

## SUB CULTURAL DIFFERENCES AMONG TURKISH AIR TRANSPORT PILOTS IN TERMS OF CREW RESOURCE MANAGEMENT-SPECIFIC NON-TECHNICAL SKILLS

Eyüp B. ŞEKERLİ<sup>(\*)</sup>  
Ender GEREDİ<sup>(\*\*)</sup>

**Özet:** Havaaracı kazalarının en önemli nedeni insan hatalarıdır. İnsan hatalarının önemli bir bölümü insan-insan etkileşimi sürecinde ortaya çıkmakta, pilot hataları ise onların teknik olmayan becerilerinden kaynaklanmaktadır. Bu nedenle en önemli amaçları arasında “pilotların teknik olmayan becerilerini geliştirmeye yönelik” olan CRM programları uygulanmaktadır. Bununla birlikte kültürel öğeler bireylerin tutum ve davranışlarını etkiledikleri için kültürden bağımsız olarak tasarlanan CRM eğitimlerinin başarı şansı azalmaktadır. CRM eğitiminin bekleneni vermesi ulusal kültüre uyarlanmasına bağlıdır. Ulusal kültürün yanı sıra diğer alt kültürlerin etkisinde kalan pilotlar da farklı tutumlara sahip olabilirler. Bu durum, özellikle farklı kaynaklardan pilot istihdam eden Türkiye’deki havayolu işletmeleri için son derece önemlidir.

Bu çalışmada Türkiye’deki havayolu işletmelerinde çalışan ve farklı kültürel özelliklerin etkisinde kalmış Türk pilotların CRM kapsamındaki teknik olmayan becerilere ilişkin tutum farklılıkları ortaya konulmuştur.

**Anahtar Sözcükler:** Sivil Havacılık Yönetimi, Ekip Kaynak Yönetimi, Uçuş Emniyeti, İnsan Hataları, Ulusal Kültür, Alt kültür.

**Abstract:** The most common reason of aircraft accidents is the human error. Most of those errors done occur during the human-human interactions and the errors by pilots are, to a great extent, related to their non-technical skills. Therefore; pilots receive Crew Resources Management training programs that are designed to help them acquire these skills effectively. However; since cultural issues are known to affect individual’s attitudes and behaviors, the success of CRM training programs highly depends on the fact that they should be adapted according to the national and other subcultures. This is something that should be taken into consideration seriously by the airlines in Turkey, which employ pilots with different cultural backgrounds. This study presents the differences in the attitudes of the pilots working for airlines in Turkey and imposed to different cultural contexts towards non-technical skills available within the CRM framework.

**Key Words:** Civil Aviation Management, Crew Resource Management, Flight Safety, Human Error, National Culture, Subculture.

### I. Introduction

The studies carried out show that the most important factor causing aircraft accidents is human, an indispensable and crucial component of flight activity. The study conducted by Boeing in 1993 reports that the errors done by humans constitute 73% of the reasons of such accidents (Helmreich et al, 2000:748 ; Flin et al., 2002: 69). Similarly, Amalberti states that 70% of the

<sup>(\*)</sup> Öğr.Gör. Muğla Üniversitesi Dalaman Meslek Yüksekokulu

<sup>(\*\*)</sup> Yrd.Doç.Dr. Anadolu Üniversitesi Sivil Havacılık Yüksekokulu

accidents and incidents are due to the errors done by flight crew (Appelbaum and Fewster, 2004:4). Ironically, role played by flight crew to ensure flight safety widely known today (Helmreich et al., 2000:748 ; Flin et al., 2002:68-69). In short; the studies done conclude that the most important reason of aircraft accidents and incidents is the errors done by the crew members during the flight (Janic, 2000:45-46).

The studies done report that the accidents occur, to a great extent, for the following reasons; (a) ineffective communication, (b) lack of situational awareness, (c) infirmity in team work, and (d) making poor decisions, all of which are due to the lack of non-technical skills (Klampfer et al., 2001: 1).

Considering such implications from the research, the researchers in the field developed training programs called “*Crew Resource Management*” (CRM) in order to guide flight crew to make use of the resources available more effectively in their near environment. The most important resource that needs managing during the flight is human. Therefore; CRM training programs aim at reducing human errors by enhancing the effectiveness of resource management processes that are related to human-human interactions in the cockpit.

CRM training programs enable the trainers to focus mainly on human-human interaction as well as to highlight the concepts such as communication, leadership, team work and coordination (Helmreich and Merritt, 2001:53). These programs include a lot of modules that aim at improving skills such as leadership, team spirit, decision-making and situational awareness; ensuring coordination among team members; more effective stress, workload and conflict management; and establishing a human-automation harmony (Civil Aviation Authority, 2003:1.1). As a result, it will be possible to reduce the human errors and their negative effects by using the resources such as human, hardware and knowledge more effectively thanks to CRM training programs. These programs aim at making behaviors more safe efficient through some changes in attitudes toward non-technical skills.

Although CRM training programs are used world-wide, most of the airlines complain for not achieving the desired outcomes regarding the improvement of non-technical skills when they use these programs (Helmreich et al., 1999:5). As a result of the recent studies analyzing the human errors done in the cockpit, the once commonly agreed idea that cockpit is a working environment that is free from culture turned out to be just a misconception. The studies conducted on the efficiency of CRM training programs show that “national culture” has an effect on the attitudes of flight crew (Helmreich and Merritt, 2001:53). This conclusion implies that a CRM training program designed to help flight crew to develop more safety-oriented attitudes and behaviors in a certain cultural context may not work for the flight crew members of a different airline doing business in a different country with different cultural values and conceptions. To illustrate with, it is now known that a CRM training designed for an Anglo-Saxon culture like USA cannot be

efficient enough when applied in a different cultural context (Klampfer et al., 2001:24).

In addition to such differences due to the presence of different national cultures, some studies report that even the attitudes of the flight crew members working for the same airline company towards “communication”, “giving orders”, “perception of authority”, “workload management”, “decision-making”, and “stress management” might differ if they have been influenced by different subcultures. In short; the cultural differences among flight crew members might deteriorate the efficiency of CRM training programs and human-human interaction, which might result in more human errors; therefore, jeopardizing the safety during the flight (Helmreich and Merritt, 2001:53-56).

This information leads us to consider the suggestion that it is necessary to be aware of the cultural differences among crew members and some possible safety problems that might occur due to these differences. So, these CRM training programs should be revised and redesigned, if necessary, accordingly in a way to overcome such problems. The main reason of the presence of such different subcultures is that flight crew members have different flight training backgrounds, which is also mentioned by Helmreich and Merritt (2001). The study done by these two researchers in an airline settled in Taiwan show that the young pilots, who had been trained in civilian flight schools of western countries, are more computer technology-conscious and have a better command of foreign languages compared to mid-aged military trained pilots (Helmreich and Merritt, 2001:101).

Air carriers in Turkey use CRM training programs and almost all of them predominantly purchase CRM training programs from abroad. In addition, the interviews made within the scope of this study reveal that these airlines do not apply different CRM training programs for their crew members even if they have different cultural backgrounds. However, a pilot study done with Turkish pilots show that their attitudes highly depend on their training background.

The surveys administered show that most of the pilots employed in Airline Companies in Turkey received their pilot training programs in Turkish Air Forces and worked for this institution for many years. However, as of 1990s, Turkish Airline Industry has experienced a considerable growth and the number of pilots trained in civil educational institutions has increased, which has resulted in the presence of people from different subcultures in the same cockpit. Therefore, it is necessary for Turkish air carriers to determine such subculture differences among flight crew members and their potential effects on the development of non-technical skills if they want to apply effective and efficient CRM training programs. Considering this necessity, within the scope of this study, a pilot study was conducted with the pilots randomly selected from those working for some Turkish air carriers. The aims of this study, in which an unstructured interview method was used, are as follows:

1. To explore whether there are differences among Turkish pilots regarding subcultures.
2. To investigate whether these differences, if there are, cause inconveniences mentioned above.

According to the results of this pilot study, there are some subculture differences among Turkish pilots. The most outstanding difference is due the civil or military educational institutions they received pilot training before starting to work as a pilot in Turkish Air Carriers. Working as a pilot in a military organization for a long time seems to lead to the establishment of a stronger organizational culture. Some of the pilots interviewed stated that this subculture difference is likely to jeopardize flight safety from time to time.

## **II.Literature Review**

Before 1940s, “Human Factors” studies were mostly categorized under the title “ergonomy”. Later, they were considered as a distinct scientific field of study. The main concern of this period was the adaptation process of humans to their working environments. The most popular research topics of this period were sleep disorders, fatigue, visual perception, design of control panels, data processing speed of the brain, decision-making skills and how to choose the crew.

In 1970s, the research conducted by NASA reported the importance of human-human interaction in aviation. The interviews done with an airline named Pan AM pilots revealed that they received a high quality training on aircraft systems and operations; however, they reported that they face problems in certain issues such as leadership, communication and decision-making (Helmreich and Merritt, 1999). Cooper, White and Lauber, in their detailed study on aircraft accidents that occurred between 1968 and 1976, concluded that most of those accidents were due to the problems in “giving orders”, “communication” and “coordination” among the crew. Similarly, the simulator studies done by Ruffell-Smith (1979) revealed the importance of management skills in cockpit (Flin et al., 2002:68).

Under the light of these findings, CRM training programs were designed to develop non-technical skills such as communication, leadership, team work, decision making, situational awareness, work load and stress management. Although CRM training programs are widely used by airlines all over the world, they are not as successful as those applied in the USA. Helmreich and Merritt, in their studies, claim that the factor which accounts for this difference in achievement is the presence of different cultural contexts (Helmreich, Merritt and Wilhelm, 1999:26).

Helmreich and Merritt (2001), in their study on determining the attitudes of pilots in certain scales, found out that their attitudes are influenced, to a great extent, by national culture. The researchers studying on the field of social psychology had already determined “national culture dimensions” in their

earlier studies and interpreted these cultural differences accordingly. Later, Helmreich and Merritt (2001) used the dimensions, which were developed by Geert Hofstede (2000:29) and used by other academicians in a lot of studies on cultural comparisons, in order to compare the attitudes of pilots from different countries Helmreich and Merritt, 2001:7).

Hofstede (2000:41) administered a total of 116,000 questionnaires to IBM employees in 40 different countries between 1967 and 1973 as a part of his studies which aim at determining the differences regarding the values of those employees. The results of these studies revealed some differences, which they called “cultural dimensions”. Among those dimensions were “power distance”, “individualism-collectivism”, “uncertainty avoidance” and “femininity-masculinity”. More importantly, Hofstede (2000) made it possible to make a numerical comparison by representing these values for each country as indexes.

Hofstede (2000) defines “power distance” dimension as the degree of unequal distribution of power within the group. The relatively equal distribution of power in the group is called “low power distance”, while unequal distribution is referred to as “high power distance”. “Uncertainty avoidance” refers to the extent how individuals in a society feel threatened in uncertain situations. The individuals with higher degrees of “uncertainty avoidance” are likely to be more nervous and stressful while people living in societies with lower levels of uncertainty avoidance tend to be more relaxed and get along with other people more easily (Hofstede and Soeters, 2002:3).

“Individualism-collectivism”, another dimension mentioned by Hofstede, deals with whether individuals of a particular society prefer to act alone or as a group. In individualist societies, the individual benefits are more important than the benefits of the society. On the other hand, collectivist societies give priority to the benefits of the group rather than those of individuals. “Masculinity-Femininity” dimension refers to whether dominant social values in the society are closer to feminist or masculine characteristics. Cultures with dominant masculine values tend to give importance to material values such as “entrepreneurship”, “competition”, “selfishness”, and “earning money”. On the other hand, cultures with dominant feminist values highlight “sincere relationships among people”, “providing services”, “caring about vulnerable individuals” and “collaboration” (Hofstede and Soeters, 2002:3-4).

By making use of cultural dimensions developed by Hofstede, Helmreich and Merritt (2001) tried to determine how the attitudes of pilots develop. According to Hofstede, organizational culture and the attitudes and behaviors towards the administration are highly affected by national culture. Similarly, Helmreich states that national culture, organizational culture and professional culture have considerable effects on the behaviors of pilots (Helmreich, 1998:1).

Helmreich and Merritt attempted to determine the attitudes of pilots from different countries regarding “giving orders”, “stress”, and

“communication” by adapting data collection instrument and scales used by Hofstede (Hofstede, 2000) in order to explore cultural differences among IBM employees in different countries to air transportation. Developed by Helmreich and Merritt including various scales, and called “Flight Management Attitudes Questionnaire-FMAQ”, was used by these researchers to determine the attitudes of pilots regarding “giving orders”, “communication”, “stress”, “rules”, “automation”, “organizational climate”, and “work values”. Within the scope of their study, the data was collected from 15,000 pilots working for a total of 36 airline companies in 23 different countries between 1993 and 1997 (Helmreich and Merritt, 2001).

Helmreich and Merritt (2001) found out that the pilots had different attitudes towards “giving orders”, “leadership” and “perception of stress” due to the international cultural differences although they have some worldwide common attitudes towards “communication” due to the effects of professional culture. On the other hand, although “communication” is an internationally valid value for pilots, some minor differences might occur due to the effect of national culture, which is the indicator of the strong influence of national culture. To illustrate with, Helmreich and Merritt stated that the pilots from Japan, Korea, Mexico and Taiwan marked “I don’t agree” less than pilots from other parts of the world did for the statement “If I perceive a problem with the flight, I will speak up, regardless of who might be affected” (Helmreich and Merritt, 2001:69).

Cultural values are influential on the behaviors that might have critical importance in the cockpit. Helmreich states that some critical behaviors - such as information exchange between relatively less experienced staff (novices) and the experienced staff; evaluation of stress and individual limitations; conformity to Standard Operating Procedures; and attitudes towards automation - are highly affected by culture itself. Therefore; it is necessary to get information about the values of the national culture and the extent to which national values differ according to subcultures (Helmreich, 1998:1).

Pilots working in the countries with high “power distance” give importance to harmony in the cockpit, but they also perceive some obstacles resulting from hierarchical differences and affecting the communication negatively. Helmreich and Merritt point out that high “power distance” results in junior staff’s overdependency on senior staff. However, when “power distance” is low, flight crew members do not perceive any obstacles regarding communication. Helmreich and Merritt also state that, in airline industry, the development of high “power distance” depends on the autocratic leadership qualities of the leader they work with (Helmreich and Merritt, 2001:57).

As for “individualism – collectivism” dimension, the pilots in individualist countries prioritize their benefits rather than the benefits of the group and the institution (Helmreich et al., 2001:7). In addition, “acting independently from the group”, “less dependence on automation”, “objecting

the rules more often compared to the pilots in collectivist countries” and “developing more realistic perceptions towards stress” are among the attitudes observed in individualistic countries (Helmreich and Merritt, 2001:98).

Uncertainty is related to the extent of how much threatened individuals feel under certain conditions. In the countries with high levels of “uncertainty avoidance”, people generally tend to obey the rules more strictly. As a result, pilots working in the countries with high levels of “uncertainty avoidance” may not take creative decisions in case of unprecedented situations. In countries with low levels of “uncertainty avoidance”, on the other hand, rules are more easily disobeyed, but more creative decisions can be taken when unprecedented situations occur (Helmreich et al., 2001:8).

What are important in countries with dominant masculine characteristics is individuals’ performances and the assessment of those performances. However; the results obtained by Helmreich and Merritt, did not correlate with the results of Hofstede’s study (Helmreich and Merritt, 2001:95). In other words, the findings for this dimension do not seem to make it possible to classify the pilots’ attitudes according to different countries.

As mentioned earlier, the dimensions suggested for national culture might display some different characteristics in some subcultures. The “power distance”, “individualism” and “uncertainty avoidance” values might differ for some groups even if they are influenced by the same national, institutional and professional cultures.

The study conducted by Wang in Taiwan highlights the effects of such differences. According to the results of this study, the Taiwanese pilots who received their flight trainings in western countries has difficulties in adapting themselves to national, institutional and professional culture values of their native country when they return home. Wang compared the attitudes of pilots with military training origin and those trained in civil flight training institutions towards the non-technical skills in the cockpit. In addition to his finding that there were significant differences between those two groups of pilots for the above mentioned attitudes, he also found that both groups of Taiwanese pilots differ from the pilots in other parts of the world in terms of attitudes in certain issues, most probably due to the effects of national culture (Yong, 2003).

In conclusion, the results obtained from the studies conducted show that national culture has considerable effects on pilots’ attitudes and behaviors. Moreover, subcultures, as part of the national culture, imply that there are attitude and behavior differences in the cockpit as well. The identification of such differences is crucial to ensure more effective CRM training programs.

### III. Methodology

#### A. Research Subjects and Sampling

The subjects of this study are Turkish pilots, first officers and second officers working for commercial airline companies operating in Turkey. According to the data obtained from Turkish Airline Pilots Association (TALPA), almost all of the pilots working for commercial airlines operating in Turkey are members of this Association, the number being 1,600 in 2005. Within the scope of this study, a sample of 350 pilots was taken from this population by using “basic random sampling” method and Flight Management Attitudes Questionnaire was administered to this sample group. 90.1% of the questionnaires were distributed in Istanbul since almost all airlines have their head offices in this city. The rest of the questionnaires (9.9%) were administered in the airlines which have their head offices in Antalya. Of those 350 questionnaires, 220 were returned and 211 were analyzed for the purposes of this study.

On the other hand, by using “stratified sampling”, the researchers wanted to be sure that the variable “receiving training and working in Turkish Air Forces” would reflect the real distribution in Turkey.

#### B. Data Collection Instrument

The data collection instrument used to determine attitudes in this study was a questionnaire, which has been inspired by the questionnaire developed by Hofstede to explore the cultural differences between countries. A group of scientists in Texas University adapted this questionnaire to use with pilots, first officers and second officers working in airline industry. This adaptation included some extra different attitude statements regarding CRM training programs rather than using all the statements used by Hofstede. The new adapted questionnaire was called Flight Management Attitudes Questionnaire (FMAQ) and two versions of this questionnaire were designed; namely USA and international version. In this study, international version was used.

FMAQ consists of six parts. The first part includes 44 statements about organizational culture, which was excluded from this study since this culture type was not the researchers’ concern for this study.

FMAQ was translated from English to Turkish by the researchers and a Turkish native speaker pilot who had worked in USA for many years. In addition, Turkish version was given to 15 pilots and first officers to check for the comprehensibility of each item in a pilot study. Later, the final version of the questionnaire was prepared.

A data collection instrument is valid as long as it can measure what it is supposed to measure. The results obtained from the studies done to identify the cultural differences by using this questionnaire were consistent with the results reported by Hofstede (2000), which shows the reliability of this instrument. In addition, the values obtained from FMAQ developed by the researchers in



Texas University were found to be consistent with those reported by Hofstede in terms of the following dimensions; “power distance”, “uncertainty avoidance” and “individualism-collectivism” (Hofstede, 2000). In this study, the internal reliability coefficient of the questionnaire was found to be 0.79 by using Crombach-Alpha method.

The questionnaire used in this study includes 67 statements in addition to demographic questions. Five point Likert scale is used to determine the attitudes of the pilots.

#### *C.Data Collection Procedure*

Before the administration of the questionnaire, necessary permissions were taken from the airlines. Later, top executive staff of these companies responsible for flight operations, training and CRM training programs was given a briefing about the purpose of the study and the questionnaire to be administered. In addition, the administrative body of Turkish Airline Pilots Association (TALPA) was also given information about the study and their contributions in the administration of the questionnaire were highly appreciated.

Moreover, unstructured interviews were made with the pilots and the staff who is responsible for CRM training programs during this data collection process. These interviews were quite useful in obtaining invaluable information for the purposes of this study.

#### *D.Data Analysis*

In this study, the data about the attitudes was collected by using FMAQ and later analyzed through four scales suggested by Helmreich et .al, which are “communication”, “giving orders”, “perception of stress” and “obeying the rules” (Helmreich et .al, 2001). In order to identify some possible differences in these scales in terms of sub cultural groups (that is, the places where flight training was received), t-test – a parametric test- was used. As for analyses, “SPSS 11.0 for Windows” software was preferred.

### **IV. Results and Discussion**

As mentioned earlier, demand for air transportation has grown recently in Turkey. Especially, the deregulation of the domestic market by the end of 2003 resulted in sudden growth in airline demand. To illustrate with, the number of departing passengers in domestic market was 9,125,298 in 2003, which later increased to 14,427,969 in 2004 and to 26,644,450 in 2006. The number of passengers in international flights was reported to be 32,133,681 in total in 2006. (General Directorate of State Airports, 2007). This unprecedented boost in 2004 led to a lack of pilots, cabin crew and technicians. The insufficient number of pilots, especially, almost became a threat for the growth of Turkish Air Transportation Industry.

Turkish Air Carriers employ pilots trained in different educational institutions. Of these sources, “Turkish Armed Forces” is the most important one with the largest contribution of qualified staff to the airline industry.

In addition to the pilots trained in educational institutions of Turkish Armed Forces, airlines also employ the graduates of flight training program at Anadolu University, School of Civil Aviation. Moreover, some airlines send the graduates of engineering faculties to attend flight training programs abroad. The increasing demand for pilots also led to the establishment of some private pilot training institutions. Finally, Turkish Aeronautical Association has recently initiated flight training programs to meet the increasing demand for pilots in Turkey by making some improvements in its policy and available equipment and staff.

This situation results in the presence of the pilots with different educational backgrounds, i.e. from different subcultures, in the same cockpit. It is assumed that the pilots with Turkish Air Forces origin adopted the values of this institution relatively more since they worked there for a long time. Therefore; it is necessary to identify the attitudes of those pilots with different cultural background towards CRM skills, which will make it possible to determine the needs of each different subculture regarding CRM training programs.

In this study, with sub cultural values in mind, the pilots who received training military and civil educational institutions were compared in terms of the following scales developed by Helmreich and Merritt; “communication”, “giving orders”, “perception of stress” and “obeying the rules” (Helmreich and Merritt, 2001:66).

#### *A.Attitudes Toward Communication*

“Communication” can be considered the basis of CRM skills since it makes the following CRM skills possible like; establishing situational awareness, team work practice, playing leadership role, coordination, and the conflict management. Therefore, effective communication is a crucial element of flight safety. As mentioned earlier, Helmreich and Merritt state that effective communication is a value commonly agreed on by most of the pilots due to the effects of professional culture. Thus, it is very important to determine whether there are differences regarding the attitudes towards “communication” between the pilots working in the same cockpit and having different training backgrounds; namely military or civil.

Table 1 presents the statements used in this “communication” scale. The answers did not reveal any differences between these two groups of pilots, and the mean for the statements were quite high.

There is common agreement for the statement “If I perceive a problem with the flight, I will speak up, regardless of who might be affected”. No significant difference is found between civil and military origin pilots for this

statement. This situation might be due to the similar effects of professional culture on the sub cultures which resulted from the flight training backgrounds of pilots. Military and civil origin pilots state that effective communication is crucial for flight safety and they would report any problems during the flight without considering its possible negative results for a person or people. This situation, of course, leads to a more effective error management by enabling the flight crew members to identify the problems and carry out the necessary evaluations.

Table 1: *Attitude Differences of Civil and Military Trained Pilots on Communication Scale*

| Statements  | Pilots' Origin | N   | M    | SD    | Difference Among Means | T     | P     |
|---|----------------|-----|------|-------|------------------------|-------|-------|
| If I perceive a problem with the flight, I will speak up, regardless of who might be affected".       | Military       | 148 | 4.33 | 0.884 | 0.08                   | 0,588 | 0.557 |
|   | Civil          | 63  | 4.25 | 0.842 |                        |       |       |
| Good communication and crew coordination are as important as technical proficiency for flight safety" | Military       | 148 | 4.36 | 0.888 | -0.13                  | 1,045 | 0.297 |
|   | Civil          | 63  | 4.49 | 0.759 |                        |       |       |
| To resolve conflicts, crewmembers should openly discuss their differences with each other             | Military       | 148 | 4.76 | 0.587 | 0.02                   | 0.194 | 0.846 |
|   | Civil          | 63  | 4.75 | 0.621 |                        |       |       |

Note. N=211. M=Mean, SD=Standard Deviation.  
t=t\_test value, \*p <.05 two-tailed

The answers given for the statement "Good communication and crew coordination are as important as technical proficiency for flight safety" reveals that Turkish pilots give importance to the effectiveness of communication, which is a desired situation for flight safety. Like the first statement in this scale, the researchers did not find any significant differences between these two groups of pilots regarding this statement.

Another statement in this scale is "To resolve conflicts, crewmembers should openly discuss their differences with each other". To ensure flight safety, it is important for the pilots to report problems and inappropriate applications to each other easily. The high mean scores for this statement show that Turkish pilots prefer to have discussions to solve problems rather than suspending the

communication, which is the most dangerous attitude for the flight safety. There is no significant difference between military and civil origin pilots for this statement.

The results obtained in “communication” scale imply that professional culture dictate clear and efficient communication as a commonly agreed value, which is also consistent with the findings of Helmreich and Merritt. “The necessity for efficient communication” is a commonly agreed value among Turkish pilots regardless of sub cultures they have been exposed to.

#### *B. Attitudes Toward Giving Orders*

Another scale used to identify the differences among sub cultures is “command” scale. The attitudes regarding this scale are highly affected by “power distance”, which also affects the efficiency of “communication in the cockpit”, “situational awareness”, “leadership”, “team work” and “conflict management”. When the mean scores are high for the statements in this scale, it can be concluded that crewmembers have high level of “power distance”. The statements used for this scales are given in Table 5.

Similarly, preferred leadership types might also give some clues about the attitudes regarding “command” and authority. Hofstede found out that the employees who are hesitant to express their opinions to a great extent stated that they work with autocratic and paternalistic leaders in their job environments. The findings of Hofstede’s study show that autocratic leaders cause the employees to be reluctant, if not afraid of, to express their diverse ideas (Hofstede, 2000:84-85).

Table 2: *Leadership Styles*

| Types  | Leadership Styles  |
|--------|--|
| Type A | Leader usually makes decisions promptly and communicates them to subordinates clearly and firmly. Expects them to carry out the decisions loyally and without raising difficulties.  |
| Type B | Leader usually makes decisions promptly, but, before going ahead, tries to explain them fully to subordinates. Gives them the reasons for the decisions and answers whatever questions they may have.  |
| Type C | Leader usually consults with subordinates before reaching decisions. Listens to their advice, considers it, and then announces decision. Expects all to work loyally to implement it whether or not it is in accordance with the advice they gave. |
| Type D | Leader usually calls a meeting of subordinates when there is an important decision to be made. Puts the problem before the group and invites discussion. Accepts the majority viewpoint as the decision.   |

Similarly, this study also presents the relationship between the reluctance of employees to express their opinions and the preferred leadership styles. Table 2 includes the descriptors for leadership styles and Table 3 the existing and preferred leadership styles.

According to the results of this study, 63.5% of Turkish pilots work with autocratic leaders described in Type A above. On the other hand, 56.4 % of those pilots reported that they would rather work with Type C leaders, who are relatively more democratic, and 20.9 % with Type D leaders, the most democratic ones. The preferences stated here by the pilots to work with democratic leaders might be accounted for by the attempts to reduce “power distance”.

Table 3: *Leadership Types-Preferred and Existing*

| Leadership Types  | Existing Leadership Type (%) | Preferred Leadership Type (%) |
|-------------------|------------------------------|-------------------------------|
| Type A Leadership | 63.5                         | 3.3                           |
| Type B Leadership | 23.2                         | 19.4                          |
| Type C Leadership | 11.4                         | 56.4                          |
| Type D Leadership | 1.9                          | 20.9                          |
| Total             | 100                          | 100                           |

Another indication of high power distance is the answers of the statement “how frequently, in your work environment, are subordinates afraid to express disagreement with their superiors?” As seen in Table 4, 45.4% of Turkish pilots marked “very frequently” and “frequently” options for this statement.

Table 4: *Expression Opinions Freely*

| Percentage Frequency | Very Often | Often | Sometimes | Seldom | Very Rarely | Total |
|----------------------|------------|-------|-----------|--------|-------------|-------|
| Percentage (%)       | 11.8       | 33.6  | 27        | 19.9   | 7.6         | 100   |
| Frequency            | 25         | 71    | 57        | 42     | 16          | 211   |

When military and civil origin pilots are compared in terms of differences in “command” scale, significant difference can be found for each statement regarding this scale (see Table 5), with military origin pilots having relatively higher percentages. Military origin pilots believe that “captain pilot is the person to fly the aircraft best during emergency situations”. The statement

“Captain pilot should take the physical control and fly the aircraft in emergency and non-standard situations” aims at finding out whether crewmembers consider captain pilot as the only person to take action during emergency and non-standard situations or not.

Table 5: *Attitude Differences of Civil and Military Trained Pilots on Command Scale*

| Statements  | Pilots' Origin | N   | M    | SD    | Difference Among Means | T     | P      |
|---|----------------|-----|------|-------|------------------------|-------|--------|
| Captain pilot should take the physical control and fly the aircraft in emergency and non-standard situations  | Military       | 148 | 4.20 | 1.254 | 0.70                   | 3.553 | 0.001* |
|   | Civil          | 63  | 3.49 | 1.343 |                        |       |        |
| Junior crew members should not question the captain's or senior crewmembers' decisions                        | Military       | 148 | 2.16 | 1.101 | 0.69                   | 4.928 | 0.000* |
|   | Civil          | 63  | 1.48 | 0.840 |                        |       |        |
| Successful flight deck management is primarily a function of the captain's flying proficiency                 | Military       | 148 | 3.38 | 1.382 | 0.68                   | 3.570 | 0.000* |
|   | Civil          | 63  | 2.70 | 1.213 |                        |       |        |
| Except for total incapacitation of the captain, the first officer should never assume command of the aircraft | Military       | 148 | 2.44 | 1.463 | 0.69                   | 3.948 | 0.000* |
|   | Civil          | 63  | 1.75 | 1.015 |                        |       |        |

Note. N=211. M=Mean, SD=Standard Deviation.  
t=t\_test value, \*p <.05 two-tailed

When captain pilots experience a decrease in his flight performance due to fatigue or stress, first officers should take the control. However, first officers report that only the captain pilot should assume responsibility during emergency situations, which signals high “power distance” level. In the countries with high levels of “power distance”, captain pilots generally act individually rather than sharing the responsibility and work load with first officers, who prefer to have a passive role during this process. As mentioned earlier, the trainees attending CRM training programs are told that they should share the workload and work in coordination with other members during normal and emergency situations.

“Successful flight deck management is primarily a function of the captain’s flying proficiency” is another statement available in “giving order” scale. Each crew member is equally important for a safe flight. In other words, the flight skills of the first officer also play an important role in successful flight deck management. According to the results of this study, half of the Turkish pilots (50.2%) reported agreement on this statement.

A detailed analysis of this statement reveals some differences between military and civil origin pilots. The mean score in this statement is 3.38 for military origin pilots and 2.70 for civil origin ones. Table 5 shows this significant difference very clearly. This result may imply that military origin pilots consider the captain pilot the only authority for a safe flight. The reason of having such an opinion is that obeying a hierarchical structure is important for this group of pilots. On the other hand, high levels of “power distance” leads to the perception of leaders as the most knowledgeable and talented member in the group. Turkish Air Forces has a promotion system basically depending on length of working, so the difference between military and civil origin might be due to cultural characteristics acquired while working for Turkish Armed Forces.

The mean score by the Turkish pilots was very low for the following statement in this scale: “Junior crew members should not question the captain’s or senior crewmembers’ decisions.” Of 211 pilots who participated in the study, 169 marked “I don’t agree” and “I don’t agree at all” options for this statement. However, Table 5 shows that there is a significant difference between military and civil origin pilots for this particular statement. Military origin pilots believe that younger and inexperienced pilots should not question themselves relatively more than civil origin pilots do, which signals the presence of higher “power distance”. The fact that civil origin pilots have a tendency to question the actions and decisions taken by the senior members might contribute to safe flight, however; this situation might lead to a conflict when the pilots from both groups are present in the cockpit. Military origin pilots seemed to have considered “not questioning the decisions of senior members” as an important value in their previous job experiences in Turkish Air Forces, which might threaten flight safety.

“Except for total incapacitation of the captain, the first officer should never assume command of the aircraft” is another statement in “giving order” scale. The high values found for this statement show that the authority of the captain pilot is very strong and can be assumed only when he /she is unable to take any actions. The mean for this statement was 2.23 and 73% of Turkish pilots marked “I don’t agree” and “I don’t agree at all” options for this statement, which implies that majority of Turkish pilots think that first officers can also take control during the flight. The low mean score for the statement might be due to captain pilots’ responsibility for training first officers. In other words, they try to help them improve their flight skills by transferring the control to first officers.

On the other hand, the researchers found a significant difference between military and civil origin pilots for this statement. The mean score by military origin ones (2.44) is higher than that by civil origin pilots (1.75). As mentioned above, this difference is due to the importance of acting within the limits of a strict hierarchy for military origin pilots.

The findings obtained from “giving orders” scale generally show that Turkish pilots have high “power distance”, which might be an obstacle for other crew members to express their opinions freely as well as to give feedback. Another finding of this study is that the pilots trained in military schools have higher “power distance” than those trained in civil pilot training institutions. Therefore, when the captain pilot has military and first officer civil origin, it is highly likely that “communication”, “team work”, “leadership” and “conflict management” efficiency will decrease, which, consequently, may lead to the lack of “situational awareness”. In other words, high “power distance” increases the risk level and jeopardizes the flight safety.

### *C. Attitudes Toward Stress*

This scale aims at determining the attitudes of pilots regarding their perceptions of stress and physical and mental performance. Pilots’ perceptions of stress are influential on flight safety. Unrealistic attitudes regarding stress and human performance and limitations lead to making wrong decisions and not being able to develop the right situational awareness. The results obtained and the statements in this scale are given in Table 6 below.

When the mean score for the statement “Even when fatigued, I perform effectively during critical times in a flight” is high, it might be concluded that pilots do not have realistic attitudes regarding the effects of stress. Stress and fatigue negatively affect the individual’s mental and physical performances such as perceiving, data processing and decision-making. Merritt and Helmreich point out (Helmreich and Merritt, 2001: 82) that professional culture causes exaggerated perceptions regarding stress and the limits of human being, that is pilots trust themselves too much due to effect of such professional culture.



Table 6: Attitude Differences of Civil and Military Trained Pilots on Stress Scale

| Statements   | Pilots' Origin | N   | M    | SD    | Difference Among Means | T      | P      |
|--|----------------|-----|------|-------|------------------------|--------|--------|
| Even when fatigued, I perform effectively during critical times in a flight            | Military       | 148 | 2.12 | 1.223 | 0.47                   | 3.294  | 0.001* |
|  | Civil          | 63  | 1.65 | 0.806 |                        |        |        |
| My decision-making ability as good as in emergencies as in routine flying conditions   | Military       | 148 | 3.71 | 1.168 | -0.10                  | -0.598 | 0.550  |
|  | Civil          | 63  | 3.81 | 0.965 |                        |        |        |
| I am less effective when stressed or fatigued.   | Military       | 148 | 3.95 | 0.995 | -0.05                  | -0.354 | 0.724  |
|  | Civil          | 63  | 4.00 | 1.063 |                        |        |        |
| Crew members should monitor each other for signs of fatigue and stress                 | Military       | 148 | 4.61 | 0.635 | 0.02                   | 0.229  | 0.819  |
|  | Civil          | 63  | 4.59 | 0.528 |                        |        |        |
| Personal problems can adversely affect my performance                                  | Military       | 148 | 3.74 | 1.082 | -0.15                  | -0.914 | 0.362  |
|  | Civil          | 63  | 3.89 | 1.002 |                        |        |        |
| A truly professional crewmember can leave his/her personal problems behind when flying | Military       | 148 | 4.05 | 0.978 | 0.06                   | 0.432  | 0.666  |
|  | Civil          | 63  | 3.98 | 0.979 |                        |        |        |

Note. N=211. M=Mean, SD=Standard Deviation.

t=t\_test value, \*p <.05 two-tailed

The mean score by Turkish pilots for the statement “Even when fatigued, I perform effectively during critical times in a flight” is quite low. This situation implies that Turkish pilots have realistic attitudes regarding the effects of fatigue. Similarly, most of the pilots interviewed within the scope of this study stated that high levels of fatigue due to heavy workload cause errors that might negatively affect flight safety.

Another important finding in this scale for the statement “Even when fatigued, I perform effectively during critical times in a flight” is the significant difference between civil and military origin pilots. The mean score for this statement by military origin pilots is 2.12 while it is 1.65 for the other group of pilots. As a result of their training programs, military origin pilots learn that the endurance required to fly military aircrafts and assuming responsibilities whenever necessary are the important issues for a successful pilot to consider. This situation might result in pilots’ not being able to evaluate the changes in their performance levels realistically due to stress and fatigue although it might increase their motivation to some extent.

International Civil Aviation Organization (ICAO) suggests that CRM training programs should include “awareness raising” for crew members regarding the effects of fatigue and other physical factors that are likely to affect physical and mental limitations of human being (International Civil Aviation Organization, 1998:2.2). In other words, it is crucial that crew members should be aware of their limits and be able to keep track of the changes in their performances so that CRM training programs can be efficient and crew members can acquire the necessary skills. The fact that pilots think they can take the right decisions even if they are exhausted can have negative effect on flight safety.

Another statement of “perception of stress” scale is “My decision-making ability as good as in emergencies as in routine flying conditions”. The high percentage for this statement implies that pilots do not perceive any negative changes in their decision-making skills during emergency situations. The mean score for this statement is 3.74 and 72 % of Turkish pilots in this study marked “I don’t agree” or “I don’t agree at all” for this statement. This result shows that Turkish pilots do not perceive any decrease in their performances when an emergency situation occurs. This high percentage for this particular statement creates a potential risk for flight safety as well. Although their confidence in their decision-making skills during emergency situations may promote motivation for the solutions to such problems, some errors done may not be noticed. No significant difference is found for this statement between two groups of pilots.

“Crew members should monitor each other for signs of fatigue and stress” is another statement available in “perception of stress” scale. Decreases in performance which are due to stress and fatigue negatively affect flight safety by increasing the risk of making errors. Crew members exchange necessary information to be used during decision-making process based on a work load labor division. A wrong decision to be taken by one of the members due to stress and fatigue may, in turn, lead to another wrong decision by the other member(s). This undesired situation might be prevented if the pilots monitor each other in terms of changes in stress and fatigue level. The high mean score for this statement implies that pilots believe that stress and fatigue have an

impact on flight safety. The mean score for this item in this study is quite high (4.60). A detailed analysis show that there is no significant difference between military and civil origin pilots for this statement, which shows that both groups of pilots believe that stress and fatigue levels affect flight safety and that awareness is crucial in this respect. This high agreement by Turkish pilots for this statement might be attributed to the effect of professional culture.

Another statement in “perception of stress” scale is “Personal problems can adversely affect my performance” As mentioned earlier, psychological and social factors negatively affect the performances of pilots. Indeed, most of the pilots in this study have complained about not spending enough time with their families, which, in turn, affect their performances negatively during the flight. The mean score for this statement is quite high (3.79). The percentage of the pilots marking “I agree” or “I totally agree” is 75 %. No significant difference is found between these two different groups of pilots.

There is a high agreement on the statement “A truly professional crewmember can leave his/her personal problems behind when flying” in “perception of stress” scale. The mean score by military origin pilots is 4.05, and by civil origin ones 3.98. In general, Turkish pilots think that they don’t reflect their personal problems on flight performance, which might imply an unrealistic attitude regarding personal problems. No significant difference is found between two groups of pilots.

#### *D. Attitudes Toward Rules*

“Obeying the Rules” scale is another scale used to identify the differences. The statements used and the scores obtained are given in Table 7. The high mean scores for the statements in this scale imply a higher tendency to “uncertainty avoidance” by the pilots. In other words, these high values signal lower tolerance towards uncertainty. Therefore; encounters with situations not regulated with certain rules increase stress level. The need for rules leads to errors while making decisions during the situations experienced for the first time.

Table 7: Attitude Differences of Civil and Military Trained Pilots on Rules Scale

| Statements   | Pilots' Origin | N   | M    | SD    | Difference Among Means | T      | P     |
|--|----------------|-----|------|-------|------------------------|--------|-------|
| The airline's rules should not be broken-even when the employee thinks it is in the airline's best interests | Military       | 148 | 4.35 | 1.029 | 0.05                   | 0.320  | 0.749 |
|  | Civil          | 63  | 4.30 | 1.042 |                        |        |       |
| Written procedures are necessary in all in-flight situations   | Military       | 148 | 4.03 | 1.189 | 0.00                   | -0.027 | 0.978 |
|  | Civil          | 63  | 4.03 | 1.062 |                        |        |       |
| Know everything about the job to have no surprises   | Military       | 148 | 3.99 | 1.000 | 0.29                   | 1.793  | 0.076 |
|  | Civil          | 63  | 3.70 | 1.131 |                        |        |       |
| To find the truth, the correct answer, the one solution?   | Military       | 148 | 4.07 | 0.780 | 0.13                   | 1.100  | 0.273 |
|  | Civil          | 63  | 3.94 | 0.821 |                        |        |       |
| Observe strict time limits for work projects   | Military       | 148 | 3.99 | 0.782 | 0.15                   | 1.166  | 0.246 |
|  | Civil          | 63  | 3.84 | 0.846 |                        |        |       |

Note. N=211. M=Mean, SD=Standard Deviation.  
t=t\_test value, \*p <.05 two-tailed

Table 7 presents the high mean scores for the statements in this scale by Turkish pilots. In other words, "uncertainty avoidance" index is quite high, which signals that "uncertainty avoidance" levels are generally high for Turkish pilots. As we can see in Table 5, t-test results show no significant difference between military and civil origin pilots for this statement, which might be attributed to the effects of national culture characteristics on this occupation. In other words, regardless of the sub cultures they might have, Turkish pilots are always rule-oriented and tend to avoid uncertainty by obeying the rules and procedures more strictly.

The statement "The airline's rules should not be broken-even when the employee thinks it is in the airline's best interests" has a mean of 4.35, which is quite high. The consistent attitudes of pilots regarding "obeying the rules" facilitate the adaptation process to standard operating procedures specified by aviation and airline's authorities.

On the other hand, people involved in aviation system continuously communicate with various elements of this system, one of which is written rules called software. It is possible to make some errors while developing rules and procedures as well. Assuming that these procedures are not questionable and ultimate truth may jeopardize flight safety.

The opinions given for the statement “Written procedures are necessary in all in-flight situations” shows the attitudes of Turkish pilots towards rules. High mean score for this statement implies that pilots need official rules for every situation. The presence of written rules leads to lower stress level on the side of pilots.

The mean score for this statement by Turkish pilots is quite high (4.03). This situation signals the tendency of pilots to lower their stress level during decision-making process as a result of “uncertainty avoidance” by leaving the responsibility to administration, which is relatively more powerful. There is no significant difference between military and civil origin pilots for this statement, which clearly verifies the findings of the previous statement. In other words, “obeying the rules” is an important value for Turkish pilots.

The statement “Know everything about the job to have no surprises” is another statement in “obeying the rules” scale and the answers given show the attitudes of pilots towards the situations in which there are not any official regulations and procedures. Having adequate knowledge about the work and avoiding the problems for which no written rule for a solution is specified are very important in the cultures with high “uncertainty avoidance” level. Encountering situations not regulated by written rules and not experienced by the pilots beforehand lead to higher stress levels in Turkish culture, a culture with high levels of “uncertainty avoidance”. The mean score for this statement is high, which proves that Turkish pilots are rule-oriented. No significant difference is found between military and civil origin pilots for this statement.

Finally, the mean scores for the statements “To find the truth, the correct answer, the one solution?” and “Observe strict time limits for work projects” verify the finding that Turkish pilots have high levels of “uncertainty avoidance”. As Table 7 shows, no significant difference is found between two groups of pilots for both statements.

## **V. Conclusion**

Flight crew and human errors play an important role in aircraft accidents. Human errors in the cockpit are mostly due to non-technical skills in human-human interaction. CRM training programs are those designed to reduce the number of these errors and their negative effects. However, the presence of crewmembers with different cultural backgrounds will deteriorate the efficiency of CRM training programs. Therefore; the cultural differences among crew members should be known and CRM training programs should be designed accordingly.

In this study, it is assumed that the pilots trained in different educational contexts have different subculture backgrounds. The results display statistically significant differences between the pilots trained in civil and military educational institutions for certain attitudes regarding CRM specific non technical skills. However; no significant differences were found for some attitudes.

The most important finding of the study is that the pilots trained in military educational institutions have higher power distance compared to those who received pilot training in civil training institutions. A significant difference was found between these two groups in “giving order” scale. For this reason especially, it might be concluded that the efficiency in communication, leadership, team work and conflict management in the cockpit may drop if the captain pilot had received military training while first officer had received it in a civil training institution. Similarly, stress management and situational awareness may also be affected negatively.

Another important finding of the study is that Turkish pilots, in general, have a realistic attitude towards the effects of fatigue, which is likely to increase flight safety. However; the pilots with military origin has stronger belief than those with civil origin in the following statement: “Even when fatigued, I perform effectively during critical times in a flight”. This may lead military origin pilots to take more risks in emergency situations even if they are very exhausted, which may, in turn, jeopardize flight safety.

Still another important finding is that Turkish pilots are generally rule-oriented. The high percentage in “obeying the rules” scale implies that the pilots try to overcome uncertainty by obeying the rules more strictly. Indeed, uncertainty avoidance is among the characteristics of Turkish national culture. This situation is an advantage for the applications of rules and procedures, but it may have a negative effect on decision-making process when an unprecedented situation occurs.

According to the results of this study, neither airlines nor Turkish Civil Aviation Authority is aware of the similarities and differences found in this study. It is crucial to know that CRM training programs designed according to Anglo-Saxon culture in order to increase flight safety, in fact, do not meet this demand. In addition, CRM training programs used in Turkey are not evaluated in terms of their efficiency.

Employing both military and civil origin pilots in the same flight crew team may be an obstacle to get the most benefit from CRM training programs. Therefore; CRM training programs in Turkey should be redesigned according to the similarities and differences found and Turkish Civil Aviation Authority should play a leading role in this process. Turkish Civil Aviation Authority sometimes permits foreign pilots to work in Turkish air carriers in order to meet or compensate the demand for pilots in Turkey. Finally, air carriers should adapt these costly CRM training programs according to their needs and should not

consider such programs as a legal “must” coming from an external authority. Otherwise, safety can be jeopardized while trying to enhance it.

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