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# **SELECTED ISSUES OF MODERN AVIATION TECHNOLOGIES**

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# **POSITIVE CULTURE AS ELEMENT OF SAFETY AND EFFICIENCY OF AIRLINE OPERATION**

**Aleksandrs Bitinšs<sup>\*</sup>, Juris Maklakovs<sup>\*\*</sup>, Vladimir Shestakov<sup>\*\*\*</sup>, Konrad Stefański<sup>\*\*\*\*</sup>**

## **1. INTRODUCTION**

Aviation Safety plays a primary role in operation and development of international air transport. Primary world leadership of aviation safety processes improvement belongs to ICAO. According to documents [8, 10, 11] aviation safety means the state of an aviation system or organization in which risks associated with aviation activities, related to, or in direct support of the operation of aircraft, are reduced and controlled to an acceptable level. The control of risk is a process, consisting in an exposure, estimation and removal or reduction risk of adverse consequences of hazard to the acceptable level. In civil aviation two directions of providing Aviation Safety are defined: Flight Safety Management System (SMS) and Aviation Security. Flight SMS is reliability of aircraft and qualification of personnel which maintain and operate the aircraft. Ensuring the security will be a result element of proper SMS implementation. In order to prove that it is reasonable to introduce particular rules and regulations into practice, the results of research conducted should be constantly monitored. Manufacturers or aircraft operators should develop and maintain measures to verify that the level of safety in the organization complies with policy and safety objectives, and to check the effectiveness of safety risk management. This is achievable by monitoring and measuring the results of activities that operational staff must engage in relation to the provision of services by the organization [17]. The basic part of the SMS process is the phase of definition. In this phase, the policies, procedures and organizational structures must be created or defined. The safety management concept applies the principles of quality management [9], ie:

- requirements for the safety management concept must be identified,
- these requirements are influenced by clients requirements and commercial purposes, as well as rules and regulations,
- these requirements must clearly refer to company policy and must be fully integrated into the organization's vision.

A safety management system is a systematic approach to managing safety, including the necessary organizational structures, accountabilities, policies and procedures. Aviation security (Avsec) is a complex of measures as well as human and material resources intended for protecting civil aviation from the acts of illegal interference in civil aviation. Unlawful interference could be acts of terrorism, sabotage, threat to life and property, communication of false threat, bombing, etc. For the achievement of aims in both cases, the aviation

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organization creates corresponding structures that carry out organizational functions in these scopes, including [2]:

- exposure and control of risk factors,
- development indexes of safety, methods and facilities of their achievement and estimation,
- training of personnel and other.

Effective functioning of safety management system in airline may be achieved only in active involvement of all personnel [4, 5, 12, 14]. Aviation technical personnel includes: engineers, aircraft technicians and aviation mechanics. When servicing aircraft, they are divided into mechanics that serve the plane, as well as engines and avionics, specialists in the field of aviation digital and radio electronic equipment. The issues of their classification, training and professional activities are determined by normative documents, the most important of which are the partial paradigm of EU-PARTS-66, Part\_145, PART-147 (Commission Decision 1321/2014) [3, 7]. In the performance of duties for the maintenance by technical personnel, airlines allow deviations from the requirements of regulatory documents and thereby create the risks of occurrence of special situations in flight and aviation accidents [6]. In practice, a certain employee finds out the first one or another hazard factor in the process of his professional activity. Therefore, the personnel is responsible for the timeliness recognition of hazard factors and operative reaction and measures for hazard elimination. In addition, personnel is always the holder of information about errors or violations made and also officially unregistered incidents. Providing of this information to management allows to define incidents' root causes and establish effective preventive measures.

It seems to be obvious that every employee could become the active participant of safety management system, on condition that he will be sure that the company created "non-punitive" environment, in which errors, non-intentional violations or reporting do not involve punishments. It will allow to establish new formal attitude for flight safety and realize the role of safety problems in the decision making process. One of the basic elements of such approach in providing safety is forming positive safety culture in the airline. A positive safety culture means that, in general, values and beliefs implemented within the organization and cooperating with the organization's management system are defined for all airline employees. The norms of behavior established as a result of such cooperation are directed at:

- involvement SMS to all types of activity in airline,
- forming personnel' safety directed thinking,
- forming atmosphere of systematic attention to the safety problems,
- generating suggestions by the personnel to improve the safety,
- possibility of formal and informal discussion of safety in organization,
- willingness of personnel to declare errors influencing safety,
- atmosphere of justice and a desire to learn from one's own and other's mistakes.

Safety culture is an indicator of the perception by management and employees of the problems maintaining a high level of safety, as well as the place that safety occupies in the overall priorities of the airline.

The security policy is usually written and documented under the direction of the top management of the organization, approved by the state regulatory authority and

communicated to all employees of the organization. A properly communicated safety policy is a prerequisite for creating and developing a positive safety culture within an aviation organization [17]. A positive safety culture is characterized by communication based on mutual trust, divided perceptions importance of the safety and the faith of employees in the effectiveness of the preventive measures been taken.

Thus, if a person does not realize expediency of some actions, then the person is not motivated to carry them out, and it is not possible to force them to work effectively with a willful technique. To consider differently, means to be deeply mistaken. From here, a major element in the system of positive culture of safety is motivation.

## **2. MOTIVATION**

Motivated behavior, it is oriented to the aim, or on purposeful activity. All human activity is based on any motivation [1, 7]. In many ways, motivation determines a person what he/she actually does in each specific situation. This means how motivation reflects the difference between what a person can do and what he/she actually does.

Definition: Motivation – a key factor for a person who encourages, directs and supports in all spheres of human activity. Usually we can say that a person has the motivation of his activity in order to achieve something. Motivation is generally considered more favorable than adverse effects, because it stimulates people to achieve different goals. However, if someone is motivated, this does not mean that he will accomplish correct actions. Motivation is difficult to measure and predict. Even having deeply researched the structure of the motivation of a person and structure of his actions, it is possible to have completely unpredictable results in his/her human behavior and reaction in different conditions.

Based on above-mentioned, it can be concluded: Motivation is a system of stimulation of people to perform certain actions. It can be considered as a process involving administrative, economic and socio-psychological methods of management. Ideally, aviation professionals should be motivated to work safely and efficiently. However, many factors can lead to contradictions of motivation. For example, financial considerations, very cold weather, can lead to a situation where a person thinks least of all about safety and, because of risk appetite, chooses an easier way, without doing work, ignoring procedures, etc. Many theories and schemes describe motivation. One of the most widely known theories that attempts to describe human motivation is Maslow's "pyramid of needs" [1]. According to this theory, hierarchies of lower needs are more primitive or simpler, and they must be satisfied before we can be motivated to higher needs. The higher the level of need, the more difficult it is to achieve. High-level needs, usually longer-term goals that can be achieved in several stages. An employee may be well motivated to meet the needs of the middle level (for example, working in a social group, obtaining a position and recognition). It should be noted that for shift workers, fatigue could be much more specific motivation than high-level needs, such as personal satisfaction and pride in time and neatly done work. Simply incompetent management can be cause lack of motivation for personnel. It is easy to conclude that such a situation is a huge threat to security, which is particularly important considering the operation of the airline.

## **3. ANALYSIS OF CONDITIONS AFFECTING THE MOTIVATION OF AIRLINE PERSONNEL ON THE BASIS OF THE SURVEY**

The survey is the questioning method used to compile statistical (one-time questionnaire) or dynamic (with multiple questionnaire) conception about the object under research. A research that uses these methods is carried out through verbal communication, it is possible to use both direct communication with the respondent (conversation, interview), and through a questionnaire which is a written survey form and usually carried out in remotely, that is without direct and immediate contact between the interviewer and the respondent. In the survey method, it is possible to obtain a high level of volume research with the least cost. A feature of this method is its anonymity (the respondents identity is not fixed, only his answers are recorded).

On that moment, there are a number of systems that provide support for conducting surveys, such as: “Monkey Survey”, “QUESTIONNAIRE” (“АНКЕТА” – in Russian), “1С”, “Enterprise” (“Предприятие” – in Russian), “Personel assessment” (“Оценка персонала” – in Russian), “Questioning”, “Degree Sure” etc. [15]. Development of these information systems, became possible as a result of the development of the theory of relational models and multidimensional data, mathematical methods for the research information systems and network Internet technologies. A significant contribution to the solution of the problem of creating modern questionnaire systems containing effective tools for collecting and processing data were made by: G. William, I. F. Codd, J. McKenel, T. L. Saati, A. Berger, A. A. Barseghyan, J. Walrand, Agner K. Erlang, V.L. Breydo, V.S. Livshits, and others [13, 16]. Organizations widely use surveys (employee surveys, team surveys), which allows them to accurately find out various pressing issues and use the results to improve the functioning of the organization.

#### **4. ASSESSMENT OF MOTIVATION LEVEL OF THE AIRLINE PERSONNEL INVOLVED IN PREPARATION OF THE AIRCRAFT FOR FLIGHT**

Our researches were conducted based on survey of aviation personnel of airline, in which the participants were involved in aircraft preparation to flight. The investigated airline has charter status, as per volumes of air traffic classified as middle category. There are five services whose personnel performs specific works on preparing an aircraft for flight: aircraft maintenance, ground operational support, fuel services, passenger organization service, dispatching service. The security control service for passengers and staff is not included. The assessment of the level of this positive safety requires a separate research. All airline personnel are included in the positive safety system. Based on the results of the survey could receive information of safety system, positive trends and effectiveness.

The assessment was carried out on the study of one of the complex indicators of positive security – motivation. Since the total number of personnel involved in preflight preparing of the aircraft is not numerous, on average no more than 25 human, then a single sample questionnaire was used in the survey, without separation on services division. For these purposes, a questionnaire was developed. The indicator “motivation in the performance of professional duties” in our case is presented as a complex indicator of quality, including a number of particular indicators, which are included in the questionnaire. Over 80% of the personnel have been involved in to survey. The distribution of respondents by age is showed in Figure 1.

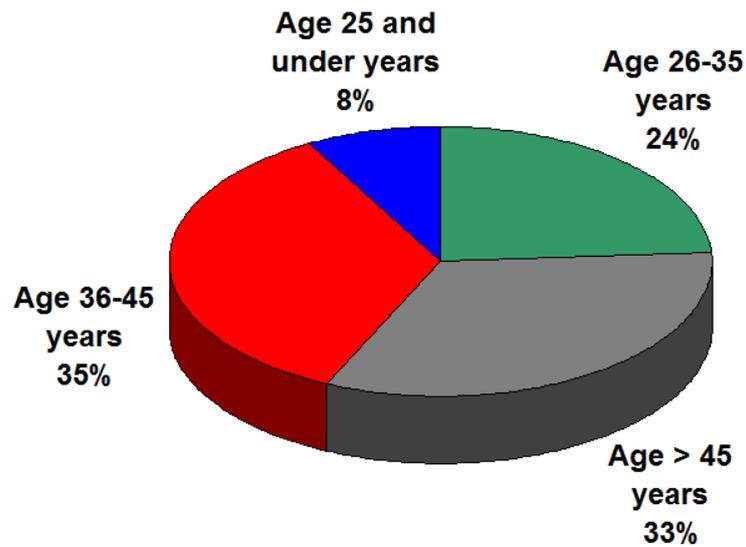


Fig. 1: Selection of respondents by age.

The average age of respondents was 40 years. The largest group consisted of respondents aged from 36 to 45 years old – 35%. The second largest group are workers aged 46 and over – 33%. And only 8% are young workers under the age of 25 years. The distribution of respondents by work experience is present in Figure 2.

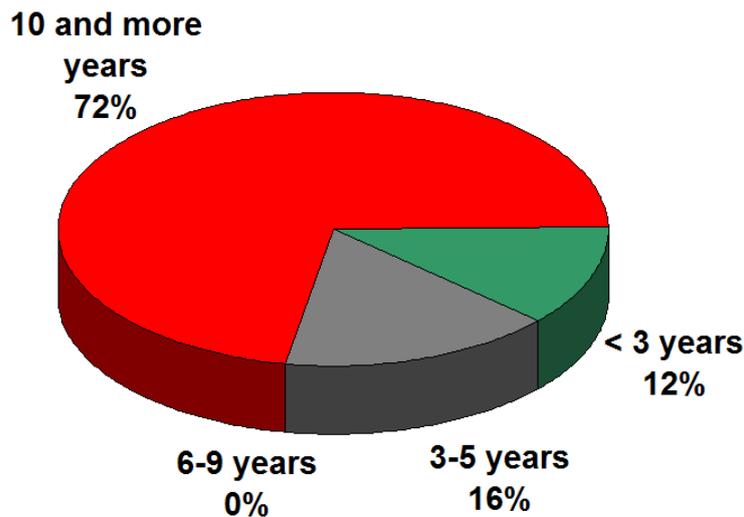


Fig. 2: Selection of respondents by experience.

The largest group among the respondents were people with a minimum ten years of work experience – 72%. Only 12% were employees with less than three years' experience. However, in the studied group of airline personnel there were no people with experience ranging from 6-9 years.

## 5. SURVEY RESULTS

The questionnaire consisted of the following questions:

- Am I satisfied with the work environment in the hangar, office, and workshop? (Figure 3)
- The state of the psychological climate in the airline (Figure 4)
- Am I satisfied with my job? (Figure 5)

- If I do my job very well, do I feel a recognition of this? (Figure 6)
- The main factors that cause mistakes / violations. (Figure 7)
- Am I satisfied with the remuneration (salary + social package) that I receive for my work? (Figure 8)
- How fully does the company use my professional potential? (Figure 9)
- Do you like working in your team, or do you want to change job? (Figure 10)
- What services play a major role in positive safety issues in the airline? (Figure 11)

The results of the survey are presented in Figures 3-11.

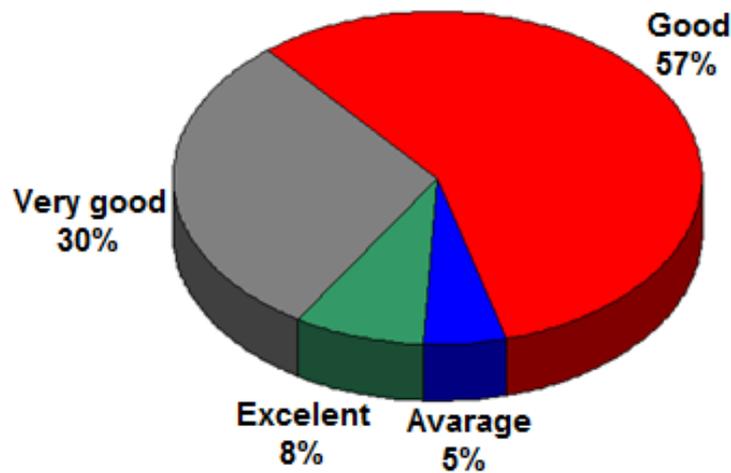


Fig. 3: Satisfaction with conditions at the workplace.

It is clearly visible from the Fig. 3, that more than half of employees rates their working conditions as good, and nearly a third as very good.

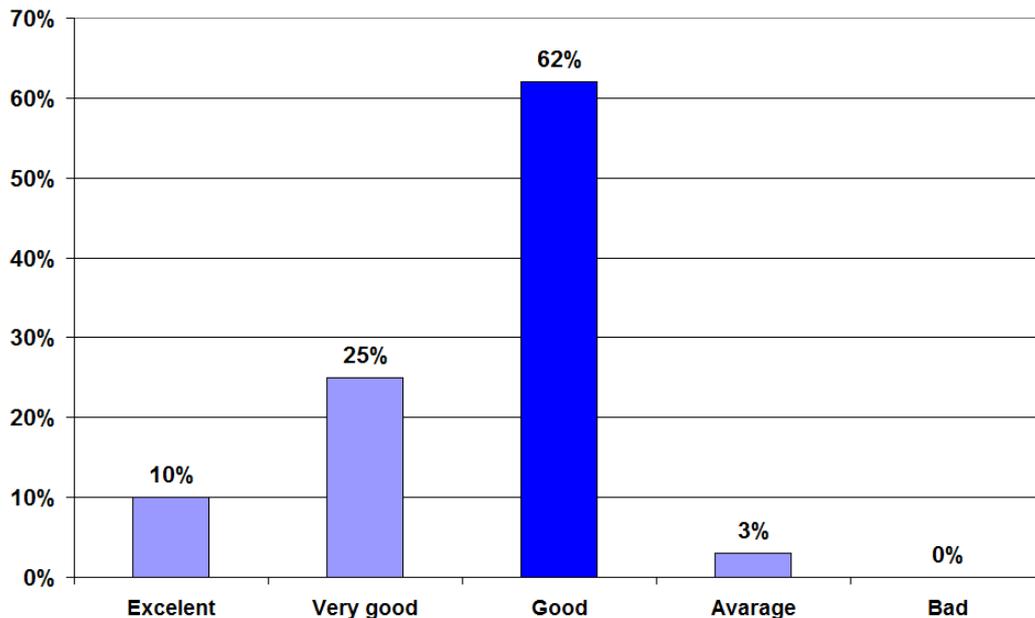


Fig. 4: The condition of the psychological climate in the airline.

It is obvious from the charts that in the airline good working conditions are created for all personnel participating in preflight preparation of aircraft and, that good psychological

climate is important – it assists in the positive culture of safety and undoubtedly ensures safety of flights.

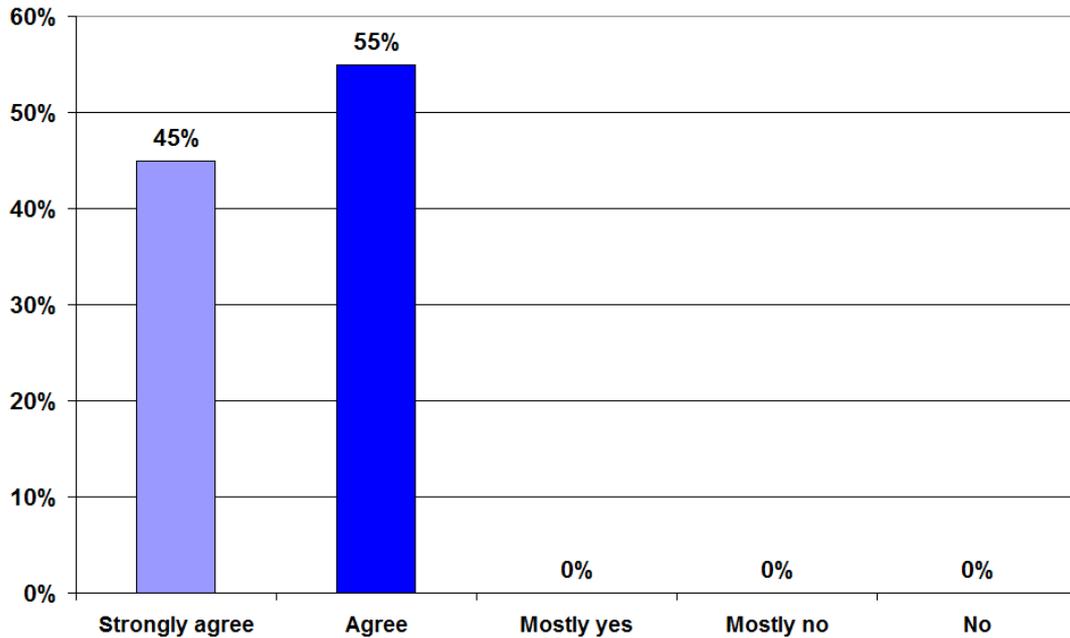


Fig. 5: Satisfaction with the level of work performed.

Good working conditions and psychological climate ensure the satisfaction of employees with the work they do when preparing an aircraft for flight, and therefore it reduces the likelihood of deviations from regulatory requirements and improves flight safety.

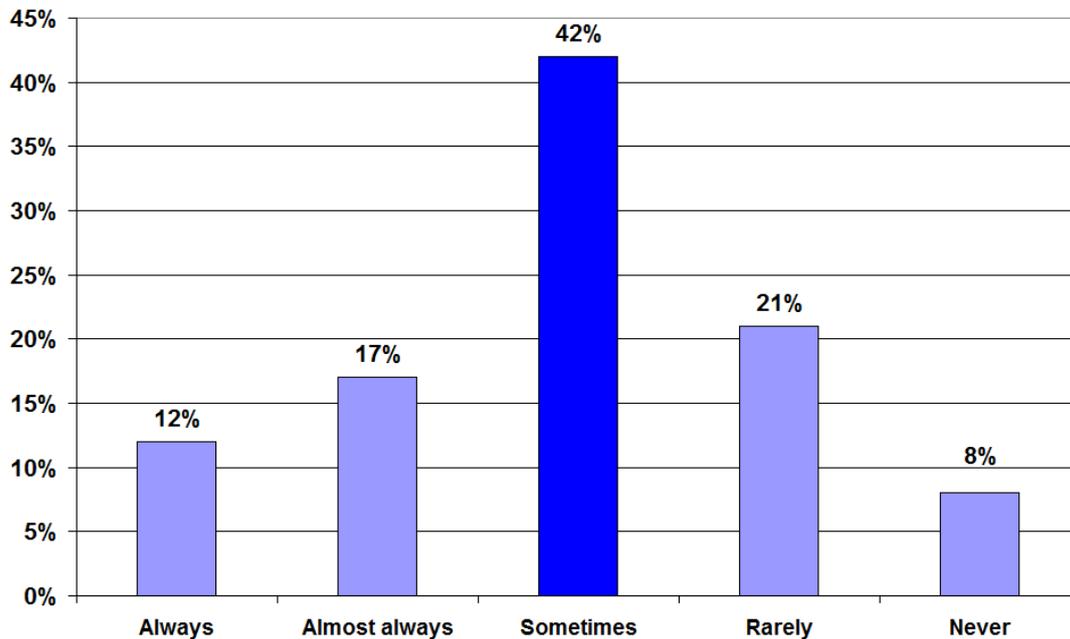


Fig. 6: Recognition to the employee for a job well done.

According to this chart, the airlines do not fully appreciate employee's involvement and only occasionally show recognition to the good performance of work done by personnel in this category. It may be worrying that as many as 8% of respondents answer that the company never does it.

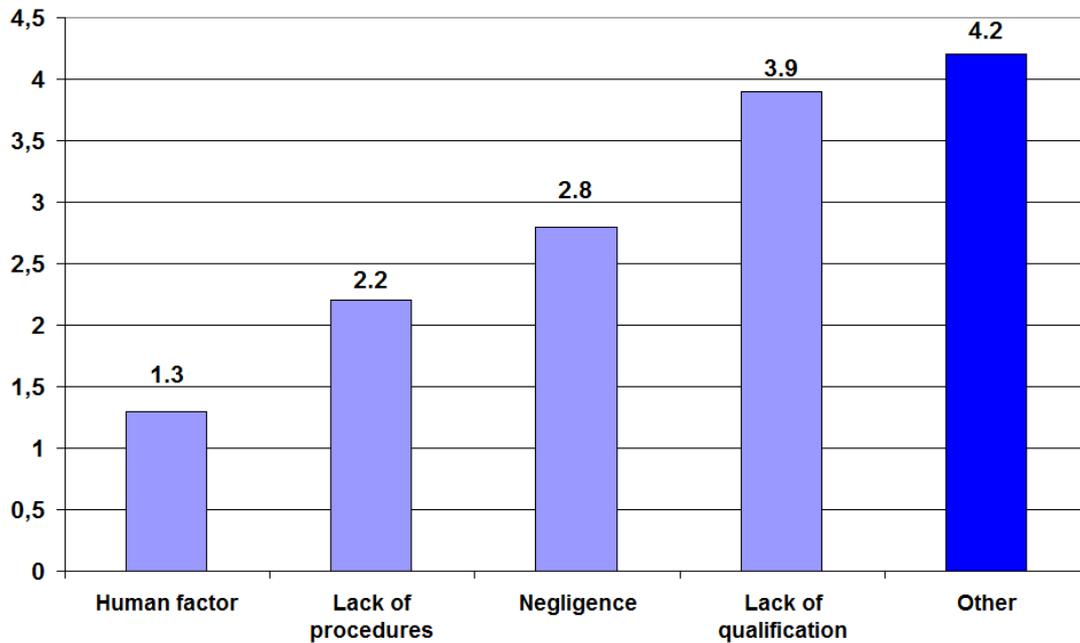


Fig. 7: Self-assessment of factors that reduce motivation in the performance of official duties, five-point assessment.

This diagram is interesting because, according to the opinions of the staff, the possible nonconformities in their work are least connected with the human factor, i.e. with the psychological attributes of personality, which is confirmed by a good psychological climate in the airline. At the same time, deviations in the preparation of the aircraft to flight based on unclear instructions, poor-quality of technical documentation and insufficient advanced training, which reduces their professional level. Also, it is evident from the schedule that when preparing the aircraft for departure in the services participating in this process, first of all, commercial situations arise in unforeseen situations for reasons that are designated as other.

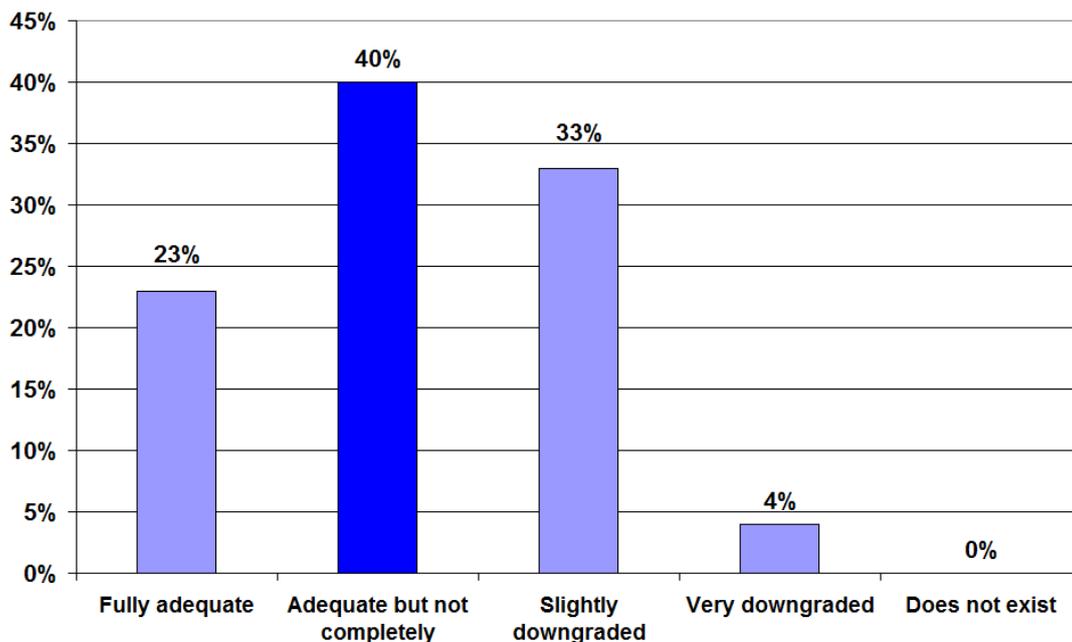


Fig. 8: Distribution of motivating factors depending on remuneration.

According to this chart, in general, over 20% of employees of these services are satisfied with the remuneration received, which undoubtedly promote a positive safety culture in the airline by the criterion of “motivation”. However, as many as 40% of personnel consider their salary not entirely satisfactory.

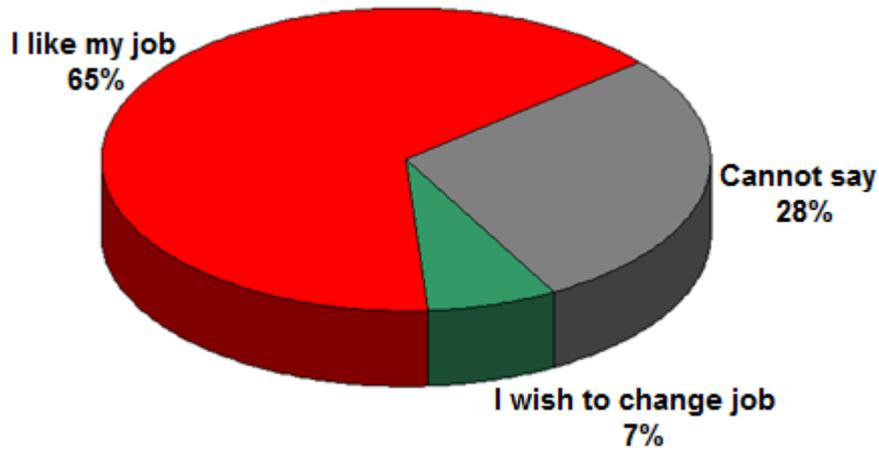


Fig. 9: The desire to work in this team.

The graph shows that nearly two-thirds of employees like their work. However, there was a group of people who wanted to change job, what may be caused by factors presented in Figure 7. This is interesting, that large percentage of respondents (28%) could not express an opinion on this matter.

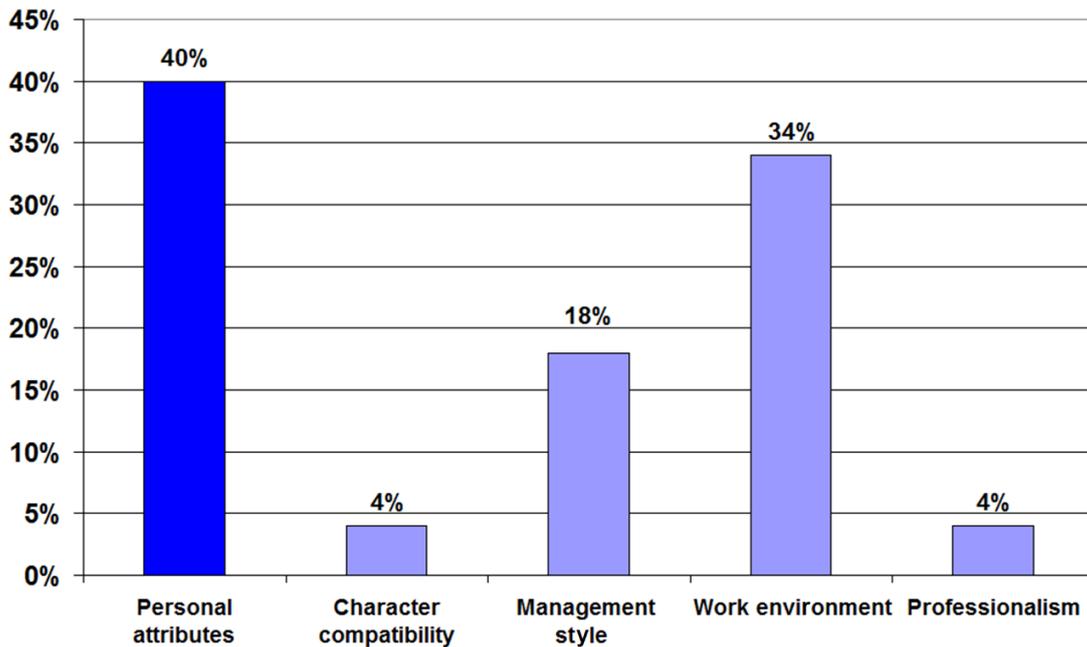


Fig. 10: Desire to work in this collective.

The chart shows that the most important for the respondents are the employees' personal attributes. The work environment goes to the second, the management style comes third, and the compatibility of the character of workers and professionalism shared the 4<sup>th</sup> place.

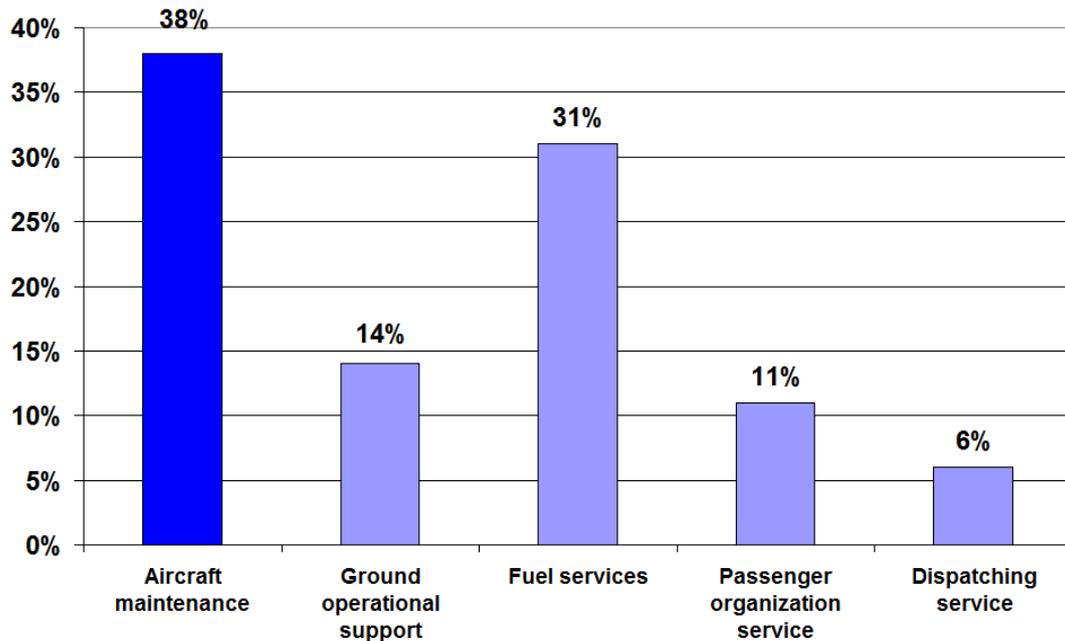


Fig. 11: The services that play a major role in the airline safety issues

As can be seen from the chart above the most important impact on the level of safety in an airline has aircraft maintenance and fuel service. According to the surveyed employees, other services whose personnel performs specific works on preparing an aircraft for flight are less important.

## 6. CONCLUSIONS

1. For the achievement of efficiency in matters of safety in an airline, it is necessary that all personnel be responsible for all their actions and take into account their possible safety implications, i.e. provide a positive safety culture. A positive safety culture should be generated from top to down level, namely from top management to employees and be based on a high degree of trust and respect between staff and management.
2. One of the most important elements of a positive safety culture is motivating staff in the performance of professional duties. In this research motivation is presented as a comprehensive quality indicator, which includes a number of particular indicators that are included in the survey.
3. The research involved personnel performing specific work on the preparation of the aircraft for flight. Research have shown that this staff positively assesses the working environment, psychological climate, employee relations, remuneration received for work performed, etc., which undoubtedly characterizes the normal level of motivation and ensure achievement of a positive safety culture.
4. The research have shown that the indicator of recognition by the management to well-done job of the staff is low-rated by employees. Perhaps it was one of the reasons that the some part of employees wishes to change the job or indicates “difficult to answer this question” (over one-third in total).
5. Such similarly argued approach gives an opportunity of the use of the received information to identify problems in culture of safety of airline and take the necessary actions for its further development.

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**Abstract:** *Effective functioning of safety system management in the aviation company is achieved only by the active participation of all individuals in this process. To achieve the goal that every specialist is an active participant of safety system management, they have to be sure that “non-punitive” job environment is implemented, where nobody is punished for provoking of violation or informing about the incidents. This approach will form a new attitude to the flight safety for specialists and give them a possibility to better understanding their own role in the solving this problem. One of the basic elements of such approach to the safety is the forming of positive culture of safety in the aviation company, where the motivation is the main component. The results of the survey research related to the motivation of the personal of one Latvian Aviation Company are presented in the report.*

**Keywords:** **aviation security, positive culture, motivation, safety, airline operation.**