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SAFETY MANAGEMENT SYSTEM IN CROATIA CONTROL Ltd.

ABSTRACT

International Civil Aviation Organization and other international aviation organizations regulate the safety in civil aviation. In the recent years the International Civil Aviation Organization has introduced the concept of the safety management system through several documents among which the most important is the 2006 Safety Management Manual. It treats the safety management system in all the segments of civil aviation, from carriers, aerodromes and air traffic control to design, construction and maintenance of aircraft, aerodromes, those who produce instruments, equipment and parts for the needs of civil aviation and others. This paper presents and partly deals with the documents from the safety management system domain and the system implementation in Croatia with special focus on the Croatia air navigation service provider, Croatia Control Ltd.

KEY WORDS

safety management system, safety, air traffic control

1. INTRODUCTION

“Air traffic safety” is a term which means undertaking of preventive actions in order to prevent aircraft accidents or to mitigate their consequences. In avia-

tion context, the term “safety” differs essentially from “security” which mean the safeguarding of civil aviation against acts of unlawful interference, e.g. anti-diversion check, body-check, physical security of facilities, etc.

Air traffic operations are related to dangers during the flight, landing and take-off, movements on the manoeuvring surfaces, aircraft handling, aircraft construction and maintenance, etc. Traffic growth and increase of operations at airports and in the air increase also the occurrence of aircraft accidents or incidents. The costs resulting from aircraft accidents can be enormously high so that one may speak of the economic need to introduce the safety management system (SMS).

It has been, therefore, concluded that it is necessary to introduce such safety programmes and safety management systems that will reduce the probability of accident [1].

According to the definition provided by the International Civil Aviation Organization (ICAO), “safety is the state in which the risk of harm to persons or of property damage is reduced to, and maintained at or below an acceptable level through a continuing process of hazard identification and risk management” [1].

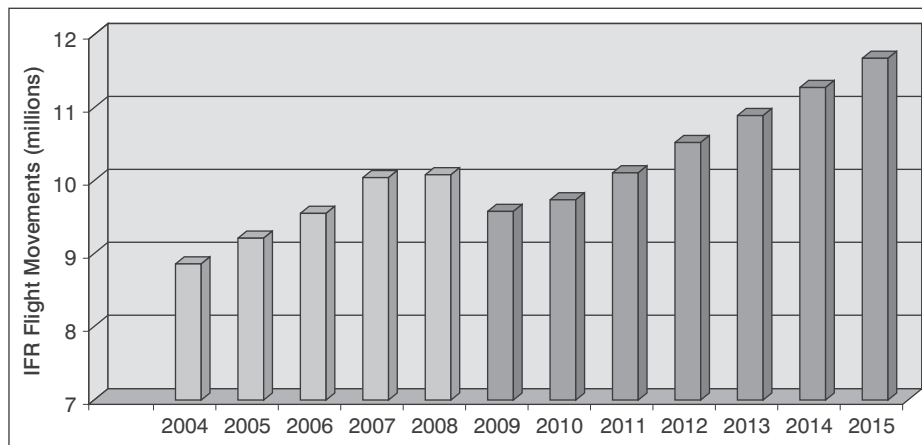


Figure 1 - Realized and expected number of IFR flight movements in EUROCONTROL Statistical Reference Area

Source: EUROCONTROL Medium-term Forecast: IFR Flight Movements 2009-2015, Base-Scenario, Vol 1, V1.0, 27.02.2009

2. INTERNATIONAL AVIATION ORGANIZATIONS AND THE REPUBLIC OF CROATIA DOCUMENTS

In the Convention on International Civil Aviation, the so-called Chicago Convention, in Article 44, ICAO speaks of providing safe and harmonious development of international civil aviation in the world [2]. Furthermore, ICAO standards and recommended practices in the Annexes of the Convention on International Civil Aviation:

- 6: Aircraft Operations, Part 1 International Air Transport – airplanes [3];
- 6: Aircraft Operations, Part 3 International Operations – helicopters [4];
- 11: Air Traffic Services [5];
- 14: Aerodromes [6],

require the member countries to establish a safety programme in order to achieve an acceptable safety level in aircraft operations.

ICAO differentiates between safety programmes and safety management systems:

- Safety programme is an integrated set of regulations and activities aimed at improving safety;
- SMS is an organized approach to managing safety, including the necessary organizational structures, accountabilities, policies and procedures.

Safety programme is very broad in scope and includes many safety activities aimed at fulfilling the programme objectives. A State's safety programme includes the regulations and directives for the conduct of safe operations of aircraft operators and service providers in air traffic control, at aerodromes and in aircraft maintenance. In accordance with the provisions of Annexes 6, 11 and 14 of the Convention, States shall require that individual operators, mainte-

nance organizations, ATS providers and certified aerodrome operators implement the safety management system accepted by the State.

Apart from the standards and recommended practices contained in the Annexes of the Convention on International Civil Aviation, ICAO describes in more detail the requirements for safety programmes and SMS through the following documents:

- Procedures for Air Navigation Services – Aircraft Operations [7],
- Procedures for Air Navigation Services – Air Traffic Management [8],
- Manual on Certification of Aerodromes [9], as well as other manuals and documents.

EUROCONTROL (European Organisation for the Safety of Air Navigation) i.e. the Safety Regulation Commission (SRC) requires that service providers in air navigation in all the Eurocontrol member countries establish the SMS. This has been defined by the ESARR (Eurocontrol Safety Regulatory Requirement) documents, 6 in all, that define in detail the SMS parts. The European Commission included in the Regulation No 2096/2005 (Common Requirements [13]) for the service provision in air navigation in the European Union the majority of requirements from ESARRs. This Regulation stipulates the certification of the service providers in air navigation provided the SMS has been established, as well as the Quality management system, Security management system, and that other conditions have achieved e.g. the requirements for organization and company management, etc.

Joint Aviation Authority (JAA), that is, European Aviation Safety Agency (EASA) defines SMS in aircraft maintenance and licensing as well as specialist improvement of personnel.

Airports Council International (ACI) treats in its documents primarily safety on the apron i.e. airside of

the airport [10]. This is understandable since it is an association of airports that provides its members with information through manuals related to the standard operative procedures and SMS on the basis of ICAO materials, civil aviation administrations of the developed countries and experiences of ICAO members.

Civil aviation administrations of the more developed countries stipulate the required safety levels.

In the Republic of Croatia, the following regulations are in force, and they define to a certain extent the SMS elements:

- Law on Air Traffic (Zakon o zračnom prometu - ZZZP), amendments (NN 46/07);
- Regulation on reporting and study of safety, accidents and serious aircraft incidents (NN 139/05);
- Regulations on conditions that have to be complied with by the aviation and auxiliary aviation personnel;
- Regulation on the certification of air navigation service providers (NN 81/2008).

3. SAFETY MANAGEMENT MANUAL

The Safety Management Manual (SMM) [1] treats the respective issues in 19 chapters. It is applicable in all the segments of air traffic: airports, air carriers, air navigation services, aircraft maintenance, production of parts and in other segments of civil aviation.

The first Chapter contains a general overview (the need for safety management, ICAO requirements, stakeholders in safety, traditional and modern perspectives of safety, etc.), then the responsibility for managing safety: parties responsible (ICAO, states, civil aviation administrations, manufacturers, aircraft operators, service providers, third party contractors and business and professional associations) and responsibilities and accountabilities.

The state safety programme lists the regulatory responsibilities, that is, the Civil Aviation Administrations. The Chapter on understanding safety deals with the concept of risk, that is, accidents and incidents, traditional and modern views of causation, human error, costs of accidents, incidents and safety. The Chapter on the basics of safety management deals with the philosophy of safety management, factors affecting system safety and safety management concepts. Risk management includes hazard identification, risk assessment, mitigation and communication.

SMM treats the incident reporting, types of incident reporting systems, international reporting systems, state voluntary reporting systems, company reporting systems, implementation, methodology, etc. Safety analysis and studies encompass analytical methods and tools. Safety performance monitoring includes safety overview, ICAO Universal Safety Over-

sight Audit Programme, Safety Oversight for the assessment of implementation of standards and recommended practice by the countries signatories of the Convention, regulatory safety audits and self-audits.

Chapter eleven treats the emergency response planning, ICAO requirements, aircraft operator's responsibilities, training and exercises. Emergency response plans have to be harmonized with the identical plans of airports.

The Chapter on establishing an SMS contains safety culture in ten steps to an SMS. The safety assessment process is presented in seven steps. Safety auditing includes a safety audit team, process of planning, preparation and conduct of the audit. Practical considerations for operating an SMS explain the need and tasks of safety offices, managers and committees, safety management training, conducting of safety surveys, disseminating safety information and its promotion.

The Chapter on Aircraft Operations treats the hazard and incident reporting, flight data analysis programme, line operations safety audit programme and cabin safety programme.

Chapter on Air Traffic Services (ATS) treats ATS safety, ATS safety management systems, ATS service providers, activities that need to be performed in changing ATS procedures, mechanisms that eliminate or reduce the negative effects of external and internal errors or negative circumstances (threat and error management), normal operations safety survey.

Chapter eighteen refers to Aerodrome Operations and includes the regulatory framework, aerodrome safety management, aerodrome emergency planning, apron safety and the role of aerodrome safety manager. Aircraft Maintenance treats managing safety in maintenance, managing procedural deviations in maintenance and certain issues of safety manager's concerns.

SMM is a very complex manual which treats comprehensively the safety management system.

4. IMPLEMENTATION OF SAFETY MANAGEMENT SYSTEM

As result of requirements to fulfil the basic conditions for safe traffic flow, SMS has become the ICAO standard for all the member countries.

The states of the developed aviation of Europe have already developed safety management systems and have implemented without any major problems the newly brought regulations of international government aviation organizations and have established SMS in all air traffic subsystems.

In the transition states, including the Republic of Croatia, these processes have been partly started.

Those institutions that are more integrated into the European system such as air navigation services are at an advantage.

The main policy of SMS at airports shall include but not be limited to the following measures:

- protection of workers,
- assessment of all risks regarding health and safety as consequence of work,
- insurance of adequate control of danger caused by other co-operators,
- stimulation of agreements and exchange of information with employees and personnel within the organization,
- insurance and maintenance of equipment,
- provision of adequate instructions, training and other useful information,
- elimination or reduction of incidents and close encounters.

In Croatia, the most advanced SMS is at the Croatia Control Ltd (Croatian Air Navigation Provider - Hrvatska kontrola zračne plovidbe d. o. o. (HKZP)).

Croatia Control has implemented the EUROCONTROL documents related to SMS to the greatest extent, and these are the ESARRs (Eurocontrol Safety Regulatory Requirements) documents, since they can define the SMS in more detail than the ICAO documents. The following ESARRs have been implemented:

- ESARR 1 – Safety Oversight in ATM [14] (applicable to a greater extent to the regulator),
- ESARR 2 – Reporting and Assessment of Safety Occurrences in ATM [15],
- ESARR 3 – Use of Safety Management Systems by ATM Service Providers [16],
- ESARR 4 – Risk Assessment and Mitigation in ATM [17],
- ESARR 5 – ATM Services' Personnel [18],
- ESARR 6 – Software in ATM Systems [19].

With every ESARR, EUROCONTROL has issued also the accompanying documentation (guidelines) which contain detailed instructions on possible methods of fulfilling the requirements from the respective ESARR, on a total of several thousand pages [22].

ESARR 1 defines the safety oversight in air traffic management, i.e. the way in which the National Supervisory Authority supervises the safety of air navigation service provision.

ESARR 2 stipulates reporting on occurrences that have or may have negative influence on air traffic safety, as well as their assessment. It is not aimed at determine the responsibility of a certain person involved in a specific occurrence, but the objective is rather to determine the causes of these occurrences and to define the corrective actions (risk mitigation

measures), with the purpose of reducing the probability of reoccurrence of these events. A more successful reporting system may result in collecting of more reports, i.e. have more indicators that would indicate parts of the system (the system understands the equipment (hardware/software), people, procedures) in which the level of safety needs to be increased. The more indicators, the better the definition of the priorities in undertaking the corrective actions. A greater number of reports does not have to mean that a certain part of the system is less safe, but, on the contrary, most likely it means more successful functioning of the SMS, which most probably means increased level of safety. The efficiency of ESARR 2 implementation depends to a great extent also on the establishment of the so-called “just-culture” environment [20].

ESARR 3 treats the use of SMS by ATM service providers and these requirements match to a great extent the requirements given in the Regulation on common requirements that have to be complied with by the air navigation service providers (CR, Reg. 2096/2005 – [13]).

ESARR 4 refers to making changes in the system (equipment, people, and procedures). In all the changes it is necessary to determine whether there are potential hazards, what is their probability and seriousness of the possible consequences, and to determine the measures which reduce these risks to a minimum that will be acceptable (acceptable or tolerable level of risk). There is, namely, no system which would be absolutely safe. ESARR 4 tolerates the occurrence of one accident in the ECAC area (European Civil Aviation Conference) of every 6.4×10^7 FH (1.55×10^{-8} accidents of commercial aircraft per hour of flying), whereas less serious events can occur much more frequently.

ESARR 5 defines standard competencies, that is, conditions that have to be complied with by the ATM service personnel, treating in detail the conditions for air traffic controllers and for the aviation-technical personnel.

ESARR 6 defines the ATM management software.

The national **regulator** harmonizes the national legislation with ICAO documents, ESARRs, “Common requirements” (Regulation 2096/2005 - CRs), other EU regulations, directives, etc., and implements the Safety Oversight, including the **certification** of air navigation service provider. The current standards for the conduct of oversight are the “Common requirements” (Reg. 2096/2005 CRs [13]), ESARR 1 [14], ESARR 3 [16], ICAO documents and the EU regulation 1315/2007 [23].

Regarding the process of the Croatian accession to EU and the harmonization of laws, regulations, and standards, as well as regarding the signed ECAA

Agreement, in compliance with CR and EU directives and regulations, Croatia Control has established an SMS. Although established, the SMS is not a “revolutionary”, but an “evolutionary” and cyclic process which requires constant monitoring and improving of the entire system, as well as reduction of risk to a minimum, i.e. to an acceptable level.

Croatia Control:

- has brought Safety Policy,
- has developed a Safety Management Manual,
- has founded the Safety and Quality Office whose manager performs the function of Safety Manager directly responsible to the general manager,
- has developed or is developing other documentation which defines SMS implementation, and insures the implementation of these documents,
- has been constantly adapting other internal procedures and documentation to the SMS requirements,
- has made available to all managers, as well as all employees who perform activities that are of significance for air traffic safety, the documents that determine SMS and its implementation, and informs them on the contents of these documents and the SMS importance.

5. CONCLUSION

International state organizations in aviation have recognized the need to introduce SMS in all organizations, institutions, manufacturers, maintenance organizations and others who are involved in civil aviation. The basic regulations in the field of safety have been known for decades already, whereas SMS is a category that has been introduced recently. The developed countries, regarding aviation in Europe and in the world, have soon accepted and implemented all the requirements which result from the documents of ICAO and other organizations, whereas European transition states, including the Republic of Croatia, have been accepting and implementing the requirements partly according to standards, and partly by incentives from outside. Airports and air carriers are in the implementation phase with, assumingly, transition solutions which should be harmonized with the requirements of ICAO and other governmental and non-governmental organizations in several years. In relation to other subjects in air traffic in Croatia, the Croatia Control has gone farthest in implementing SMS, since they apply to a great extent the respective EUROCONTROL standards.

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SAŽETAK

SUSTAV UPRAVLJANJA SIGURNOSTI U HRVATSKOJ KONTROLI ZRAČNE PLOVIDBE

Međunarodna organizacija za civilno zrakoplovstvo i druge međunarodne zrakoplovne organizacije propisuju sigurnost u civilnom zrakoplovstvu. Posljednjih godina Međunarodna organizacija za civilno zrakoplovstvo uvodi pojam sustava upravljanja sigurnošću kroz nekoliko dokumenata od kojih je najvažniji Priručnik upravljanja sigurnošću. On obrađuje sustav upravljanja sigurnošću u svim segmentima civilnog zrakoplovstva, od prijevoznika, aerodroma i pružatelja usluga u zračnoj plovidbi do projektiranja, izgradnje i održavanja zrakoplova, aerodroma; kod onih koji izrađuju uređaje, opremu i dijelove za potrebe civilnog zrakoplovstva i drugih. U radu su prikazani i dijelom obrađeni dokumenti iz domene sustava upravljanja sigurnošću te implementacija sustava kod pružatelja usluga u zračnoj plovidbi.

KLJUČNE RIJEČI

sustav upravljanja sigurnošću, sigurnost, kontrola zračnog prometa

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