

Business Process Analysis in Continuous Airworthiness Management in the Low-Cost Carrier Airline in Indonesia: A Case Study

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Abstract

Indonesia has an alarming safety level leading to the ban to fly to other countries from 2007 to 2018. Even though the government and the aviation industry in Indonesia have tried to resolve this problem, reports from the Indonesia National Transportation Safety Committee have shown that up until 2021 there were notable numbers of accidents and incidents resulting in a number of fatalities. In this paper, the authors aim to propose a framework for the improvement of the continuous airworthiness business process. We gathered the data from the available studies and applicable regulations. Interviews and surveys were conducted with airworthiness experts in Indonesia to define the critical success factors of continuous airworthiness. Then, we analyzed the current quality process in an Indonesian low-cost carrier airline with the compliance management framework. The study shows that the existing business process lacks the critical control point in accordance with the applicable regulation. For further research, business process reengineering can be carried out to take the compliance management process into account.

Keywords

Aircraft Airworthiness, Continuing Airworthiness, Business Process Reengineering, Business Process Management Notation, and Compliance Management.

1. Introduction

As the world's largest archipelagic country with a size of almost 2 million square km, air transportation has a crucial role in Indonesia. With more than 250 million citizens who live on more than 17,000 islands across the country, air transport is a key factor in increasing connectivity which results in economic growth. Even though air transportation is highly important in Indonesia, Indonesia has a problem with the lack of assurance level on safety (Dachyar and Siva, 2016).

In 2007 there were 2 accidents resulting in hundreds of fatalities in Indonesia. This resulted in a ban from other aviation authorities. On 16 April 2007, FAA reduced Indonesia's aviation safety ratings to category 2, which means it is not in conformance with the ICAO safety standards. On 4 July 2007, European Union issued Commission Regulation (EC) No. 787-2007 to ban all Indonesian airlines to fly to Europe. Government and industry experts successfully implemented some changes and the ban was lifted in 2018. Although currently there is no restriction from other countries as it was before, the safety report shows that the safety problem still exists. According to National Transportation Safety Committee, there are 45 accidents and 112 serious incidents occurred in Indonesia from 2017 to 2021.

This problem if remains unsolved may be resulting in another accident and fatalities. Some study has looked into the problem of safety and quality assurance in Indonesian air transportation (Pramono et al., 2020; Pramono et al., 2018). He mentioned that airworthiness management is the process to ensure that an aircraft is in airworthy condition and safe to operate. This process should have been in place within the Indonesian airline's procedures as it is mandated by

the civil aviation safety regulation. The fact that the level of safety is still at an alarming rate shows that there is a need to improve the processes.

1.1 Objectives

This study aims to analyze the continuous airworthiness management process in a low-cost carrier airline in Indonesia. The goal of this study was to define the problem in the as-is continuous business process in an LCC organization and give some improvement recommendations.

2. Literature Review

2.1 Airworthiness

According to ICAO Annex 8, airworthiness is a condition where the aircraft complies with its applicable regulations and can be safely operated within certain operational limits. Conformance of the aircraft over the airworthiness requirements of the country where the aircraft is registered must be done in the design, production, and operational phase. A certificate of airworthiness (CoA) will be issued by the competent authority (National Aviation Authority) as the statement of the aircraft's airworthiness. CoA is a statement that an aircraft, engine, propeller, or components is in accordance with its approved type design and safe to operate.

Continuous airworthiness is a set of processes to ensure that the aircraft is comply with applicable requirements and operates in safe conditions (Florio. 2016).

2.2 Indonesia Civil Aviation Safety Regulations

Requirements for Air Operator Certificate including continuous airworthiness requirements are stated in Civil Aviation Safety Regulation (CASR) Part 121. The specific requirements of continuous airworthiness that an airline needs to meet are written in the CASR Part 121 Subpart L. Table 1 shows the summary of CASR Part 121 Subpart L.

Table 1. Summary of CASR 121 Airworthiness Requirements

CASR Part 121 Subpart L	
121.361	Applicability
121.363	Responsibility of Airworthiness
121.365	Maintenance, Preventive Maintenance, and Alteration Organization
121.367	Maintenance Program
121.369	Company Maintenance Manual Requirements
121.371	Required Inspection and Appropriate Personnel
121.373	Continuing Analysis and Surveillance
121.374	Continuous Airworthiness Maintenance Program for Two-Engine ETOPS
121.375	Maintenance and Preventive Maintenance Training Program
121.377	Maintenance and Preventive Maintenance Personnel Duty Time Limitations
121.378	Certificate Requirements
121.379	Authority to Perform and Approve Maintenance, Preventive Maintenance, and Alterations
121.380	Maintenance Recording Requirements
121.380a	Transfer of Maintenance Records

2.2.1 Continuing Analysis and Surveillance

CASR 121.373 mandates each certificate holder to develop and implement a continuing analysis and surveillance system (CASS). CASS's objective is to analyze and monitor the performance and effectiveness of its maintenance program and for the correction of any deficiency in those programs. The system shall include a systems of audits and investigation of operational events to monitor maintenance program performance to ensure that everyone, including all of the certificate holder maintenance provider comply with the certificate holder's maintenance manual and with all applicable regulations. There shall be a system of data collection and analysis of operational data result from the operation of the aircrafts.

2.3 Business Process

Business process is a set of activities which purpose is to be the guidance of an organization to reach its goals. Business processes guide whatever and whenever an organization runs its activities (Hull et al., 2018). This study is focusing on the quality auditing process in an airline's continuous airworthiness management.

2.4 Business Process Reengineering

Business Process Reengineering (BPR) is one of the tools to do changes in the business process. (Harmon, 2007). There are four reasons why an organization needs to perform business process reengineering: to improve the service, to reduce running time, to reduce cost, and to improve quality. (Muthu et al., 1990) break down BPR into five activities: prepare for BPR by identify objective and develop strategic purpose, map and analyze as-is process, design to-be process, implement the changes, and improve continuously.

2.5 Business Process Compliance

The interpretation of laws, standards, or contracts into compliance requirements is crucial for companies. The development and implementation of business processes that comply with the applicable requirements are called business process compliance (Schumm et al., 2010).

3. Methods

This study is conducted in four stages. In the first stage, a literature review was carried out to define the background, problems, and objectives of this study. In the second stage, interviews with experts were conducted to propose best practice knowledge through the determination of critical success factors. In the third stage, the current process is modeled and analyzed. In the fourth and final stage, the analysis of the result was conducted to get a conclusion and recommendation for future studies.

4. Data Collection

4.1 As-Is Process Mapping

This study takes a look at continuing analysis and surveillance process, specifically the audit process of an LCC airline in Indonesia. The trigger for an audit event referred to in the airline procedure manual is the yearly audit plan.

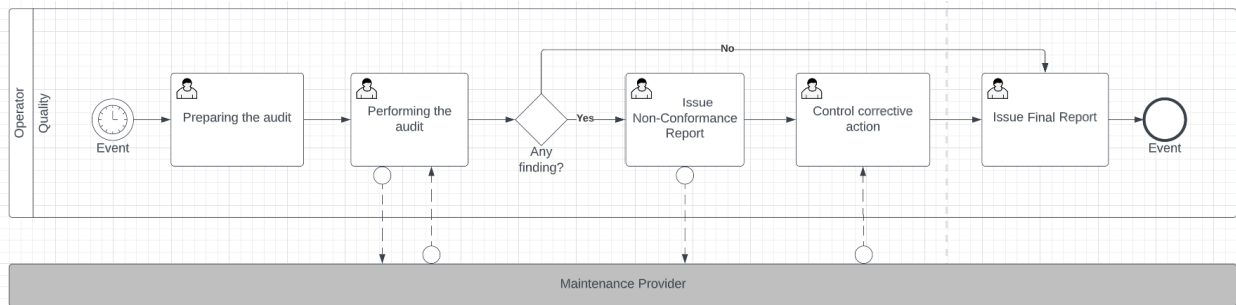


Figure 1. Audit Process of an Indonesian LCC

Figure 1 shows the audit process of an Indonesian LCC airline as written on the company manual and procedure. The process to conduct the audit is a straightforward process. In the end of the audit, a final report will be issued and stored in a folder as hardcopy.

4.2 Continuous Airworthiness Critical Success Factors

Surveys were conducted on the airworthiness experts of DAAO to determine the critical success factors. A geomean > 3.5 was used to consider that a criterion is acceptable to consider as the critical success factor of the continuing airworthiness process Table 2 below shows the results.

Table 2. Likert Scale of Critical Success Factors

		A	B	C	D	E	F	G	H	I	J		
1	Are the "implementation of the procedure which complies with the regulation" critical to the continuous airworthiness process?	5	5	5	5	5	5	5	5	5	5	5	Accept
2	Are the "updating of the maintenance manual and procedure" critical to the continuous airworthiness process?	5	5	5	5	5	5	5	5	5	5	5	Accept
3	Are the "continuing analysis and surveillance" critical to the continuous airworthiness process?	5	5	5	5	5	5	5	5	5	5	5	Accept
4	Are the "personnel qualification and competence" critical to the continuous airworthiness process?	5	5	5	5	5	5	5	5	5	5	5	Accept
5	Are the "availability of the spare part" critical to the continuous airworthiness process?	5	5	4	4	5	4	5	5	4	5	5	Accept
6	Is the "availability of adequate tools and facilities" critical to the continuous airworthiness process?	5	4	4	4	4	5	4	5	5	4	4	Accept

5. Results and Discussion

5.1 Problem Identification on As-Is Business Process

We identify problem in the as-is business process by comparing it with the applicable regulation and industry best practices. Having a continuous auditing process would be an ideal situation to give real time insights into violation of the requirements (Ramezani et al., 2012). Proper continuous analysis and surveillance can not be achieved by only relying on a scheduled audit. There should be an indicator that can trigger an audit based on the actual condition on the daily operation. The As-Is business process also lack step to review and analyze previous audit report. Analyzing previous report is a requirement as per the CASR. To be able to analyze and review the previous audit report, we should also have a good records system. Record system improvement using a proper information technology system can be beneficial for the organization. Table 3 summarizes problems that we found in the as-is business process.

Table 3. As-Is Business Process Problem Mapping

Findings	Recommendation
Audit execution only based on a yearly pre-determined schedule	Established performance indicator that can trigger an audit

There is no review on the previous audit result	<ul style="list-style-type: none"> ● Established procedure to review the previous audit result before executing an audit. ● Established a findings repository.
The audit reports is maintained and keep in a hardcopy format	Established an audit record system

The airworthiness compliance management framework can be used to determine the control point that should be added to the continuous analysis and surveillance process. The process itself should consist of several processes that are well-connected between each process. Information technology should be used to improve the process of continuous analysis and surveillance to help the airline gather the data needed, lay the facts, and deliver the data within time.

5.2 Airworthiness Compliance Management

In this section, we use the compliance management model proposed by (Schumm et al., 2010) to develop the airworthiness compliance management model. Critical success factors used as the continuous airworthiness best practices as the internalized compliance requirement

Table 4. Airworthiness Compliance Management Framework

Compliance sources (UU No. 1 tahun 2009, CASR Part 121, Company Policies)			
Internalized compliance requirements (Critical Success Factors)			
Control for requirements that need to be checked		Control for requirements that state how things need to be done	
Technical	Manual	Technical	Manual
<ul style="list-style-type: none"> ● Monitoring aircraft status report ● Monitoring deferred maintenance item ● Determining reliability alert level 	<ul style="list-style-type: none"> ● Voluntary safety reporting ● Surveillance/ Spot check ● Record check ● Inventory check ● Competence assessment 	<ul style="list-style-type: none"> ● KPI and SLA analysis ● Maintenance Information System setup 	<ul style="list-style-type: none"> ● Procedure and manuals ● Training program ● Contracts

Table 4 showing the airworthiness compliance management framework gives a clear picture of the incorporation of the regulation into the control point that an airline needs. The control point that we determined can be used as a performance indicator to trigger an audit.

6. Conclusion

To have a continuous airworthiness business process that fully complies with the requirements and is effective to maintain the safety level of the airline is critical for the future of the company. A thorough analysis of compliance management is sometimes forgotten if the process has been implemented in a long time or has been approved by the competent authority without a deeper analysis of the process effectivity. The study that we conducted on the audit process of an Indonesian low-cost airline can reach to these conclusion: 1. An organization can neglect an existing compliance issue on the business process once a process has been approved by the competent authority, 2. Continuous improvement is important in compliance management to be able to keep the compliance to ever changing regulation. Future research on the improvement of the business process is needed to propose a framework for the improvement of Indonesia's aviation safety.

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Biographies

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