THE QUALITY SYSTEM OF AIR TRANSPORT PILOTS TRAINING AT THE UNIVERSITY OF PARDUBICE

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ANNOTATION:
This article contains a description of quality system for airline transport pilots training at the Faculty of Transport Engineering at the University of Pardubice. The system is based on new regulations within the European Union which came mainly to unification of personnel licensing and training procedure, increased on-safety, including principles of safety culture, and support of new methods used in both didactical and practical training. Similar rules are gradually introduced to all sectors of civil aviation in Europe.

Quality system as a complex according to the new rules concerns of a Management System, Safety Management System and Compliance Monitoring System and has proved to be very efficient in airline transport pilots training. Functional Compliance Monitoring System parameters coincide with all applicable laws and regulations which ensure one of the significant parts of the new quality system. The role of Safety Management System is to increase the level of safety in practical training particularly, but the theoretical part consists of hours of all knowledge acquired during the training. Management System covers all parts and joins them to an indivisible unit. Separate documents are prepared for each system, the Management System (MS), Safety Management System (SMS) and Compliance Monitoring Program (CMP) at the Faculty of Transport Engineering. The article describes all aspects of Management System, including safety policy, management processes and responsibilities of each participating person, general and basic principles, operational procedures, regulations and procedures that concern ensuring the required level of safety within the Faculty of Transport Engineering. It further shows the methodology chosen to define duties and responsibilities of Assistant Manager (AM), Safety Manager (SM), Compliance Monitoring Manager (CMM) and the methodology of personnel selection to Safety Review Board (SRB), Safety Action Group (SAG) and all other personnel involved in the quality system.

At the end you will find the commented current experiences and description of procedures ensuring further improvement of quality of educational process. This work was supported by the project no. VEGA 1/0299/27 supported by the Ministry of the Interior of the Czech Republic.

1. INTRODUCTION
From the cradle of aviation, air transport is associated with a variety of hazards due to the environment in which it is carried out, especially an accident, often associated with fire, nowadays, cause a kind of uncertainty for passengers and the public.

Quality is a concept we have been meeting more and more as in the last twenty years and it suggests that future will continue. The importance of quality has since recently in the world. It is so apparent that we can talk without exaggeration about a kind of "quality revolution" the past few decades initiated a significant shift in quality with account in the field of operational safety. That was mostly because the way to define quality in supply and quality towards an overemphasis over inquiry and the assumption the only objective is to pass a formal test from the product’s market to the customer’s market. The concept of business based on "we used to call what is being produced", although supported by the best marketing strategies, it promotes sales, but no chance to survive. Obviously, the "we can only produce what can be sold" approach is preferred. The elongated period has confirmed the guideline that the customer wants something better quality and not very expensive to accept any compromise or errors tolerance on the supplier's side of the product.

From the perspective of business subjects, it would be a fatal to look at quality as existential property. On the contrary, it is necessary to perceive them as part of management and entrepreneurial skills, and not all managers,
including government authorities, are willing to accept these decisions based on the quality of the product, which often justifies it to the market. Short-term business strategies that are simply needed to survive in business.

Already during the 1970s, the quality of products, especially those in Japanese firms, have become significant competitive factors, often equal, if not even more important than the price itself. Nevertheless, this concept of quality is gradually overcome and tools are being considered as important factors. This means the need to respond quickly to customer requirements and any changes in the market and to shorten response times to acquisition and the time of development of new products as well as continuous production times. The concept of a business strategy can be associated with the prioritization of all of these characteristics. Property rights are taken into account in these current competitive factors, i.e., price, quality, and time.

This article describes a system for the quality management of a transport project at the Faculty of Transport Engineering at the University of Padua. This system consists of a Management System, a Management System for Safety, Management System for Quality, Management System for Quantity, and Compliance Monitoring System and has proven to be very effective in reducing transport project time. Several documents are processed for each system, the Management System (MS), Safety Management System (SMS) and Compliance Monitoring Program (CMP) of the Faculty of Transport Engineering. The article describes all aspects of Management System, including safety policy.

The Safety Management focuses on risk management only that combines operational safety, financial, legal, and economic risks, which are only considered in part of the risk management in terms of their uncertainty.

The formal process of safety risk management is the subject of a separate document that provides clear guidance and maintenance of safety information about hazard identification, risk analysis and risk management processes. At the same time, the documentation of the document is adapted to requirements of transparency of the safety management system for better CAA supervision.

The document provides procedures of hazard identification in an analysis and further evaluation of the resulting risks. Then it defines corrective action if needed. The document described in paragraph 3 is used to monitor and supervise the implementation of corrective action. Document Implementation of corrective actions monitors progress of the safety management system and the record of execution. This method provides a permanent overview of the performance of safety activities defined in basic safety management processes.

ATO safety management is a combination of the following tasks and processes:
- Safety management risk assessment and risk management process (risk management)
- Internal safety oversight, training, and investigations
- Managing operational and organisational changes from the perspective of safety
- Continuous improvement of the level of safety achieved

Keeping knowledge and verifying the organization’s readiness to deal with crisis situations and efficient procedures of operation recovery within the emergency planning.

2. FACTS AND CONDITIONS

INFLUENCING THE
IMPLEMENTATION OF SAFETY
MANAGEMENT

To ensure effective communication in hazard identification, safety risk assessments, and management, all relevant input information must be provided. The communication culture is internally acquired within the ATO by the refresher training and the relationships described in the Operational Manual. To obtain relevant information for safety risk assessment in part of external communication with customers, suppliers, and other partners, effective processes are described and implemented in the CMP.

To achieve the required safety management results, standards are allocated to the basis of an analysis of safety management, an assessment of the Safety Management Board and the approval of the Accountability Manager. One of the topics in the assessment of safety risk management, risk analysis and assessment in the sufficiency of dedicated resources and their ability to ensure all safety and security safety management processes. Safety risks associated with risk of failure for ATO operation staff are also considered.

Risks acceptance criteria and standard ALARP concept

Risk acceptance criteria are set in the ATO Safety Policy. The basis for the ALARP principle is defined in ICAO Doc. 9829, which is based on EASA's ATO approach to risk management that risk are managed on the basis of both safety and economic acceptability. For this reason, risk management has been introduced in the ALARP (As Low As Reasonably Practicable) principle, which directs the risks to a level that is practically achievable from the economic point of view and is always below the minimum tolerable / permitted level.

Preparation for safety risk management and management

From the point of view of process engines, the main objectives of the established system (e.g., relationships, roles, and procedures) for safety management are the right outcomes of the risk assessment and the risk management process which leads to the risk being reduced to the required level.

Safety risk assessment and management is performed during the initial risk analysis, the regular implementation of hazard identification and in advance of the decision-making of the Faculty of Transport Engineering managers on important operational and organisational activities, operational and organisational changes, introduction of new tools, extension of basic, etc.

For the effective and reliable implementation of the risk management and risk management processes it is important to set up a framework for individual leaders and the level of intervention of the Safety Management Board. The Safety Manager is responsible for identifying the stimulus under consideration when the Safety Management Board is established or is not required. If so, the Accountability Manager is asked to approve the nomination of a manager, then the intervention.
methods of analysis used, the input data and the SAG activity schedule.

Hazard identification principles:
Hazard is a condition, object or activity that may potentially cause injury to persons, damage to equipment or structures, loss of substantial property, or reduced ability to perform ATO operations.

Hazard identification is one of the most important elements leading to safety improvement. Hazard identification allows ATO to identify to a timely manner conditions or situations that could directly threaten the safety and reliability of the ATO.

Hazard is a common component of ATO operating processes. The hazard and its consequences manifest is triggered when a combination of unfavorable conditions, situations and states of objects and the whole system occurs. The result is the occurrence of a situation with a safety support.

Hazard identification - source of information, specific procedures for hazard identification.
Hazard are identified both reactively following the occurrence of undesired events or on the basis of formal investigations as well as proactively.

The required stimuli of the ATO safety management system imply the need to proactive hazard identification before it becomes a safety event. The goal is to achieve a sufficient level of prediction of unfavorable conditions.

Hazard identification and consequences of hazards - reactive to identify the consequences of hazards.
Hazard identification still does not ensure the expression of the consequences of hazard. Every hazard has more consequences of hazard. In further work with the hazard, the consequences are obtained on the basis of queries as to how the specific hazard concern the ATO in particular.

The consequences of the hazard are perceived as undesirable outcomes that have already occurred (information is obtained and assessed from reactive sources) or hazardous situations that may arise (information is provided through proactive sources - e.g. assessment of operational processes).

The consequences are described on the basis of a logical refinement that specifies instead of a possible hazardous event, time-related to different periods of occurrence cycles, characteristic scenario, day and night times, the specific nature of operational events and various other factors.

3. RISK ASSESSMENT - DETERMINATION OF PROBABILITY AND SEVERITY

We define safety risks for the need of management in the context of the identified hazards based on their probability and severity.

Probability analysis:
The likelihood of other risk is defined as the probability of occurrence of a hazardous event.

Table 1: Probability of occurrence

<table>
<thead>
<tr>
<th>Qualitative Definition</th>
<th>Probable</th>
<th>Occasional</th>
<th>Rare</th>
<th>Very Unlikely</th>
<th>Almost Impossible</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>9</td>
<td>6</td>
<td>4</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

We determine the severity of the consequences of the hazard based on 5 degrees:

<table>
<thead>
<tr>
<th>Level of consequence</th>
<th>Definition</th>
<th>Significance</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Catastrophic</td>
<td>Significant property damage, death or injury</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Severe</td>
<td>Equipment loss, damage to health, 2nd or 3rd degree burn</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td>Significant</td>
<td>Minor injury, or property damage</td>
<td>C</td>
<td></td>
</tr>
</tbody>
</table>

In the framework of the implementation of the causal analysis (analysis of reasons, contributing factors and existing barriers) the direct reasons are taken into account, namely the incorrect execution of sequenced operations, hazardous behavior and violation of established rules, the human factor, etc. The contributing factors are the organizational factors, environmental factors are.

For barriers that reduce probability, we consider:
- CAA Certification Requirements
- Established operating procedures
- Principles of ATO operation
- Instructor training

Additional questions to determine the likelihood of risk:
- Are similar sources from the past accounted, or is this occurring separately?
- How many employees work according to the new procedures?
- For what proportion of the time is the equipment or procedure considered?

We determine the probability of the consequences of the hazard based on 5 degrees.
4. DESCRIPTION AND DETERMINATION OF RISK ACCEPTABILITY

Safety risks are already evaluated for probability and consequence, and the next step is to determine the acceptability of the consequences of the event.

At the time of the risk assessment process, the determination of an ordinal scale is a task to be carried out by the operational personnel involved in those risks.

Safety recommendations are prepared by the Safety Manager and approved by the Accountable Manager.

(a) Unacceptable risks
As unacceptable we refer to the risks that are in the red zone of the risk matrix. The risk in this area are too high to be able to carry out the operational processes involved in those risks.

(b) Tolerable risks
As tolerable risks we refer to the risks in the yellow zone of the risk matrix. Risks in this area are tolerable under the assumption of a regular check according to established safety recommendations.

Safety Manager is responsible for determining the safety recommendations.

(c) Acceptable risks
As acceptable risks we refer to the risks in the green zone of the risk matrix. Such risks are controlled by the ATO and can be accepted without any obligation to manage them.

Safety Manager is responsible for the risk assessment.

5. SAFETY RISK MANAGEMENT

PRINCIPLES OF DEFENSE SELECTION

The safety manager is responsible for the safety risk management process. The responsibility of the Accountable Manager is to ensure that the processes comply with the established standards. Based on the assessment of the acceptability of risk according to its competence within the time defined areas within the risk matrix the following procedures are set for the ATO.

Safety recommendations are used to manage safety risks (reduction, mitigation) in the ATO. Applying safety recommendations is the responsibility of the employees assigned by the Safety Management for the implementation of the safety recommendations. If the risk is still present, the process is repeated until the risk is eliminated or the risk is eliminated. The Safety Manager must be informed about the implementation / non-implementation of the safety measures. In case of non-compliance with the safety recommendations, the Safety Manager must take steps to ensure that the required level of safety is maintained.

Table 2: Severity of occurrence

<table>
<thead>
<tr>
<th>Probability</th>
<th>Categorical</th>
<th>Frequency</th>
<th>Consequence</th>
<th>Likelihood</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Occasional</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Rare</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Very Unlikely</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Extremely Possible</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>

Table 3: Risk acceptability

Risk values marked in red (A, B, C, G, H, I, J) are defined as unacceptable. The yellow values (D, E, F, G) are defined as tolerable. The green value (K, L, M, N, O, P, Q) are acceptable.

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- Cancellation - operation or operation is terminated, safety risks are higher than the benefits that are provided during the risk.
- Reduction - Frequency of use or activity is reduced or activity is taken to reduce the consequences of the risk.
- Exclusion of flaws - The consequences of the omission operation are removed as a necessary condition of the system.

Possible alternatives for the safety risks mitigation must have the same potential for mitigation. Before deciding on their use the Safety Manager considers the effectiveness of design, management and personnel measures, and the cost-benefit analysis.

The Safety Manager must perform the functionality of the proposed measures, acceptability for each of the stakeholders, feasibility and performance. The Safety Manager analyzes the safety issues that remain in the system after mitigating the original risks. Reaching the same safety measure of a different nature may occur.

Safety recommendations can be made as follows:

- Implementation of new technologies
- Application or change of procedures and regulations
- Training (focusing on the problem area)
6. CONCLUSION

Approved training organizations must set up, maintain and continually improve the quality management system of the organization to ensure the necessary certification conditions. The quality system is generally based on the strategy and internal philosophy of a specific organization, or in each quality system is original in its own way and is a universal model of such a system. There are only recommendations and suggestions of smaller quality system requirements. The aim of the article was to show one of the possible forms of the quality system of the training organization, to describe and explain the role of all its components and to emphasize the importance of its key parts, such as feedback systems and audits.

7. REFERENCES