The Seybold Report
ISSN 1533-9211
DOI 10.17605/OSF.IO/2Y7AG

UTILIZATION OF UNMANNED AERIAL VEHICLE (UAV) TECHNOLOGY AS SURVEILLANCE IN SUPPORTING SMART DEFENSE IN THE NEW CAPITAL CITY

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Abstract

To protect the Nusantara Capital City as the center of gravity for Indonesia, it is necessary to adjust the national defense strategy as a whole. The relocation of the new State Capital is expected to create new centers of economic growth, maximize the potential of regional resources, reduce the population density directly related to traffic jams in Jakarta, and reduce inequality between regions. In its implementation, it requires an implementation of a smart defense built by synergizing between hard defense (military defense) and soft defense (non-military defense). The research objective is to analyze UAV technology's selection and strategic determination as surveillance in supporting smart defense in the Nusantara Capital City. This study used mixed method with interviews and questionnaires from experts selected according to the needs of the research object. The processing uses a combination of the Analytic Network Process (ANP) method with Super Decisions tool in choosing a comparison of criteria, sub-criteria, and alternative uses of UAV, which uses 4 criteria, 13 sub-criteria, and 3 alternative UAV models. It is strengthened by PESTEL (Political, Economic, Social, Technology, Environment, and Legal), SWOT (Strength, Weakness, Opportunity, and Threat) and the analysis method for determining strategies for making UAV selection decisions. The result of the ANP analysis using the super decision tool shows that the UAV CH-4 Rainbow selected as the surveillance tool in supporting smart defense in the Nusantara Capital City. The Normalized Geometric Mean value for the Capability criteria is 0.56501, and Cost is 0.26220, Dimension is

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0.11750, Maintenance is 0.05528. Based on SWOT-PESTEL analysis, the results were obtained in Quadrant I, "Supporting Aggressive Strategy" with an Internal Factor Analysis Summary (IFAS) value of 0.089587 and an External Factor Analysis Summary (EFAS) value of 0.074759.

Keywords: UAV, Smart Defense, ANP Super Decisions, and PESTEL-SWOT

1. INTRODUCTION

President Joko Widodo decided to move new National Capital from Java Island to Kalimantan. It is hoped that The Capital City of Nusantara will become a new center of gravity in boosting the economy in the central and eastern regions of Indonesia (Kemenkominfo, 2022). The relocation of the Capital City is expected to create new centers of economic growth and maximize the potential of regional resources. The relocation is intended to reduce the population density directly related to congestion in Jakarta and reduce economic disparities between regions. Based on the 2020 Indonesian population census results, almost 56.56%, or around 150.18 million people, are concentrated on the island of Java (BPS, 2020).

The relocation and construction of the new capital city need to be supported by a robust, integrated, and modern defense and security system and spatial infrastructure. The national defense system is a universal defense system that involves all citizens, territories, and other national resources. The defense system must be prepared early by the government and implemented in a total, integrated, directed, and continuous manner to uphold national sovereignty, territorial integrity, and security of all nations from all threats.

To protect Nusantara Capital City as the center of gravity for Indonesia, it is necessary to adjust the national defense strategy as a whole. Based on the Law Number 3 of 2022, it is mandated that the defense development of the new State Capital has the capability of deterrence in a layered defense system and strategy by adopting a smart defense that is built by synergizing between hard defense (military defense) and soft defense (non-military defense). With an integrated and coordinated defense system, it will be able to deter and take action, as well as destroy any threat effectively and efficiently. Its implementation requires the implementation of technology-based smart defense, diplomacy, and integrated local wisdom that is universal by involving all components and national resources.

Implementing technology-based smart defense requires an unmanned aerial vehicle (UAV), a type of aircraft (drone). That can be controlled remotely by a pilot or can control itself using the laws of aerodynamics. It is expected that the UAV carry weapons and other payloads (Syofianti, R., 2011). In carrying out military tasks, UAVs have excellent advantages compared to other military aircraft technologies, such as surveillance tools and intelligence, carrying out missions in dangerous areas, and supporting routine security patrols (Hikmah, N., 2015). Uncrewed aircraft first appeared as a military tool in the 18th century and was used by the North Atlantic Treaty Organizations (NATO) for reconnaissance and spying (Pasaribu, F., 2017). The United States used uncrewed aircraft as reconnaissance equipment in the 1990 gulf war, even before Israel used reconnaissance drones in 1982 and 1996 in Lebanon.

Uncrewed aircraft, in practice, are more widely used as military tools. The minimum risk in carrying out dangerous missions, the high level of efficiency in use, and lower production costs

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ISSN 1533-9211
DOI 10.17605/OSF.IO/2Y7AG

compared to crewed aircraft are the main reasons why uncrewed aircraft are in great demand to be used in the military field. These advantages have also caused uncrewed aircraft to be widely used and developed in various countries. On the one hand, technological developments, especially the development of uncrewed aircraft, provide many positive benefits. On the other hand, these technological advances cannot be matched by progress in existing laws, so there is an opportunity for abuse of military power.

Based on the above conditions, an analysis of the selection and determination of the UAV strategy is needed to decide the best surveillance equipment to support smart defense in the new Capital City. The purpose of this study is to use the Analytic Network Process (ANP) method with the support from super decisions tools in identifying comparison criteria, sub-criteria, and alternatives in using UAV technology from various countries and strengthened by PESTEL-SWOT analysis method in determining strategies for alternative UAV selection.

2. RESEARCH METHOD

This research uses mixed methods; data processing uses the new Analytic Network Process (ANP) approach and the nifty decision tool in which quantitative assessment and calculation aspects aim to get a value or viewpoint represented by experts. Furthermore, the SWOT-PESTEL analysis method was used to determine the strategy of alternative UAVs as surveillance in supporting smart defense in Nusantara Capital City.

This study uses two types of data sources, namely primary data sources and secondary data sources. Data collection both primary data and secondary data were analyzed using ANP and SWOT-PASTEL. The ANP analysis is weighted by respondents using a questionnaire while the SWOT-PASTEL analysis is formulated from the results of interviews and data processing. Primary data come from interviews and questionnaires from four selected experts, which can provide information that will be used as the primary data source in the early stages of research development. In addition, there are also several secondary data sources originating from books, journals, legislation, and regulations related to the research.

a) Analytic Network Process (ANP) Method

ANP is a mathematical theory that allows decision-makers to deal systematically with interrelated factors (dependencies) and feedback. The decision-making method is based on Multi-Criteria Decision Making (MCDM) with the super decision tool version 3.10 using a general framework and a multi-criteria decision-making process without assumptions. The advantage of the ANP method is that it can help measure decision-making and integrate many factors in the network (Saaty, 2013). Elements in a cluster can affect other elements in the same cluster (internal dependency), and focusing on each criterion can also affect elements in other clusters (external dependency). ANP intends to understand the overall effect of all elements. Therefore, all standards must be arranged and prioritized in a hierarchical control or network framework, which can be compared and integrated to get the priority order of the standard set. Furthermore, ANP also aims to get the influence of the elements in the feedback system by paying attention to each criterion. Finally, the results of this effect are weighted according to the importance that the standard feedback network is the structure to be used to solve problems

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that cannot be structured using a hierarchical structure. The feedback network consists of interactions and dependencies between lower-level elements. The feedback structure does not have a linear form from top to bottom but looks like a circular network on each cluster of each element and can be circular on the cluster itself. This form cannot be called a level. Feedback also has a source and sink. The source point indicates the starting point of the interest path and has never been used as a destination for other interest paths. In contrast, the spill point is a point that is the destination of the interest path and has never been the origin of other interests (Aam & Abrista, 2013).

In this study, the number of samples selected in filling out the ANP weighting based on the views of experts was four respondents. The selected experts are given a code according to the needs of the research object, including: [E1] Member of DPR Commission I, [E2] Director of Planning, [E3] Head of Information and Data Processing Section, and [E4] Development Planner. The ideal UAV decision-making is based on specific criteria from interviews with experts and considering references from books, journals, national and international magazines, and other references. The results of the criteria and sub criteria for UAV determination are shown in table 1. Following are the steps on how data analysis was conducted in this study:

Step 1: Determine the desired criteria and sub-criteria to determine the problem to be solved in a clear, detailed, and easy-to-understand manner, and be given a code label to facilitate calculations. A solution that might be suitable for the problem will be determined. Criteria and sub-criteria listed on Table 1 are the result of with the experts.

Table 1: Analysis Criteria for UAV Determination

No.	UAV Criteria	Code	Sub-Criteria	Code
1.	Dimensions	C1	Wingspan	C1-1
			Length	C1-2
			Height	C1-3
2.	Performance	C2	Endurance	C2-1
			Range	C2-2
			Cruise Speed	C2-3
			Payload Capacity	C2-4
3.	Maintenance	C3	Spare Part	C3-1
			Human Resources	C3-2
			Facilities	C3-3
4.	Cost	C4	Acquisition Cost	C4-1
			Operational Cost	C4-2
			Maintenance Cost	C4-3

Step 2: Determining alternative UAV technologies from several countries equipped with technical specifications in terms of dimensions, capabilities (endurance, range, cruising speed, and payload capacity), maintenance, and acquisition costs of UAVs as surveillance to support smart defense in Nusantara Capital City.

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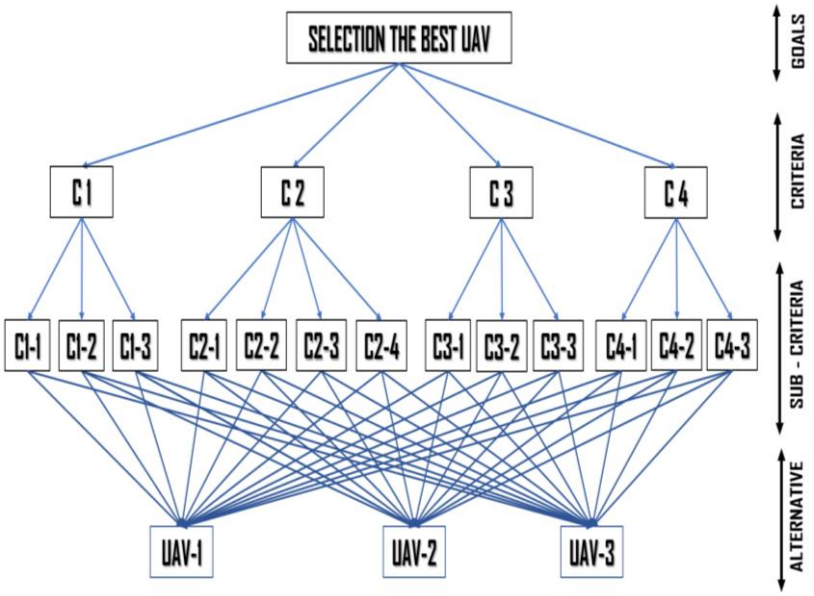
ISSN 1533-9211
DOI 10.17605/OSF.IO/2Y7AG

Table 2: UAV Type Alternatives

Parameter	MQ-1 Predator	CH-4 Rainbow	Bayraktar TB2
Figure			
Manufacturing Country	USA	China	Turkey
Model	Fix wing	Fix wing	Fix wing
Length	8,2 m	9,0 m	6,5 m
Wingspan	16,8 m	18 m	12 m
Height	2,1 m	3,8 m	2,2 m
Payload Capacity	204 kg	115 kg	150 kg
Range	1.900 km	3.500 km	300 km
Endurance	24 hrs.	14 hrs.	27 hrs.
Cruise Speed	130 km/hr.	350 km/hr.	222 km/hr.
Acquisition Cost	US$ 32 M	US$ 4 M	US$ 5 - 5.5 M

Step 3: Create a hierarchical structure starting with the primary goals regarding selecting the best UAV technology from various countries as surveillance in supporting smart defense in Nusantara Capital City. After compiling the main goal as the top level, a hierarchical level of criteria and sub-criteria will be arranged below it. Data processing results produce Normalized Geometric Mean values for each criterion and sub-criteria, and ranking is carried out. The hierarchical structure in this study can be seen in Figure 1.

Figure 1: UAV Selection Hierarchy Model



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ISSN 1533-9211
DOI 10.17605/OSF.IO/2Y7AG

Step 4: Preparing pairwise comparison matrices between criteria, sub-criteria, and alternatives. After that, entering the relative importance weights between criteria, sub-criteria, and alternatives based on decision makers preferences using values based on the scale.

The ANP (Analytical Network Process) method develops the AHP method. ANP allows interaction and feedback from elements within the cluster (Inner Dependence) and between clusters (Outer Dependence). ANP is an unstructured problem-solving method that requires dependence on the relationships between its elements. ANP is a non-parametric and non-Bayesian qualitative approach to decision-making with a general framework without making assumptions. However, there is an interdependent relationship between elements and alternatives. In this study, it is assumed that a system has N clusters where the elements in each cluster interact with each other or influence some or all of the existing clusters. If the cluster is denoted by Dimensions (C1), Performance (C2), Maintenance (C3), and Cost (C4), each has 3 (C1), 4 (C2), 3 (C3) and 3 (C4) elements. The influence of a set of elements in a cluster on other elements in a system can be represented through a ratio-scale priority vector taken from pairwise comparisons. This network has a high complexity compared to different types because of feedback from one cluster to another or with the cluster itself. After weighing the criteria for mutual influence, it will lead to the most appropriate alternative, especially in this study. The working principle of ANP is shown in Figure 2.

Table 3: Relative Level of Importance Scale

Relative Level of Importance	Definition
1	both elements are equally important
3	one element is slightly more important than the other
5	one element is more important than the other
7	one element is certainly more important than the other
9	one element is absolutely more important than the other
2, 4, 6, 8	Intermediate values between two adjacent preferences

b) PASTEL-SWOT Analysis Method

PESTEL analysis is an acronym for tools used in strategic management to analyze, identify, and monitor what internal and external factors may have an impact in the future. The PESTEL acronym consists of six words representing P (Politics), E (Economics), S (Social), T (Technology), E (Environment), and L (Legal).

P (Politics) determines the extent to which the government can influence the economy. The factors include fiscal policy, trade tariffs, and tax policies that can affect the broader economic environment. E (Economics) is a factor that directly impacts the company: rising inflation, product prices, and consumer services. S (Social) describes the social environment of a company and can identify business trends or strategies that occur in society based on demographics, culture to population analysis. T (Technology) affects companies where, when they started, many companies automated their operations. E (Environment) is a factor that talks about the role of the environment in providing success to business industries that depend on the environment. Furthermore, L (Legal) is a legal factor that influences a country's business

ISSN 1533-9211

DOI 10.17605/OSF.IO/2Y7AG

environment, such as the government's law (Natasya, P., 2022). SWOT is an acronym for internal strengths and weaknesses, as well as opportunities and threats faced. This analysis is based on the assumption that an effective strategy is derived from a good "fit" between internal resources (strengths and weaknesses) and external situations (opportunities and threats). A good fit will maximize strengths and opportunities and minimize weaknesses and threats (Pearce & Robinson, 2014).

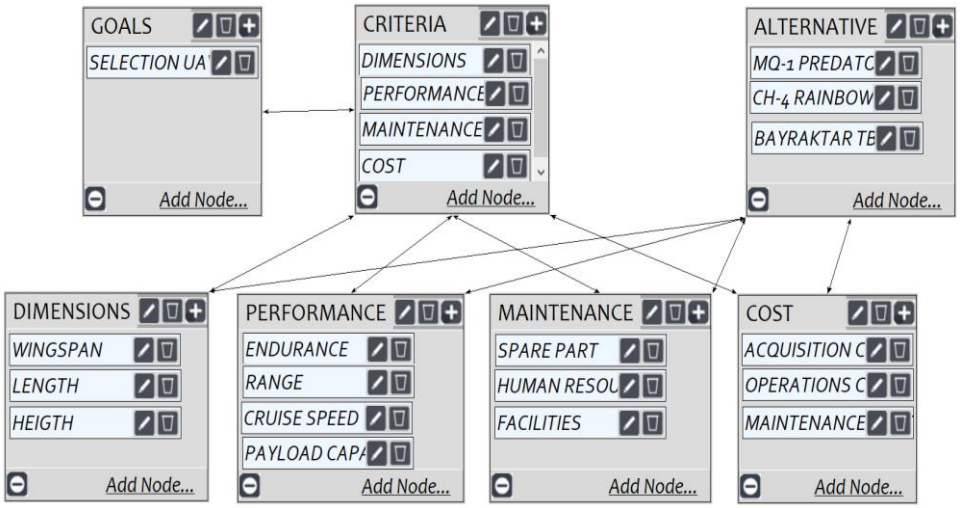
The SWOT analysis compares the Internal Factor Analysis Summary (IFAS) and the External Factor Analysis Summary (EFAS), namely internal and external forces faced with existing opportunities and threats. From this analysis, clausal mapping is obtained for the factors used as SWOT weight and score calculations, and the best quadrant is produced in determining strategy. The scale used in this study uses a Likert scale with 1 (strongly disagree), 2 (disagree), 3 (neutral), 4 (agree), and 5 (strongly agree).

3. RESULT AND DISCUSSION

A. Results of ANP Multi-Criteria Decision Making

The application of ANP for the decision-making acquisition of Unmanned Aerial Vehicles in this study consists of four criteria consisting of [C1] Dimensions, [C2] Capability, [C3] Maintenance, and [C4] Cost as mentioned in table 1. Dimensional criteria describe the form or condition of the UAV as surveillance. Capability criteria are the type and level of capability possessed by the UAV to support various national defense missions, maintenance criteria are related to maintenance aspects of the UAV to carry out its functions, and cost criteria include all costs incurred. Necessary to acquire, operate and maintain the UAV. Hierarchical modelling of ANP applications is shown in Figure 2.

Figure 2: Hierarchical Modelling in ANP Applications



After the hierarchical modelling has been compiled using a hierarchical structure and a feedback network, the process of evaluating each criterion, sub-criteria, and alternative is

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ISSN 1533-9211
DOI 10.17605/OSF.IO/2Y7AG

continued. The results obtained are in the form of Normalized Geometric Mean values and rankings, as shown in Tables 5, 6, 7, 8, 9, and 10 below:

Table 5: Results of Comparison Rating Criteria

Criteria	Normalized Geometric Mean	Rank
Ability	0,61930	1
Cost	0,23880	2
Dimensions	0,10096	3
Maintenance	0,04093	4
Consistency Ratio:		**0,04381**

Table 6-7: Comparison Results of Capability and Cost Sub-criteria Rankings

Criteria	Normalized Geometric Mean	Rank
Range	0,61248	1
Durability	0,22326	2
Cruising Speed	0,11216	3
Load Capacity	0,05211	4
Consistency Ratio:		**0,09003**

Criteria	Normalized Geometric Mean	Rank
Acquisition Cost	0,66097	1
Operating costs	0,24672	2
Maintenance cost	0,09232	3
Consistency Ratio:		**0,00675**

Table 8-9: Comparison Results of Dimensional and Maintenance Sub-criteria Rankings

Criteria	Normalized Geometric Mean	Rank
Human Resources	0,66603	1
Spare Parts	0,23800	2
Facility	0,09596	3
Consistency Ratio:		**0,03112**

Criteria	Normalized Geometric Mean	Rank
Length	0,63702	1
Wingspan	0,25828	2
Height	0,10470	3
Consistency Ratio:		**0,03703**

Table 10: Rating Comparison Results between Alternatives and Criteria

USV Alternative	Ability Sub-Criteria	Cost Sub-criteria	Dimension sub-criteria	Maintenance Sub Criteria	Weight Matrix	Rank
CH-4 Rainbow	0,07866	0,16735	0,12177	0,66941	0,60020	1
Bayraktar TB2	0,06639	0,06065	0,01349	0,24263	0,20055	2
MQ-1 Predator	0,06447	0,02198	0,03139	0,08794	0,19926	3

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ISSN 1533-9211
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B. PESTEL-SWOT Analysis Results

To determine the right decision, one must consider the views of various parties, starting from stakeholders, policymakers, military observers, and users of military power. It is necessary to analyze strengths, weaknesses, opportunities, and threats in determining UAVs to strengthen national defense. Interviews with experts and literature studies produced indicators from Uthe views of various aspects related to selecting the right UAV in maintaining national integrity and resilience, especially in the nation's capital. The formulation of indicators is shown in table 11.

Table 11: Determination of IFAS and EFAS in PESTEL-SWOT

ASPECT	Internal Factors Analysis Summary (IFAS)		External Factors Analysis Summary (EFAS)	
	STRENGTH	WEAKNESS	OPPORTUNITY	THREAT
	1	2	3	4
POLITIC	Diplomatic relations between two countries has been established for a long time, with the political commitment of the leaders of the two countries to establish equal political relations in a comprehensive and mutually respectful partnership, free from threats of embargo	Procurement of armed UAVs purchased from abroad is not accompanied by efforts to modernize adequate maintenance and repair facilities. Furthermore, the dominance of SOEs in the Indonesian defense industry ecosystem has yet to show the existence of helices and supply chains in the Indonesian defense industry.	As a new axis of power, China tends to be more open and flexible in carrying out cooperation, so it can be an opportunity for Indonesia to access high technology from China.	The dynamics of Indonesia-China political relations can heat up due to the South China Sea Conflict, thus potentially causing risks to the Transfer of Technology (ToT) process and the CH-4 Rainbow UAV Spare Part Supply.
ECONOMY	The significantly increased (aggregate) of defense budget can be used to procure the CH-4 Rainbow UAV. The price tends to be cheap, around US$ 4 million. So far, the range of war drones is around US$ 1 million to US$ 25 million.	The defense budget allocation stagnation around 0.8% of GDP. Lack of alignment of government budget policies for MRO/Maintenance implementing institutions in the context of increasing the capability of defense equipment maintenance and repair facilities.	The UAV CH-4 Rainbow Military Armament System purchase is cheaper because trade between Indonesia and China continues to increase, and investment activities continue to increase, with a total investment value of US$ 3.5 billion. It is supported by strengthening ASEAN+3 Cooperation (China, Japan, United States of America) and ACFT (ASEAN China Free Trade).	There was an imbalance in economic stability between Indonesia and China. It is because the achievements of Indonesia's economic program as a developing country depends on the management of natural resources, while China's industrial and technological developments are developing as a whole. As a result, it can potentially make Indonesia a peripheral country forever in defense cooperation with China.

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ASPECT	Internal Factors Analysis Summary (IFAS)		External Factors Analysis Summary (EFAS)	
	STRENGTH	WEAKNESS	OPPORTUNITY	THREAT
	1	2	3	4
SOCIAL	Indonesian users such as the Indonesian Air Force welcome the plan to acquire the CH-4 Rainbow UAV, given its ability to be used to support smart defense in the Archipelago's Capital City more effectively.	Some parties have negative sentiments regarding purchasing/procurement/cooperation with China.	N / A	The cooperation has the potential to be a step towards recovering China's goals related to BRI, fishing ground (nine-dash line), and other interests in the South China Sea.
TECHNOLOGY	The R & D engineering trajectory in the UAV field will make it easier for us to adapt for later use of CH-4. The CH-4 UAV has been equipped with a satellite communications system to extend its operating range to 1,080 nautical miles (2,000 km). UAV CH-4 Rainbow has received a Military Airworthiness Certificate from the Ministry of Defense. Drone trial has been conducted with satisfactory result	The unavailability of CH-4 Rainbow UAV Depot and Maintenance Facilities, as well as Domestic UAV maintenance service providers	Potential to be developed by the Defense Industry in Indonesia to make similar UAVs through the ToT mechanism, Trade offs for Local Content, and Offsets to be made in Indonesia	There is potential dependence on UAV CH-4 Rainbow Parts from Producing Countries (China)
ENVIRONMENT	In line with the provisions of Government Regulation Number 101 of 2014 concerning the Management of Hazardous and Toxic Waste; Government Regulation Number 41 of 1999 concerning Air Pollution Control, The number of dust particles and the degree of noise measured by air quality and noise measuring devices, considering that the UAV CH-4 Rainbow is environmentally friendly, does not cause air and noise pollution	N / A	Ownership of the UAV CH-4 Rainbow will increase the ability to detect threats early and increase surveillance in areas that are difficult to reach.	N / A

ISSN 1533-9211

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ASPECT	Internal Factors Analysis Summary (IFAS)		External Factors Analysis Summary (EFAS)	
	STRENGTH	WEAKNESS	OPPORTUNITY	THREAT
	1	2	3	4
LEGAL	Legal aspects have been regulated in Law Number 16 of 2012, which regulates mechanisms for cooperation and procurement from abroad, Minister of Defense Regulation Number 30 of 2015 concerning Offsets; Government Regulation (PP) Number 76 of 2014 concerning Counter-Trade Mechanisms in the Procurement of Defense and Security Equipment from Abroad; and other relevant regulations.	It still needs to ratify the MoU on procurement and processing cooperation between Indonesia and China.	The acquisition program opens up the potential to implement Law Number 16 of 2012 concerning the Defense Industry in order to increase the Capacity of the Domestic Defense Industry. In addition, Indonesia also has an MoU Establishing a High-Level Dialogue and Cooperation Mechanism (HDCM).	N / A

Internal Factor Analysis Summary (Ifas)			
Strength (S)	Weight	Rate	Score
Established diplomatic relations between the two countries for a long time, with the political commitment of the two countries' leaders to establish equal political relations in a comprehensive and mutually respectful partnership and free from threats from the embargo. In line with the leadership's policy to modernize the defense equipment.	0,148485	0,127168	0,018882
The significantly increased (aggregate) defense budget can be used to procure the CH-4 Rainbow UAV.	0,145455	0,132948	0,019338
The Indonesian Air Force user welcomes the plan to acquire the CH-4 Rainbow UAV, given its ability to support smart defense in the Archipelago's Capital City more effectively.	0,118182	0,138728	0,016395
The R & D engineering trajectory in the UAV field will make it easier for us to adapt for later use of CH-4.	0,136364	0,141618	0,019312
The use of UAV is in line with the provisions of Government Regulation Number 101 of 2014 concerning the Management of Hazardous and Toxic Waste. Furthermore, UAV CH-4 Rainbow also in accordance with the Government Regulation Number 41 of 1999 concerning Air Pollution Control, The UAV CH-4 Rainbow is environmentally friendly, does not cause air & noise pollution.	0,057576	0,130058	0,007488

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Legal aspects have been regulated in Law Number 16 of 2012, which regulates mechanisms for foreign cooperation and procurement, Minister of Defense Number 30 of 2015 concerning Offsets; Government Regulation Number 76 of 2014 concerning Counter-Trade Mechanisms in the Procurement of Foreign Defense and Security Equipment; and other relevant regulations.	0,139394	0,121387	0,016921
Weakness (W)			
Procurement carried out through the purchase of foreign the main tool of the Indonesian armed forces weapon system is not accompanied by efforts to modernize maintenance and repair facilities; the dominance of SOEs in the Indonesian defense industry ecosystem has yet to show the existence of a helix and supply chain in the Indonesian defense industry.	0,047138	0,040462	0,001907
The stagnation of the defense budget allocation, which is always only around 0.8% of GDP; The lack of alignment of government budget policies towards MRO/Maintenances implementing institutions in the context of increasing the capability of defense equipment maintenance and repair facilities.	0,048485	0,043353	0,002102
Some parties have negative sentiments regarding purchasing/procurement/cooperation with China	0,054545	0,034682	0,001892
The unavailability of CH-4 Rainbow UAV Depot and Maintenance Facilities, as well as Domestic UAV maintenance service providers	0,051515	0,043353	0,002233
N / A			
It still needs to ratify the MoU on procurement and processing cooperation between Indonesia and China.	0,054545	0,046243	0,002522
			0,008749
External Factor Analysis Summary (EFAS)			
Opportunity (O)			
China as a new axis of power, tends to be more open and flexible in carrying out cooperation, so it can be an opportunity for Indonesia to access high technology from China.	0,144781	0,120603	0,017461
The UAV CH-4 Rainbow Military Armament System purchase is cheaper because trade between Indonesia and China continues to increase, and investment activities continue to increase, with a total investment value of US$ 3.5 billion. It is supported by strengthening ASEAN+3 Cooperation (China, Japan, United States of America) and ACFT (ASEAN China Free Trade).	0,158249	0,123116	0,019483
N / A			

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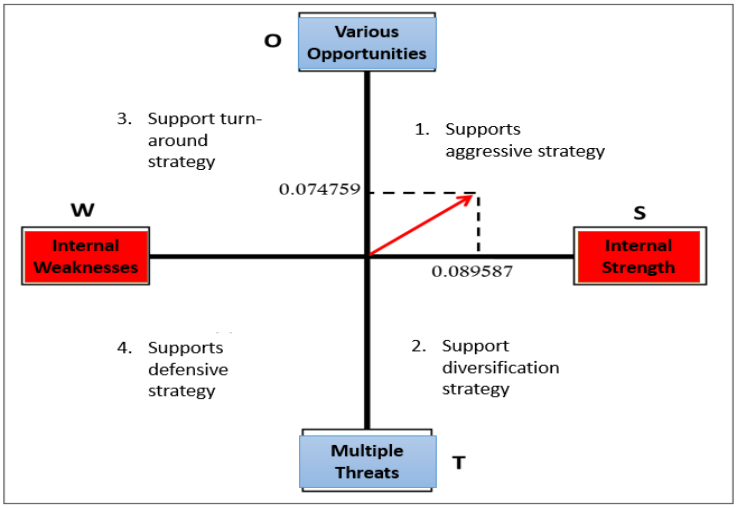
The potential for development by the Defense Industry in Indonesia is to make similar UAVs through the ToT mechanism, Trade off for Local Content and Offsets to be made in Indonesia.	0,164983	0,123116	0,020312
Ownership of the UAV CH-4 Rainbow will increase the ability to detect threats early and increase surveillance in areas that are difficult to reach.	0,161616	0,125628	0,020304
The acquisition program opens up the potential to implement Law Number 16 of 2012 concerning the Defense Industry in order to increase the Capacity of the Domestic Defense Industry. In addition, Indonesia also has an MoU Establishing a High-Level Dialogue and Cooperation Mechanism (HDCM).	0,158249	0,115578	0,018290
			0,095850
Threat (T)			
The dynamics of Indonesia-China political relations have the potential to heat up due to the South China Sea Conflict, thus potentially causing risks to the Transfer of Technology (ToT) process and Supply of UAV CH-4 Rainbow Parts.	0,047138	0,113065	0,005330
There was an imbalance in economic stability between Indonesia and China. It is because the achievements of Indonesia's economic program as a developing country that depends on the management of natural resources, while China's industrial and technological developments are developing as a whole. As a result, it can potentially make Indonesia a peripheral country forever in defense cooperation with China.	0,053872	0,120603	0,006497
The cooperation has the potential to be a step towards recovering China's goals related to BRI, fishing ground (nine-dash line), and other interests in the South China Sea.	0,050505	0,032663	0,001650
There is a potential dependence on CH-4 Rainbow UAV Parts from Producing Countries (China).	0,060606	0,125628	0,007614
N / A			
N / A			
			0,021090

Internal (X)	**Weight**	**External (Y)**	**Weight**
Strength	0,098336	Opportunity	0,095850
Weakness	0,008749	Threat	0,021090
Difference	0,089587	**Difference**	0,074759

ISSN 1533-9211

DOI 10.17605/OSF.IO/2Y7AG

Figure 3: SWOT Analysis Result Quadrant



Based on the PESTEL-SWOT analysis, the results were obtained in Quadrant I, "Supporting Aggressive Strategies" which means strategies that support Government policies to continue to maximize existing strengths and opportunities to move forward and achieve tremendous success. The result of the internal value (x) of the difference between strengths and weaknesses is 0.089587, and the external value (y) of the difference between opportunities and threats is 0.074759. Based on the results of the calculation value between Weight x Rating, the 3 (three) best strategies with the highest score in determining UAV technology are obtained, namely:

S4 - O3 → 0,019312 x 0,020312 = 0,000392

Improving the R&D and Engineering Trajectory in the field of UAV CH-4 Rainbow technology in order to increase the potential to be developed by the Defense Industry in Indonesia in making similar UAVs through the Transfer of Technology (ToT) mechanism, Tradeoff for Local and Offset Content, and implementing Law num. 16 of 2012 concerning the Defense Industry.

S1 - O4 → 0,018882 x 0,020304 = 0,000383

Maintain long-standing diplomatic relations between the two countries with equal political relations in a comprehensive and mutually respectful partnership, acquire CH-4 Rainbow UAV technology to increase the ability to detect early threats, and increase surveillance to areas that are difficult to reach.

S2 - O2 → 0,019338 x 0,019483 = 0,000377

Significantly increase the defense budget so that it can be utilized in the procurement of UAV CH-4 Rainbow defense equipment, which is cheaper (low cost) so that the value of trade between Indonesia and China will continue to increase. Investment activities will continue to increase and strengthen ASEAN + 3 (China cooperation. Japan, United States of America) and ACFT (ASEAN China Free Trade).

The Seybold Report
ISSN 1533-9211
DOI 10.17605/OSF.IO/2Y7AG

4. CONCLUSION

a) This study applies a combination of strategic decision-making using the ANP method with the super decision tool and PESTEL-SWOT to obtain scientifically valuable recommendations. It can be used as a reference for policymakers in the defense sector in Indonesia for the acquisition of Unmanned Aerial Vehicles (AUV).

b) The results of ANP super decision data processing show that the CH-4 Rainbow is an alternative UAV model that ranks first based on the expert's questionnaire. While the "Capability" criterion is the highest priority with a Geometric Mean value of 0.61930 in the selection of UAVs, and the "Range" sub-criteria ranks top in the Capability criteria with a Geometric Mean value of 0.61248.

c) PESTEL-SWOT results show results in Quadrant I, "Supporting Aggressive Strategy" which means a strategy that supports Government policies to continue to maximize existing strengths and opportunities to move forward and achieve tremendous success. The results show that strengths have a higher value compared to weaknesses as shown by the difference score of internal value (x) of the difference between strengths and weaknesses is 0.089587, and the opportunities are higher than threats with the external value (y) of the difference between opportunities and threats is 0.074759.

d) The limitation of this study is the limited range of informants, so further research is needed for a broader range of informants and the views of several countries that created military UAV technology.

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