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Human Factors Quality Control in Air Traffic

Muhammad Usman Tariq

Abstract

Every living person, from infants to older people, gets affected by internal and external factors. There are numerous researches and writings related to humans and these various factors. Human factors are recognized since the start of the human race. The awareness of the impacts of our environment is not new to humans. The focus in this chapter is upon those factors which can create an impact on aircraft mechanisms and air traffic controllers. These factors include human, psychological, work conditions, training, health conditions, environment, societal, and training. These factors must be quality controlled to minimize the errors in the critical domain of air traffic. A reduction in the number of errors will allow the performance to be higher and lowers the chances of fatal accidents.

Keywords: quality, human factors, qms, aviation

1. Introduction

Defining the term “Human Factors” is somehow challenging. When we think about the factors which may impact humans, it is understandable that the list is long and diverse from one person to another. It includes the diversified societal, geographical, and environmental differences related to those people. It possibly is more suitable to predict the concept instead of becoming entangled in setting an all-inclusive definition [1]. Any factor that impacts a human’s performance anyhow then becomes of those beings that can be assessed to determine the impact upon the person. Trying to group these factors even into comprehensive groups can restrict our focus. Every person shares the majority of aspects to some extent. A reduced number of human factors may smear only to finite numbers of people or professions [2, 3].

Most of the factors which impact one group will influence the other with equivalent effect [4]. There are some features of the work for each group that makes them more inclined to affect by various factors and less so much from others. The communal thread, which relates these two groups, is concentration and focus. A deficiency can have calamitous consequences on the flying community [5, 6]. While air traffic controllers are at work at the moment of flight, it would make their requirement for focus and concentration more [7]. Still, when pondering the implication of a stick failure because of the lack of tightening a bolt or negligence of a moving part because of the lack of lubrication, it becomes evident that they were because of the lack of focus eventually the impact can have severe results. There are various kinds of work based on the common theme of aviation [8].

Moreover, the failure of a person to do efficiently has reflective impacts on protecting the National Air Space. Flight attendants have more awareness than the air traffic controllers than many aviation medical officers. However, some aviation medical officers perform physical tests on the air traffic controllers and understand the job responsibilities. As aviation officers do not have medical certifications, their importance and job function is not recognized by much of the aviation community, who do not directly contact them. A brief introduction to both kinds of work will be explained to understand the tasks of the environmental factors that may occur with either group [9]. Air Traffic Controllers can work commonly for five types of employers. Many of the civilian controllers are working under Federal Aviation Administration [10]. The other two nationally employed Air Traffic Controllers are those who are present on duty within the armed forces and those employed under Defense Department. Not all, but many smaller airfields had air traffic control services outsourced by the Federal Aviation Authority in some previous years. These Air Traffic Controllers are employed for private firms that manage the Federal Aviation Authority contract for that facility. Lastly are the private contract towers [11].

An example of this can be any airfield or Boeing field retaining air traffic controllers not assisting a federal contract. As the Federal Aviation Authority is involved with employee air traffic controllers, the remaining discussion will mainly be focused on this group. In this group, there are especially four sub-groups, sometimes stated as options. Three of them have direct responsibility and contact for guiding aircraft [12]. The fourth Autonomous Flight Safety System (AFSS) has a partial contract with aircraft in flight, based on the facility, first is the choice typically concepts of the public. Visual inspection is the pillar boosted by the usage of radar. As significant, complex fields radar is a virtual requirement [13]. They perform moving aircraft on the ground, aligning them for departure, and setting the preliminary headings instantly after departure [14]. They also have a responsibility for airplanes approaching the airport for landings. In three of the four options, the foremost task of the air traffic controllers is to help the pilot sustain the separation of their airplane from those around them [15]. The airport's size, the number of runways, and the schedule of departures and landings impact the work's complications; another option with a direct connection with the airplanes is the air route traffic control center (ARTCC). The kinds of facilities are for management of aircraft flying once they have recognized their air routes. They are not limited to commercial air transportation, though most of their traffic arrives from the higher altitude, lengthier distance type of flying. Radar is utilized for this control again. The facilities employ hundreds of controllers [16].

Automated Flight Service Stations (AFSS) are another type of air traffic control facility. They do not actively separate the aircraft; these stations get the flight schedules and provide weather details to the pilots for their flight route. They also help pilots in locating their position when they have no surety about their location. The usage of triangulation and radio does it [17, 18]. There are three types of work that fall under the aviation mechanic. The first one is the power plant mechanic. The second one is the airframe mechanic who performs the airframe and control services. As the name suggests, work performed has to do with the engine parts of the aircraft. The second type is the airframe mechanic, which works. Both power plants and airframe mechanics hold mechanical type certificates from the Federal Aviation Authority [19, 20].

A mechanic without a certificate may work on aircraft, though, requires to be under the direct regulation and control of another having a certificate. The third is the avionics personal integrated with the airplane's communication, radio, and compass elements. Again these elements contribute to a secure and safe .flight of

the aircraft and vital tolls for the pilot [17]. Now we will look into the human quality factors of these occupations after refreshing the basics of the aviation mechanics and air traffic controllers. Instead of covering each vocation distinctly concerning each general element, it seems less monotonous to cover most aspects and explain how they impact the profession [21].

2. Health conditions

Air traffic controllers in the Federal Aviation Authority have health standards and go through regular check-ups based on the age and controllers' options. Except if employers cover them, mechanics do not possess a set of health standards [22]. The primary concern is those health conditions that can cause the person's abrupt and or subtle exhaustion. Definitely, during a crucial time in the control of an airplane, a sudden breakdown could be distressing. The area gets much of the concentration when recognizing the health clearance [23, 24]. Though just as challenging and correspondingly as troublesome are the subtle exhaustions, those conditions, though they do not take one off the job, similarly do not let employees perform at 100 percent of their potential. It would be the case of mild or moderate breathing issues, cardiac arrest untreated, the disturbing headache, and the whole extent of other conditions which are both disrupting and physically draining for any reason. Aside from climbing stairs to access a tower, most of the work is air traffic control is inactive or walking and standing in a comparatively small area [5, 25, 26].

Though the same cannot be assumed for the mechanic. They function in troublesome places and large working areas, as the physical issue can significantly impact their work [27]. Instead of grabbing the appropriate tool or seeing the manual, utilizing a shortcut or presumption in this area could prove distressing. Insufficient strength in fastening and unfastening the nuts and bolts because of the neurological or musculoskeletal condition could eventually generate a problem [28, 29]. Also, states that impact the entire agility could transform into a less than required work effort. These health conditions affect human factors, which ultimately create an impact on job performance. Because of the public trust and work's nature, these jobs differ from the typical professions [30, 31].

Keeping that recognition in mind is significant to avoid potentially adverse human factors [32]. Physical ability can have some impact on the job performance of both aviation mechanics and air traffic controllers. Height can act as an obstacle required to be handled by the air traffic controller [33]. The most common would be an individual height about the view from a tower or a piece of equipment. For the aviation mechanic, both height and body physique can generate issues. Because of the work's nature, sometimes convenience into a limited work area becomes a need of the job. If they cannot access the job, a different individual will perceptibly have to do that job [34]. The grave concern is when they have to work hard to body physique to perform the task. The work quality can be compromised, which would not be tolerable. When all probable, spaces to alleviate the impact of body physique should be raised [35]. Moreover, some people have physical traits which, for any reason, make their work much easier for them in comparison to their colleagues [36].

3. Psychological conditions

Distinct thinking and sustaining concentration and focus on tasks at hand are symbols of excellent performance in air traffic controllers and airplane mechanics.

Many professions need complete focus when working. It cannot be highlighted enough that these kinds of jobs, at times, do not endure errors [37, 38]. Numerous psychological conditions can impact workgroups, individual performance, and impact on other people's environments. Situational stress and depression states might be the most common mental conditions that can impact employees [39]. The extent of the effect on a person and his colleagues is pervasive and versatile. Then again, some people essentially explore comfort and relief in the workplace if situational stress is an outcome of factors outside of their employment [9, 40].

Many of them work without issues during those times as work allows a genuine break from specific problems and thoughts. These people seem to be those who entrenched the capability to concentrate while performing delicate parts of the safety of their job. It effectively becomes automatic when starting these jobs [22]. Others are not as self-controlled, allowing thoughts and feelings to interrupt and hinder their concentration and focus [41]. Indeed, if the work environment creates the root of the depression, then arriving at the workplace would not be a seamless situation [42, 43]. Those impacted by stress, colleagues, and managers require to keep in mind the changing character of the human mentality. It is always assumed that 90 percent of the issues are caused by ten percent of the employees [44]. The group of people who might not have adequately identified personality disorders, though their societal behaviors and character make them very problematic to manage in the workplace. Their colleagues and managers mainly recognize their impact. So these employees can easily make their problem, the problem of their workplace [43]. The condition can profoundly affect the workplace and creates a troublesome situation where such an individual is working. Then there are also employees with a direct personality disorder that either has been identified or identified if the individual ever required professional aid [6, 45].

Possibly the worst of ten percent, their vital task in life is to make enemies with people around them. The causes for these actions are recognized, and they generate disruption and devastation in the staff, which is very factual. Again because of the several regulations, rights, and rules all distinct employees get, it is problematic to handle them. Lastly, come those employees who may be honestly psychotic [46]. When they beat the clinical level, still have not performed obvious actions to cause their displacement, they are very troublesome [12, 47].

Many other conditions involving anxiety and depression leave the individual with the information that they are distressed and may not be appropriate for specific jobs. Not always so with the psychotic person [48]. There is no requirement for discussing the issues related to shifting the acts and thoughts of a delusional and paranoid individual to the radar screen, safe repairing of a powerplant, and skies. Workload, scheduling, budget, and various other factors make it very troublesome to recognize some of these problems. Identifying the potential issue would be the primary step which can be and is frequently impractical at times. However, the psychological factors which can generate an unfortunate outcome may well be close to the top of the list concerning the rate of occurrence [24, 49].

4. Societal issues

General society is just a reflection of several smaller social groups. There are people employed in and around the world of aviation from smaller groups, with fewer smaller groups confined within that world. Then there come the clicks which form in any work environment. As various flight specialists will recognize, an increased number of air traffic controller interviews, for any reason, make the declaration that they are the best in the system. The origin for this comes from a

procedure in training future Air Traffic Controllers. It is perceived that they should have confidence and are told that they are the finest in the system. Now the reason here is deficient though the outcome of being inculcated in that way is fundamental. Not all air traffic controllers fall victim to that thought. However, many will repeat the phrase repeatedly as it is said that often saying something makes people feel that there can be any truth in the statement [50, 51]. The fundamental human factor issue comes from the lack of tolerance and competition that various air traffic controllers have. As they feel their plan is the only plan, it then follows that others must be doing it inaccurately. It can create unnecessary friction and discussion between the employees [52]. Moreover, if a person seriously thinks about it, there is a chance to obstruct the adapting or learning procedure. On the contrary, it could be said with rationality that competition is healthy. Societal characteristics, situations, and problems outside the workplace can influence anyone [22, 53].

5. Work conditions

As the total environment for a person can be segmented into various aspects, it is sometimes troublesome to keep these arbitrary divisions to the least. For example, working conditions will involve the physical setup of the workplace, equipment arrangement, accessibility of specific tools utilized in work performed [43, 54].

In the Air Traffic Controllers environment, the setting of equipment, towers, radios, displays, signal beacons, and other equipment segments can differ significantly from capacity to capacity. Research, study, time, and energy are invested in the settlement, arrangement of displays for computers and radar, display colors, chair types, and all the several equipment pieces required to perform their jobs [55]. Some management officials in the aviation industry feel there is an increased background noise during their connection with the flights. The noise comes from the air traffic controllers when they talk among themselves [56]. To avoid these, officials have placed carpeting in the trashcans to limit the sound of waste substances dropping to them [57, 58]. These are just utilized as instances of the thought procedures and considerations given to the alterations in the work environment of the air controllers. Another stimulating habit adopted by controllers, especially in the tower environment, is the rule recognized when approaching an air traffic controller on position the person wants to speak. Generally, the person will wait until the controller is talking on the radio before speaking to them. In the dynamic space, officials cannot understand if two persons speak at once but can talk to one and identify another person trying to speak to them [25, 26]. At a suitable time, the controller can identify the individual and start the conversation. The aviation mechanic is conditional to a more evolving environment based on the type of employer and work [59]. They can differ from working at the same place daily to working outside the airplane. The regulations and rules explain that they must have technical guides at hand when employed on an aircraft. The easy accessibility of these documents and manuals can influence their performance [10].

The settlements of the tools and equipment for them to carry out their tasks will make their jobs more accessible, and if they are not adequate for the job and cannot repair, it makes their work difficult [60]. The number of disruptions they may experience in their work and then the availability of the telephone will have an influence. When the mechanics are in the middle of servicing or assembling an airplane component, they require tracking the procedure and ensuring they finalize all the steps [61]. Not tightening a bolt or, in fact, over-tightening it can be destroyed. Working on some types of machinery can put the mechanic into a physical placement that can be uncomfortable and impact work performance [62].

6. Environment conditions

The temperature and lighting are appropriately controlled and kept persistent for the air traffic controller. The air traffic controllers work in the weather condition from a tower, and the mechanic may work in the weather. The tower controller has to handle the weather and night and day lightening at the different airports [59]. Again, it does not take much of an idea to visualize how the various times of day, cloud cover, and sun positioning can affect the tower cab [63]. At the same time, the temperature can vary slightly due to the comparatively large amount of glass present. The aviation mechanic does not have the same benefit when it comes to weather conditions at the controller. Functioning in extreme heat and cold can affect the health of a person [64].

7. Training

The inclusiveness and depth of training can differ from individual to individual and also between job types. There is an issue to permit access to training due to extensive contemplations and the demand on the other side when the academic procedure is completed. The all-inclusive and in-depth training is the better option. The air traffic controllers cannot understand if the training is too restricted even if the problem exists [36].

8. Conclusion

Various factors have been discussed in detail that allows the air traffic controllers, managers, quality management staff, quality control officers, auditors, employees, and people involved in the process improvement. However, the provided factors are a non-exhaustive list that could expand to other unknown or unknown factors. Everyone should play an important role in sustaining the high-quality levels and avoiding errors that could be fatal. Organizations need to measure their performance and monitor the error rate continuously to avoid any future accidents.

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