THE PILOT COMPETENCY DEVELOPMENT MODEL: A CASE STUDY OF INDONESIAN NAVAL AVIATION CENTER

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Abstract: The Indonesian Navy's military condition in facing the globalization era of the industrial revolution 4.0 underwent many significant changes, both in policies and coaching practices that were implemented in regulating developments over the past decade. The competency model was an important basis of human resource functions such as recruitment, training and development, and performance management. The purpose of this study was to identifying and analyzing the pilot competency development model in the Naval Aviation Center. This research was a descriptive study with a qualitative approach. The results of this study concluded that the pilot of the Indonesian Naval Aviation Center requires the development of competency models that were quite significant in various areas of competence such as 1.) Interpersonal Pilot Communication Competencies; 2.) Competence of Aviation Security Personnel; 3.) Competency Constraint Satisfaction Optimization Problem; 4.) Competency of Flight Control Systems that have been tested, licensed, and well implemented.

Keywords: Pilot, competency, competency development, competency development model, Indonesian Naval Aviation Center

Introduction

Indonesia had national jurisdiction area of ± 7.8 million km² with two-thirds of its territory being the sea of ± 5.9 million km², which includes the Indonesian Exclusive Economic Zone (EEZ) of ± 2.7 million km² and the Territorial Sea, Waters and Islands and Waters An area of ± 3.2 million km². In addition, it has a coastline length of ± 81,000 km and has 17,499 islands. As a consequence of the above rules, the territory of Indonesia's national jurisdiction must be seen as a unified territory (space) whether land, sea, and air are rounded and intact. As an archipelagic country, the natural sea has an important meaning for the Indonesian people.

Politically the sea gave birth to a conception of unity not only inward but also outwardly as was recognized by UNCLOS 1982.

The sea also became a vital transportation media (including trade). Like the sea, the islands that are within the territory of national jurisdiction, especially those in the border region also have a very significant meaning. Based on Presidential Regulation No. 78/2005, Indonesia has 92 outermost small islands that need to be managed and secured, 12 of which have vulnerability or have the potential to become sources of conflict, so their existence needs to be maintained because it is a manifestation of state sovereignty.

The Indonesian Navy's military condition in facing the globalization era of the industrial revolution 4.0 underwent many significant changes, both in policies and coaching practices that were implemented in regulating developments over the past decade. The global era also requires a nation to have energy, food security and the mastery of national science and technology to be able to survive and achieve excellence in the 21st century where the global scope is still coloured by the rapid development of military technology as a result of Revolution in Military Affairs (Becker, 2012). Wark & Webber (2015) said that Revolution in Military Affairs had an impact on the advancement of military technology, the concept of operations, organization, military doctrine, and strategy, even broadly affecting political, social, and economic aspects.

Directly or indirectly, Revolution in Military Affairs has triggered an expansion of the arms race that raises the potential for conflict, threatens other countries, and influences regional and global security stability (Kalulu, 2018). Increased awareness of Maritime Domain Awareness globally also influences strategic policy changes in water areas in each country (Endsley, 2015). In order to conquer the challenges while capturing opportunities from the Indonesian Government's national policies related to optimally increasing the performance of

the military personnel of the Indonesian Navy, especially related to pilot competencies at The Indonesian Naval Aviation Center.

Pilot competency development in the Indonesian Naval Aviation Center in each agency must be implemented if the agency wants to develop because according to O'Connor & Walker (2011) one of the benefits and advantages in developing pilot competency can be said to be a reference for success in their work. This accurate competency model will be able to determine exactly what knowledge and skills are needed for success in a job (Potnuru & Sahoo, 2016). If someone holds a certain position (pilot), then he must have the competencies required in his position, surely he is predicted to be successful and successful in carrying out his work duties, especially large-scale institutions to use competency models to help them recognize the skills, knowledge, and personal characteristics needed to successfully achieve optimal performance (Tamborello & Trafton, 2017).

Sateesh *et al.* (2019) stated the competency model is a set of competencies that can jointly determine successful performance in a particular work environment. The competency model is an important basis of human resource functions such as recruitment, training and development, and performance management. The purpose of this study is to describe, identify and analysis about the pilot competency development model in the Naval Aviation Center.

Methodology

Research Approach and Design

This research is a descriptive research method with a qualitative approach. Qualitative research as a research procedure that produces descriptive data in the form of written or oral words from people and observed behavior of phenomena that occur where descriptive research methods emphasize data (Yin, 2016). Besides, everything collected is likely to be the key to what has been studied.

Sampling Technique

Sampling or data sources in this study were carried out purposively and the sample size was determined by a snowball. The following are the informants chosen in this study who are pilots working at the Indonesian Naval Aviation Center:

Table 1: Identification and codification of informants

No	Name	Age	Rank	Work Unit	Codification
1.	Henoch	45	CAPT	Training Command	PILOT-001
2.	Biyanto	53	CDR	Training Command	PILOT-002
3.	Wahjoedi	50	CDR	Training Command	PILOT-003
4.	Zuhri	48	CDR	1st Air wing	PILOT-004
5.	Tri Wibowo	49	CDR	2nd Air wing	PILOT-005
6.	Sensa	36	LCDR	2nd Air wing	PILOT-006
7.	Wahyu	37	LCDR	2nd Air wing	PILOT-007
8.	Ardiansyah	35	LCDR	2nd Air wing	PILOT-008
9.	Marwanto	36	LCDR	Navy pilot School	PILOT-009
10.	Melala	32	LT	Training Command	PILOT-010

(Source: Primary Data, 2020)

Analysis Data Technique

The results of this study only describe or construct in-depth interviews with research subjects so that they can provide a clear picture of the pilot competency development model in the Indonesian Naval Aviation Center by triangulation techniques.

Results and Discussion

Indonesian Naval Aviation Center

The Indonesian Navy as an integral part of the Indonesian Army Force plays the main component of the defence of the country's maritime forces carrying out their duties based on state policy and political decisions to uphold national sovereignty, maintain the territorial integrity of the Unitary State of the Republic of Indonesia based on the Pancasila and the Constitution of 1945, and protect the entire nation and all of Indonesia's blood spills from threats and disruptions to the integrity of the nation and state. Following are some statements from PILOT-002, PILOT-005, PILOT-003, and PILOT-001 statements:

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"The Indonesian Navy as part of the main component of national defence at sea carries out development and development of capabilities and strengths using capability-based planning." (PILOT-002, 2020)

"... by considering the complexity of the assessment of the threat spectrum and the conditions of defence budget constraints, the development of the capabilities and strength of the Indonesian Navy is directed at priority and urgent targets "(PILOT-005, 2020)

"... one of the approaches used is to prepare the Minimum Essential Force. " (PILOT-003, 2020)

"In addition to complementing the Main Armament Weapons System through procurement from abroad, The Indonesian Navy also continues to encourage increased competitiveness and production capacity of the domestic defence industry, as well as realizing harmony in the procurement of defence equipment from abroad through the Transfer of Technology (ToT) and Joint Production programs in procurement and development of The Indonesian Navy's Main Armament System Tool. " (PILOT-001, 2020)

In identifying the competency development model for pilots The Indonesian Naval Aviation Center describes several components of the appropriate pilot dimensions, including 1.) Interpersonal Pilot Communication Competencies; 2.) Competence of Aviation Security Personnel; 3.) Competency Constraint Satisfaction Optimization Problem; 4.) Flight Control System Competencies.

The Competency of Interpersonal Pilot Communication

Adler *et al.* (2016) said that interpersonal communication competence is one's ability to communicate effectively so that it can smooth one's progress in achieving their goals and simultaneously reflect an appreciation for the goals of others. This is in line with the explanation of the following PILOT-007 and PILOT-004 informants:

"Competence of interpersonal communication as the ability to achieve interpersonal goals according to the situational and relational context." (PILOT-007, 2020)

"In my opinion, interpersonal communication competence as the ability to interact well with others, which is good here refers to the quality of accuracy, clarity, understand ability, coherence, expertise, effectiveness and suitability in communication." (PILOT-004, 2020)

Koman & Wolff (2018) developed the interpersonal communication competency scale, based on their findings regarding the most important interpersonal communication skills needed to achieve effective communication. The following is an explanation of each of these skills:

1.) Self-disclosure is defined as the ability to open or reveal other people's personality elements through communication. Self-disclosure is intentionally revealing significant information about yourself that is usually unknown to others.

2.) Empathy is the process of identification and means feeling like others by making others as a reference and not based on personal experience references. Empathy is to take another perspective in an effort to experience their thoughts and feelings.

3.) Social relaxation is the third dimension of competence interpersonal communication and is described as the lack or lack of anxiety or fear in living an everyday social life. Consists of feeling comfortable, low social fears, and the ability to deal with negative reactions or criticisms of others without stress.

4.) Assertiveness refers to the behavior of fighting for one's personal rights by considering the rights of others. Assertive communicators express their needs, they do not attack or negate people's needs and maintain their dignity.

5.) Interaction management is one's ability to handle ritual procedures in daily conversation such as discussing the topic to be discussed, having conversations alternately, starting and ending conversations, and developing conversation topics.

6.) Alter centrism, the sixth dimension, includes showing interest in topics started by others, full attention to what they say and how they say it, responds not only to what is said but also what is not said, responsive to what is the other person thinks and is able to adapt during the conversation.

7.) Expressiveness, namely the ability to communicate feelings through nonverbal behavior and verbal communication of thoughts and feelings. This includes nonverbal behaviours such as facial expressions, body movements, and the use of appropriate words in expressing oneself.

8.) Supportiveness is the ability to provide responses that show solidarity with other situations. The goal is that the feelings of the two people are the same. As a result, communication has become much easier.

9.) Immediacy, ninth skill, refers to a willingness to be approached and available for communication.

10.) Environmental control shows the ability of a person to achieve the goals set and can meet personal needs, the ability to handle conflicts and solve problems in a cooperative atmosphere, and the ability to get compliance from others.

The Competency of Aviation Security Personnel

Miranda (2018) described that Aviation Security is a condition that provides protection to the flight from unlawful actions through the integrated use of human resources, facilities, and procedures which these three elements must always be developed in accordance with needs. The following is an explanation of the following informants PILOT-010, PILOT-006, and PILOT-008:

> "Airport flight security personnel must have the capability and knowledge in the field of aviation security as evidenced by a competency certificate or personnel proficiency certificate." (PILOT-010, 2020)

> "Security personnel must be able to provide good service without having to give a bad impression." (PILOT-006, 2020)
> "Aviation security personnel are not only tasked with ensuring airport security but also as a source of information at airports." (PILOT-008, 2020)

Constraint Programming is a declarative approach to problem-solving by describing problems into a set of constraints to solve combinatorial or optimization problems (Aven,

2016). The following statements are consistent with what was said by informants PILOT-001,

PILOT-009, and PILOT-005:

> "... in programming constraints, we only need to model the problem as a constraint satisfaction problem, and then the solver will find a solution to the problem. " (PILOT-001, 2020)

> "... In modelling problems, we use variables, domains, and constraints that represent the set of solutions. "(PILOT-009, 2020)

> "A constraint is basically a relation of several variables that have a value expressed in a domain." (PILOT-005, 2020)

A constraint is a limit to the possible values for a variable. Some of the advantages of

programming constraints include: 1.) The output is short; 2.) The program is simple so that it

can be easily adapted if there is a change in needs; 3.) The program can be created and modified

quickly, so it is possible to experiment to get the most efficient and fastest computing time

(Young & Dulewicz, 2015).

The Competency of Constraint Satisfaction Optimization Problem

Young & Dulewicz, (2015) said that the standard of constraint satisfaction technique is to only

look for possible solutions, but this can be expanded to get the optimal solution used by

Constraint Satisfaction Optimization Problem (CSOP). The following is an explanation from

PILOT-002 and PILOT-008 informants:

> "The quality of a solution is usually measured by a function called an objective function. CSOP consists of a standard CSP and an optimization function that maps each solution to its numerical value. "(PILOT-002, 2020)

> "... most industrial applications and aviation institutions can use the CSOP concept. " (PILOT-008, 2020)

According to Becker (2012), the most widely used algorithm to get optimal solutions

in CSOP is Branch and Bound, which uses a heuristic function that maps partial labelling to a

numerical value with a depth-first search algorithm to get a solution for various optimization

problems, especially for discrete and combinatorial optimization. The Branch and Bound

algorithm is also a systematic method of searching within a solution space. The Branch and Bound algorithm build a solution space with the BFS (Breadth-First Search) scheme.

The Competency of Flight Control Systems

The Flight Control System is used to control the effect of force on the aircraft, the direction, and the attitude of the aircraft (Judy & Gollery, 2019). This is the statement according to PILOT-006 and PILOT-003:

> "It should be noted that the flight steering control system and its characteristics can vary depending on the type of aircraft." (PILOT-006, 2020)

> "Most of the basic design of the flying steering control system is mechanical." (PILOT-003, 2020)

Based on the operating system combines mechanical parts such as rods, cables, pulleys, and chains to continue the force from the control column to the aircraft control device. Judy (2018) stated that mechanical control systems are currently still used in small aircraft and sports aircraft categories where aerodynamic forces are not too excessive. As for some of the drive systems that are on the plane are as follows:

1.) Mechanical System

> To operating flight control system (mechanically or manually) is the most basic method for controlling an aircraft. It used in early aircraft and are currently used in small aircraft where aerodynamic strength is not excessive. Manual flight control systems used a collection of mechanical components such as pushrod, tension cables, pulleys, counterweights, and sometimes chains to transmit the force applied to the cockpit control directly to the control surface. The turnbuckle is often used to adjust the tension level of the control cable. TB-9 Tampico is a typical example of an aircraft that uses this type of system.

2.) Hydraulic-Mechanical System

Hydraulic-powered control surfaces help overcome this limitation with a hydraulic flight control system, the size and performance of the aircraft are limited by economics rather than pilot muscle strength (Becker, 2012). Initially, only a partially reinforced system was used where the pilot could still feel some aerodynamic payload on the control surface. The complexity and weight of the mechanical flight control system increase significantly with the size and performance of the aircraft.

3.) Fly-by-Wire System

The fly-by-wire (FBW) system replaces the aircraft's manual flight control with an electronic interface. Flight control movements are converted into electronic signals transmitted by cables (therefore the term fly by wire), and flight control computers (Judy, 2018). Commands from the computer are also inputted without the knowledge of the pilot to stabilize the aircraft and perform other tasks.

4.) Flight Control Equipment Work System

The flight control system working on the simulator device has the same movement mechanism as the original conditions on the plane. The pilot as the driving column control in the cockpit will adjust the movement to flight needs. The control column which functions as the aileron and elevator controller and the pedal as the rudder controller will be driven through the intermediate control cable (sling). Where the sling will move the control surface in terms of mechanical movement. So that the control carried out on the control column will be directly connected to the control surface.

The Analysis of Pilot Competency Development Model at the Indonesian Naval Aviation Center

The pilot has several identifications related to the analysis of competency requirements that should be possessed, including 1.) Interpersonal Pilot Communication Competencies; 2.)

Competence of Aviation Security Personnel; 3.) Competency Constraint Satisfaction Optimization Problem; 4.) Flight Control System Competencies. The following are the results of an analysis of the pilot competency development model at the Indonesian Naval Aviation Center:
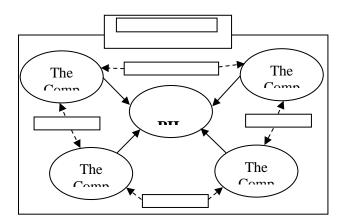

Figure 1: Pilot competency development model at the Indonesian Naval Aviation Center
(Source: Primary Data, 2020)

Conclusion

The results of this study conclude that the pilot of the Indonesian Naval Aviation Center requires the development of competency models that are quite significant in various areas of competence such as 1.) Interpersonal Pilot Communication Competencies; 2.) Competence of Aviation Security Personnel; 3.) Competency Constraint Satisfaction Optimization Problem; 4.) Competency of Flight Control Systems that have been tested, licensed, and well implemented. To conquer the challenges while capturing opportunities from the Indonesian Government's national policies related to optimally increasing the performance of the military personnel of the Indonesian Navy, especially related to pilot competencies at the Indonesian Naval Aviation Center.

The development of pilot competencies in the Indonesian Naval Aviation Center at each headquarters agency must be carried out if the headquarters agency wants to develop

organizationally and institutionally. A pilot has a great responsibility in his work so that not just anyone can just pocket a license. In this pilot flight driving the aircraft following the flight plan and in the cockpit at any time he has an idea to save passengers and aircraft. For multi-crew, a clear division of tasks must be determined who the pilot is flying and who is monitoring the pilot. Synergy in the distribution of tasks and work coordination between them will result in better, safer, and more efficient flight quality.

In developing the competency model some crucial things need to be considered, considered, and even considered by the management of The Indonesian Naval Aviation Center as the party responsible for decision making in the organization. The pilot competency model at The Indonesian Naval Aviation Center for an institution under the auspices of the Indonesian Navy is prepared as well as optimal to suit the characteristics of the pilot personnel, this is because the analysis of competency requirements is also different. Besides, there are other factors such as organizational culture, focus on developing pilot performance results, expected individual behavior of pilots, as well as goals and targets to be achieved by The Indonesian Naval Aviation Center.

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