Develop Model Harmonization ATFM and A-CDM with Integrated Policy Network Supporting Air Traffic Services

Rachma Fitrianti, Siti Malkhamah, Achmad Djunaedi, Dewanti
Affiliation: Universitas Gadjah Mada, Indonesia
E-mail: rachma.atc12@mail.ugm.ac.id, malkhamah@ugm.ac.id, adjun@ugm.ac.id, dewanti@ugm.ac.id

Keywords	ABSTRACT
The Innovation-Decision & Development Process, HOTS (Higher Order Thinking Skills), Integrated Policy Network Harmonization ATFM and A-CDM, Soft System Methodolgy	This study presents an illustration of the Development of the Integrated Policy Network Model Harmonization of ATFM and A-CDM based on Higher Order Thinking Skills to find out how digital transformation in the innovation of ATM System implementation in Indonesia. This research is included in Soft System Methodolgy with the category of theoretical research practice or research interest. According to Checkland and Scholes (1990) and Checkland (1989) is a reflection on problem situations in the real world based on a certain methodology and intellectual framework. The results of the study are expected to show that the Development of the Integrated Policy Network Model Harmonization of ATFM and A-CDM is also determined by the HOTS (Higher Order Thinking Skills) of aviation personnel on the three main capabilities needed for the future, namely: analytical, critical, and creative. Personnel are expected to be able to recognize the complexities and possible problems that exist in the provision of aviation services to support Decision Making. And it is expected to be an input for the government and the highest leadership of an aviation industry as policy makers, in order to improve the Development of the ATFM and A-CDM-based Harmonization Network Integrated Policy Model HOTS. As a result of the HOTS study, according to Checkland & Scholes (1990), the Integrated Policy Network Model of Atfm and A-CDM Harmonization is an experience-based knowledge from HOTS based on the innovation of the application of the ATM System to influence the improvement of aviation personnel as the use of facilities and individuals in the organization through the Design Approach Soft System Methodolgy.

INTRODUCTION

Naturally, the air transportation system is a competitive and collaborative environment, where stakeholders must optimize from all lines both HR (Human Resources), service supporting facilities, regulations and policies that provide economic benefits by considering aspects of safety, security, services and compliance (compliance with applicable rules), as well as ensuring all flight activities are efficient, effective and aligned.

In Indonesia, Airport Collaborative Decision Making (A-CDM) implemented as part of the Plan Seamless Air Navigation Service (ANS), based on ICAO Doc. 9854 and Global Air Navigation Plan, ICAO Doc.9750. Operational Concept Air Traffic Management Global contains a vision of an integrated, harmonized and interoperable ATM System globally, with planning up to and after 2025. (3. ICAO Doc.9854, n.d., bl 10)

Table 1 ATFM Implementation Status (ICAO ATFM/SG/10), 2020, bl 3)

ATFM/SG/10 – WP/11
04 – 08/05/2020

Administration (Tier)	% Implementation	Implementation Status
Hong Kong, China (A)	65	Incomplete
Macao, China (B)	22	Incomplete
Cook Islands (B)	*no report*	Did Not Report
Fiji (B)	*no report*	Did Not Report
France (French Polynesia) (B)	*no report*	Did Not Report
DPR Korea (B)	*no report*	Did Not Report
India (A)	*Incorrect report* 91	Robust
Indonesia (A)	(no change) 68	Incomplete
Japan (A)	89	Marginal

Table 2 Summary of A-CDM Survey (2. ICAO - APAC ACDM Impl-2 (2/7/21), n.d., bl 39)

Administration	Airport	Year Implemented/Planned
Australia	Brisbane	2019
	Sydney	2020
	Perth	2020
	Melbourne	2020
Bhutan	No info	0
China	Kunming Changshui	2014
	Beijing Capital	2017
	Shanghai Hongqiao	2013
	Shanghai Pudong	2016
	Chengdu Shuangliu	2017
	Guangzhou Baiyun	2016
	Xi'an Xianyang	2017
	Shenzhen Baoan	2016
Hong Kong, China	HKIA	2017
Fiji	Nadi	2018
India	Bengaluru	2013
	Delhi	2013
	Mumbai	2015
	Kolkata	2018 (APA-CDM/TF/4)
	Chennai	2018 (APA-CDM/TF/4)
	Shamshabad	0
	Jaipur	2019 (APA-CDM/TF/4)
	Ahmedabad	2019 (APA-CDM/TF/4)
	Trivandrum	2019 (APA-CDM/TF/4)
	Guwahati	2019 (APA-CDM/TF/4)
Japan	Chitose (Sapporo)	2018
	Narita	2020
	Haneda	2020
Malaysia	Kuala Lumpur	2021 (APA-CDM/TF/4)
New Zealand	Wellington	2015
	Auckland	2016
	Christchurch	2019
Pakistan	No info	0
Philippines	Manila	2022 (APA-CDM/TF/4)
Singapore	Changi	2016

Prior to implementation, each country must verify the implementation of the Global Performance of the Air Navigation System (ICAO Doc 9883) on the implementation of the ATM System and The Manual on ATM System Requirements (ICAO Doc 9882) contains eleven Key Performance Area (KPA) systems, as well as a number of Preferred Aerodrome/Airspace and Route Specifications (PARS) requirements and Preferred ATM

Service Levels (PASL) with analysis of safety, ATM capacity requirements to meet current and forecast traffic demands, efficiency, predictability, cost-effectiveness and environment to meet stakeholder expectations.

Planning considerations are required prior to the PARS/GASL Phase, it is important to ensure everyone in the planning process is aware that the foundation required for development, the ability to perform should be a priority, and the operational capability of the start of the Phase is a secondary consideration. (ICAO APANPIRG/30, n.d., bl 6)

ICAO Doc. 9854 Global Air Traffic Management Operational Concept stated: Humans will play an important and if necessary, central role in the Global ATM system. Humans are responsible for managing the system, monitoring its performance and intervening, when necessary, to ensure the desired results of the system. Because consideration of the human factor must be given in all aspects of the system.(3. ICAO Doc.9854, n.d.)

In aviation intellectual circles, some figures who are very intense about Collaborative Decision Making policies are Mr. Vic Van Der Westhuizen, an ICAO Expert

"CDM is a process that allows all parties in aviation to coordinate" ATFM itself makes it possible to create efficient flights and A-CDM is shown to improve efficiency in flight operations by optimizing the use of various available resources**,** so it is necessary to determine the continuous exchange of information related to safety. ATFM and A-CDM need to work together, they cannot work alone."

However, Implementation Airport Collaborative Decision Making highlights that the focus on implementing A-CDM needs to shift away from being seen primarily as an IT/tool-driven project summed up as ''A-CDM is 10% technology and 90% people, processes and culture''. It is important to consider the fact that A-CDM is a concept to facilitate increased collaboration between multi-agency stakeholders to ensure more timely decision making.(Corrigan et al., 2015)

Policy implementation is an activity that is seen after a legitimate briefing is issued from a policy which includes efforts to manage inputs to produce outputs or outcomes for the community. The policy implementation stage can be characterized and distinguished from the policy-making stage. Policy making on the one hand is a process that has bottom-up logic, in the sense that the policy process begins with the delivery of aspirations, requests or support from the community. While policy implementation on the other hand has a top-down logic, in the sense of reducing abstract or macro policy alternatives to concrete or micro actions. Wibawa, Samodra.,1994)

Integrated policy network Assumes that the way to achieve increased success in actual outcomes is guided by policy through the creation of improved integration and implementation of policies across different policy sectors. In terms of coordination and Integration Public Policy (Christensen & Lægreid, 2007). Integrated policy involves the linkage of content (e.g. policy objectives, policy instruments) of several policy sectors, as well as the elimination of contradictions between several policy sectors. Policy coordination refers to the process of realizing this, for example through shared information systems, planning and decision-making processes (Shannon & Schmidt, 2002).

Proper implementation and policies will address these differences separately, involving different levels of collaboration and information sharing, taking into account the benefits of each unit. Diffusion according to Rogers (1995, 2003: 5-6) is the process by which innovation is communicated through certain channels over time to members of a social system. In addition, diffusion is also considered a type of social change, that is, a change in a process of change that occurs in the structure and function of the social system.

For the proper nature of the sequence of stages in the innovation decision-making process namely; knowledge, persuasion, decision, implementation and confirmation. The Innovation-Decision Process is the process through which a person goes from the first knowledge of an innovation , the attitude towards the innovation, the decision to accept or

reject, the implementation of a new idea, and confirm the decision.(Everett M. Rogers, Singhal, & Quinlan, 2019, bl 161)

In the scope of harmonization of ATFM and A-CDM in general, previous studies on innovation-based ATM System, but evidence from industry-based case studies on "what factors make change successful in aviation" is scant and the aviation industry faces very real challenges in the face of major system changes as implications of the future of the Concept Single European Sky (SES) and new requirements for Safety Management System (SMS). At the same time, the aviation industry is under great financial pressure. (Corrigan et al., 2015)

In Indonesia, the development of ATM System-based innovations and several related policies in Indonesia, such as PM 9 of 2022 concerning the National Aviation Navigation Order, KP 112 of 2018 concerning Procedures for Managing Airport Slot Time Allocation and Airport Collaborative Decision Making (A-CDM) Manual in the aviation industry, must be anticipated by adjusting the needs of competence and qualifications of personnel, as well as following the development of knowledge and technology in the world of work so that it is able to adapt to industry needs. As an effort to provide efficient, effective and harmonious services, it is important to determine the continuation of the aviation industry itself and related universities.

When delivering new policy changes or innovations through diffusion requires the right approach or strategy and runs over time. With the right strategy and relevant to the target diffusion believed by individuals in the organization / institution then new policies or innovations will be accepted. Diffusions carried out on individuals are expected to have an impact on their organizations or institutions and can be input for policy makers, change decision makers and the highest leaders of an aviation industry in refining and improving policy formulations that can be drawn for the Development of a HOTS-based ATFM and A-CDM Harmonization Network Integrated Policy Model for smooth flight services.

Table 3 Flight Service Constraints

| No.	Relations	Issues
1.	Airport ↔ Air Operator	• Lack of Parking Stand • Flight Information Operator to Airport Not Updated
2.	Airport ↔ Navigation	• Data provided by Air Operator not synchronized between Airport &; Air Navigation, different format
3.	Air Operator ↔ Air Navigation	• Slot Availability at Destination Airport • CTOT (Calculated Take of Time) • Ground Time Performance • Ground Handling Activities • Slot Uncertainty

Source : Processed by Researchers
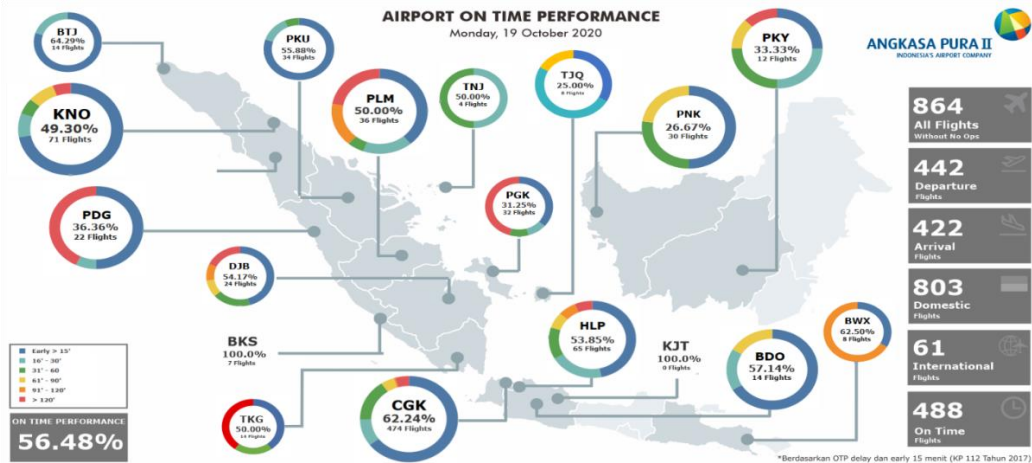
Figure 1 Airport On Time Performance (source AP2)

Vocational College, Stakeholders and the Indonesian Aviation Industry is also responsible for providing human resources (Human Resources) in this case aviation personnel for the three main capabilities needed for the future, namely: analytical, critical, and creative. That way of thinking is called the higher-order way of thinking (HOTS: Higher Order Thinking Skills).(Miri, David, & Uri, 2007, bl 353)

HOTS habituation can be obtained by personnel by always being introduced and experiencing firsthand the real world situation (from Virtual to Reality) Guntur Eka et al., 2020). By recognizing the real world, personnel will recognize the complexity and possible problems that exist in the provision of flight services. Such as environmental, health, earth and space issues, as well as the use of science and technology in various aspects to support decision making that provides economic benefits by considering aspects of safety, security, services and compliance , as well as ensuring all flight activities are efficient, effective and aligned.

Therefore, it presents the thought that the process of social search is a learning process in which individual points of view are described systematically, to organize discussions about "change that brings improvement". It is this learning system that gives rise to the concept of 'soft systems' thinking as a contradiction of the concept of 'hard systems' (see Figure 1.1)
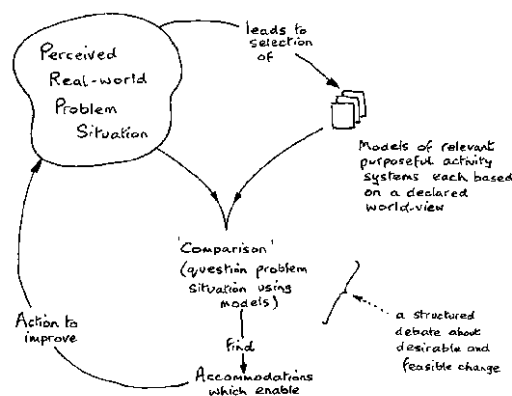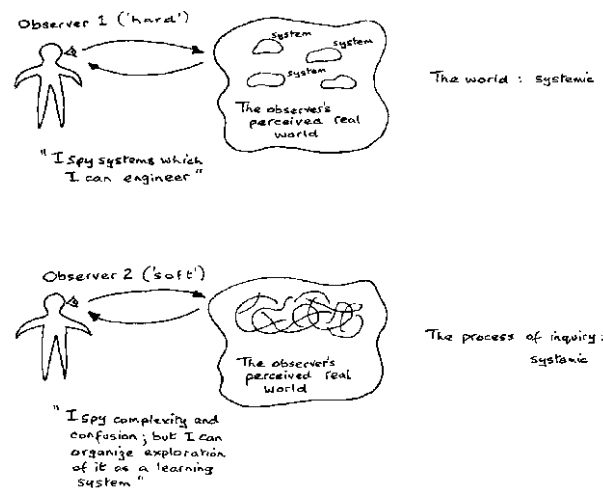

Figure 2 Shifts in thinking The Innovation-Decision&Development Process changed to SSM. (Checkland, 2013, bl 6)

Furthermore, problems that are within a certain scope in the scientific method are referred to as complexity, aiming to solve real-world problems (see figure 1.2)

Figure 3 Differences in mental attitudes, angles hard system and soft systems.
(Checkland, 2013)

Thus, the policy aims to strengthen the competitiveness of the aviation industry. From the discussion above, there are several important issues that are interesting to study, namely that "policy implementation and decision making" is really in accordance with the expectations or intentions of policy makers. The reason, to increase efficiency in flight operations by optimizing the use of various available resources, so it is necessary to determine the continuous exchange of information related to safety.

Researchers try to analyze the effectiveness of the implementation and impact of Indonesian government policies as policy makers and the highest leaders of an aviation industry, as well as to improve the **Development of ATFM and A-CDM Harmonization Models through a HOTS-based Integrated Policy Network.** To find out how the innovation of the application of the ATM System in the integrated policy network model of ATFM and A-CDM Harmonization affects the effectiveness of increasing the professionalism of HOTS-based aviation personnel as the use of facilities and individuals in the organization. Through the design of the **Soft System Methodolgy** approach, as well as its ability to recognize the complexity and possible problems that exist in the smooth delivery of aviation services, in various aspects to support decision making.

Previous studies comparing the results and impact of innovations in the application of ATM System in ATFM and A-CDM Harmonization have been widely carried out in aviation environments with a fairly diverse scope and methods. This is in line with the development of innovation ATM System which is quite rapid. However similar research in the scope of training academics and members of the air sector has a brief reference and focus on the practical application of this topic, which still has little approach in academic research sources (Netto, Silva, &; Baltazar, 2020, bl 23). So researchers need to do in-depth research related to this topic.

METHODS

This research was conducted based on qualitative methods. The qualitative approach is considered very useful for analyzing problems between multi-institutional stakeholders, Network Policy, such as a more or less stable pattern of social relations between interdependent actors, formed in a policy program and/or a group of means formed, maintained and transformed through a series of iterations.(Koppenjan &; E.H. Klijn, 2004, bll 69–70)

With a qualitative approach, organizational behavior and individual decisions about an innovation are not instantaneous actions. Everet Rogers 2003 offers a model of The Innovation-Decision & **Development** Process where one of the steps to the success of policy

implementation strategies in changing people's lives is largely determined by the diffusions carried out, as a more real picture of the situation.

RESULTS
Development of Atfm and A-CDM Harmonization Implementation

In Chapter IV, researchers try to elaborate the results of literature studies. The literature study on the implementation of ATFM and A-CDM Harmonization in Indonesia is a response to the adoption and implementation of the development of ATM System innovation, as part of the Seamless Air Navigation Service (ANS) Plan, based on ICAO Doc. 9854 and Global Air Navigation Plan, ICAO Doc.9750 to ICAO Doc. 9971 Manual on Collaborative Decision-Making (CDM). This is what underlies this research using Soft System Methodology (SSM) developed by Checkland (1990), because this research not only evaluates existing policies, and provides input on improvements to existing policies, but rather a commitment to generate new knowledge through finding solutions or improvements to real problems that exist in the "real world".

The aviation sector has established a sophisticated flight data reporting system as a form of ATM System innovation implementation. Perum LPPNPI Jakarta Air Traffic Services Centre (JATSC) Branch is a flight navigation service provider unit serving the Indonesian Flight Information Region, including flight navigation services at Soekarno-Hatta International Airport, Tangerang, Banten. Based on PM 69 of 2013, Seokarno-Hatta International Airport according to its function and hierarchy as a primary scale Gathering Airport (Hub). This makes Seokarno-Hatta International Airport continue to experience an increase in the number of aircraft movements every month and become the busiest airport in Indonesia, even making the State of Indonesia a country that has the fourth busiest airport in Asia Pacific which also includes Juanda International Airport, I Gusti Ngurah Rai International Airport and Sultan Hasanuddin International Airport (ICAO Document Asia/Pacific Seamless ATM Plan, Rev 2.0:2016).

Table 1 ATFM Process Table in Indonesia

	ATFM Process						
Pillar	**Implementation**			**Legislation/Rules**	**Training &; HR**	**Technology & Facilities**	**International Regulation Support**
	Airspace	**ANSP**	**Airport User**				
	√	√	√	PM.10 of 2022 Rev PM.65 of 2017 : Civil Aviation	Personnel responsible for the	Chronos Slot Application	ICAO Doc.9854(Global ATM)
		√	√	Safety Regulations CASR170	implementation of ATFM are	Support technology and	ICAO Doc. 9426 (ATFM)
	√	√		PM.9 of 2022 Rev PM.55 of 2016:	competent personnel and	equipment, reminder	ICAO Doc. 9971 (CATFM)
	√	√	√	National Logging Navigation Order	have received adequate	compliance	
		√		PM.57 Year 2016 : Implementation of Airport Slot Time Allocation	training		
	√	√	√	KP.265 Year 2017: Guidelines for Calculating Airspace Capacity &; Runway Capacity			
	√	√	√	KP 112 of 2017 concerning Procedures for			

Allocating Airport Slot Time IM 19 of 2015 concerning Leveling the Distribution of Flight Schedules for Improving Flight Service and Safety

Source : Processed by Researchers

Table 2 Table of A-CDM Implementation Phases in Indonesia

Phase A-CDM (ICAO 9971)	Information	Soekarno Hatta Airport
INITIATION (PHASE I)	Early Introduction to A-CDM (The term and definition of A-CDM, Roles and responsibilities of A-CDM stakeholders)	Familirization of A-CDM to Stakeholders;
	Stakeholder Consultation	More accurate prediction of aircraft movements, more accurate prediction of passenger movements, Increased capacity and increased compliance and use of time slots
	Draft Governance Structure	A Steering Committee and Operational Committee have been formed within AP2;
	MoU between all stakeholders (Standardization of A-CDM procedures Similarities in milestone approaches)	Drafting A-CDM Manual; Drafting MoU on A-CDM Operations with Stakeholders;
	A-CDM Gap Analysis (In making decisions)	Data exchange between A-CDM entities The confidentiality of data from each stakeholder is an obstacle in data exchange; There is still a lack of knowledge of the entities to be involved; Change management; Quite high development investment.
	Cost Benefit Analysis (CBA)	There is no trust yet to run A-CDM (advantages and benefits);
	Definition of Needs	Evaluation /Ensure Data Sharing; TSAT &; TOBT Measurement with stakeholders Variable Taxi Time Measurement with ANSP;
	Procurement (If needed/ Procurement)	Quite high development investment. The budget for implementing data integration is quite large.
	High-Level Implementation Plan	Development of Information sharing platforms; Join taskforce with airnav.

Zaen Pasha Ashsyafa, Wulan Sari, Putri Amalya Rahayu, Diky Dikrurahman, Deni Yusup Permana

IMPLEMENTATION (PHASE II)	Government	There is no clear set of guidelines for implementing A-CDM in accordance with the characteristics of airports in Indonesia;
	Forming a Steering Group (Establishment of A-CDM Project Management Team)	Setting up the organization's project;
	Arrangement of project organization with roles and responsibilities	AOCC unit has been established as an A-CDM Support Organization;
	Develop a detailed implementation plan (Aims to achieve an effective and efficient completion process)	Implementation of several integerations of the main needs of 16 miletsone supporting data.
	Establish a Communication plan (Development of a culture of continuous improvement)	verbally and data integration (FARMS system)
	Establish a training plan	There is still a lack of knowledge of the entities to be involved;
	Establish a data sharing agreement	There is no regulation governing A-CDM in Indonesia; Sharing data between companies; Change management;

Source : Processed by Researchers

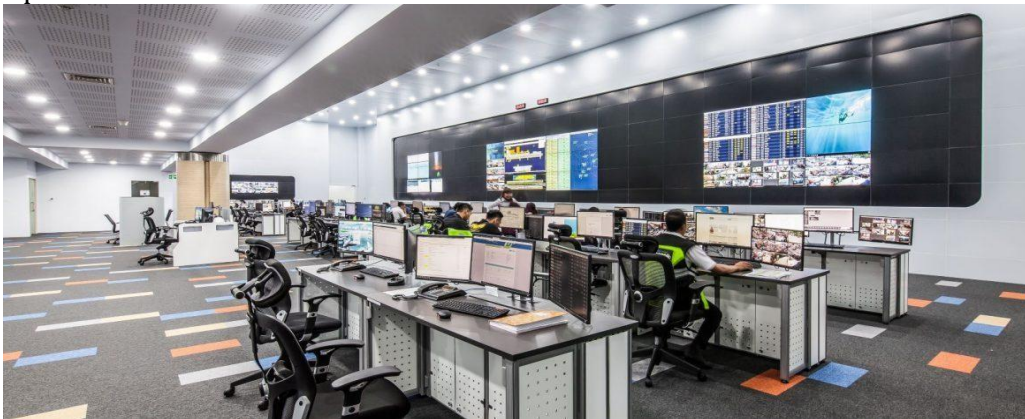
Figure 1 AOCC (Airport Operation Control Center) Soekarno-Hatta International Airport, Tangerang
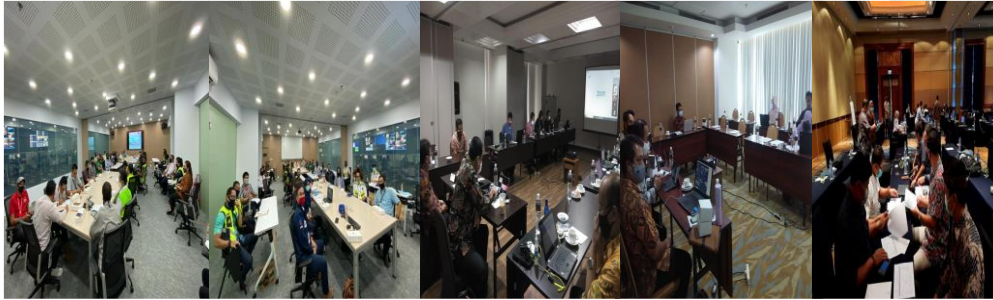
Figure 2 Familirization of A-CDM to Stakeholders

Implementation of A-CDM Implementation at PT. AP I and PT. AP II has formed an AOCC unit as an ACDM support organization located in a special room that has been equipped with complete equipment. Program and Work Plan of PT. AP II is in the development stage of Information Sharing Platform and Join Taskforce with Airnav, Variable Taxi Time measurement with ANSP, drafting ACDM Manual, Drafting ACDM Operation MoU with Stakeholders.

Figure 3 AOCC (Airport Operation Control Center)

Familiarization PT. AP II is in the process of improving the implementation of AOCC, but it has not been carried out regularly so that stakeholders do not understand the common purpose of the need for ACDM. The work unit involved PT. AP I is still internal and PT. AP II units at AOCC GIA, Air Asia, Airnav and Immigration. ACDM Milestone is not yet fully running. Coordination of data and information PT. AP I and PT. AP 2 data exchange is still limited, conventional and not all integrated. Leader Committee PT. AP I Highly committed and PT. AP II previously signed a commitment from the directors of ANSP, Airport, Airline and Groundhandling, but the Key Performance Indicator was not yet available.

Discussion of Analysis One: The Effectiveness of Atfm and A-CDM Harmonization Implementation on the Smooth Delivery of Flight Services

In answering research questions on how the effectiveness of the implementation and policies of ATFM and ACDM Harmonization Innovation on the smooth delivery of aviation services to support Decision Making with economic benefits by considering aspects of safety, security, services and compliance (compliance with applicable regulations), as well as ensuring all flight activities are efficient, effective and harmonized. Researchers start from early intervention by exploring and understanding problematic situations with the framework of Merilee S. Grindle. (1980)

In the analysis of this intervention to measure the success of the implementation of the ATFM and A-CDM Harmonization program, results will be obtained that illustrate:
1. Impact on society, individuals and groups
2. Community change and acceptance

Discussion of Analysis Two: Identifying Factors that Affect the Effectiveness of Atfm and A-CDM Harmonization Implementation
Introduction to Problematic Situations Effectiveness Factors for the Implementation of Harmonization of ATFM and ACDM (Social Factors)

Analysis Two concentrates on the underlying social analysis of the Integrated Network to identify factors that influence implementation effectiveness. That is, by understanding the social situation in general, SSM practitioners can create a more comprehensive picture regarding real-world situations. It is essential that changes and selection of relevant and socially viable systems of human activity to improve the situation, accommodate conflicting interests and take action to improve the real-world situation.

This relates to the sixth stage of the SSM process (the stage of formulating proposed corrective action steps, refinement, and changes in real-world situations) which requires two considerations, namely feasible and desirable change by considering systematically desirable, culturally feasible. Therefore, in the introduction of real-world situations, especially the social aspect, is very important.

Checkland and Poulter (2006) suggest three social elements that are the focus of analysis in the Analysis Two stage, namely the elements of roles, norms and values. Roles are social positions that mark differences among members of a group or organization. Norms are expected behaviors associated with a role. Values are the standards or criteria by which behavior-in-role is assessed. The three social elements are closely interrelated, dynamic, and always changing over time along with changes in the real world. Based on this, researchers conducted a social system analysis on the existing system in the harmonization of ATFM and ACDM.

Roles atau Peran

1. Air Traffic Flow Management (ATFM)

The role of ATFM Indonesia is contained in: (1) PM No.09 of 2022 Rev.PM No.55 of 2016 concerning the National Aviation Navigation Order (2) PM.10 of 2022 rev. PM.65 of 2017 (CASR170): Aviation Traffic Regulations, (3) PM No.57 of 2016 concerning the Allocation of Airport Slot Time, and (4) KP No.265 of 2017 (CASR170-03) concerning Guidelines for Calculating Airspace Capacity & Runway Capacity (Airspace &Rwy Capacity) as next:

o ATFM is one of the functions of Air Traffic Management (ATM) which aims to optimize ATC capacity for traffic demand to contribute to safety, smoothness and regularity of flight traffic flow

1. ATFM as referred to in Article 39A is implemented under the following conditions:
   a. There is traffic congestion (exceeding capacity); or
   b. Traffic congestion is expected to exceed the capacity
2. Traffic density as referred to in paragraph (1) letter a, takes into account the ATC capacity, Airspace capacity and Runway capacity determined.
3. ATFM is implemented based on the results of agreements at technical meetings at the national and regional levels of Asia Pacific.
4. ATFM services in an area of Airspace should be developed and implemented as a centralized ATFM organization.
5. Implementation of ATFM services using the principles of openness and justice.
6. The implementation of ATFM services in Indonesia is carried out by flight navigation service providers and is inseparable from CDM and A-CDM.
   o Air Traffic Flow Management (ATFM) is implemented in airspace where flight traffic demand exceeds a predetermined capacity in accordance with statutory provisions
   o Airport Slot Time Operator, as the party that supervises, coordinates, evaluates and reports the use of slot time at 35 (Thirty-five) coordinated airports in Indonesia. Where the allocation of flight time availability (slot time) and the use of airport facilities, capacity and infrastructure effectively and efficiently.

o The Aviation Navigation Service Provider must make a calculation of airspace capacity and runway capacity in accordance with the provisions stipulated in this regulation and must be authorized by the Director.

2. Airport Collabroration Decision Making (ACDM)

The role of ACDM Indonesia is contained in: (1) PM No.09 of 2022 Rev.PM No.55 of 2016 concerning the National Aviation Navigation Order (2) PP No.32 of 2021 concerning the Implementation of the Aviation Sector, Airport Operations Need to Meet Aviation Safety Regulations, and (3) PM No.95 of 2021 concerning Aerodromes as follows:

o Airport Collabroration Decision Making , hereinafter abbreviated as A-CDM, is a collection of processes prepared based on the CDM philosophy implemented in airport operations.

1. ACDM as referred to in Article 40 paragraph (6) is a collaboration between airport operators, Flight Navigation Services, air transport companies and other stakeholders to exchange operational information and improve the efficiency and effectiveness of flight operations at airports.

o The Airport or Airport Operator Unit must provide airport facilities that meet the requirements of Aviation Safety and Security, as well as airport services in accordance with established standards.

1. The operation of Airport Facilities must meet:
a. Standard Needs, and
b. Technical Standards

2. Standard needs as referred to in paragraph (1) letter a are the minimum needs of airport facilities that must be met to support service and flight safety.

3. Technical standards as referred to in paragraph (1) point b are facility parameters that must be met by airport facilities to be operated.

o Airport is an area on land and/or waters with certain boundaries that is used as a place for aircraft to land and take off, get on and off passengers, load and unload goods, and places for intra and intermodal transportation transfers, which are equipped with aviation safety and security facilities, as well as basic facilities

1. The Director-General supervises the implementation of Civil Aviation Safety Regulations Part 139 on Aerodromes.

2. Supervision as referred to in paragraph (1), includes;
   a. Audit
   b. Inspection
   c. Surveillance
   d. Monitoring

3. The Director General shall determine the supervisory procedures as referred to in paragraph (1) and paragraph (2).

4. Based on the results of supervision as referred to in Article 5, the Person in Charge of Aerodrome, Airport Operator, and Heliport operator who violate the provisions of Civil Aviation Safety Regulation Section 139 concerning Aerodrome may be subject to administrative sanctions.

5. Administrative sanctions as referred to in paragraph (1) may be:
   a. Written warnings;
   b. Freezing;
   c. Revocation; and/or
   d. Administrative fines.

6. The imposition of administrative sanctions as referred to in Article 6 may be granted in the event that:
   a. The violation has the potential to endanger flight security and/or safety; or
   b. Not carrying out follow-up on the results of supervision.

3. Collabroration Decision Making (CDM)

The role of CDM Indonesia is contained in: (1) PM No.09 of 2022 Rev.PM No.55 of 2016 concerning the National Aviation Navigation Order as follows:

o Collabroration Decision Making , hereinafter abbreviated as CDM, is a collaborative initiative carried out between stakeholders through information exchange mechanisms, to improve the ATM system in each phase from strategic to tactical.

1. CDM as referred to in Article 40 paragraph (6) is a coordination between Flight Navigation Service Providers, Airport operators, Airspace Users and other stakeholders in order to improve the overall performance of the ATM System and the integration of the system used to the full interoperability stage.

2. At air bases that are shared for airports, airport operators in CDM activities involve air base commanders.

Values

1. Air Traffic Flow Management (ATFM)
   - ATFM Maintains ATC from overload by ensuring the demand for both airspace and runway does not exceed the existing capacity.
   - Make air traffic (traffic flow) optimal by adjusting the existing capacity when demand (demand) increases or is expected to increase.
   - Control aircraft movements safely, regularly, and quickly in accordance with existing capacity.

2. Airport Collaborative Decision Making (ACDM)
   - Airport Collaborative Decision Making (ACDM) is a concept and process of collaboration between stakeholders at the airport to be able to share and exchange flight information with parties at the right time. Through the ACDM concept can increase the benefits of airport resources, reduce the rate of flight delays. A-CDM will be able to balance between demand (demand) with capacity (demand/capacity balancing). In principle, A-CDM increases and optimizes airspace capacity and is very appropriate to be implemented at airports that experience capacity saturation and demand or are predicted to experience saturation.

Norms.

1. Data requirements: CDM processes operate in future information-enriched environments, with data exchange as the primary facilitator of collaboration. Differences in data requirements to support different CDM processes lead to additional investments required by AUs in information infrastructure and data collection mechanisms.

2. Automation: Increased automation is expected, particularly in CDM processes with faster response times. In addition to different data requirements, different CDM processes will require AU automation with customized algorithms. In addition, the constantly changing CDM process requires growing automation.

3. Aerial scope of CDM: The extension of the collaborative process of aviation to the most tactical process of CDM invites greater harmonization of the data and processes required as the aircraft will operate in a variety of environments.

4. Training: Similar to the need to develop new algorithms for different or changing CDM processes, AUs operating across borders require additional training to handle variations in these processes.

5. Smoothness: The flight will cross the boundary where different CDM processes can be applied. Different CDM processes and data affect performance for various reasons such as inconsistent goals, obtaining optimal parts, different decision-making times, and lack of visibility into each process.

6. Cross-decision consistency: Different layers of decision-making can lead to inconsistencies. For example, agreement can be reached on broad performance objectives through CDM for strategic decisions. Operational decisions reached

collaboratively may seek different operational performance objectives based on circumstances, effectively contradicting strategic decisions. The process should consider potential inconsistencies and guidelines to mitigate these inconsistencies.

7. Verification and robustness to gain an advantage or "game": Since the CDM process is based on information provided by many participants with different purposes, the provision of false information to "game" the system in their favor is a potential problem. The lack of harmonization can make it difficult to detect, or become too strong about the impact of this behavior across different processes with the end result being a less fair system.

Discussion of Analysis Three: Developing Atfm and A-CDM Harmonization Model through Hots-Based Integrated Policy Network
Constraints in the Implementation of Atfm and ACDM Harmonization

Most policy processes and interactions regarding solving societal problems in networked societies are characterized by great uncertainty. How this uncertainty has substantive, strategic, and institutional aspects. This uncertainty poses risks to the organization. It is difficult to provide an adequate response to uncertainty because the impact of such responses cannot be predicted precisely as a result of uncertainty itself.

Centralization and consultation as two 'classic' government responses that still retain their benefits today. An important background to this response, particularly centralization, is a strong belief in political superiority. This assumes that the government will play a central role in dealing with wicked problems. Hence, the fact that in practice governments rarely play this important role and in fact, they are not prepared to do so. When both of these 'classic' responses are unsatisfactory, the question arises as to what alternative responses are available to governments.

There is no clear rule and regulation in the implementation of ATFM and A-CDM Harmonization in accordance with the characteristics of airports in Indonesia so as to integrate the involvement of each stakeholder, a clear roadmap and performance parameters to determine the success of an implementation. Meanwhile, the Vision and Mission are related to the unequal understanding of the "goals" to be achieved between internal units for the needs of ATFM and A-CDM Harmonization.

There is no interface with stakeholders related to access in the system directly regarding the status of "turn around". The need for the concept of coordinating operations and ACDM data exchange formats that are not yet available such as ToBT, TSAT, etc. that can be shared in one particular portal. Because between ATFM and A-CDM have different scopes, scope of objectives, slots and measurements. The purpose of ATFM is to manage the demand and capacity of the air space from the take off phase to landing. While ACDM aims more towards improving the timeliness and optimization of airport resources on the ground, by providing solutions for cost reduction, environmental benefits, capacity optimization and efficiency.

The need for situational awareness of personnel and service support facilities becomes an international standard for flight operations to support decision making that provides economic benefits by considering aspects of safety, security, services and compliance , as well as ensuring all flight activities are efficient, effective and aligned.

The need for open data sharing in the exchange of flight data to be distributed for service delivery, flight information and timely decision making. Estimation predictions are not biased 100% actual, although defiation can occur. For this reason, stages are needed for the identification of demand at certain times in order to identify early abnormal conditions as a form of anticipation of obstacles that will arise, so that the communicative process of various actors to act together achieves the vision of harmonization of ATFM and A-CDM.

Implementation is a process to realize policy formulation. Three distinct elements underline every successful A-CDM implementation worldwide: actively involving all parties; an impartial view of the work that must be achieved to achieve the goal; and lastly

Zaen Pasha Ashsyafa, Wulan Sari, Putri Amalya Rahayu, Diky Dikrurahman, Deni Yusup Permana

an effective multi-stakeholder project management approach**.** To ensure that all airport partners see benefits for the airport as a whole, as well as for themselves, such policies are indispensable in decision-making practices in the public sector, and are therefore needed by the actors involved and decision-making by governments.

DEP: Departure Planning Information, e.g. TTOT
ARR: Arrival Update Message, e.g. ELDT
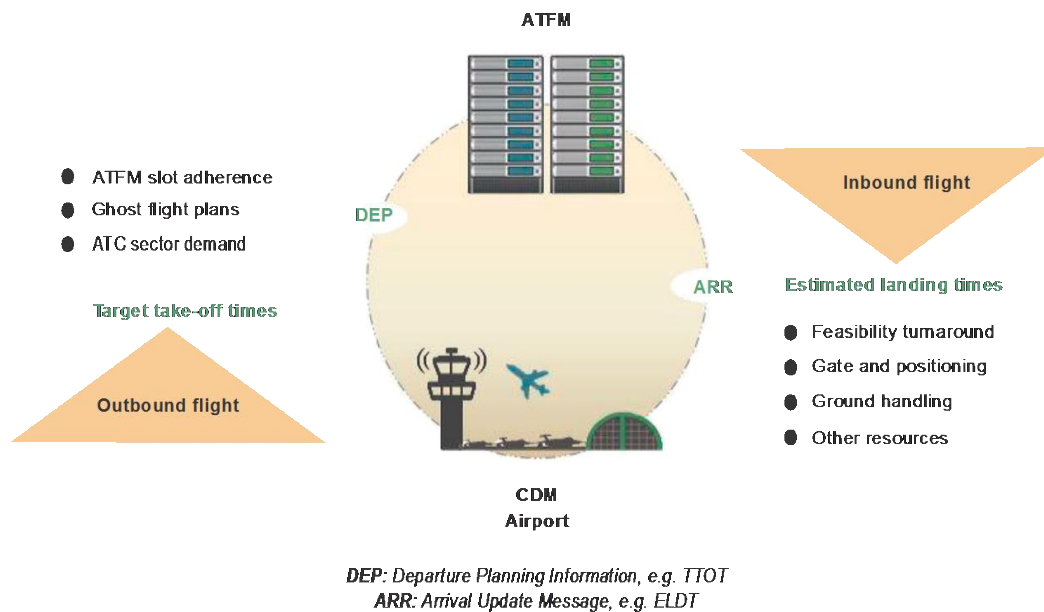
Figure 6 Information exchanges between A-CDM and ATFM

In the Implementation Phase **of ACDM Operations and Monitoring**, the focus will remain on continuous improvement and development of the A-CDM system to optimize the utilization of airport infrastructure so it is very important to determine the measurement of key performance indicators related to TOBT and TSAT to evaluate the effectiveness of A-CDM implementation. To measure A-CDM performance, post-implementation performance is the same that was used before implementation. A-CM performance measurement can be better realized based on agreed indicators. There is no ideal A-CDM scenario: every situation is different and requires different solutions.

While the implementation of ATFM consists of three phases: strategic, pre-tactical and tactical. This phase is considered a fully integrated cycle of planning, action and continuous review in the ATM and Postoperative Planning process. The involvement of operational stakeholders in each phase is crucial. **ATFM Postoperative Analysis** best practices are methods, processes, or activities that, once evaluated, show success, have a positive impact, and can be repeated. Post-operative analysis should be completed by evaluating ADP and its results. Reported problems and operational statistics should be evaluated and analyzed to learn from experience and to make appropriate adjustments and improvements in the future.

CONCLUSION

The complex cycle of problems Implementation of Harmonization of ATFM and ACDM in performance management starting from the stage of identifying strategic matters (agreeing what matters) that complement the planning and budget process, collecting appropriate performance information (agreeing what matters) that complement the planning and budget process, to the learning and improvement stage, will run effectively if there is a culture that encourages performance at the top level management until the

management group that carries it out. The culture that drives performance can be realized if the trigger and shaping elements are built and implemented.

This research was carried out at Soekarno Hatta Airport - Cengkareng to reconstruct the theory of Innovation-Decision & Development Process Transformation which encourages the performance of the development of integrated policy network harmonization of ATFM and A-CDM based on HOTS which is expected to affect the effectiveness of increasing the professionalism of aviation personnel as the use of facilities and individuals in the organization, as well as providing recommendations on the management of elements the shaper is at the Directorate General of Air Transportation.

Reconstruction of Integrated Network Level Substantive Outcome from HOTS perspective related to principal-principal problems based on KPA Harmonization of ATFM &; ACDM (Encouraging Compliance &; Performance Effectiveness) was carried out on the previous theory (Koppenjan & E.H. Klijn, 2004), resulting in "Draft Ministerial Regulation on Collaboration Decision Making (Confict &; Information Management) Harmonization of ATFM and ACDM"

Reconstruction of Integrated Network Management at Impact On The Process Level from the perspective of HOTS related to Problem Solving Interest in ATFM &; ACDM Harmonization is carried out on the previous theory (Checkland & Poulter, 2020), resulting in Model Qualifications to be implemented (Leader Comit &; Future Competencies)

Reconstruction of Integrated Network Management at the Institutional Impact Level from the perspective of HOTS related to negotiation and hold-up problems in ATFM &; ACDM Harmonization (Transformation of Innovation-Decision Process) was carried out on the previous theory (E M Rogers, Singhal, & Quinlan, 2019), resulting in the Diffusion of learning process Transformation of Innovation-Decision Proces" and interpersonal relationships through "Higher Order Thinking Skills".

Zaen Pasha Ashsyafa, Wulan Sari, Putri Amalya Rahayu, Diky Dikrurahman, Deni Yusup
Permana

REFERENCES

2. ICAO - APAC ACDM Impl-2 (2/7/21). (n.d.). ICAO - Asia/Pacific ACDM Impl.2 (2 Juli 2021).

3. ICAO Doc.9854. (n.d.). Doc.9854: Global Air Traffic Management Operational Concept.

Checkland, Peter. (2013). Soft Systems Methodology. Encyclopedia of Operations Research and Management Science, 58, 1430–1436. https://doi.org/10.1007/978-1-4419-1153-7_971

Checkland, Peter, & Poulter, John. (2020). Soft systems methodology. Systems approaches to making change: A practical guide, 201–253.

Christensen, Tom, & Lægreid, Per. (2007). The whole-of-government approach to public sector reform. Public Administration Review, 67(6), 1059–1066. https://doi.org/10.1111/j.1540-6210.2007.00797.x

Corrigan, S., Mårtensson, L., Kay, A., Okwir, S., Ulfvengren, P., & McDonald, N. (2015). Preparing for Airport Collaborative Decision Making (A-CDM) implementation: an evaluation and recommendations. Cognition, Technology and Work, 17(2), 207–218. https://doi.org/10.1007/s10111-014-0295-x

ICAO APANPIRG/30. (n.d.). ICAO - Asia/Pacific Seamless ANS Plan V3.0 (November 2019).

ICAO ATFM/SG/10). (2020). ICAO - Asia/Pacific CDM/ATFM Operations and Problem Areas (Mei 2020). (April).

Koppenjan, J. F. M., & E.H. Klijn. (2004). Managing uncertainties in networks; a network perspective on problem solving and decision making. (August).

Miri, Barak, David, Ben Chaim, & Uri, Zoller. (2007). Purposely teaching for the promotion of higher-order thinking skills: A case of critical thinking. Research in Science Education, 37(4), 353–369. https://doi.org/10.1007/s11165-006-9029-2

Netto, Omar, Silva, Jorge, & Baltazar, Maria. (2020). The airport A-CDM operational implementation description and challenges. Journal of Airline and Airport Management, 10(1), 14. https://doi.org/10.3926/jairm.148

Rogers, E M, Singhal, A., & Quinlan, M. M. (2019). Diffusion of innovations. An Integrated Approach to Communication Theory and Research, 415-433.

Rogers, Everett M., Singhal, Arvind, & Quinlan, Margaret M. (2019). Diffusion of innovations. In An Integrated Approach to Communication Theory and Research, Third Edition. https://doi.org/10.4324/9780203710753-35

Shannon, M. A., & Schmidt, C. H. (2002). Theoretical Approaches to Understanding Intersectoral Policy Integration. In Cross-Sectoral Policy Impacts on Forests.