SAFETY MANAGEMENT IN AIR TRAFFIC SERVICES

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Abstract. *The paper considered the concept of aviation security and factors that lead to accidents. The types of human errors in the maintenance of air traffic are described. A graphical diagram with an explanation of the concept of "safety cycle" is given. The economic aspect of the aviation industry in the event of non-standard situations has been studied.*

Keywords: *experience, error, attention errors, memory errors, perception errors, errors and gross violations, direct consequences, indirect consequences, industrial and social consequences, the price of safety*

INTRODUCTION

Technological maps are developed, in order to improve the skills of specialists, to reduce the time to think about the situation, for the purpose of reflection on the next step and sequence of actions. However, in each individual case, an aircraft accident may develop unpredictably. Every dispatcher and pilot can make a mistake. Our goal is to reduce the time required to parry an aviation accident, to minimize the influence of the human factor in each case.

Human behavior in an aircraft accident can be influenced by many extraneous factors. That is why the behavior in the event of an aviation accident at the landing stage should be as "automated" as possible. And for this it is necessary to investigate and analyze the algorithms of the actions of the dispatcher and the pilot. Analyze the factors that can lead to a special in-flight event during the landing phase. To study the factors influencing the behavior of the controller and the pilot, and ways to reduce the influence of these factors.

It is known that most accidents are committed through the fault of the flight and air traffic controllers. They are the result of suboptimal human actions. Therefore, any improvements in this area can significantly improve the level of Flight Safety.

MATERIALS AND METHODS:

Analytical methods were used in the work. As well as monitoring the work of air traffic controllers in the process. The regulatory and technical rules and methods used by the ATS personnel in non-standard situations were analyzed.

The purpose of the study is to analyze the existing technologies for the work of air traffic controllers regarding the performance of work in non-standard situations, to compare the procedure for performing actions of SUE Center "Uzaeronavigation" controllers and foreign countries.

RESULTS AND DISCUSSION:

The use of inappropriate rules involves the use of a procedure that experience has shown to work in the past but contains unrecognized defects. If such a solution worked in the situation when it was first used, it can become part of an individual approach to solving such problems.

When a person does not have a ready-made solution based on previous experience and / or education, he turns to personal knowledge and experience. Making a decision in this way will take more time than applying a rule-based decision. Because it requires substantiation of knowledge on basic principles. Errors arise due to lack of knowledge or incorrect justification. Applying

knowledge based on personal experience will be particularly difficult. Because, the person at this time will be busy, or his attention will be diverted from the justification process by other circumstances. In such situations, the possibility of making a mistake increases.

The actions of an experienced person are routine and brought to automatism. A person only monitors the progress, mistakes and errors arise as a result of:

- Errors of attention. They arise as a result of the inability to follow the process of performing a routine action. At a certain critical moment, this happens when a planned procedure is similar to, but not identical to, a routine activity performed earlier. If attention is distracted or distracted at a critical moment when the procedure differs from the usual action, the person is more likely to perform the usual action, something that is needed at the moment.

- Memory errors occur when we either forget what we intended to do, or skip an element of the chain of planned actions.

- Errors of perception - errors in recognition. They arise when we are sure that we have heard or seen something before, in fact, different from the given circumstances.

Errors (which are normal human actions) are quite different from violations. Both actions lead to system failure. The difference lies in the intention.

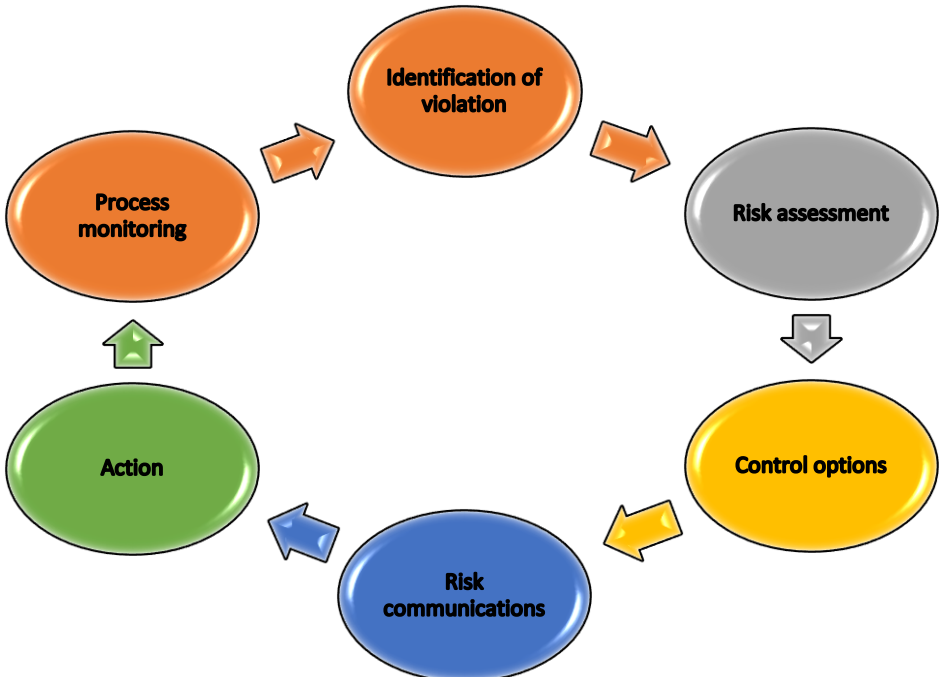
Violation is a deliberate act, while error is unintentional. For example, take the situation where the controller allows the aircraft to descend to the level of an aircraft flying at cruising speed. When the distance of the ranging equipment between them is 18 nautical miles and this happens in circumstances where the required minimum is 20 nautical miles. If the controller made an error in calculating the distance difference of the distance measuring equipment recommended by the pilots, this will be an error. If the controller calculated everything correctly, and allowed the descending aircraft to descend to the level of an aircraft traveling at cruising speed, knowing that the condition of the necessary minimum was not met, this would be a gross violation.

Some violations are the result of insufficient or unrealistic actions. When people have developed habits of "approximate work" while doing a task. In this case, it is very visible to notify of their detection. To correct procedures immediately. In any case, violations will not be tolerated. There have been a number of accidents in which a corporate culture tolerating short cuts instead of following published procedures has been cited as a cause of accidents.

An effective safety management system requires a given number and potential interactions of factors affecting safety. A required example of the type of systematic process is shown in Figure 1, Safety Cycle. It is followed by a short description of the cycle.

Figure 1.

Safety cycle



Each identified violation should be identified and prioritized. This assessment requires finding and analyzing all available information. The information is evaluated to determine the extent of operational disturbances. Are they "one of a kind" or systemic? A database may be required to facilitate the storage and retrieval of information. In this case, appropriate tools are needed.

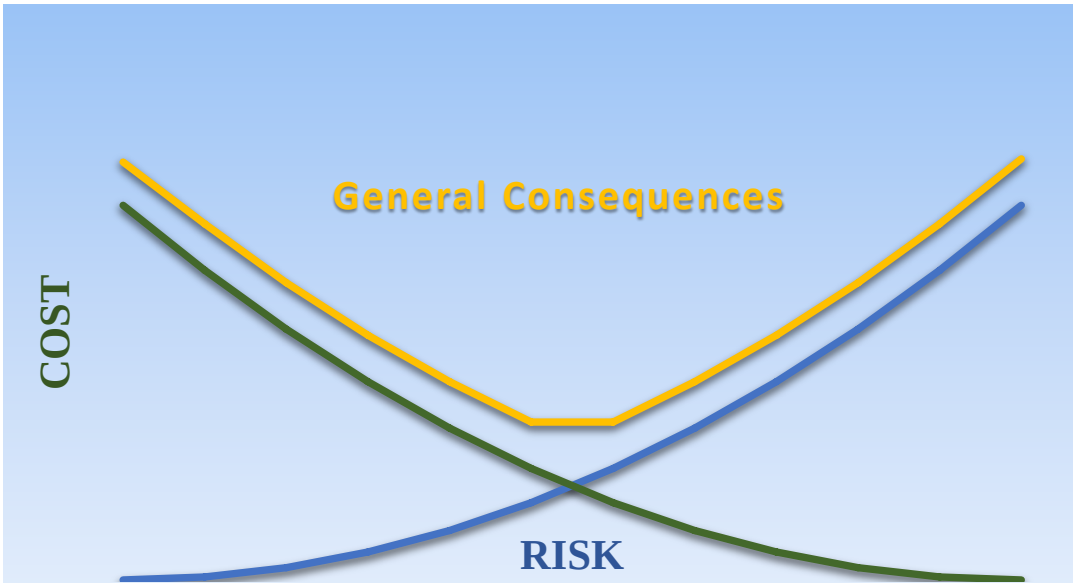
Once defects are found in a security system, decisions must be made on how to avoid or eliminate the breach or mitigate the risk associated with it. The decision must take into account local conditions, as "one size" does not fit all situations. Care must be taken that the decision does not lead to new violations. This is a risk management process.

Running a portable but reliable airline or service provider requires a constant balance between the need to meet production goals (such as departing on time) and security goals (the extra time it takes to check the safety of a closed gate). The aviation workspace is filled with unsafe conditions that cannot be avoided, but operations must continue.

Some operations make a "zero accident" commitment and claim that "safety is their number one goal." The reality is that operators (as well as some commercial aviation organizations) need to generate income in order to survive. Profit or loss is an immediate indicator of success in meeting your productive goals. Be that as it may, safety is a necessary prerequisite for a sustainable airline business, as the temptation to save money will gradually grow. For many companies, the concept of safety can be defined by the absence of losses in disasters. Companies may only realize they have safety issues after an accident or loss, in part because it will result in losses/reduced profits. However, a company can operate for years under unsafe conditions without adverse consequences. In the absence of an effective safety manual to identify and eliminate unsafe conditions, a company may be considered to be meeting its safety objectives. Which is proven by "no loss". It's actually just a happy accident.

Figure 2.

Cost-to-Safety Graph

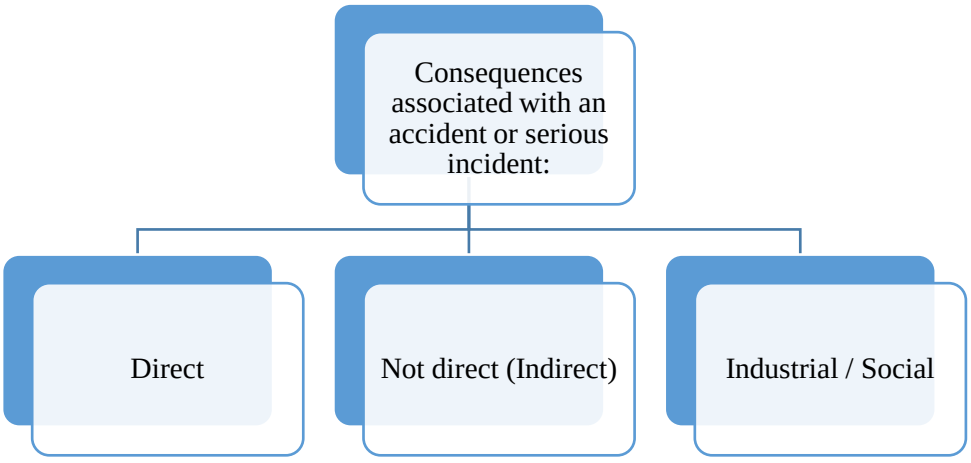


Security and profit are not mutually exclusive. Indeed, quality organizations understand that the cost of correcting unsafe conditions is an investment in further long-term profits. Accidents are expensive. Thus, money spent on ways to reduce risk also reduces losses - as shown in Figure 2. However, spending more and more money on reducing risk may not result in an equivalent profit. Companies must balance the cost of risk with the costs of ways to mitigate it. In other words, some level of loss can be accepted in terms of direct benefit to loss. Be that as it may, only a few companies are able to survive the economic consequences of a major disaster. Thus, there is a strong economic reason for effective security management to manage risk.

Ensuring safe separation intervals should guarantee conflict-free aircraft flights. It is based on technologies and procedures that ensure the required minimum separation of aircraft and maximize the capacity of the ATM system. (Эшмурадов Д. Э., 2015)

Figure 3.

Cost of risk



Direct consequences are obvious consequences that are easily identified. For the most part, they are related to physical injury, repair, replacement or compensation for damage, aircraft equipment and damage to property. The high cost of an accident can be reduced by insurance payments. (Some large organizations try to protect themselves by accumulating funds to cover risk costs).

Indirect effects - since insurance can only cover certain types of expenses, there are expenses that are not covered by insurance funds. Understanding such costs is fundamental to understanding the economics of security. Indirect consequences include all non-insured costs resulting from an accident rather than direct consequences. Such costs are not always clear and are often deferred. Examples of some of the costs that are not included in the insurance and may be accumulated depending on the accident.

Industrial and social consequences. In addition to the monetary consequences described above, a plane crash can cause more damage to the reputation of the aviation industry and the market as a whole than an airline accident. (The events of September 11, 2001 are proof of this). Passengers choosing alternative modes of travel (such as rail) may be at additional risk.

The cost of safety is even more difficult to determine than the overall consequences of an accident, partly because of the difficulty in estimating the consequences of averted accidents. Be that as it may, some operators are trying to determine the costs and benefits of establishing security management systems. They found that the savings are substantial. However, profit analysis is difficult, there is a procedure to follow, and senior management is reluctant to spend money if there is no quantifiable profit. One way to address this issue is to separate the costs of the security management system from the costs of correcting system defects, making the costs of the security management system the responsibility of the security department and the costs of correcting system defects to line management. This procedure involves senior management in assessing the costs and benefits of the safety management system.

CONCLUSIONS:

Depending on the intensity of the flows of arriving and departing aircraft and the applicable flight rules in the area of the aerodrome (air hub), one of the three main methods of organizing air traffic can be established. Firstly, the organization of the movement of the aircraft according to the established patterns without radar control, with the use (without the use) of technical means of navigation. It is used when organizing flights in the area of an aerodrome (air hub) and consists in establishing, as a rule, one typical aircraft movement pattern for each of the take-off and landing directions. Secondly, the organization of traffic according to established patterns, including landing approach and exit patterns from the airfield area at the shortest distance, in the presence of radar control and other technical means of navigation. This technique is used when organizing flights in the area of an aerodrome (air hub) and consists in establishing alternative aircraft movement patterns for each of the take-off and landing directions. Thirdly, the organization of traffic on standard routes of departure and arrival SID / STAR, regardless of the use of radar control. This technique is used when separating the flows of arriving and departing aircraft, in developing and establishing schemes in which for all aircraft following standard routes, the possibility of safe separation is provided in advance in compliance with the established separation standards at intersection points.

ATM in the area of the aerodrome (air hub) consists in the development and implementation of a set of organizational and technical solutions to create a highly efficient and safe ATS system that meets the needs of air traffic.

The created ATM system should be adapted to function both in normal (standard) conditions and in conditions of "peak" air traffic intensity (daily and seasonal), failure of RTS navigation, "failed" situations in air traffic, complex (dangerous) meteorological phenomena etc.

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