

Building Digital and Sustainable Transportation of Indonesia Air Transport

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Abstract—Air transportation as part of the national transportation system has an interest in building digital and sustainable transformation as part of the dynamics of public services which are directed towards world class services based on aspects of safety, capacity and efficiency, security, economic development and environmental protection. An implementation strategy approach that can be elaborated by capitalizing on software resources (infostructure & operation system transformation - transformation towards fulfilling compliance with ICAO SARPs, international best practices and domestic legislation/regulations), hardware (governance & portfolio transformation - transformation towards a sustainable public governance ecosystem both digitally) and brain ware (human capital transformation - human capital-based transformation) of the organization as well as optimizing the interface of science and technology and the related strategic environment in a directed, orderly and integrated manner through the 4 (four) "C" policy implementation method, namely Cooperation (stakeholder cooperation interests), Consensus (stakeholder agreement and agreement), Compliance (compliance with the implementation of laws, norms and ethics), and Commitment (firmness in carrying out planning, organizing, implementing and evaluating). With the belief that through the right and wise approach, the challenges of global priorities/strategic objectives as well as the dynamics of challenges in building digital and sustainable transformation of Indonesian air transportation can be controlled to realize safe, safe and comfortable Indonesian civil aviation.

Keywords—Digital Transformation, Sustainability, Future Air Transport.

Introduction

The national transportation system is a transportation system that is systematically organized starting from planning, development, implementation, monitoring and evaluation in realizing the provision of effective and efficient transportation services.

In order to realize a systemically organized transportation system, in its development, fundamental changes are increasingly needed from old fashion business as usual to out of the box methods with the help of technology and science.

Digital transformation in the transportation system is a process of achieving smart mobility through intelligent systems driven by information and communication technology.

Sustainable transportation is defined as a transportation system whose fuel use, vehicle emissions, level of safety, congestion, and social and economic access do not cause negative impacts that future generations cannot anticipate.

Air transportation as part of the national transportation system has an interest in building digital and sustainable transformation as part of the dynamics of public services which are directed towards world class services based on aspects of safety, capacity and efficiency, security, economic development and environmental protection. .

The development of digital and sustainable transformation of Indonesian air transportation then gave rise to problem questions which were then formulated as follows:

- 1) What is the importance of digital and sustainable transformation of Indonesian air transportation?
- 2) What are the challenges in building digital and sustainable transformation of Indonesian air transportation?
- 3) What is the strategy for implementing digital and sustainable transformation of Indonesian air transportation?

Problem Analysis

1. *The Importance of Digital and Sustainable Transformation in the Indonesian Air Transportation System*

Table 1. Transformation Analysis

Meaning Important	Transformation	
	From	Toward
<i>Authorities & Mandate</i>	<ul style="list-style-type: none">• A less dynamic and inconsistent approach to legislation and regulations	<ul style="list-style-type: none">• Legislative-regulatory authorities and policy instruments that are modern, clear, and adaptable to evolving transport systems
<i>Risk & Opportunity Assesment</i>	<ul style="list-style-type: none">• Inconsistent understanding of risks and how to manage them using data	<ul style="list-style-type: none">• Clear understanding of risks and tolerance levels• Reliable data-based risk assessments for cross-modal and regional and international comparisons



		<ul style="list-style-type: none"> • Ability to assess economic impact and conduct cost-benefit analysis • Consistency of research with users to understand impact and perceptions
<i>Policy Design</i>	<ul style="list-style-type: none"> • Inflexible policy instruments, including non-regulatory approaches 	<ul style="list-style-type: none"> • Ability to select cost-effective, high-impact interventions • Community and industry engagement to design policies and explore voluntary compliance.
<i>Program & Services Design</i>	<ul style="list-style-type: none"> • Lack of focus on the user; • Traditional regulatory approach with limited consultation; • Conventional cost structure 	<ul style="list-style-type: none"> • User-centered, digital-first design and delivery of programs and services • Involvement of digital transformation enablers • New regulatory and non-regulatory approaches, including alternative service delivery models • Creative and modern financing models to support high quality services and increase regional and international competitiveness
<i>Program & Service Delivery</i>	<ul style="list-style-type: none"> • Paper-based face-to-face transactions with a lack of user support across channels; • Inconsistent or non-existent service standards; • Lack of effective ways to provide feedback; • Inconsistent risk management 	<ul style="list-style-type: none"> • Digital-first multi-channel delivery; • Transparent and integrative service standards; • Strong feedback mechanism; • Risk management-based approach related to regulatory compliance and enforcement aspects.
<i>Monitoring & Assesment</i>	<ul style="list-style-type: none"> • Data is inconsistent or unavailable, making it difficult to measure program success. 	<ul style="list-style-type: none"> • Open and timely data that informs decision making; • Data helps improve programs, drive innovation and experimentation • Publicly shared performance reports

Fig. 1. Concept Constellation

2. Challenges of Building Digital and Sustainable Transformation in the Indonesian Air Transportation System

The challenges in building digital and sustainable transformation in Indonesia's air transportation system are at least defined by the explanation that related to digital transformation there are issues that Data Center infrastructure is varied, siloed and inefficient (server rooms that are not yet standardized, varying levels of security and low utilization), applications digital services that are scattered sporadically, diverse and not yet integrated, and; massive cyber attacks on Indonesia. From this, infrastructure and applications are needed that are safe, standardized and have cyber security resilience.

Supporters (enablers) of digital transformation consisting of Big data, Artificial Intelligence, Internet of Things; Community Literacy; Cybersecurity; Information and Communication Technology HR Development; Development of the Information and Communication Technology Industry, and; Research and Development needs to be concerned with developing digital transformation because it has great potential to change work patterns and air transportation services in Indonesia.

Based on the resolution of the 2002 ICAO High Level Conference on Long Term Aspirational Goals (HLC LTAG) which related to the issue of sustainability in aviation towards Net Zero Carbon 2050, there is a gap between policy and field facts in environmental protection regarding the availability of sustainable aviation fuel/bio-fuels, aircraft technology flying, airport operations and flight navigation services and the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA). Other problems facing the development of sustainable transportation are regional specific conditions, such as geography, geology, tropical climate, economic-socio-cultural, land-environmental characteristics, risk of earthquakes, floods, global warming and climate change.

Sustainable aspects of the Indonesian air transportation system, as outlined by the Organization for Economic Co-operation and Development (OECD), must have three important aspects that are fulfilled, namely: (1) Environment, transportation that is sensitive to climate change issues, air quality, noise, land use and waste management (2). Economic, transportation that is affordable for the community and can meet the operational costs of productive transportation that is sensitive to material and energy issues, economic growth, employment issues, prices and healthy industrial competition (3) Social, transportation that can support the realization of a safe social environment and safety, increasing access, connectivity and affordability, increasing social justice and health levels.

Strategy for Implementing Digital and Sustainable Transformation in the Indonesian Air Transportation System

Air transportation services for the community must transform towards digital. Digitalization must also have an impact because digitalization is not a goal, digitalization is a means of accelerating the achievement of goals. The application of digitalization is one way to provide agile and fast services, because all needs are integrated in one hand. Through accelerated digitalization, services can be transformed into dynamic governance. Where services become more effective and efficient with world-class agile and adaptive characteristics that are results-oriented and performance management.

Digital transformation that is going well will encourage the sustainability of Indonesian air transportation. Building digital and sustainable transformation in Indonesia's air transportation system can be done by implementing the following implementation strategies: (1) Preparing policies and programs (intelligent policies & programs) through attention to issues of legislation, regulations, policies,



interventions and instruments, outreach & awareness , and monitoring; (2) Service innovation through attention to regulatory authorization issues, internal services, creative investment financing and consulting services, etc.; (3) Transparency and public trust (transparency & public trust) through attention to issues of engagement, relationship building, sharing data & information and accountability; (4) Data-driven decision making, which can be achieved through strong attention to big data issues, advanced analysis, environment and infrastructure, and governance, and; (5) Modern and inclusive workforce (modern, inclusive workforce) through attention to HR issues, work equipment, culture and workplace.

In principle, in responding to the challenges of 5 (five) global priority aspects or aviation strategic objectives, namely safety, capacity and efficiency, safety and facilitation, economic development and environmental protection, agility and innovation are needed in meeting the demands of future aviation.



Fig. 2. Policy Concept

Responding to the actual issues above, a proposal for an implementation strategy approach that can be elaborated by capitalizing on software resources (infostructure & operation system transformation - transformation towards fulfilling compliance with ICAO SARPs, internal best practices and domestic legislation/regulations), hardware (governance & portfolio transformation - transformation towards a digital good public governance ecosystem) and brainware (human capital transformation - human capital-based transformation) of the organization as well as optimizing the interface of science and technology and the related strategic environment in a directed, orderly and integrated manner through 4 (four) policy implementation methods) "C" namely Cooperation (stakeholder cooperation), Consensus (stakeholder agreement and agreement), Compliance (compliance with the implementation of laws, norms and ethics), and Commitment (firmness in carrying out planning, organizing, implementation and evaluation).



Fig. 2. Policy Strategy

With the belief that through the right and wise approach, the challenges of global priorities/strategic objectives as well as the dynamics of challenges in building digital and sustainable transformation of Indonesian air transportation can be controlled to realize Indonesian civil aviation SELAMANYA (Safe, Safe and Comfortable).

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