Evolving Trend of Manufacturer-Retailer Outlets in the Textile Sector of Pakistan

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1.1 STRESS AND OCCUPATIONAL STRESS

1.11 What is Stress?

It is not easy to properly define what stress is, although it is quite a common experience for everyone. Stress is a part of everyday life and not necessarily a negative phenomenon, being a Physiological stimulus usually connected with human-environment interactions.

However, it can become a harmful risk factor for health when it is perceived as an Imbalance between an excess of demands and the individual ability to meet them. This Cause a perturbation of the psycho-physical equilibrium, taxing physical, psychic and behavioral Responses aimed at coping with it. If this coping fails, stress can have harmful consequences on Physical, mental and social well-being, with high costs both for the individual and society.

Stress at work can be generated by job demands, environmental conditions, and work Organization and human relations; impact on job satisfaction, performance efficiency and health can vary widely depending on the psycho-physical characteristics and coping resources of individuals, as well as on the social support received.

1.12 what is occupational stress?

Occupational stress can be defined as the physiological and emotional responses that occur when workers perceive an imbalance between their work demands and their capability and/or resources to meet these demands.

Importantly, stress responses occur when the imbalance is such that the worker perceives they are not coping in situations where it is important to them that they cope.

1.13 What is not occupational stress?

Occupational stress is not a disease. Worker's responses to stressors may be positive or negative depending on the type of demands placed on them, the amount of control they have over the situation, the amount of support they receive and the individual response of the person. In the vast majority of instances people adjust to stressors and are able to continue to perform their normal work duties.

1.2 AIR TRAFFIC CONTROL WORLD WIDE; HISTORY[1]

1.21 Part-One

Until the mid 1930s, there was no formal wireless organization or control of air traffic in Australia. Few aircraft apart from the 'all-metal' DC2 carried two-way radio equipment. The few which did could communicate with Coastal Radio Stations and with the fledgling Aeradio organization. The first Aeradio stations at Darwin, Essendon and Launceston were temporary rigs, operated by the RAAF and AWA Ltd.

In 1937, the Civil Aviation Branch appointed Aerodrome Control Officers (ACOs) at Archer field, Mascot, Para field and Essendon. Their function was to regulate air traffic at aerodromes, provide a meteorology service, and give advice to pilots of aircraft engaged in cross-country flights. The personal qualities required of Aerodrome Control Officers were mature age, discipline, power of command and level-headedness. Lacking radio communications, ACOs used visual signaling devices - the Aldis signaling lamp and Very cartridge pistol. At Essendon and Mascot they operated from rudimentary Control Towers on the roofs of the Aero Clubs. From these Towers hung red and cream cane balls, which were raised or lowered to indicate aerodrome conditions.

Following the crash of ANA's DC2 aircraft *Kyeema* in October 1938 it was revealed that two major weaknesses existed in the ground control organization. A radio beacon to provide pilots with a positive course along which to fly was soon introduced. This was the Lorenz 33 MHz Radio Range, the precursor of the VAR and today's VOR. The other major innovation was the appointment of Flight Checking Officers whose job it was to

maintain a watch on the progress of flights on the main air routes. This was to guard against a pilot making a grave miscalculation of his position, as had happened with the *Kyeema*.

Flight Checking Officers (FCOs) were introduced in August 1940 and were at the same locations as Aerodrome Control Officers. They were selected from experienced airline pilots and provided what would become known as a uniquely Australian aviation service - Operational Control. Their duties were to check flight plans and ensure that adequate fuel was carried, to divert aircraft if conditions at the destination were unsafe, close airports if weather conditions deteriorated below minimum standards, and to keep pilots informed of changing flying conditions. During the war, the widespread installation of radio facilities made it possible to take positive control of flights en route. A ground organization capable of exercising such control, including positive separation between aircraft, was established. The first Flight Control Manual was published in 1943, and in early 1944 the use of radio for Aerodrome Control purposes made it possible to exercise greater control over aircraft operating in the vicinity of aerodromes.

Aircraft were separated by the most rudimentary rules: northbound aircraft flew at odd thousands of feet and those southbound at even thousands. This was the NOSE rule. Also, aircraft flying at the same height along an air route had to be separated by ten minutes flying time. With aircraft of vastly different speeds on the same trunk air routes, a procedure was needed to maintain this longitudinal separation.

The solution was presented in 1944 by a Sydney FCO, Mr Norman Rodoni, who invented a form of computer, known as the ‘Rodoniscope’. It comprised a rotating circular glass disk 60 cm in diameter, under which was a chart showing aircraft reporting points. At the outer edge of the chart was a clock face. By marking the position reports and circulating the glass disk in real time, the controller could see at what time Aeradio was likely to receive a position report and would then mark the actual position when the radio report was received. Thus is was possible to accurately predict when a faster aircraft would overtake a slower machine.

1.22 Part Two

In September 1946 the Provisional International Civil Aviation Organization (PICAO) appointed a Special Radio Technical Committee to evaluate the wartime developments in navigation, communications and air traffic control which could be used by civil aviation in peacetime. ICAO later issued a series of Annexes which established uniform standards to be observed by member States. Interestingly, under Australian Regulations Air Traffic Controllers were not required to be licensed until 1961. A steady growth in air traffic, particularly on the main air routes between Brisbane, Sydney and Melbourne led to congestion in the vicinity of these aerodromes where aircraft were on descent from their cruising height prior to landing. The already overloaded radio communications facilities did not allow a sufficiently rapid means of communication between ATC and the pilots of aircraft flying in these critical areas, especially in conditions of bad weather.

A separate service called Approach Control was introduced, and evaluated on a trial basis at Es sendon, Mascot and Archer field in July 1947. By 1950 it was introduced at other locations where traffic density warranted such units. The next major innovation was the Flight Progress Board (FPB), which was based on an American model. The Flight Progress Board was introduced from 1950, and performed two separate control functions. First, it looked after aircraft traveling on controlled air routes. At a distance of more than 60 miles from the major airport aircraft were under the control of an Area Controller, who used Ae radio stations for communications with aircraft.

Second, within a 60 mile radius of a major airport, the Arrivals Controller was in direct radio communications with all aircraft so that control was positive and carried out with least possible delay, thus providing control of aircraft converging on a busy airport. It was soon realized that there was a need for some positive means of coordination between a control tower and the associated air traffic control centre in the assignment of aircraft altitudes. Without this coordination, there was the ever present possibility that the same altitude for different aircraft could be assigned and although the control tower was responsible for the control of aircraft only in a restricted area, there existed the possibility of double assignment of altitudes.

This method of separating air traffic within controlled airspace continued to be used until the mid-1960s when Area Approach Control Centers (AACCs) were established which now leads us, inevitably, to the introduction of radar. This quantum leap changed what had been a static display of a dynamic situation with the flight progress board, to a completely dynamic radar display.

Possibly the most dramatic impact on ATC in Australia was the introduction of radar. Radar was invented in Britain in 1935, and its contribution to the Allied war effort is well documented. The Department of Civil Aviation, after the war, experimented with a number of ex-wartime radar installations at Essen don. Airport. Some were, by today's standards, positively primitive, such as the Australian Light Weight Air Warning (LW/AW) radar, housed under a canvas tent. Another was the 276 radar with its daylight plotter in the tower. An operator worked in a small, darkened building on the airport, tracking aircraft on his screen. The x and y coordinate voltages, representing the location of the aircraft, were connected to the tower by a control cable, and traced as a brown line on a sheet of chemical-impregnated blotting paper.

In 1959, short-range 'raw display' Cossor radars were provided at Sydney and Melbourne airports to facilitate control of arriving and departing aircraft within up to 50 miles of each respective airport. In 1961, DCA produced a long-term plan outlining 'Surveillance Radar Requirements', recommending the provision of dual-purpose radars for approach and area control at Brisbane, Sydney, Melbourne, Adelaide and Perth. Scan-converted bright radar display systems were incorporated in new AACCs at Sydney, Melbourne and Brisbane.

A further enhancement was Secondary Surveillance Radar (SSR) which required target aircraft to be fitted with a receiver/transmitter (transponder) which responded to a recognized signal radiated from the ground radar beacon. In early systems only a symbol, different depending on the code being squawked by the aircraft, was displayed superimposed on the aircraft's Primary Radar return. In later display systems, such as the fully synthetic, computerized ATCARDS system, an aircraft's call sign, altitude and

computed ground-speed were displayed against the aircraft target on the operator's screen.

This is a very brief overview of the some of the many innovations which ATC and the supporting Airways Engineering organization implemented in response to the vastly increased volume of air traffic, and the introduction of jet aircraft.

1.3 AIR TRAFFIC CONTROL IN GENERAL

ATC as a profession is a real addiction, no matter whether controllers are among the young blood or senior controller group of forty naughty. It is such a profession that will always give controller a feeling of satisfaction.

It is not simply a profession but a family of young and grey haired people under one roof and with in glass walls, controlling the skies, day and night. It inculcates punctuality, discipline, develops confidence, initiative, decision making and enhances speaking power. spectrum of air traffic control is very wide that can be judged from the fact that starting from the know how to the function of a small step down transformer of runway light, it also includes the ill affects of cosmic rays on pilots while flying at high altitude.

Imagine trying to direct 260 tons of metal, filled with passengers and cargo, through the air in the middle of a storm. AIR-TRAFFIC CONTROLLERS are responsible for the safe and efficient flow of air traffic throughout the nation's airspace. They navigate the airways, helping pilots pass other planes, find their way through fog and rough weather, and land safely at a busy airport. They coordinate flights to prevent accidents and minimize delays in takeoffs and landings. They can be found working in three basic specialties: Air Traffic Control Towers, En Route Centers, and Flight Service Stations.

Airport Tower Controllers regulate a specific airport's traffic. They use two-way radios to give pilots permission to take off and land. They also direct ground traffic, which includes taxiing aircraft, vehicles, and airport workers. Tower Controllers normally

direct air traffic within three to thirty miles of an airport. When planes leave this assigned airspace they are passed on to an En Route Center.

En Route Controllers regulate flights between airports. They contact pilots by radio and control their position in the airways between tower jurisdictions. Using sophisticated radar and computer equipment, they maintain a progressive check on aircraft and issue instructions, clearance, and advice. When an aircraft leaves the airspace assigned to an En Route Center, control passes on to the next center or to a Tower Controller. If a pilot is lost or having trouble, the center gives orientation instructions and directions to the nearest emergency landing field. En Route Controllers work in teams of two or three.

Flight Service Station Controllers are experts on the terrain, airports, and navigational facilities in their areas. Pilots file their flight plans with Station Controllers who conduct pre-flight briefings on weather conditions, suggested routes, altitudes, indications of turbulence, and other flight safety information. They often use direction-finding equipment to provide special assistance to search-and-rescue operations. Controllers in all three specialties use radio, teletype, inter-telephone, and other electronic equipment to monitor and contact aircraft.

1.4 AIR TRAFFIC CONTROL IN PAKISTAN

1.41 Military Perspective

The job of air traffic controllers is highly demanding and strenuous as it places tremendous amount of responsibility on them to ensure safe operations within their area of responsibility. The air traffic system in the PAF has come a long way since the old days when using flags for directing the aircraft and placing the gooseneck to light up the runways were a norm. Today PAF ATCs have evolved in to well-equipped and organized controlling outfits. With ever increasing round the clock flying operations, the modernization of PAF ATCs with state-of-the-art approach radars, use friendly aeronautical information systems and advance communication facilities is well on the

way, while the induction of modern aids is aimed at to ensure safe operations. PAF controllers are doing multi task job in air traffic control. Where there is joint user PAF controllers also controlling the civil traffic very effectively. Military controlling is as different from the civil air craft controlling as the operations of civil and military air craft mind of the controller and planning of traffic move on with the speed of the traffic. PAF controlling is at all the operational bases, while at Quetta and Peshawar controllers handling both the traffic.

1.42 Civil Perspective

1. Air space of Pakistan divided into two area controls and of control zone
   - Karachi ACC
   - Lahore ACC
   - Cherat control zone

Karachi ACC

Area bounded by line joining from point 2330N 06120E then northwards till it meets the cost line then along the coast line Iran/Pakistan and Afghanistan/Pakistan border to 3000N 06020 then east long parallel until it meets the common border of Pakistan/India then south along the border to the coastline then along the coastline to 2330N then west along 2330N to 06120E. Area divides in to three sectors zone wise for effective control of traffic.

Karachi ACC (northern sector)

Karachi ACC (eastern sector)

Karachi ACC (western sector)

Lahore ACC

Area bounded by the joining from point 3000N 06620E to 3000N 07330E thence northward along the border b/w Pakistan and India to 3247N 07430E then along the United Nations cease fire line in the Kashmir areas to 3508N 07707E to 3650N 07415E, then along the geographical boundaries of Pakistan to 3000N 6620E. Area divides in to three sectors zone wise for effective control of traffic.

Lahore ACC (southern sector)

Lahore ACC (northern sector)

1.43 Training Institutes in Pakistan

In Pakistan mainly only one institute to train air traffic controller, that is civil aviation training institute in Hyderabad, sindh. PAF has a small school at PAF Academy Risalpur to train their own controller to control military traffic according to military requirement. Standard operation procedure and basic of ATC is same as in civil aviation.

CATI (Civil Aviation Training Institute Hyderabad)

1. The Civil Aviation Authority was created in December 1982 to handle all matters related to Civil Aviation in Pakistan. In order to keep up with the rapid advancement in the field of aviation, it was felt that an autonomous body was required to bring country's aviation infrastructure and facilities at par with international standards

2. ***TRAINING:*** School of Air Traffic Services and Communication Operations is catering training needs of Air Traffic Services based on (Radar & Non-Radar) facilities and Communication Operations. This School has been operating since 1948 well before the establishment of Civil Aviation Training Institute Hyderabad. However, after the inception of CATI, the School was subjected to an up-gradation in the form of induction of modern equipment and instructional concept, including the use of Audio Visual Aids. Various courses being conducted conform to the laid down ICAO syllabi
The objective of this School is to impart training in the disciplines of Air Traffic Services including Radar and Communication Operations at entry level, wherein the capabilities of trainees are tested and improved for absorption in the CAA at various facilities in the field. This School has the capability of conducting advanced level courses for experienced officers and lower level programmes for operational staff. On completion of training, the students are generally able to take up duties in Air Traffic Control units and Communication centers after undergoing a few weeks On-The-Job training & familiarization. Civil Aviation Training Institute (CATI) provides training in the disciplines of :

- Air Traffic Services
- Electronics Engineering
- Communication Operations
- Aviation Management & Administration
- Rescue and Fire Fighting Services
- Electromechanical Engineering

1.5 STATEMENT OF THE PROBLEM

Stress is a part of everyday life and not necessarily a negative phenomenon, being a Physiological stimulus usually connected with human-environment interactions. Occupational stress is one of the major reasons of declining work performance especially in operational nature of work so how this stress can be reduced in highly stressful job Air traffic control, so focus of this thesis will be to sort out these problems:

- What are the sources of stress in air traffic control?
- What are the consequences of this stress on the health of air traffic controller?
- How to mange this stress at work place?

1.6 SIGNIFICANCE OF THE STUDY

Occupational stress can no longer be considered an occasional, personal problem to be remedied with palliatives. It is becoming an increasingly global phenomenon, affecting all categories of workers, all workplaces and all countries. This trend — coupled with its rising cost to the individual, to industry and to society as a whole — has greatly heightened awareness of the need for effective and innovative ways of tackling stress. Stress prevention at the workplace has proved particularly effective in combating stress, by attacking its roots and causes,

rather than merely treating its effects. In line with such an approach, this thesis is aimed at providing concrete advice on how to prevent stress in specific occupation (as air traffic control) particularly exposed to stress.

1.7 SCOPE OF THE STUDY

This research paper is focus on data collected from military air traffic controller and civil aviation air traffic controller areas of focus are as followings:

- Military air traffic controller at PAF base Samungli, Quetta
- Military air traffic controller at PAF base Mushaf. Sarghoda
- Military air traffic controller at PAF base Faisal, Karachi
- Military air traffic controller at PAF base Masroor, Karachi
- Civil air traffic controller at Jinnah international airport Karachi
- Karachi area control center.

1.8 DEFINITION OF THE TERMS

ATC: air traffic control

ATCO: air traffic control officer

CATI: civil aviation training institute

ATCs: air traffic controllers

R/T: radio telephonic

VDT: visual display transmission

ICAO: International civil aviation organization

FAA: federal aviation administration

CAA: civil aviation authority

FAA; federal aviation authority

1.9 DELIMITATION

Results are sorted out on the basis of current procedure followed by air traffic controller, which may change in future. These changes may have adverse or favorable affects impacts on this research paper. For example shifts timing and working tool can get better or vice versa.

2.1 RESERCH DESIGN

2.11 Purpose of the study:

Type of study is "descriptive". A descriptive study under take in order to ascertain and be able to describe the character of the variable of interest in a situation, same is with this thesis paper, thesis concentrate on those entire specific variables which specifically cause the occupational stress in air traffic control.

2.12 Type of investigation:

Casual vs. correlational

In this thesis paper type of investigation will be" correlational". Focus will be to delineating the important factors/ element associated with occupational stress in Air Traffic Control.

2.13 Study setting:

"Non- contrived study" because interview will be taken by both type of air traffic controller military and civil aviation.

2.14 Unit of analysis:

"Dyad as the unit of analysis". Two unit factors as stated above in study setting.

2.15 Time horizon:

Cross sectional study, means study will be focus on cross section observation regarding would be taken not in one shot different type of stress condition would be analyzed by several visits.

2.2 RESEARCH METHOD

2.21 Research instrument:

Statistical instrument is "non probability sampling technique" in which further specified as "purposive sampling" on the basis of judgment. Sample would not be probalized straight method is adapted and purposes base sampling is there to justify both the elements.

2.22 Data collection method:

Primary source of data:

- Interviews
- Observational survey.

Secondary source of data:

- Internet
- Publications

2.23 Respondents:

Two groups will be there one of military air traffic controller and other of civil aviation controller.

Number of respondent:

05 from each group so size will be of 10 people.

2.3 TREATMENT OF DATA:

Data collected treated as mathematically by using simple sampling technique. Data collected through questionnaire further explained by the data collected through interview.

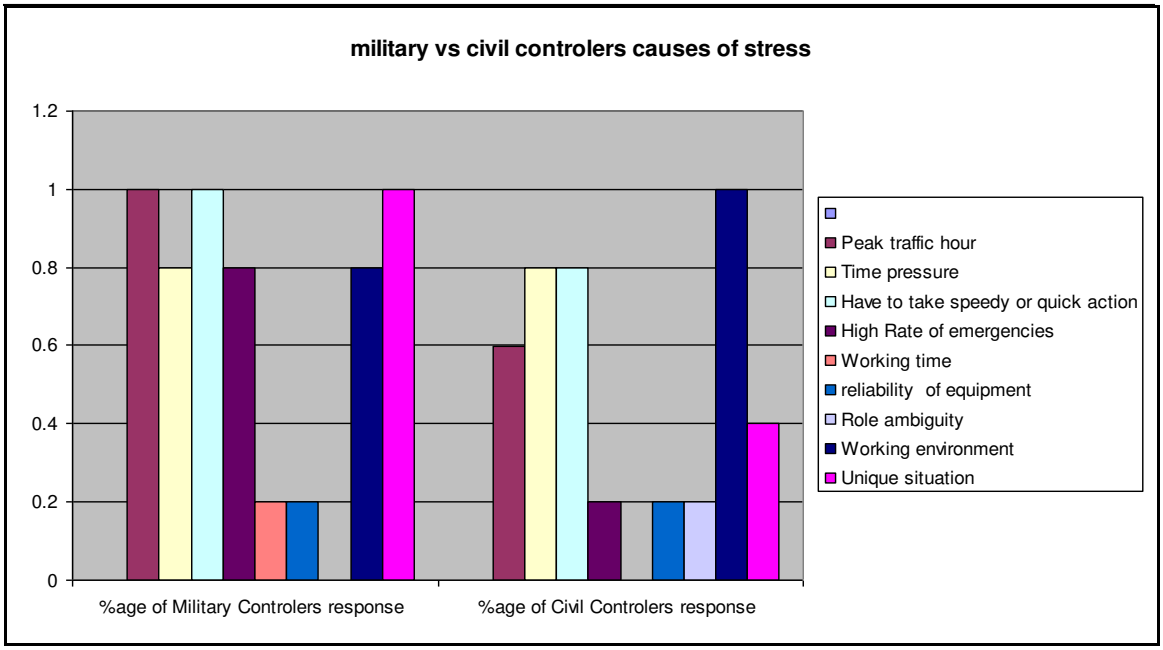
3.1 QUANTATIVE ANALYSIS OF DATA:

The following mentioned data analysis collected through the questionnaire filed by air traffic controllers to quantify the number of people involved and gets to know the main sources consequences and stress measure in their profession. As sample size was 10 interviews taken by 05 military controllers and 05 civil controllers. The main reasons and consequences collected through those respondents are described in next section, While all these causes and consequences further elaborated by data collected through interview from respondents.

TABLE-01 MAIN SOURCES OF STRESS

S. no	Main sources of stress	Affirm Response of military controlers (respon.05)	Affirm Response of civil controllers (respon.05)	%age of Military Controlers response	%age of Civil Controlers response
01	Peak traffic hour	05 (specific slots timing of flying)	03(scheduled flights at different timings	100%	60%
02	Time pressure	04 (intense flying during slots timings)	04(equally important in civil sector)	80%	80%
03	Have to take speedy or quick action	05 (have to take decision with the speed of aircraft)	04 (slow speed air craft so reaction time is more)	100%	80%
04	High Rate of emergencies	04 (rate is high in fighter air craft)	01(rarely happen with transport air craft	80%	20%

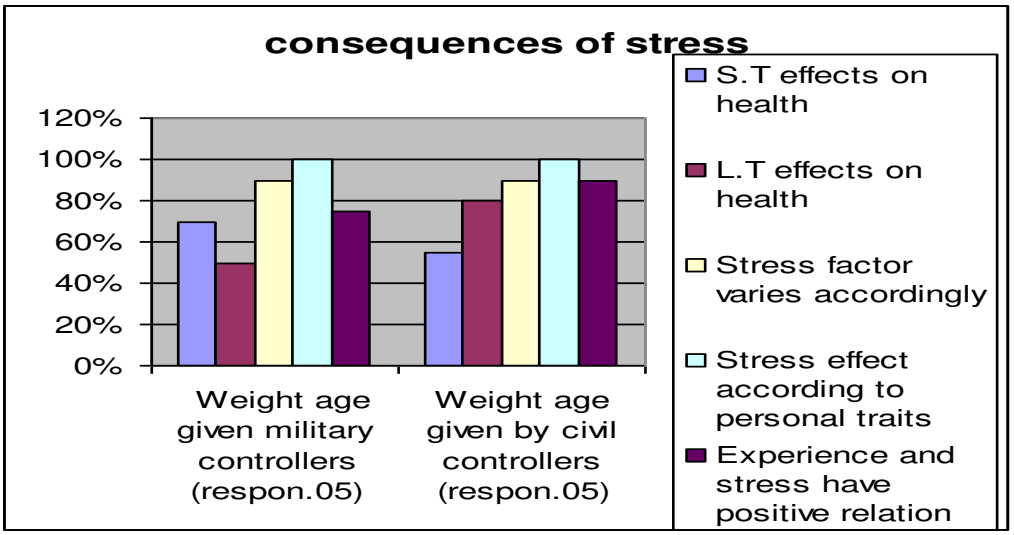
S. no	Main sources of stress	Affirm Response of military controlers (respon.05)	Affirm Response of civil controllers (respon.05)	%age of Military Controlers response	%age of Civil Controlers response
05	Working time	01 (proper shift timings followed so less)	None	20%	none
06	reliability of equipment	01(equipment get off or intermittent cause stress)	01(equipment get off or intermittent cause stress)	20%	20%
07	Role ambiguity	none	01	none	20%
08	Working environment	04	05	80%	100%
09	Unique situation	05	02 less in case of slow speed and scheduled air craft as rate of emergencies also less	100%	40%



Picture-01 (Graphical presentation of Table- 01)

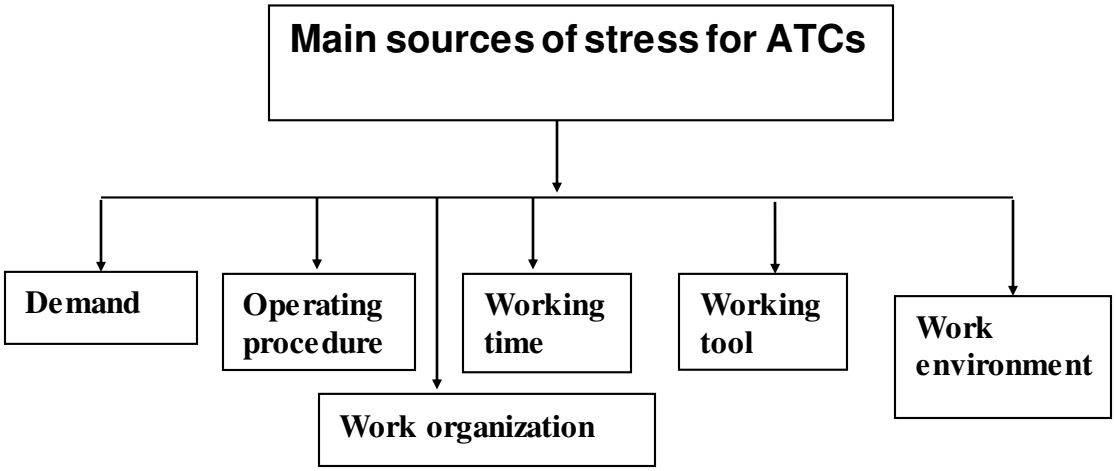
TABLE.02 CONSEQUENCES OF STRESS

S. no	Consequences of stress	Weight age given military controllers (respon.05)	Weight age given by civil controllers (respon.05)
01	S.T effects on health	70%	55%
02	L.T effects on health	50%	80%
03	Stress factor varies accordingly	90%	90%
04	Stress effect according to personal traits	100%	100%
05	Experience and stress have positive relation	75%	90%



Picture-02 (Graphical presentation of Table- 02)

3.2 MAIN SOURCES OF STRESS FOR ATCS



** *These factors collected from controllers through interview (both military and civil controllers)*

Demand:

- Number of aircraft under control(this increase more in case of military traffic)
- Peak traffic hour
- Extraneous traffic
- Unforeseeable events

Operating procedures:

- time pressure
- having to bend the rules (local operating procedures vary according to type of aircraft and terrain around)
- feeling of loss of control
- fear of consequences of errors

Working times:

- unbroken duty periods
- shift and night work

Working tools:

- limitations and reliability of equipment
- VDT, R/T and telephone quality
- equipment layout

Work environment:

- lighting, optical reflections
- noise/distracters
- microclimate
- bad posture
- rest and canteen facilities

Work organization:

- role ambiguity
- relations with supervisors and
- colleagues
- lack of control over work process
- salary
- public opinion

Another important stressful factor is shift work, connected with the requirement of an Optimum use of all mental faculties at all hours of the day and night, sometimes irrespective of the workload. It has to be taken into account that an ATC's work performance can be impaired at certain hours of the day by an excessive workload, but it can also be lowered during the night by a decline in mental and physical functions, in spite of a reduced external load. In fact, a lack of stimulation from a low workload can further increase the normal drop in physical and mental efficiency during the night hours, connected to perturbation of sleeping habits and circadian rhythms of body functions. This can be particularly harmful in emergency situations. Furthermore, air traffic controllers are among the groups of workers more exposed to" critical accidents", these being situations which cause unusually strong emotional reactions, such as in the case of air accidents with loss of life or serious injury, near collisions or loss of control due to overload. The psychic **(anger, guilt, grief, anxiety)** and physical (**tachycardia, hypertension, headache, sweating, heartburn, insomnia**) reactions cannot only hamper work performance (poor attention and concentration, impaired thinking and memory), but can also give rise to long-term post-traumatic disorders.

3.3 THE CONSEQUENCES ON HEALTH AND WELL-BEING

If we consider stress as the external demands upon an individual, it is clear that stress for air traffic controllers is connected, on the one hand, with the intrinsic characteristics of the job and, on the other hand, with the work organization and conditions in the work

place. It is important to bear in mind that the psycho-physical responses of individuals also depend on their resources, defined both in terms of personal characteristics and coping strategies. According to the survey and collected data, high stress levels and consequent troubles and illnesses are more likely to develop in work activities where there is high psychological demand, but low decision latitude and inadequate social support at the workplace ("high strain job"). On the other hand, jobs having not only high psychological demands, but also a high decision latitude and adequate social support, are likely to determine an active behavior that stimulates learning, motivation and labor productivity. As far as air traffic control is concerned, it is evident that the job entails, on the whole, high psychological demands while being subjected to a considerable degree of external control. This feeling of lack of personal influence that ATCs often complain of can be a powerful stressor, also taking into account that the job requires high levels of responsibility. However, both "demand" and "control", as well as "social support", can vary widely according to several factors dealing with different working situations, e.g. work environment, equipment, work planning and procedures, workload distribution, team composition, working hours, rest pauses, shift schedules and human relations. Furthermore, the consequences on an ATC's performance and well-being may differ widely among individuals in relation to many factors dealing with age, lifestyles ,life events, work experience, personality traits (introversion, anxiety, type A), behavioral characteristics (mood, sleeping habits, morning ness), attitudes, motivation, and physical and mental health. Moreover, many other factors related to social conditions can play an important role in this respect, e.g. socio-economic status, housing conditions, commuting, family attitudes, social support and integration. Therefore, all these aspects can have more or less influence on an ATC's job satisfaction, health and well-being according to different circumstances. They can interact and interfere with each other, giving rise to not only possible additive or multiplicative, but also subtractive effects, so that it is often very difficult to evaluate and compare the effective stress and strain in different groups and individuals.

3.31 Main consequences of stress for air traffic controllers

Consequences of stress on air traffic controller are as follows these all are based on the data collected from the respondent through interview on the basis of sources of stress got through the questionnaire.

a. Stress Short -term effects

Stress cause short terms effects on:

- Brain and cardiac activity
- Hormonal excretion
- Performance efficiency
- Mental processes
- Operative behavior

b. long term effects

Stress cause long term effects as follows:

- Hypertension
- Ischemic heart disease
- Diabetes
- Peptic ulcers
- Psychoneurotic disorders

c. Influenced by Personality traits

Stress factor vary according to following personality traits:

- Skill
- Aptitude
- Motivation
- Experience
- Operating behavior
- Coping strategies
- Social support

With regard to the short-term effects, an ATC's responses can be documented in terms Of changes in hormonal secretion (e.g. adrenaline, non-adrenaline, and cortisol), heart rate, blood pressure, muscular activity, cerebral waves, work performance (errors) and behavior (sleeping, smoking, eating and drinking habits). These can indicate a normal, physiological adaptation of the individual to external stimulation, as well as an excessive strain due to an imbalance between demands and resources. Most research indicates that these responses are in some way related to the workload, which can be evaluated in terms of the number of aircraft under control or expected to come under control, peak traffic counts, duration and type of communications, tight work schedules, and number and complexity of problems to be solved. However, big differences among air control centers can be recorded, mainly in relation to air traffic density. On the other hand, they appear to be greatly influenced by subjective factors, such as personality traits (anxiety, introversion), aptitude, skill, ability, motivation, experience and operating behavior.

In the long term, some studies indicate that this demanding occupational activity may be a risk factor for stress-related symptoms, such as headaches, chronic fatigue, heart burn, In digestion and chest pain, as well as for serious illnesses, such as hypertension, coronary heart disease, diabetes, peptic ulcers and psychoneurotic disorders. It is quite easy to foresee the high costs from both the existential and the economic point of view that these negative consequences of stress can have, not only for the single person, but also for companies and society. Therefore, prevention and control of stress becomes a compulsory target for employees, in order to safeguard their physical, mental and social health; for companies, in order to improve The efficiency and reliability of the service; as well as for society as a whole, in order to guarantee the highest levels of safety and comfort for all included and affected by this very important work activity.

4.1 STRESS MANAGEMENT IN AIR TRAFFIC CONTROL

An effective strategy aimed at reducing stress should address both the causes and the consequences of stress, thus acting upon all factors involved concerning work organization, as well as the personal resources and social conditions of the controllers. The possibility of making changes and improvements in job demands is determined mainly by

- Technical factors related to the development of scientific knowledge with regard to air flight and control systems.
- Implementing new methods of automation in air traffic control activities, for example, could profoundly change job demands and characteristics one result of such changes could be a modification in conditions which are known to cause stress.
- Specific arrangements of work organization and careful attention to the psycho physiological conditions of ATCs are just as important tools capable of reducing stress and improving the comfort and well-being of operators.

In order to have an understanding of the possible practical interventions for stress prevention and attenuation, this thesis refers to the model of the stress development process. We have several possibilities of intervention at different levels, which can have a different impact and effectiveness in relation to the causal factor they deal with and to their congruence with the specific environmental and personal conditions. With respect to the particular aspects of an ATC's job, this paper examines the possibilities at the different levels.

4.2 FACTORS HELP TO REDUCE OR MANAGE STRESS IN ATC:

there are so many ways to reduce the stress at work lace or to mange stress in air traffic control following are the factors which are really very useful to control this stress .following all factors are a based on the data collected from the respondent through

Interview and observations. These factors are:

1. Intervention on the external socio-economic environment
2. Intervention on technology and work organization
3. Intervention in working place and task structure
4. Intervention to improve individual responses and behavior
5. Specific intervention for health protection and promotion

Above all mentioned factors can be sub divided further as follows:

4. 21 Intervention on the external socio-economic environment

- Legislation, international and national directives
- Social support

4.22 Intervention on technology and work organization

- Improving job planning and reliability of the work systems
- Reduction of working times and arrangement of working teams and
- rest pauses in relation to the workload
- Arrangement of shift schedules according to psycho-physiological

And social criteria

- Participation in decision making

4.23 Intervention in working place and task structure

- Improving the work environment
- Lighting
- Noise
- Microclimatic conditions and indoor air quality
- Arranging workplaces according to ergonomic criteria
- Workstation design
- Working with visual displays units
- Sitting postures

4.24 Intervention to improve individual responses and behavior

- Individual ways of coping with stress
- Selection and training
- Counseling and other supporting measures at company level

4.25 Specific intervention for health protection and promotion

- Appropriate medical surveillance

4.21 Intervention on the External Socio-Economic Environment

A. Legislation, international and national directives

The Air Navigation Commission of the International Civil Aviation Organization (ICAO) has formulated the following objective for the task:

"To improve safety in aviation by making States more aware and responsive to the importance of human factors in civil aviation operations through the provision of practical human factors material and measures developed on the basis of experience in States".

It is, therefore, necessary that states, organizations, companies and agencies involved in air traffic control make constant efforts for a more and more widespread exchange of know-how, expertise and guidelines to make possible a standardization and an effective integration of information services, flight data and air traffic management. This is the main goal of the ICAO project on the Future Air Navigation System (FANS) that deals with a combination of satellite technology and the best of line-of-sight systems to provide an air navigational system which will overcome many of today's deficiencies on a global scale. In Western Europe for example, air traffic control is managed by 22 independent systems run autonomously by governments and agencies on a national basis. Un fortunately these all are not available in Pakistan but CAA trying its best to implement all the rules under ICAO as it is abides to do. The EURO CONTROL International Convention defines, among the most prominent tasks, those concerning the Promotion of common policies for ground and airborne navigational systems, and training of air traffic

services staff. In this perspective, the European ATC Harmonization and Implementation Programme (EATCHIP) is an important tool aimed at properly harmonizing the traffic services among member States in terms of airspace management, working rules and operational procedures, systems and human resources.

B. Social support

Social support is a crucial point in stress management. According to different research studies and above mentioned model, this is one of the three factors that concur in determining stress conditions. It can be seen in two main aspects:

- The availability of social services aimed at satisfying ATCs' needs. They concern, for example, transport facilities for reducing commuting times, canteen and sleep facilities, and housing conditions;

- The recognition at a social level of the importance of ATCs' activities and, consequently, its appreciation by the general population. ATCs complain that the general public does not fully understand the complexity and importance of their job, which is often considered "second class".

After an enquiry on job satisfaction within a group of controllers, pointed Out that "the controllers' descriptions of their own profession are very emphatic: ultra specialized, honorable, indispensable, irreplaceable, unique ... There is a shortage of descriptions to prove that this profession is *unlike the others*, and that it is one to be carried out with pride. This internal acknowledgement makes up for a *lack of external image*: the profession is little known among the general public, and is even often blamed for causing continuous traffic delays. The self- assessment is therefore indispensable for maintaining the will to work and to work well". This is probably determined by a scarcity of information and, therefore, the ATC companies should increase their activities in the field of public relations in order to give people adequate information about the ATCs' activities and, more generally, about the complexity of such activities, so that people can better appreciate the ATCs' job and role in modern society.

4.22 Intervention on Technology and Work Organization

A. Improving job planning and reliability of the work systems

The passage from the old procedural methods to modern assistance, under total radar Coverage of air space, is the main factor which enables a "jump in quality", not only in terms of work efficiency, but also in terms of stress levels, by reducing cognitive, memory and Communicative loads as well as uncertainty and un foresee ability of the situations (that are ,in most cases, the main sources of strain).The further technological passage to operating under "multi-radar" assistance permits a Further increase in levels of reliability and safety as well as a decrease in stress levels. The improvement in coordinating the information flow among the centers in order to assure an increasingly safe, regular and expeditious air traffic flow is the other milestone which allows ATCs to operate safely and quietly. This is made possible by modernizing the telecommunication and radio assistance systems and improving the efficiency and reliability of equipment, as well as by the progressive automation of the aeronautical information service, flight data processing and air traffic management. These improvements allow for better planning of air traffic and, consequently, a more balanced workload among centers, sectors and individual ATCs. These improvements may also subsequently reduce the possibility or the seriousness of many unforeseen situations, by allowing for more reliable information and more time for solving problems and making decisions, while eliminating many stressful and risky traffic peaks. It is clear that the introduction of advanced automated systems in air traffic control activities can profoundly change job demands and content; therefore, it has to be carried out very carefully.

The goal of progressive automation is to maximize system safety and efficiency by reducing human work load and error. However it can also increase some problems related to both cognitive processes and operative procedures. There is a justifiable concern for increased human boredom, decreased motivation, and loss of situational awareness, over-reliance on and misuse of automated systems, and deterioration of skill. Controllers have the influence of the new automated work stations may have on motivation and job satisfaction, some problems and the related risks that can

arise. Regarding information processing, it has to be taken into account that the cognitive competence of controllers consists of simultaneously mastering part of the procedure by application and/or adaptation type. For the moment, it is the controllers themselves who "decide" about this division according to their personality and cognitive structure. With automated workstations, this division will be taken over by the machine, and the controller will then only need to apply or adapt. Some may suffer from this and gain the impression that they can no longer pursue their own logic independently, that they are losing landmarks in their reasoning and that they can no longer think in a reliable manner. Automated systems are now able to provide aids for preventing conflicts. They will provide a "pre-processing" of situations of potential conflicts by showing the areas in which they exist (identification), the degree of urgency (classification) and even the type of solutions that can be considered. This processing carried out by the machine greatly diminishes the individual's decision power. This is certainly indispensable and unavoidable in terms of the reliability of the system, but it is also risky, having a notable effect on decision making. Indeed, what is the limit beyond which the controller will have the impression that his powers of decision are being "stolen" from him? How far can one go in letting him control the process of deciding and not simply "speaking the right information into the microphone"? The answer to the question is not an easy one, since it is difficult toned the balance between the stress alleviation by increasing the security of the man/machine system, and the reduced involvement which reduces security through a drop of vigilance. Another example in this field comes from the utilization of the Automated Traffic Alert and Collision Avoidance System (TCAS). The level of acceptance of TCAS, after more than 20 million hours of operation worldwide, has been clearly divided between pilots and controllers. From the line pilot's perspective, TCAS provides an "extra set of eyes in the cockpit" and increases overall situational awareness, especially in terminal area airspace. Overall, TCAS has been highly regarded by the pilot community. Air traffic controllers, however, have complained about TCAS operation because of its incompatibilities with existing ATC procedures alerts, and that aircraft are leaving assigned clearances without ATC authorization and knowledge. These deviations are disruptive to a controller's plans, they increase workload and are often the cause of a great deal of unnecessary anxiety on the part of the ATCs involved.

B. Reduction of working times and arrangement of working teams and rest pauses in relation to the workload.

The mental effort, required to maintain the highest level of attention and vigilance, as well as to safely and effectively face the task in terms of cognitive and memory load, can vary widely in relation to air traffic density and connected problems. Therefore, to guarantee the best level of performance efficiency avoiding excessive mental stress and fatigue, particular attention has to be paid to arranging duty periods. In relation to the peculiarity of the job and the characteristics of the demands, it is worth Stressing that one of the most important aspects in this domain is flexibility, which should be used in scheduling duty periods and arranging working teams and sectors according to the air traffic density. For example, the Committee on the Regulation of Air Traffic Controllers' Hours in the United Kingdom, after a wide survey on workloads, hours of duty, sleep, performance and fatigue, concluded that the regulation of working hours should be aimed at ensuring, as far as reasonably Possible, that controllers' fatigue does not endanger aircraft, and thereby to assist controllers in providing a service safely and effectively.

(i) ***Duty periods***:

- The length of the duty period should not exceed eight hours (extendable to 10 hours in special circumstances), and should be adjusted according to the workload.
- an interval of no less than 12 hours should be scheduled between the conclusion of one period of duty and the commencement of the next period of duty;
- within a 30-day cycle (720 consecutive hours), the aggregate of periods of duty should not exceed 200 hours, and not fewer than three intervals of a minimum of 60 hours each should be allowed between the conclusion of one period of duty and the commencement of the next period of duty;
- Consecutive periods of duty should not exceed 50 hours in a seven-day cycle. After that, an interval of a minimum of 60 hours should be allowed before the commencement of the next period of duty;

- Overtime should be an exception.

(ii) ***Breaks during operational duty*****:**

- no operational duty shall exceed a period of two hours without there being taken, during or at the end of that period, a break or breaks totaling no less than 30 minutes;
- during periods of high traffic density ,the possibility of having more frequent short breaks (Ten minutes) should be provided;
- a sufficiently long break for meals should be allowed, providing adequate canteen facilities to assure hot and good quality meals.

(iii) ***Holidays***:

- During any consecutive period of 365 days, no fewer than ten days of total holiday Entitlement shall be taken in periods of no less than five consecutive days.

C. Arrangement of shift schedules according to psycho-physiological and social criteria

Shift work, in particular night work, is a further stress factor for the ATCs due to its Negative effects on various aspects of their lives, in particular as concerns:

(a) Disturbances of the normal biological rhythms, beginning with the sleep/wake cycle;

(b) Changes in work performance and efficiency over the 24-hour period, with consequent errors and accidents as potential outcomes;

(c) negative effects on health and well-being, including troubles with the digestive function (disturbances of appetite, gastro duodenitis, colitis, peptic ulcers), nervous system (sleep deficit, anxiety, depression) and cardiovascular systems (ischemic heart diseases);

(d) social problems, resulting from difficulties in maintaining the usual relationships both at the family and social levels, with consequent negative influences on marital relations, children's education and social contacts.

Recent studies and this research paper also have resulted in some recommendations for the design of shift-work systems aimed at voiding or reducing dangerous effects on health, well-being and efficiency of shift workers. They can be summarized in the following points:

1. Adopting a rapidly-rotating shift system, changing work shifts every one or two days Instead of every week (or longer), in order to cause less disturbance to the normal circadian rhythm of body functions, including performance.
2. Reducing the number of consecutive night shifts as much as possible (one or two at most), and having a day's rest after the night-shift period. This prevents accumulation of sleep deficit and fatigue, and allows a quicker recovery.
3. Delaying the beginning of the morning shift (e.g. at 07:00 or later) to allow a normal Amount of sleep.
4. Preferring the forward rotation (e.g. morning-afternoon-night) to the backward one (e.g. afternoon-morning-night) to allow a longer period of rest between shifts. The forward rotation also parallels the "natural" tendency of body functions to lengthen the circadian rhythm over 24 hours when in "free-running" conditions (without external synchronizers).
5. Adjusting the length of shifts according to the physical and mental workload: day shifts should be shorter, whereas night shifts could be longer if the workload is reduced and there are sleeping facilities.
6. Giving the possibility of a short sleep or naps during the night shift, arranging proper sleep facilities. This has been found to have favorable effects on performance, physiological adjustment and tolerance of night work.
7. Keeping the shift rotation as regular as possible, so that the shift cycle will not be tool long and will include some free weekends. This allows a better organization of personal, family and social life.

8. Arranging a sufficiently long pause (45 to 60 minutes) for meals during the work shift, and providing hot meals. Individuals should also adopt some personal strategies, in particular as concerns their sleeping and eating habits, such as:

(a) Keeping to a tight sleeping schedule while on shift and night work and, as much as possible, avoiding disturbances (e.g. arranging the bedroom so that it is as silent and dark as possible; using ear plugs; making some arrangements with family members and neighbors).

(b) Avoiding the use of sleeping pills, save in exceptional cases, and only under medical control.

(c) Trying to adhere to the usual meal times, this can act as a good synchronizer of body functions.

(d) Eating light meals no later than two hours before going to sleep; avoiding caffeinated drinks and alcohol; relaxing before going to sleep (light exercise, reading, watching television, listening to music).

(e) During the night shift, having the main meal preferably before 01:00; there after, Consuming only light snacks with a high carbohydrate level and soft drinks (fruit juices, Milk).

Above mentioned factors would found to be very help full in overcoming sleepiness and maintaining alertness and performance efficiency. In fact, in a study concerning their psycho-physical reactions, the examined controllers were shown to be maintaining a normal circadian synchronization of body rhythms, and high levels of awake ness and alertness (documented by mood and physical fitness rating scales, as well as by tests of performance and hormonal excretion) also during the night, in spite of the external under stimulation. .

D. Participation in decision making

Participation of the controllers in decision making appears to be necessary to increase Perceived influence, motivation, job satisfaction and performance efficiency, as well as to decrease stress and relative negative consequences, no only for the individual, but also

for the organization (role conflicts and role ambiguity, job-related communications, exasperated criticisms, strikes, etc.). This aspect is becoming more and more important as long as automated and expert systems are being introduced. The effect of automation can be very complex: some tasks are eliminated, others modified, and still others created. The adaptation of the controllers to such changes depends greatly on their involvement in the process, particularly as concerns the man-machine cooperation and the utilization of skill and creativity in an apparently more normal

And passive role, that other wise can give rise to frustration and alienation.

4.23 Improving the Work Environment

Particular attention has to be given to ensuring that environmental conditions in the control centers are suitable and comfortable as concerns, in particular, lighting, noise and microclimatic conditions.

A. Lighting

Taking into consideration that the ATC ‘s task is performed almost exclusively in front Of a visual display unit, particular attention should be paid to providing lighting conditions which favor an optimal visual performance. Lighting conditions are completely different inside the regional centers and the towers. In the radar centers, dim light (under200 lux) is usually used to favors the visual contrast on the screen. It has to be considered that the introduction of modern screens are brighter and in color, allows an increase of the illumination levels in the control room (up to 500 lux), thus avoiding excessive (and troublesome) luminance contrasts between central and lateral visual fields, making the environment more stimulating, thus increasing vigilance and alertness. The lighting should be indirect, obtained preferably by mixing natural and artificial light directed onto the ceiling and the walls and thus reflecting into the room. This gives a diffuse lighting in the work environment without shadows and glare. Each artificial lighting unit should contain two or more phase-shifted tubes to avoid flickering, which is extremely annoying, causes visual discomfort and makes the reading of the different traces on the screen more difficult. Inside the towers, the opposite is the problem. It is necessary to avoid excessive illumination levels due to external bright light using both

anti-reflection glass and curtains; it is also important to have the possibility of positioning and shielding the visual display units to avoid indirect glare due to bright reflections on the screen.

B. Noise

The noise levels recorded inside control rooms are usually under the risk level for loss of hearing, but can have significant effects in terms of interference with speech communication, the disturbance of mental concentration and annoyance. It is worth considering the peculiarity of verbal communication, carried out in a foreign language for most of the pilots and ATCs, and containing many un familiar, technical and cipher words. The main sources of noise are represented by conversations, manual operations (e.g. manipulations of strip supports) and office machines (printers, telephones, photocopiers, etc.). Therefore particular attention has to be paid in order to stop background noise from exceeding45-50 dB by installing quieter office machinery, arranging work sectors in order to have better sound protection from each other, and installing more insulating headsets and more sensitive microphones.

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C. Arranging workplaces according to ergonomic criteria and work design.

Particular attention has to be paid to the configuration of the workstation, in particular as concerns the console layout in terms of the positioning of radar screens and auxiliary displays, the disposition of commands and controls, and the design of the keyboard and other interfaces. Further standardization of the panel layout is required. Information and controls must be easy to understand and input devices easy to operate, according to logical processes of mental reasoning: delays and errors may occur because of confusing, misleading or excessively confusing documentation and information, poorly located knobs and levers, or lack of proper coding causing mismatches and mistakes. Data displays containing flight information should preferably be located beside the radar screen, whereas the auxiliary displays showing maps or other complementary information can be placed above it. High resolution and multi-color displays are preferred; keyboards, rolling balls or joysticks should be movable to accommodate individual preferences;

headset jacks must be positioned on both sides of the table and should not protrude. It is also important to arrange the layout of the workplace in order to avoid glare caused By excessive brightness contrasts between different objects and surfaces; it causes discomfort and hampers the comprehension of the information. The displays should be shaded and the surfaces matte, avoiding the use of reflective materials and bright colors on table-tops and consoles.

The most advanced display systems allow for better performance with greater comfort because of their greater width, more favorable visual contrast, higher reliability, greater possibility of storing and retrieving information, and a better control layout. On the other hand, particular attention has to be given to software ergonomics that can offer great possibilities or improving presentation, comprehension and processing of information. With regard to this, it has been proved that an appropriate use of colors, symbols, line shaping, windows and figures facilitates and hastens data recognition and extraction. However, it is worth mentioning that drastic changes in workstation design and man-Machine interfaces, often made possible by technological improvements, should be adopted very carefully, as they can cause excessive stress and decreased performance due to difficulties in the adaptation of mental processes and operating procedures.

D. Working with visual display units

The interaction between the ATC and a visual display terminal are mainly characterized in terms of data acquisition and interactive communication. The ATC has a continuous dialogue with the radar-computer system by calling up in formation, scanning traces, inputting, reading and deleting data. The controller concentrates mainly on the radar screen and periodically glances at the side displays and keyboard. The radar screen should be placed in the centre of the visual field and should be adjustable in height, distance and angle to give the operator the possibility of arranging the best working position in order to avoid, on the one hand, prolonged contraction of the neck muscles and, on the other hand, an excessive effort of visual adjustment with consequent visual discomfort and fatigue. Therefore, it is recommended that the screen be place within a viewing angle of 5° above and 30° below the horizontal plane of sight, and that the eye-screen distance is between 50 and 70 cm to facilitate visual adjustment. To give the

operator the possibility of coming closer to the screen in order to focus better on traces in moments requiring particular attention, it is necessary that the table-top be not overly large but, at the same time, able to support the arms without interference with the keyboard.

E. Sitting postures

The ATC usually remains seated in front of the console, changing position slightly according to the working conditions. The ATC normally sits in the middle of or forward on the chair with his or her arms on the table-top when he or she is actively operating and needs precise control of the radar screen, and leaning on the backrest when he or she is on stand-by. A prolonged, constrained sitting posture causes musculo-skeletal discomfort and pain, particularly at the level of the neck, the shoulders and the lumbar tract. In order to avoid or alleviate such disturbances, it is important to use suitable chairs which allow a comfortable sitting posture while working, as well as useful muscle relaxation while on stand-by or resting in front of the screen. A good chair should be designed for a forward and reclining sitting posture, adjustable in height and angle, rotating on a five-legged base .It should also have user-friendly controls, have Wide arms and a high backrest, a pad for lumbar support and ahead-rest. These at should be made of a sufficiently resistant padding of foam rubber covered with non-slip and permeable material.

4.24 Intervention to Improve Individual Responses and Behavior

A. Individual ways of coping with stress

Managing stress properly also requires that the individual learn how to cope effectively in terms of personal lifestyles and behaviors.

1. First of all, people should **avoid ineffective ways of coping**, which can have an apparent Short term positive effect but, in the long run, can cause further problems in health and Well-being. We refer, in particular, to smoking, alcohol drinking and drug

consumption. Increasing **smoking** (for smokers) and/or **alcohol intake** is sometimes seen as a way of obtaining a sense of relief and calmness. Of course, apart from short-term relief, there are many adverse effects both on performance efficiency, due to interference with the upper nervous system activities, and on health, due to increased risk of lung tumours and chronic bronchitis from smoking, and of stomach and liver diseases from alcohol. The consumption of **drugs** (e.g. stimulants, tranquillizers or anti-depressants) can have a positive effect only if they are used — under medical supervision and attention is paid to their negative effects on vigilance and performance! — As auxiliary and temporary support for the organization of effective strategies aimed at removing the causes of tress. In any other case they become a dangerous masking factor of the stress condition that is more likely to become chronic and cause dangerous drug dependence and addiction.

2. Secondly, **maintaining good physical fitness and emotionally stable psychic conditions** are the best aids in fighting and overcoming stress. To stay in satisfactory condition, people should pay particular attention to physical exercise, eating habits, sleeping patterns, relaxation techniques and leisure activities. There is no doubt that **physical exercise**, if carried out regularly and in a non-competitive way, is beneficial for all the body functions improving both physical and psychological well-being.

However, particular attention should be given by the controllers to secondary occupations and/or sport activities which could hamper proper relaxation or adequate sleep, thus leading to Greater tiredness or reduced alertness while on duty. Proper **eating habits** are also important in keeping the person fit. A balanced diet, having light and easily digested meals before and during work, can support work performance during duty periods, avoiding drops in mental efficiency and drowsiness that generally occur after heavy meals. A diet with a low-fat content and the right amount of calories, aimed at maintaining an ideal body weight, also has a strong influence in preventing degenerative processes for chronic Digestive and cardiovascular diseases, for which both stress and obesity are important risk factors. Preserving **sleep** both in terms of quantity (for recovering from physical fatigue) and Quality (for psychic well-being), is a very

important -stress measure. Sleeping troubles, in fact, can be an early symptom of stress, but can make the person more vulnerable to stress as well. Should these troubles arise, the person should not use sleeping tablets (or only as a last resort), but try behavioral methods, such as taking more exercise to become more tired before going to bed; adopting stricter times for going to bed and getting up; avoiding eating before going to bed; having a light dinner with a prevalent content of carbohydrates rather than proteins; not taking stimulants, such as alcoholic beverages, tea, coffee and soft drinks containing caffeine; having a warm bath before going to bed; arranging a comfortable bedroom protected from disturbing noises; listening to relaxing music or reading before sleeping.

B. Counseling and other supporting measures at company level

Psychological support and counseling given by psychologists appears to be an important Aspect of the coping strategies that can be activated at company level.

This should be carried out periodically and, in particular, on occasions of high emotional stress and anxiety due to conflicts or errors that can lead to burn-out. This should be concerned with improving self-control, developing a more effective capacity of choosing among alternative modes of action and behavior, and to gaining more information about reactions by monitoring self-behavior, emotions and thoughts.

4.25 Appropriate Medical Surveillance for Health Protection and Promotion

Because of the specific requirements of the task, it is necessary that operators not only possess high intellectual and operative skills, but that they are also in good health (both physical and mental) in order to guarantee the highest levels of vigilance and performance at all times. Therefore, good medical surveillance is essential to ensure that operators are in good health and are able to carry out their job without unnecessary stress. In fact, the fear of losing their license (and the accompanying economic benefits) because of health problems is often a further stress factor for the controllers. Consequently, the application of the precise norms and recommendations, defined by the International civil Aviation Organization (ICAO) for the medical certification of license

holders must be regarded as a preventive measure rather than a fitness programme. At present, the controllers are submitted to a periodic check-up, at least every two years for those under 40 and every year for those over 40. These check-ups consist of a general medical examination supplemented by blood and urine analysis, electrocardiogram, visual and auditory tests and, if necessary, further medical checks by specialists. During these medical checks, doctors should pay particular attention to specific complaints Or illnesses, as well as to personality characteristics and coping strategies, with the aim of defining possible stress-related disorders and suggesting further preventive measures. Therefore, medical surveillance should be converted from the predominant aspect of Formal certification of “fitness for work”, derived from the lack of evidence of significant troubles and illnesses causing a decrease in medical fitness, into a more positive approach aimed at preserving the controller's health and well-being at best.

This deals with the above-mentioned guidelines and education programmes on preventive health measures (e.g. sleep, diet, smoking, physical fitness, rehabilitation), as well as to positive Personal behaviors which are able to enhance job satisfaction and the psycho-physical condition. Taking into account the different factors that can influence resistance and tolerance to stress, constant attention has to be paid to give social support to those controllers who may be expected to encounter more difficulties in coping with stress on the basis of their psycho- physiological characteristics, health situation and living conditions.

5.1 CONCLUSION

Air traffic controllers are widely recognized as an occupational group which has to cope with a highly demanding job that involves a complex series of tasks, requiring high levels of knowledge and expertise, combined with high levels of responsibility, not only with regard to risking lives, but also the high economic costs of aeronautical activities.

Surveys show that the main sources of stress reported by air traffic controllers are related both to the operative aspects of their job and to organizational structures. In the former case, the most important factors are peaks of traffic load, time pressure, resolving conflicts in the application of rules, and the limitations and reliability of equipment. The factors relating to organizational structure mainly concern shift schedules (and particularly night work), role conflicts, unfavorable working conditions and the lack of control over work.

Analysis has emphasized the complexity of the work of air traffic controllers. For example, the cognitive/sensory capacities required for high performance at radar workstations include spatial scanning, movement detection, image and pattern recognition, prioritizing, visual and verbal filtering, coding and decoding, inductive and deductive reasoning, short- and long-term memory, and mathematical and probabilistic reasoning. Air traffic controllers are also among the groups of workers who are most exposed to *critical accidents* which cause unusually strong emotional reactions, such as air accidents with loss of life or serious injury, near collisions or loss of control due to overload.

However, the consequences of these stressors on the performance of individual air traffic controllers may differ widely in relation to factors such as age, life style, work experience, personality traits, attitude, motivation and physical and mental health. Indeed, many studies on the consequences of stress on air traffic controllers have reported apparently contradictory findings. Nevertheless, a number of studies indicate that the demanding work of air traffic controllers may well be a risk factor in the long term in the development of stress-related symptoms, including headaches, chronic fatigue, heartburn,

indigestion and chest pain, as well as such serious illnesses as hypertension, coronary heart disease, diabetes, peptic ulcers and psychoneurotic disorders.

5.2 RECOMMENDATION (PREVENTION OF STRESS FOR AIR TRAFFIC CONTROLLERS).

In view of the safety and operational implications of the service provided, the air traffic control profession is understandably under close scrutiny at many levels. These range from the Air Navigation Commission of the International Civil Aviation Organization (ICAO) to regional and national bodies. Air traffic controllers have to pass regular physical tests in order to retain their operating license, which provides them with an added motivation to maintain them in good physical condition. Based on a wealth of practical examples, the manual reviews the various interventions which have been made in the following areas:

- the ***external socio-economic environment***, including national legislation, international and national directives and social support, in terms of facilities such as transport to work, canteens and sleeping facilities;

- ***technology and work organization***, including the improvement of job planning and the reliability of work systems, the reduction of working times and the arrangement of work teams and rest pauses in accordance with work load, the arrangement of shift schedules according to psycho-physiological and social criteria, and approaches to improve the participation of air traffic controllers in decisions which concern them;

- ***the workplace and the structure of tasks***, with particular reference to the ergonomic design of workstations and improvements in work environment factors, such as lighting, noise, micro-climatic conditions and indoor air quality;

- ***the improvement of individual responses and behavior***, through guidance in individual ways of coping with stress, measures related to selection and training, and counseling and other supporting measures, including critical incident stress management; and

- ***Health protection and promotion***, with emphasis on the conversion of medical surveillance from a process predominantly concerned with the formal certification of *fitness for work* into a more positive intervention designed to maintain and improve the health and well-being of air traffic controllers.

APPENDIX-"A"

QUESTIONNAIRE

Circle the appropriate number you think most related to the statement.

4= STRONGLY AGREE
3= AGREE
2= DISAGREE
1=STRONGLY DISAGREE

Sources of stress in air traffic control are:

Peak traffic hour	4	3	2	1
Time pressure	4	3	2	1
Have to take speedy or quick action	4	3	2	1
High Rate of emergencies	4	3	2	1
Working time	4	3	2	1
reliability of equipment	4	3	2	1
Role ambiguity	4	3	2	1
Working environment	4	3	2	1
Unique situation	4	3	2	1

Any additional factor you think cause of stress not mentioned above

- _____
- _____
- _____
- _____

Consequences of stress in air traffic control are:

Consequences of stress				
S.T effects on health	4	3	2	1
L.T effects on health	4	3	2	1
Stress factor varies accordingly	4	3	2	1
Stress effect according to personal traits	4	3	2	1
Experience and stress have positive relation	4	3	2	1

Any additional factor you think can be consequences of stress not listed above:

- _____
- _____
- _____
- _____

APPENDIX-"B"

LIST OF THE REPONDENTS

MILLITARY CONTROLLERS]

- **Sqn/Ldr Fayyaz Ahmed**

SATCO, PAF BASE SAMUNGLI, QUETTA.

- **Sqn/Ldr Salamat**

SATCO, PAF BASE MIANWALI.

- **Flt/ Lt Ameer Ali**

ATCO, PAF BASE CHAKLALA

- **Flt/Lt Maria**

ATCO PAF BASE SARGHODA.

- **Flg/Off Zahida**

ATCO PAF BASE PESHAWAR

CIVIL CONTROLLERS:

- **Area controller Fayyaz**

Karachi Area Control centre

- **Area controller Rehman**

Karachi Area Control centre

- **Area controller Nasir**

Karachi Area Control centre

- **Junior controller Mr. Zeeshan**

Karachi Aerodrome

- **Junior controller Miss Nida**

Karachi Aerodrome

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