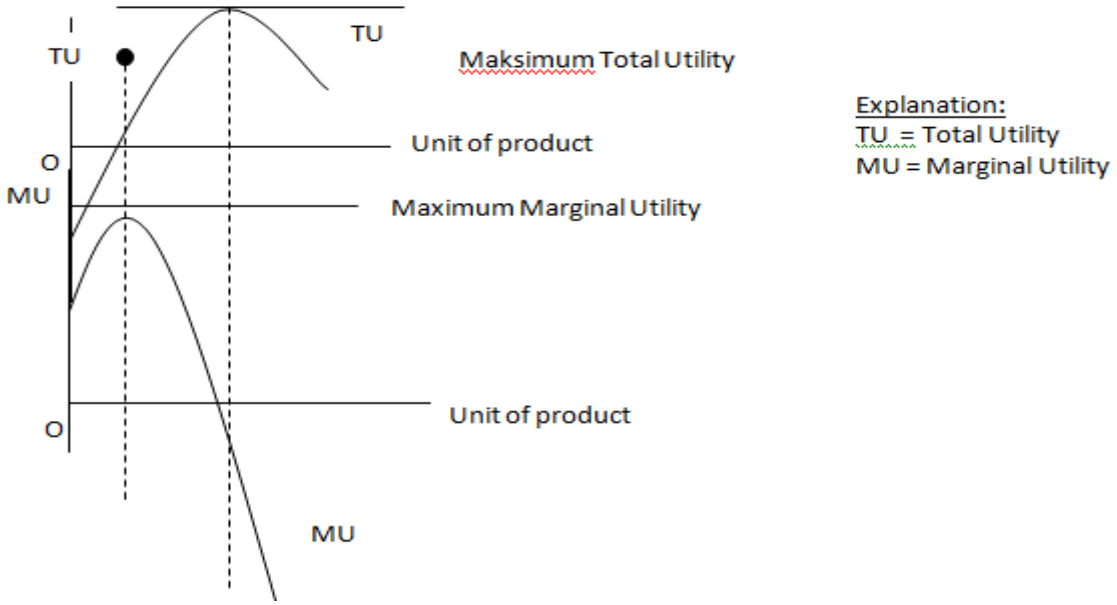

Figure-2. Curve Value

The highest or maximum use value is determined by the amount of product consumed and the price of the product. If the product consumed is only one, its maximum value is equal to the highest value that the product can achieve. For more than one product consumption, the maximum usage value obtained depends on the price between the products. At the same price between one product and another, its maximum use value is obtained if the marginal product use value is the same as the marginal product value of another product or MU4 = MUB = ... = MUz. As for the different product prices, the maximum use value is obtained if the marginal use value of each unit of the price of the product concerned is equal to the marginal use value of each unit of money of the price of another product or MUZ / PA = MUB / PB = ... = MUZ / PZ.

Besides relating to satisfaction in consuming, the marginal use value approach is used also in the achievement of product acquisition rates from the use of multiple production tools. For example, the acquisition of a rate of increase in sales by the number of views or the loading of advertising on various media, or the acquisition of a number of customers with various types or levels of education of insurance agents. In this study, the approximation of marginal use values is used in the achievement of the amount of air-borne loads of various types or types of aircraft. The relevance of the marginal utility values approach can be explained thus. The total cargo or goods and / or persons that can be transported by air is determined how many times the load is transported because the carrying capacity of each aircraft is limited. The more the number of shuttles or flights (sortie) the greater the total load

can be transported. While Gossen's law applies that the more sortie, the reduced amount of cargo can be reduced, due to some restrictions such as loading and unloading facilities at the airport of departure and destination airports, the transit storage capacity at the airport, the time required for landing And takeoff, or the number of aircraft available. Thus, an additional marginal charge applies to each type or type of aircraft. Therefore, the operating cost of each type or type of aircraft varies, the following formula of maximum carrying capacity is required.

DATA COLLECTION RESULTS

The Power of the Allocated Air Force Basic

1) Law No. 3 of 2002 on State Defense

In Chapter III, the State Defense Implementation article 10 paragraph (3) point c states that Indonesian national army is in charge of implementing the state defense policy to implement OMSP. In the OMSP explanation, among others, in the form of humanitarian aid (civic mission) on the basis of demand. The explanation of paragraph (3) can be used as the operational basis of the Air Force, especially the Air Transport Operations, because political decisions can change the use of force for tasks of assistance to mandatory duties in the implementation of humanitarian missions such as implementing OMSP in order to overcome natural disasters occurring in the territory of NKRI.

2) Law Number 34 Year 2004 on Indonesian National Army

In the discussion of article 7 states that the task of the Indonesian national army is to carry out the OMSP to help prevent natural disasters, displacement and humanitarian assistance and to assist in search and rescue. OMSP is the foundation of Indonesian national army / *TNI AU* to assist the central and local governments, especially when the government faces difficulties in tackling natural disasters. Referring to Indonesian Law Number 34 year 2004, Indonesian national army / *TNI AU* shall prepare the capability in implementing OMSP and set the targets to be achieved including the capability of Air Transport Operations, so as to guarantee the maintenance of national stability and resilience in order to maintain the integrity of Indonesian Republic.

3) Indonesian Law Number 24 Year 2007 on Disaster Management

Article 10 states that the Government will soon establish a National Disaster Management Agency (BNPB). Followed by Government Regulation Number 21 Year 2008 on Disaster Management Implementation, Government Regulation Number 22 Year 2008 regarding Funding and Management of Disaster Relief and Presidential Regulation Number 8 Year 2008 regarding to Natural Disaster Management Agency (*BNPB*). This provides the basis for the Air Force to carry out Air Transport Operations to assist the handling of natural disasters in order to succeed OMSP's tasks.

4) Decision of the Indonesian National Army Commander Number 21 year 2007 dated 12 January 2007 on the Doctrine of the Indonesian National Armed Forces *Tri Dharma Eka Karma*

In Chapter VII use of Indonesian National Army, Article 35 Military Operations other than war on sub article a. Objectives of point 12) and 13) stated that the use of Indonesian National Army power in the context of OMSP implementation is intended to: Help to cope with natural disasters, displacement and humanitarian assistance, and assist in the search and rescue of accidents.

Amount of Allocation

Compared with the real condition in every year of the incident, the allocation of the Air Force's strength, particularly the aircraft to help overcome natural disasters (OMSP), is quite high. For the earthquake and tsunami that occurred in Aceh in 2004 it was allocated almost 82% of the average number of aircraft in circulation status (see Table-1). This condition exhausts the power of the Air Force, as it allocates almost ready strength to OMSP overall.

No	Aircraft Types	Strength		Operated		
		Inventory	Circulation	Percentage to		
				Unit	Inventory	Circulation
1	C-130 B/H Hercules	20	9	9	45%	100%
2	F-27 Fokker Troopship	5	5	2	40%	40%
3	CN-235 Casa Nurtanio	6	3	2	34%	67%
4	C-212 Casa	6	2	2	34%	100%
5	SA-330 L Puma	7	3	3	43%	100%
Evarage					39,2 %	81,4%

Note: The average use (39.2%) of the inventory amount or (81.4%) of the circulation amount, while the status maintained an average of 50% of the inventory.

The allocation of power to OMSP is the use of all forces, since most of the Air Force's aircraft inventory is in a grounded state. The status of maintained or maintained is not up to 50% of the amount of inventory. The last condition is that in 2010 there was a decrease in the number of aircraft in the Air Force's inventory, but the circulation status remained low. (See Table -2). The small percentage of the number of aircraft in circulation status is likely to be the result of budget constraints for the maintenance of the main tool of the Air Force's arms system.

Table-2. The Readiness of Air Force's Aircraft

No	Type of the Aircraft	Strength	Circulation	Operated		
				Unit	Percentage to	
					Inventory	Circulation
1	C-130 B/H Hercules	19	8	6	31,58%	75,0%
2	F-27 Fokker	5	5	2	40,0%	40,0%
3	CN-235	6	3	2	33,33%	66,67%
4	C-212 Casa	6	2	2	33,33%	100%
5	SA-330 Puma	7	3	3	42,86%	100%
Everage					36,22 %	76,33%

Note: Average readiness of 36.22% of inventory amount or 76.33% of circulation

Aircraft Performance

To calculate the carrying capacity and operating cost in air transport operations, it is necessary to have data in the form of characteristics and specifications of each type and type of aircraft allocated in OMSP. The data in question are in

Table -3, Tables -4, Tables -5, Tables -6, and Tables -7.

Table-3. Characteristic of the Aircraft

(Jane's All the World Aircraft)

No	Type of the Aircraft	Maximum Distance	Maximum Charge	Fuel Use (per sorti)
1	C-130 B/H Hercules	19.685 KM (2.160 NM)	19.685 Kg (43.399 Ib)	37.000 Ib (21.016 lt)
2	F-27 Friendship	1.926 Km (1.020 NM)	5.906 Kg (13.020 Ib)	14.400 Ib (8.179,2 lt)
3	CN-235 Casa Nurtanio	1.688 KM (900 NM)	1.500 Kg (9.921 Ib)	17.750 Ib (10.082 lt)
4	C-212 Casa	408 KM (220 NM)	2.770 Kg (16.106 Ib)	6.220 Ib (3.532,96 lt)

Table-4. Aircraft and Helicopter Maintenance Fee of *TNI AU*

(*Mabes TNI, Skep Panglima TNI No. Skep/480/XII/2006*)

No	OPS COST	C-130 B	C-130 H	C-130 L-100-30	F-27	CN-235	C-212	SA-330	NAS-332
1	Wheel & Tire	33.50	33.50	33.50	12.19	18.70	13.39		
2	Brake	160.38	160.38	162.34	270.30	382.00	351.44		
3	Duk Har AF	927.97	2,590.51	1,704.72	1,641.73	2,520.39	183.45	149.73	80,08
4	Engine	428.32	912.87	699.01	363.47	365.63	445.55	979.20	1128,14
5	TCI Non AVI	89.71	89.71	89.71	94.74	153.95	94.74	1.082.77	2322,93
6	LRU AVI	7.826.75	7.826.75	7826.75	14.370.14	7.185.08	5.101.74	5.137.42	4764,61
7	Prop			180.72	90.36	110.43	113.03		
8	Oil, Hyd, Spec Prod	716.36	716.36	2,151.19	329.45	206.83	435.00	3.12	359,93
9	Unsched Repair	74.16	74.16	74.16	85.95	49.09	46.12	178.17	301,87
10	Total (USD)	10.257,15	12.404.24	12.922.10	17.258.33	10.990,10	6.784,46	7.530,41	8.957,56

Table -5. Fuel Costs for Aircraft and Helicopters of *TNI AU* Per Hour.
(*Mabes TNI, Skep Panglima TNI No. Skep/480/XII/2006*)

No.	Aircraft	Liter Per Hour	Cost per Liter	Cost per flight
1	C-130 B	3200	USD Cent 83.16	USD 2661.22
2	C-130 H/HS	3200	USD Cent 83.16	USD 2661.22
3	C-130L-100-30	3200	USD Cent 83.16	USD 2661.22
4	F-27	1100	USD Cent 83.16	USD 914.76
5	CN-235	700	USD Cent 83.16	USD 582.12
6	C-212	500	USD Cent 83.16	USD 415.80
7	SA-330 PUMA	700	USD Cent 83.16	USD 582.12
8	NAS 332 SUPER PUMA	800	USD Cent 83.16	USD 665.28

Table -6. Operational Cost Calculation for Airplane and Helicopter of *TNI AU* per Flight

	C-130 B	USD 10.257,15	+ USD 2661,22	= USD 12.918.37
	C-130 H/HS	USD 12.404,24	+ USD 2661,22	= USD 15.065.46
	C-130 L-100-30	USD 12.922.10	+ USD 2661.22	= USD 15.583.32
	F-27	USD 17.258.33	+ USD 914.76	= USD 18.173.09
	CN-235	USD10.990,10	+ USD 582,12	= USD 11.572.22
	CN-212	USD 6.784,46	+ USD 415,80	= USD 7.200.26
	SA-330 PUMA	USD 7.530,41	+ USD 582,12	= USD 8.112.53
	NAS 332	USD 8.957.56	+ USD 665.28	= USD 9.622,84

Source: processed

Table-7. Operation Cost Calculation of each Sorti

No	Type of the Aircraft/Route	Distance (Km) per sorti	Roaming Speed (Km/Jam)	Number of Flying Hours (Jam 3:4)	Hourly operating costs (USD)	Total Operation Cost (USD) (5 x 6)
1	2	3	4	5	6	7
			HLM – MDN (2* 1.306,80)			
1	C-30	2613.6	556	4.70	15065.46	70818.50046
2	F-27	2613.6	480	5.45	18173.09	98952.47505
3	CN-235	2613.6	405	6.45	11572.22	74679.39307
			MDN – LOKASI (2* 299)			
4	F-27	598	480	1.25	18173.09	22640.64129
5	CN-235	598	405	1.48	11572.22	17086.88286
6	C-212	598	346	1.73	7200.26	12444.38

Source: processed

DISCUSSION

Aircraft Use Patterns

The air transportation aid for disaster response in Aceh for three months, from 27 December 2004 to 27 March 2005, was carried out with the following net pattern.

Axis or Hub-Hub is between *Halim Perdanakusuma Airport Jakarta and Medan Polonia Airport*. The loads are transported weighing 1,006,792 Kg in 259 sortie, as many as 1,280.15 flight hours, and the distance of *Halim - Medan* as far as 1,306.80 KM. Meanwhile, the aircraft mixed aircraft consisted of nine C.130

Optimization Simulation

For a simulation of the marginal utility value approach I (see Table -8), refer to Table -3 for the maximum load and fuel requirements of each

Hercules, two F-27 Fokker, and two CN-235 Casa-Nurtanio.

The radius or Hub-Spoke is the *Medan Polonia Airport with Maimun Saleh Sabang, Iskandar Muda Banda Aceh, Cut Nyak Dien Meulaboh, Sibolga, and Lhok*

Sumawe. The loads are transported weighing 1,070,523 kg in 376 sorties, 701.40 hours of flight, and 299 KM average distance from *Medan Polonia* airport. Meanwhile, the aircraft used is also a combination of two F-27 Fokker, two CN-235 Casa-Nurtanio, and two C-212 Casa.

Flight from Halim - Medan

sortie and table -7 for the operating cost of each sortie of each type of aircraft. Assumption of air operating time in accordance with the standard of

emergency response time of approximately two weeks, as a basis for determining the marginal haulage of each type of aircraft.

Table-8. Simulation of Marginal Utility Value Approach I

Number of sorti	Total Utility (Kg)			Marginal Utility (MU) (Kg)			MU/P		
	C-130 B/H	F-27	CN-235	C-130 B/H	F-27	CN-235	C-130 B/H	F-27	CN-235
1	19500	5900	4500	19500	5900	4500	0.275	0.060	0.060
2	38500	11640	8890	19000	5740	4390	0.268	0.058	0.059
3	57000	17220	13170	18500	5580	4280	0.261	0.056	0.057
4	75000	22640	17340	18000	5420	4170	0.254	0.055	0.056
5	92500	27900	21400	17500	5260	4060	0.247	0.053	0.054
6	109500	33000	25350	17000	5100	3950	0.240	0.052	0.053
7	126000	37940	29190	16500	4940	3840	0.233	0.050	0.051
8	142000	42720	32920	16000	4780	3730	0.226	0.048	0.050
9	157500	47340	36540	15500	4620	3620	0.219	0.047	0.048
10	172500	51800	40050	15000	4460	3510	0.212	0.045	0.047
11	187000	56100	43450	14500	4300	3400	0.205	0.043	0.046
12	201000	60240	46740	14000	4140	3290	0.198	0.042	0.044
13	214500	64220	49920	13500	3980	3180	0.191	0.040	0.043
14	227500	68040	52990	13000	3820	3070	0.184	0.039	0.041
15	240000	71700	55950	12500	3660	2960	0.177	0.037	0.040
16	252000	75200	58800	12000	3500	2850	0.169	**0.035**	0.038
17	263500	78540	61540	11500	3340	2740	0.162	0.034	0.037
18	274500	81720	64170	11000	3180	2630	0.155	0.032	**0.035**
19	285000	84740	66690	10500	3020	2520	0.148	0.031	0.034
20	295000	87600	69100	10000	2860	2410	0.141	0.029	0.032
21	304500	90300	71400	9500	2700	2300	0.134	0.027	0.031
22	313500	92840	73590	9000	2540	2190	0.127	0.026	0.029
23	322000	95220	75670	8500	2380	2080	0.120	0.024	0.028
24	330000	97440	77640	8000	2220	1970	0.113	0.022	0.026
25	337500	99500	79500	7500	2060	1860	0.106	0.021	0.025
26	344500	101400	81250	7000	1900	1750	0.099	0.019	0.023
27	351000	103140	82890	6500	1740	1640	0.092	0.018	0.022
28	357000	104720	84420	6000	1580	1530	0.085	0.016	0.020
29	362500	106140	85840	5500	1420	1420	0.078	0.014	0.019
30	367500	107400	87150	5000	1260	1310	0.071	0.013	0.018
31	372000	108500	88350	4500	1100	1200	0.064	0.011	0.016
32	376000	109440	89440	4000	940	1090	0.056	0.009	0.015
33	379500	110220	90420	3500	780	980	0.049	0.008	0.013
34	382500	110840	91290	3000	620	870	0.042	0.006	0.012
35	385000	111300	92050	2500	460	760	**0.035**	0.005	0.010
36	387000	111600	92700	2000	300	650	0.028	0.003	0.009
37	388500	111740	93240	1500	140	540	0.021	0.001	0.007
38	389500	111720	93670	1000	-20	430	0.014	0.000	0.006
39	390000	111540	93990	500	-180	320	0.007	-0.002	0.004
40	390000	111200	94200	0	-340	210	0.000	-0.003	0.003

The optimal composition obtained from Table -8 is 35 sortie C-130 Hercules, 16 sortie F-27, and 18 sortie CN-235. Under this condition the amount of freight that can be transported is 524,370 Kg

(from 385,000 + 75,200 + 64,170), in 69 sortie (from 35 + 16 + 18). If it must be completed within two weeks or 69 sortie to carry a load of 1,006,792 Kg. (Actual charge), no optimal conditions are achieved because the amount of cargo transported is twice the optimum load amount. In order to obtain the optimal conditions of departure and destination airports each must be more than one, exactly two airports in 138 sortie. For that, it takes two weeks, otherwise it takes four weeks.

a. Flight Medan - Four Airports

For simulating the approximate value of marginal use II (see Table -9), also refer to Table -3 and Table -7 and assuming air transport operating times of approximately two weeks.

Tabel -9. Simulation of Marginal Utility Value Approach II

Number of sorti	Total carrying capacity (TU) (Kg)			Marginal Transport Power (MU) (Kg)			MU/P		
	F-27	CN-235	C-212	F-27	CN-235	C-212	F-27	CN-235	C-212
1	5900	4500	2700	5900	4500	2700	0.261	0.263	0.217
2	11640	8890	5330	5740	4390	2630	0.254	0.257	0.211
3	17220	13170	7890	5580	4280	2560	0.246	0.250	0.206
4	22640	17340	10380	5420	4170	2490	0.239	0.244	0.200
5	27900	21400	12800	5260	4060	2420	0.232	0.238	0.194
6	33000	25350	15150	5100	3950	2350	0.225	0.231	0.189
7	37940	29190	17430	4940	3840	2280	0.218	0.225	0.183
8	42720	32920	19640	4780	3730	2210	0.211	0.218	0.178
9	47340	36540	21780	4620	3620	2140	0.204	0.212	0.172
10	51800	40050	23850	4460	3510	2070	0.197	0.205	0.166
11	56100	43450	25850	4300	3400	2000	0.190	0.199	0.161
12	60240	46740	27780	4140	3290	1930	0.183	0.193	0.155
13	64220	49920	29640	3980	3180	1860	0.176	0.186	0.149
14	68040	52990	31430	3820	3070	1790	0.169	0.180	0.144
15	71700	55950	33150	3660	2960	1720	0.162	0.173	0.138
16	75200	58800	34800	3500	2850	1650	0.155	0.167	0.133
17	78540	61540	36380	3340	2740	1580	0.148	0.160	0.127
18	81720	64170	37890	3180	2630	1510	0.140	0.154	0.121
19	84740	66690	39330	3020	2520	1440	0.133	0.147	0.116
20	87600	69100	40700	2860	2410	1370	0.126	0.141	0.110
21	90300	71400	42000	2700	2300	1300	0.119	0.135	0.104
22	92840	73590	43230	2540	2190	1230	0.112	0.128	0.099
23	95220	75670	44390	2380	2080	1160	0.105	0.122	0.093
24	97440	77640	45480	2220	1970	1090	0.098	0.115	0.088
25	99500	79500	46500	2060	1860	1020	0.091	0.109	0.082
26	101400	81250	47450	1900	1750	950	0.084	0.102	0.076
27	103140	82890	48330	1740	1640	880	0.077	0.096	0.071
28	104720	84420	49140	1580	1530	810	0.070	0.090	0.065
29	106140	85840	49880	1420	1420	740	0.063	0.083	0.059
30	107400	87150	50550	1260	1310	670	0.056	0.077	0.054
31	108500	88350	51150	1100	1200	600	0.049	0.070	0.048
32	109440	89440	51680	940	1090	530	0.042	0.064	0.043
33	110220	90420	52140	780	980	460	0.034	0.057	0.037
34	110840	91290	52530	620	870	390	0.027	0.051	0.031
35	111300	92050	52850	460	760	320	0.020	0.044	0.026
36	111600	92700	53100	300	650	250	0.013	0.038	0.020

37	111740	93240	53280	140	540	180	0.006	0.032	0.014
38	111720	93670	53390	-20	430	110	-0.001	0.025	0.009
39	111540	93990	53430	-180	320	40	-0.008	0.019	0.003
40	111200	94200	53400	-340	210	-30	-0.015	0.012	-0.002

The optimal compositions obtained from Table -9 are 27 sortie F-27 Fokker, 30 sortie CN-235 Casa-Nurtanio, and 26 C-212 Casa. Under this condition the amount of charge that can be transported is 237,740 Kg (from 103.140 + 87.150 + 47.450), in 83 sortie (from 27 + 30 + 26). If it has to be completed within two weeks or 83 sortie to carry a load of 1,070,523 kg (actual charge), no optimal conditions are achieved because the amount of cargo transported is four times the optimal load amount. In order to obtain optimal conditions, the airport of departure should be more than one, exactly four airports in 332 sortie. For that, it takes two weeks, otherwise it takes eight weeks.

Interpretation of Data Processing Results

The air transportation aid for disaster response in Aceh in 2004 was carried out for three months, but according to the function it has to be completed about two weeks by optimizing the implementation of air transport operations.

Transportation Jakarta - Medan

With the same amount of payload it can be transported in a sortie (not a sortie as in the actual event), but not with one departure and destination airport. For that, it takes two airports of departure besides *Halim Perdanakusuma* namely *Juanda airport Surabaya* and destination airports such as *Sultan Syarif Kasim II Pekanbaru* in addition to *Polonia Medan*. Thus, in addition to time can be saved to only two weeks, efficiency will also be achieved in the activities of landfilling (cargo) that is Surabaya to eastern Indonesia and Jakarta to western Indonesia.

Transportation Medan - Destination / Location

With the same amount of charge can be transported in 332 sorties, but not with a departure airport but at least four airports, for example in addition to the *Medan Polonia Airport*, as well as *Hang Nadim Batam, Sultan Syarif Kasim II Pekanbaru*, and *Minangkabau Padang*.

Thus, time can be saved to just two weeks. This effort can be realized if the aircraft's readiness can be improved. During this time, the aircraft operated about 36% of normal power. If, this condition can be improved and upgraded to 60% it appears to be an adequate percentage of the number of aircraft allocated to OMSP as much as 100% of the number of aircraft in circulation. To maintain the level of preparedness in support of the main task of the Indonesian National Army, it is not wise to mean that not all operational aircraft can be allocated to OMSP. Therefore, in addition to improving the readiness of aircraft in circulation also adds strength especially to Fokker F-27 aircraft, CN-235 Cassa, and C-212 Casa or similar.

CONCLUSION

The implementation of OMSP in Aceh from 27 December 2004 to 27 March 2005 was not optimal, in terms of the number of sortie achieved and the length of operation. For Jakarta - Medan route, the number of sorti is 259, while for the Medan route - to the location, the number of sorti 376 within three months. According to the optimization technique the Marginal Utility mission should be completed within two weeks, each with a sortie sort of 138 for the Jakarta -

Medan nets as well as 332 sorties for the Medan nets - to the location. In this case it is required that the airport of departure and / or destination be added. *Jakarta - Medan to Medan - Jakarta* and *Surabaya - Pekanbaru*, while *Medan - Location to Medan - Location, Batam - Location, Pekanbaru - Location, and Padang - Location*. Otherwise, *Jakarta - Medan* route takes four weeks and *Medan* - location for eight weeks. Then it is suggested that; a) In this regard, it is necessary to increase the aircraft's readiness level in circulation status and to increase the power of F-27, CN-235 and C-212 aircraft or similar; b) It is necessary to upgrade the capability of a particular airport or air base by completing facilities for emergency air transport, especially in disaster prone areas; c) In addition to that, in the interest of the main task there should be provision on the amount or percentage of the aircraft's ready-to-operate power that can be allocated to OMSP at any given moment.

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