HUMAN FACTORS AND CONSEQUENCES FOR SAFETY IN AIR TRAFFIC MANAGEMENT

Veronika Judičáková - Juraj Vagner

This paper deals with the human factor and its impact on security in air traffic control management. It mainly focuses on the internal and external factors affecting the performance of the work of air traffic controllers. Errors and failures in the management of air traffic control operating as consequences of negative factors. Attention is given to the air disasters which were because consequences of alluring air traffic control management, detailed analysis of accidents, the reasons for this failure sand the introduced measures in place of accidents. From the findings are made suggestions for possible action to prevent or eliminate as many of accidents.

Keywords: Human factor, air traffic control, Air traffic controller, air accidents, stress, failure

1 INTRODUCTION

The main objective of the topic „The human factor and its impact on security in air traffic management“ is to try to further analyze the impact of human factors on the work of air traffic controller, its responsibilities, duties and tasks, but also by what the errors and the consequences of errors can occur. The work of air traffic controller is mentally challenging and even the smallest error often means heavy material losses on aircraft but worse fatalities. The issue of human factor is very interesting, as the share of human factor in air accidents is also the ever increasing and improving technology remains high. Attention is focused on incidents caused by human factor, which was till now cause up to 70% of air accidents. Even with the advancement of technology, intensive training, tests, continuous exercise and ongoing psychotréningom is the work of air traffic controller action ubiquitous human factor. Among the key staff of air traffic include pilots, maintenance personnel, aviation ground personnel and many others, without which the operation of the aircraft certainly. Everyone who participates for the flight may be the person who causes the accident. The work focuses on the occurrence of individual errors and factors affecting the performance of work in the field of air traffic controllers. Analyzing accidents and aviation disasters, the impact of stress, fatigue and various lifestyle factors, with the only result of this error, and air traffic controller.

2 ONE ASPECT OF HUMAN FACTORS IN AVIATION

Human behavior and performance are the leading cause of aviation accidents and incidents. For significant improvement in this situation it is necessary to understand the issue a lot more people and greatly expand the application of acquired knowledge into practice. Since human began in the distant past use different tools, application of elemental ergonomics means a significant improvement in labor efficiency. Real revolution in the field of ergonomics started in the last few centuries. Knowing that education in human factors began to be needed in the aviation industry resulted in different countries to different approaches to the training system. This knowledge was enhanced by the tragic air disaster that occurred in 1977 on the island of Tenerife collision of two Boeings 747 which killed 583 people.

The notion of the human factor is the most flexible and most valuable part of the aviation system, but at the same time also most vulnerable to influences which may be adverse effects its performance. Over the years it has been shown that around three of the four air accident had their cause in other than its optimum human performance. Such causes were classified in the past mostly by "pilot error" or "error ATC". However, this is no help in the prevention of accidents rather counterproductive, since it refers only to the system where the error occurred, but not why I keep. Error caused by man in a complex system can be triggered by poor design, stimulated by inadequate training, poorly designed operational procedures, an imperfect concept potentially inappropriate treatment manuals.

2.1 The human factor as a scientific discipline

A lot of attention in the field of adverse effects on human aviation in the past concentrated mainly on noise, vibration, heat, cold or inertial forces. Optimization of people in this complex work environment encompasses all aspects of human performance and behavior such as:

- decision-making and other mental processes,
- the design of displays and control elements of the control tower,
- communication and computer software,
- maps and diagrams,
- documentation.

Technology human factor is all about the people in their living and working situations, their relationship to machines, processes and environment that surrounds and also on their relationship to other people. Technology human factors in aviation include complex personal, medical, biological and other natural approaches for optimal air traffic management as a whole. One of the general definitions of human factor introduced by Professor Edward says "human factor is the discipline that deals with the optimization of human relations and human
activities in the systematic application of humanities integrated within the systems engineering". Its aim is to force the system, including the safety and efficiency of health and well begin.

2.2 Models of the human factor

In the field of human factors use different conceptual models. Characters include model "SHELL" and "Swiss cheese model".

Model of the human factor SHELL

This model was designed in 1972 by Professor E. Edwadsom. In its present form it modified the structure of "building blocks" of FH Hawkins in 1976. SHELL name originated from the initials of the individual elements (Software, Hardware, Environment and live ware). The diagram in Figure shows us the different elements and strongly bounded contours. Sense is that the better the different elements fit into the roughness of edges, the better the system is fabricated. SHELL model points out that man is not the only cause of the accident. Each element model portrays SHELL building block in the study of human factors in aviation (ICAO). The human element is at the center or axis SHELL model, which portrays a modern system. Human element represents the most critical and most flexible component in the system, which must interact with other elements and to the Software, Hardware, Environment and live ware.

Pict. 1: Model SHELL

Basic interface SHELL model:

Liveware "central" - Software

We are talking about the interaction between the human "human operator" and non-physical support systems in the workplace. As a rule designed software to fit the needs of human use in order to ease and practicality.

Liveware "central" - Hardware

Here we are talking about the interaction between the human "human operator" and the machine. It discusses how the design of displays and controls should respond to the needs and technical achievements should minimize error.

Liveware "central" - Environmental

It is human interaction "human operator" and the internal and external environment. Relates to organizational, regulatory and social aspects of the environment such as employee morale, health, occupational hygiene, and not least job security. Adapting the environment to match the requirements of workers.

Liveware "central" - Liveware

It is human interaction "human operator" and others in aviation which performs tasks. This interface is related to leadership, crew cooperation and mutual influence of personality. It also can be understood as a relationship as between individuals within and between the groups.

Model of the human factor "Swiss cheese model"

This theoretical "model of human error" designed in 1990 by James Reason shows us how accidents happen in aviation. It can also be called a model of the causes of accidents. The model focuses on the organizational hierarchy but also to human error. This model shows that the accident occurs because some (human) errors occurred in several or all levels of the organizational hierarchy. The system compares him to a slice of cheese side by side. Slice of cheese can be understood as a kind of barrier or barrier is the lack of a hole in the system. Holes are moving and changing the location of the sections and also their size. System fails as a whole at the moment when all the holes in the cheese slices at some point settled, creating a trajectory for the occasion of an accident. Consequently, there is a failure and the accident itself.

Pict. 2: Model Swiss cheese

Swiss cheese model is based on the sequence of these errors:

- this sequence of human error, leading to an accident or mistake
- active fault,
- hidden or latent error.

Hidden (Latent Failures) failure lasts the first three levels; they need not prove a longer time and days, weeks or months. Latent defects in the system there for some time before an event occurs. Prerequisite for hidden faults can be tedious crew, or inappropriate communication process. Most are caused by their own
organization as staff training, hierarchical relationships, communication patterns) or managerial choice

2.3 Aspect of human performance in ATM

Critical article on who is under pressure and the load is an air traffic controller. The root of the air traffic controller is to ensure the safe and orderly flow of air traffic. Normal load is meant to perform common tasks and activities that are a constant dependent on the number of ordained aircraft. Constant load is meant joining the management responsibilities remain and operate in their workplace, regardless of the number of air traffic control. Conflicting burdens us already at the title evokes that it is a search and conflict resolution and is a function of the square of the number of air traffic control.

ESSAR 5 down general requirements applied to the conditions of the Slovak Republic in force in the Member States of the European Civil Aviation Conference (ECAC). This legislation regulates the safety of all personnel ATM services, which is responsible for security in the provision of ATM services for air traffic controllers and technical staff. The aim is to achieve a harmonized minimum level of competence and skills of the staff. Involves meeting the required level of knowledge, skills, experience and sufficient knowledge of the English language.

Requirements for air traffic controllers under ESSAR 5:
- The requirements applied by the Authority,
- Requirements applicable air traffic service providers,
- Requirements applicable individuals.

2.4. Factors affecting the operation of air traffic controller

- performance,
- hazard perception,
- judgment and enforcement of judgments,
- skills and knowledge.

The performance of the air traffic controller is largely influenced by the physical and psychological limitations. Physical limitations such as injury, illness and fatigue would be in the air traffic controller did not occur. Performance is often affected by motivation, job satisfaction, which largely operates on human behavior and quality of work. Emotions can have significant results in how to react to air traffic controller’s cluster of events, which may, in the negative sense lead to less vigilance, which is an important aspect of organized activities

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3 PROPOSALS FOR PREVENTIVE MEASURES IN THE AREA OF HUMAN FACTOR

Human error is an integral part of life, everyone has doubts. It is wrong to believe that in the course of a career managing the tower did not even one mistake. However, if the error at the right time revealed just depends on whether it is possible to make improvements or not. Air traffic controllers must carry out its work so given the responsibility by the position of the pursuit of that ever goes wrong there. In this chapter I will discuss how air traffic controller errors minimized.

In air transport, can prevent errors by using three main methods:
- predict,
- recognize,
- remedy.

The key to predictability is the philosophy that if there is a presumption that something could go wrong and we cannot know exactly what it is and when this occurs. Therefore, regular monitoring and analysis reinforces the vigilance needed in all professions related to safety. Predictability enhances alertness and vigilance is the key to the recognition of the worsening situation of this error. Recognition then leads to remedy the situation. In some situations, it is advisable to first correct the error and then analyzed. In aviation, the general principle or motto: “be ahead of the aircraft” or anticipate what might happen, than to react to what's happening, or save what has already happened.

Flawless synergy colleagues

There are many life-saving and regulations that control tower to help avert a mistake, but in this case, if the funds are used properly and regulations followed. For a better defense than the errors of multi Avoid When work is good synergy colleagues. It is important that each one management was equally cautious when working with experienced or novice colleagues. Mistake anyone can make a matter of fact.

Better consistency for compliance.

Carefully read the rules have visibility and control over the airspace of the airport. Consistency is necessary for the smooth and safe operation of the airport:
consistency in Passing Information to pilots of aircraft,
consistency when passing information to another colleague,
consistency should be done as part of the controls.

Measures to combat stress and time constraint
The Management should try not to get under the influence of extreme urgency, doing things at the last minute.

For the avoidance of stress management should be guided by the following rules:
- effective planning and organizing time,
- laying realistic goals and knowledge frontiers,
- assertive approach to fulfill the obligations,
- sleep 8 hours a day for at least 4 days per week,
- continuous rest and relaxation,
- regular holiday spending,
- implementation of regular physical activity,
- regular and sufficient sleep at least 8 hours a day and four days a week,
- actively and meaningfully spent leisure time,
- sports and maintain your health,
- family,
- good relationships with friends,
- sense of humor positive thinking and optimistic outlook on life.

Giving proper fatigue
With errors largely played the role of fatigue. Signs of fatigue as yawning, reduced ability to concentrate focus the eyes or head crashes are at work managing excludable. In this profession is such signs shall not be tolerated and overlooked. It is important to realize that management is responsible for hundreds of lives of people who are in the aircraft and that he navigates. As anti-fatigue, I would propose to underestimate:
- sufficient and quality sleep,
- adequate fluid intake,
- lower the temperature in the workplace,
- food with high protein,
- regular and sufficient sleep at least 8 hours a day and four days a week,
- short exercise as far as possible.

Improving air traffic controller training
For training air traffic controller should have sufficient space for training on the simulator. They should be placed high demands on the required mental effort, because the real error in the operation seldom things are going as well as in the manuals. Often occurs when training the trainer "turn a blind eye" the lack of readiness training, which can result in real practice to fatal errors. Proposals to improve air traffic controller training:
- training extended to several hours,
- cooperation with other airports abroad learning curve for the air traffic controller.

4 CONCLUSION
Although the error in the beginning can seem insignificant, can lead to disaster. Any mistake must deal with management, and predict it is best to detect it early on process. For that is important that this work is carried out smart people, with the necessary experience and of course medically fit. Steering is one that allocates spacing aircraft, assigned flight level, speed etc. Is the person who is responsible for hundreds of lives. We can conclude, from which it is clear that, like any human activity, as well as aviation accompany human error. Everyone is probably obvious that all accidents and problems will never be able to completely prevent and eliminate them completely. Probability theory is stark and it is clear that if will fly, will become a high situation, which for various reasons fail completely if an incident or accident occurs. However, we must try to minimize their numbers, respectively, reduce their consequences. To maintain a high safety of flying, sector, it is important to be paid due attention to just the human factor, not only in managing the tower, but also for other professions that have to do with flight operations.

BIBLIOGRAPHY

AUTHORS ADDRESSES
Ing. Veronika Jadičáková, Letecká fakulta, Technická univerzita v Košiciach, Katedra manažmentu letecke dopravy, Rampová 7, 041 21 Košice
Ing. Juraj Vagner, Letecká fakulta, Technická univerzita v Košiciach, Katedra letevej pripravy, Rampová 7, 041 21 Košice juraj.vagner@tuke.sk