The Role and Influence of Communication on Flight Safety in the Aviation Industry

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The Role and Influence of Communication on Flight Safety in the Aviation Industry

AUTHOR: Nataliya Martynova		**ADVISOR** Tone Therese Linge
Student Number 234255	**Name** Nataliya Martynova	

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Abstract

Flight safety in the aviation industry is a number one priority all over the world. It is provided by numerous stakeholders and highly depends on many aspects, starting from communication, technical maintenance, Air Traffic controllers, and pilots' proficiency, and ending up by security checks at the airports' terminals. Simultaneously, piloting proficiency and communication stand out of the list and play an equally important role in safe flights' operations. Though overall aviation is considered to be safe transportation, yet there is always room for improvement. Based on qualitative in-depth interviews this research identified the key role of communication in flight safety and determined language and cultural issues as the main aspects affecting communication in the cockpit. The conclusion suggests the need of improving English language proficiency, especially in: China, Brazil, Japan; the necessity of using aviation phraseology in native English-speaking countries of the Northern American continent and Australia. Along with language issues, culture-related aspects such as Power Distance and Individualism vs. Collectivism need special attention.

Key words: Aviation, Safety, Communication, Language, Cultural Aspects, Crew Resource Management (CRM)

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Foreword

Globalization process enclosed the whole world, steadily accelerating pace of life, the emergence of new technologies, continuous optimization process in all areas, and enormous competition

make it necessary to constantly improve communication strategies to comply with rapidly changing trends and rhythm of modern life. For aviation, a high-tech and expeditiously developing industry, efficient communication is essential. Moreover, in some cases, it may become a lifesaving criterion. Therefore, communication in the aviation industry is highly routinized, standardized, contextualized, determined, and regulated by numerous organizations. It is non-negotiable, it must be learned by heart by every single team member, operating in high risk working environment, accompanied by time pressure, constantly changing conditions, and a high level of uncertainty (Orasanu, Fisher, & Davison, 1997).

1 Introduction

1.1 Problem statement

It is hard to overestimate the role of communication in general and its efficiency, particularly in everyday life. When it comes to the aviation industry, communication plays one of the key roles. A great majority of pilots and Air Traffic Controllers (ATCs) assert: "*good communication is as important as technical proficiency for the safety of a flight"* (Wulle & Zerr, 1997, as cited by Tajima, 2004, p. 451).

There are many factors affecting business communication. Some of the major factors could be listed as the language (misunderstanding and misinterpretation of the message), past experiences, positional differences among the staff, cultural aspects such as emotional differences, cultural diversity, etc. (Salem, 2019). Besides the main factors affecting communication, there are also specific ones that are especially relevant for some industries including aviation. To name a few:

Firstly, it is the absence of non-verbal communication which is a critical element of communication. During the information transmission sessions between pilots and ATC's, not being able to see each other undermines the communication between them. Pilots also suffer from it during the in-cockpit transmission sessions between them due to their physical positioning being faced towards the front windscreen and not towards each other. Therefore, as Myhre states, efficiencies of different communication ways can be quantified as follows.

Just words	7%
Voice and tone	38%
Body language	55%

(Myhre, 2002, p. 83).

As it follows from the aforementioned figures, it is not far-fetched to suggest that this factor becomes crucial in terms of communication on the flight deck.

Secondly, the impact of a high level of *noise* produced by working engines and air condition system, only aggravate understanding of messages.

Thirdly, It is the response time limitation/time deficiency that pilots and ATCs are challenged with. Due to the travel speed of modern aircrafts, pilots and ATC's have only seconds for communication to prevent an accident. Thus, on November 6, 2013, the ATC at Vnukovo airport in Moscow parted to the sides two Boeings operated by Air 9 and Air 15 flying at the same altitude of 600 meters at a distance of 2.5 km from each other. Considering Boeings' speed (which can be up to 800 km/h) rushing towards one another, they would fly the distance of 2.5 km within 5-6 seconds. Thus, ATC had only 5 seconds for communication that could have prevented the accident. And in that case, the ATC succeeded in his mission. ATC's order: "Air 15 call-sign 388, climb to 900 meters immediately! Left turn heading 240! Immediately!" saved the lives of several hundred people that day. (Life.ru, 2013).

The number of departures and arrivals, the range of flights as well as aircraft sizes and speed have increased significantly compared to what it was at the end of the 20th century. These modern airplanes do not fly in a vacuum, they permanently require information exchange, clearance, weather forecast and changes on the route, airplane position relative to other air traffic

participants, altitude, speeds, heading, etc. When it comes to departure and landing, especially at those busy hubs, efficient communication between pilots and ATCs is essential (Tajima, 2004). The whole flight, from the beginning to the end, is all about communication, which goes in parallel with technical actions. Thus, flight attendants communicate with passengers, pilots in the cockpit constantly communicate to each other to cross-check hundreds of necessary pre- and-inflight procedures, read checklists which is another form of communication. And certainly, one of the most important things is information exchange between pilots and ATCs. It becomes particularly crucial when an emergency takes place. Then pilots have to rely on the information and instructions from the ground, ATCs (Tajima, 2004).

1.2 Thesis structure

This research project starts with a theoretical review of communication in the aviation industry, displaying applicable theories and previous investigations. It is followed by the description of factors affecting communication. The conceptual model is drawn on basis of theoretical implications. The methodology section describes the method, procedures, and tools implemented in this research project in detail. Findings on aspects affecting communication in the cockpit are analysed and discussed and followed by a conclusion and recommendations for future research.

2 Theory

The section aims to discuss both existing theoretical knowledge and previous investigations of the phenomenon addressed in this study. It provides a theoretical review of communication in the aviation industry, the definition of communication in general, and cross-cultural communication specifically. It is followed by an in-depth description of factors influencing communication on the flight deck: language, cultural aspects, and CRM.

2.1 Theoretical review of communication in the aviation industry

Investigations of communication issues in the aviation industry take their origin from the end of the 1970s. To a fairly large extent, it was governed by the necessity to improve flight safety due to several major and deadliest air crashes worldwide. Some of them will be further discussed in the chapters Language, Cultural aspects, and CRM. Communication serves as a glue that tights together group members performing team tasks. Proper and efficient communication becomes especially essential for teams, requiring coordination among their members, operating in high-risk environments (Orasanu et al,1997). The aviation industry is just such an environment. Flight operations require a necessity for coordination among all divisions: pilots between each other and with ATC, flight crew with flight attendants, maintenance personnel and ramp agents, etc. Therefore, communication on the flight deck is highly routinized and standardized. It is supposed to be performed in accordance with checklists, Standard Operating Procedures (SOPs), international and local standards, and regulations (Orasanu et al, 1997).

Communication in the aviation industry has its own nuances and carries several functions at once. Initially, there have been recognized numerous issues mostly related to Language, Cultural aspects, and CRM categories, contributing to fatal misunderstandings on the flight deck. These issues will be voiced and discussed in detail in the corresponding chapters of Section 2 Theory.

Here I would like to list some issues that have been highlighted by numerous scholars (Tajima, 2004; Merritt & Maurino, 2004; Hazrati, 2015) as fundamental problems that need to be solved to make international and therefore, multicultural airspace safe. And as Merritt & Ratwatte (1997 as cited by Tajima, 2004) stated: "Regardless of the country of origin, any international flight by its very definition is a multi-cultural experience" (p. 452).

The first issue is related to English language proficiency and cultural issues highly interconnected with it. It is partly mistakenly considered that all the danger is coming from non-native English speakers (Merritt & Maurino, 2004). The following accident will be discussed in detail later in this section. Indeed, Aircraft Accident Report (1979) revealed the trace of mother tongue influence in the KLM captain's English language communication session in the accident on Tenerife island in 1978. Despite the captain's intensive use of official international aviation language for decades, his message did not comply with aviation phraseology and therefore, did not alert about the danger the other participants in that communication session. However, Merritt & Maurino (2004) suggested, that:

> "Cross-cultural issues in aviation can only be resolved with joint effort. This is not something that "they" (the other cultures) have to fix – there is a role for people on both sides of the interface, for members of the dominant model as well as people outside the dominant model" (p. 172).

The dominant model implies an uneven contribution and participation in the development of the aviation industry of different countries, and accordingly, cultures. Therefore, it justifies the dominance of the most active stakeholders such as North America, Canada, Brazil, Australia, and Western Europe (Merritt & Maurino, 2004), and makes them legislators in the field of establishing international rules and regulations. The researchers also mentioned that by the year 2004 they "don't know which interfaces are problematic… and the extent of successful assimilation or integration in different regions of the world" (Merritt & Maurino, 2004, p.172).

Simultaneously, Merritt & Maurino (2004) specified that majority of native English speakers are "mono-linguists who have never faced the challenge of communicating in a second or third language" (p.173). Therefore, their contribution to airspace safety could be the following: a slowed down, shorten, and clearly articulated words and information transmission sessions, especially in stressful and risky situations.

The second issue is concerned with the necessity of "Overcoming misunderstanding based on inadequate communication strategies or cultural differences…" (Orasanu et al, 1997, p. 15). The scholars consider this issue as the most difficult problem. An essential and effective measure has been taken in order to solve this problem: Crew Recourse Management training program has been implemented. This topic will be later discussed in detail. The important aspect here is that due to the globalization process, there is a tendency of working migration in the aviation industry. Some airlines tend to recruit expatriate flight deck crews from other countries while they are training their local pilots. In this case, a cultural clash on the flight deck is almost guaranteed. Later, the same scholars articulated concern of whether those CRM training designed and successfully applied in the USA would work for pilots and ATC in South America, the Far East, and the Middle East? (Orasanu et al, 1997).

It is expected to find the answers to the aforementioned questions in this research project by interviewing pilots currently employed by the airlines registered in both South American, Far Eastern, Middle Eastern, Western European, and Eastern European countries.

2.2 Research question:

How does communication affect flight safety in an inter-cultural environment? The role of Crew Resource Management (CRM), language, and cultural aspects in safe flight operations.

2.3 Definition of Communication

O'Sullivan, Hartley, Saunders, Montgomery & Fiske (1994) defined communication as "A process by which A sends a message to B upon whom it has an effect". A more detailed definition states: "A negotiation and exchange of meaning, in which messages, people-in-cultures and 'reality' interact so as to enable meaning to be produced or understanding to occur" (p. 50).

Cross-Cultural communication in its turn has a more detailed definition. Thus, Conrad and Poole (2012, as cited by Mor-Barak, 2017) suggested the following definition: "…the process through which people, acting together, create, sustain, and manage meaning through the use of verbal and nonverbal signs and symbols from a particular context" (p.182). Where under symbols: words, gestures, tones of voice, and artifacts are intended. Nonverbal signs in its turn contemplate eye

contact, body language, emotions, proximity, and aforementioned tone of voice and gesturing (Mor-Barak, 2017, pp.182-183).

2.4 Factors influencing communication in the aviation industry

The literature review revealed three major key factors: language, cultural aspects, and CRM are influencing communication in the aviation industry and as a result, potentially affecting the safety of flight operations. Noteworthy, all these three factors are highly interrelated and interdependent hence influencing and enhancing one another in every day flights' operation. Let's consider these factors in more detail.

2.4.1 Language

In this chapter, I would like to present some core elements and processes of aviation communication related to the language aspect for a better understanding of the phenomenon. Thus, the first important element of communication in the aviation industry is Radiotelephony Alphabet implemented by International Civil Aviation Organization (ICAO) and accepted by the entire aviation world. It is not only used by pilots and ATCs but also used by many others such as flight attendants' departments, passengers' check-in, and cargo departments, maintenance departments, etc. It is an important tool helping various "Englishes" pilots (Tajima,2004, p.465) and ATC to avoid stress and misunderstanding, as in some languages, for example, in Arabic, /b/ and /p/ sounds are not differentiated and pronounced like something in between (This information has been derived by the author from observation of international students and later,

confirmed by several Arabic native speakers). This is just a random example to boost readers' understanding of the studied phenomenon.

Table 1-ICAO Radiotelephony Alphabet

A Alpha	B Bravo	C Charlie	D Delta	E Echo	F Foxtrot	G Golf	H Hotel	I India
J Julia	K Kilo	L Lima	M Mike	N November	O Oscar	P Papa	Q Quebec	R Romeo
S Sierra	T Tango	U Uniform	V Victor	W Whiskey	X X-ray	Y Yankee	Z Zulu	

(Adopted from ICAO.int)

Additionally, a document called Radiotelephony Manual Cap 413 (latest 23rd edition, 2020) provides very detailed instructions determining every single step of communication in the cockpit including aviation terminology, phraseology, transmitting technique: sequence of communication session starting from the way the microphone needs to be held and ending up with the content of the message, etc. (Radiotelephony Manual, 2020). Table 2 depicts the numerals and their correct pronunciation.

Table 2-Transmission of Numbers

Numeral	Pronunciation
0	ZERO
1	WUN
2	TOO
3	TREE
4	FOWer
5	FIFE
6	SIX
7	SEVen
8	AIT
9	NINer
Decimal	DAYSEEMAL
Hundred	HUN DRED
Thousand	TOUSAND

(Adopted from Radiotelephony Manual Cap 413, 2020).

Interestingly, according to Radiotelephony principle, the numeral 9 should be pronounced as “niner” to avoid confusion among German-speaking pilots and ATC’s in whose mother tongue “nine” sounds very similar to “nein” which means “no”. As another example, 164.9 should be read as “wun six fower dayseemal niner” (Tajima, 2004).

It also worth to be mentioned some examples of aviation terminology and phraseology. Following Table 3 contains a little percentage of existent terminology and has been presented just for boosting the reader’s understanding of the topic.

Table 3-Example of Aviation Terminology and Phraseology

ACKNOWLEDGE	Let me know that my message has been received and understood
BREAK	Indicator of messages separation
BREAK BREAK	Indicates the separation between messages addressed to different aircraft in a busy environment
OVER	My transmission is ended and a response from you is expected
OUT	This exchange of transmissions is ended, and no response is required
READ BACK	Repeat all the message back to me exactly as received
AFFIRM	Yes
NEGATIVE	No or Permission not granted, or It is not correct
ROGER	I have received your last transmission. NB Must not be used in situations requiring direct answers like affirmative (AFFIRM) or negative (NEGATIVE)

(Adopted from Radiotelephony Manual Cap 413, 2020).

Noteworthy, the term ROGER may only be used in a situation when neither affirmation nor readback is expected. For example, when ATC transmitted information about weather like "Wind 220 (degree) at 7 (knot)", then the pilot may reply "ROGER" (Tajima, 2004).

Literature review acknowledges numerous issues related to language and miscommunication in the aviation industry. Thus, researchers Orasanu et al. (1997) highlighted the following categories collected by Aviation Safety Reporting System (ASRS): *Dual Language Switching* or *Code-switch* (Tajima, 2004), *Language/Accent, Mitigating language, Unfamiliar Terminology or Deviation from terminology/phraseology* taking place in day-to-day communication on the flight deck between pilots, and pilots -to -ATCs.

Thus, Wulle & Zerr (as cited by Tajima, 2004, p. 461) stated that miscommunication due to English language proficiency takes place not only among non-native speakers but rather among native English speakers who tend to use non-phraseological and ambiguous use of the English language.

Tajima (2004) also pointed out that flying to Japan and China: “English-speaking pilots have to be accustomed to the idiosyncratic characters of local Englishes in non-English-speaking countries” (p.465). It not only means their “peculiar pronunciation”, but also preference for vocabulary and phraseology due to “limited English lexicon” (Tajima, 2004, p. 465).

For example, in the accident on Tenerife island in 1978, when Boeing 747 KLM and Boeing 747 Pan Am, the world biggest civil airplanes of that time, collided on the runway with 583 fatalities (Weick, 1990, p. 571), relatively unexperienced for that particular airplane type first officer tried to prevent the accident. At the ATC clearance readback, he said: “We are, uh, taking off” or “We are at take-off” (Roitsch, Babcock, & Edmunds, 1978, p.18). It could mean either “We are now at the takeoff position” or “We are now (actually) taking off” (Tajima, 2004, p. 460). This announcement appeared to be non-standard and therefore, did not alert ATC about the escalation of the emergency. Numerous analyses pointed out the evidence of “code-mixing at the syntactic level” in this phrase (Tajima, 2004, p. 460). It is assumed, in that communication session present progressive form of the Dutch language, native for captain and first officer in the cockpit, was applied in the announcement made in English (Tajima, 2004). This proposal indicates the interconnection and interdependence of language and cultural aspects.

The last person who could have prevented the accident was the flight engineer, who questioned: “Is he not clear then, that Pan Am?”. Sadly, they both made their statements in a

“tentative manner”, using mitigating vocabulary and non-standard phraseology (Roitsch et all, 1979, p.22).

However, practice illustrates a positive outcome too. In some cases, even basic knowledge of phraseology and initial skills in aviation communication may become lifesaving, such as it happened with John, a passenger of a two-seater Cessna 172 airplane in Humberside airport, England, whose pilot got ill at the controls (Palk, Yan & Smith-Spark, 2013). Receiving support and instructions from flying instructor, Roy Murray, on the ground, the passenger managed to make a “blind landing” as there was no light in the cockpit and little hope for the best. Later Mr. Murray stated: “…the passenger had no flying experience and did a "remarkable job" (Smith, 2013). And added: “I think without any sort of talk down he would have just gone into the ground and that would have been the end of it”. Despite all the obstacles and issues that arose: zero experience, age (77 years old passenger), no light on the flight deck, and flying instructor’s unawareness of where the light switch is located on this particular airplane, and therefore, threat to do something essentially wrong and brake stable approach; looming twilight and thus, the necessity of heading to another unfamiliar, but better equipped airport and making go-around three times; time pressure due to potential fuel shortage and inability to control it, John Wildey successfully landed the airplane from the fourth approach (Brindle, 2015, 46:34). All these aforementioned factors state the crucial role of language and communication for flight safety.

2.4.2 Cultural Aspects

There are many approaches and, accordingly, definitions of *culture*. Thus, it may be defined from the historical point of view as the traditions passed on to future generations; or for example, from normative perspective culture means ideals, values, and rules for living. Nevertheless, the proponents of all these approaches agree on one thing: culture is rather learned than biologically inherited (Jandt, 2004).

It is believed that every person in his / her childhood obtains particular models of feeling, thinking and potential acting which he/she carries through his / her person's lifetime which is in analogy with computers may be called as *mental programs* or *software of the mind*. It is also known that in order to learn something different, one needs to unlearn previous/existent patterns, and the unlearning process is more challenging comparing to learning something for the first time (Hofstede, Hofstede, & Minkov, 2010). Moreover, numerous scholars consider that stress and accompanying it pressure "can produce regression to first learned responses" (Allnut, 1982; Barthol & Ku, 1959 as cited by Weick, 1990, p. 576).

Thus, according to Hofstede et al, (2010), this software of the mind corresponds to the term *culture* which in the majority of Western languages is commonly associated with "*civilization*" or "*refinement of the mind*". In broader understanding *culture* is a *collective phenomenon* that originates from sharing by people the same social environment either in the past or in present, where it literally was learned. Thus, culture may be defined as "*the collective programming of the mind that distinguishes the members of one group or category of people from others"* (Hofstede et al, 2010, p. 6).

Literature review revealed that dimensions suggested by Hofstede et al (2010) are still the most applicable to the aviation industry field when it comes to cultural aspects.

Masculinity vs. Femininity

Numerous scholars (Porter, Samovar, & Penington as cited by Mulvaney, 2004, p.225) suggested viewing communication between genders as cross-cultural communication. Communication between representatives of opposite genders implies meaningful differences in communication patterns, habits, and traditions which are also inherent in intercultural communication.

Language, in its turn, appeared to play a significant role in communication between genders. It is considered to reflect distinctions in genders' social status. Thus, female language patterns are mostly associated with a nonviolent and subordinate role in society. Male language strategies, conversely, demonstrate an aspiration to dominate, preserve independence, and enhance their status (Mulvaney, 2004).

It is considered that female and male nonverbal behavior also differs from one another, for example in terms of reply to an incursion of space. In such a situation where men may give an aggressive response, women would probably give in space rather than confront the intruder (Mulvaney, 2004).

Previous studies in opposite genders' communication on the flight deck stated certain difficulties for both genders in developing efficient communication strategies as well as initiation of proper topics for interaction. Being exposed to gender related jokes and comments, trying to socialize themselves in the male dominated working environment, female pilots had to inherent their male colleagues' behavior to fit the environment (McCarthy et al, 2015).

Power Distance (PDI)

Power Distance (PDI) is one dimension of national cultures' differences defined by Hofstede et al (2010) as "*extent to which the less powerful members of institutions and organizations within a country expect and accept that power is distributed unequally" (p. 61)*. Interestingly, subordinates are considered to provide more objective reflection of differences rather than their bosses themselves, as it is easier to observe somebody's behavior than our own. Thus, Hofstede suggested applying Power Distance Index (PDI) as a measurement of a power difference for countries, where the range varies from almost 0 for a small-power-distance country to almost 100 for a large-power-distance country.

Table 4-Example of Power Distance Index of Some Countries Worldwide

Country	Index
Russia	93
Arab Emirates	80
China	80
India	77
Brazil	69
Colombia	67
Thailand	64
Greece	60
South Korea	60
United States	40

Canada total	39
Switzerland	26
Austria	11

(Adopted from Hofstede et al, 2010, pp.57-59).

Table 4 depicts lowest values for Western European countries such as Austria and German-speaking part of Switzerland, a little bit higher value for United States and Canada, relatively high value for some Asian and Latin American countries such as Colombia, Brazil, India, and the highest value for China, Arabic-speaking countries, and Eastern European countries such as Russia (Hofstede et al, 2010).

Thus, literature review affirms the trace of Power Distance dimension in airplane accidents worldwide. Accident with Avianca flight 052 on January 1990, from Colombia to New York, airport JFK has already been mentioned in terms of CRM issues related to communication context. Besides, the presence of Power Distance issues has been discovered during airplane accident investigations (Orasanu et al, 1997).

Thus, during flight 052 of Avianca airlines on January 25, 1990, in the situation when airplane experienced fuel shortage, and captain advised the first officer, responsible for communication with ATCs in that flight, to announce the emergency on board, the first officer transmitted: “I think we need priority…we’re running out of fuel…We’re running out of fuel, Sir” (Hazrati, 2015, p. 248). These phrases indicate not the only deviation from standard phraseology, but evidence of Power Distance issues. According to Hofstede et al (2010), Colombia belongs to the category of countries with a high-power distance index. Therefore, the cockpit crew member used mitigating language and was cautious to ask ATC for assistance, to announce an emergency, and accordingly, request immediate landing as the first officer must

have felt subordinate to American ATC (Hazrati, 2015). As aviation phraseology does not imply the address “Sir”.

Relatively recent accident of Asiana Airlines Flight 214 on Boeing 777-200 ER in the airport of San Francisco July 6, 2013, with 3 fatalities and 200 injured, indicated an issue with the Power Distance dimension (Aircraft Accident Report, 2014, p.xi). Thus, according to NTSB, Aircraft Accident Report (2014), Pilot Flying (PF) did not immediately initiate landing abortion when discovered an unstable approach because: “… he believed he could correct the vertical path deviation, because he did not want to acknowledge the error and “fail” his operating experience (OE) training flight, or because he was deferring to the Pilot Monitoring (PM) (a more senior crewmember)” (NTSB, 2014, p. 92).

Individualism vs. Collectivism

Literature review revealed that Individualism vs. Collectivism along with the Power Distance dimension played a crucial role in the tragic development of situations that, chained together with other factors, led to several fatal accidents in the history of the aviation industry.

In one of the world deadliest Tenerife air disaster with 583 fatalities (Weick, 1990, p. 571) when two jumbo jets, Boeings 747 of KLM and Pan Am airlines, collided on the runway in heavy fog, while Pan Am Boeing 747 was still taxiing and KLM Boeing 747 started taking-off without ATC’s clearance, Power Distance factor was the last link that closed the chain of errors which led to the disaster. Due to the KLM captain’s high rank and position in the company (“head of flight training and a member of the top management team”) (Weick, 1990, p. 579), relatively young in his position first officer made just two attempts to challenge captain’s decision of taking-off. The first time observing the captain pushing the thrust levers, he

pronounced: “Wait a minute, we do not have an ATC clearance” (Roitsch et al, 1978, p.18). The second time he tried to prevent the collision by reading back their intention of taking-off to ATC: “We are, uh, taking off” or “We are at take-off” (Roitsch et al, 1978, p.18).

Previous investigations in cross-cultural correlation revealed that representatives of countries with a high level of individualism tend to communicate more directly, assertively, and argumentatively comparing to people representing countries with high collectivism. (Kapoor, Hughes, Baldwin & Blue, 2003; Merkin, 2015). Simultaneously, according to Hofstede (1983, 1994 as cited by Kim, Hearn, Hatcher, & Weber, 2004, p. 148), it is of particular importance to which cultural context a society belongs. Thus, low context cultures, to which most Western countries belong, imply direct communication and an individualistic nonverbal style. It means intentions and meanings are articulated clearly. High context cultures, such as Eastern societies belong to, vice versa, are characterized by indirect verbal communication and “contextual nonverbal style” (Kim et al, 2004, pp. 148-149).

2.4.3 Crew Resource Management (CRM)

The phenomenon of CRM takes its origin from the end of the 1970s when this acronym initially stood for *Cockpit Resource Management* and was mostly perceived by the pilot community as a “psychobabble” or management’s attempt of “brainwashing” (Helmreich, & Foushee, 2010, p.4) Gradually, the phenomenon has evolved. Nowadays, it involves a wide range of participants: pilots, cabin crews, maintenance personnel, air traffic controllers, and therefore, stands for Crew Resource Management (Helmreich & Foushee, 2010).

Historically, the figure of the pilot was associated with single, brave, calm under stress, and independent individual in an open cockpit with “white scarf trailing”. These attributes more likely correlate with individual activity rather than with teamwork. Over time, the size of aircraft expanded, and its design became increasingly complex, as well as the intensity of flights grew. Therefore, the necessity for a co-pilot in the cockpit to reduce the captain’s workload and simultaneously, to minimize the possibility of human error became apparent (Helmreich & Foushee, 2010).

CRM is defined by a psychologist member of the National Transportation Safety Board (NTSB), Lauber, J. K. (as cited by Helmreich & Foushee, 2010) as “using all available resources – information, equipment, and people – to achieve safe and efficient flight operations” (p.5). CRM is aimed to emphasize interpersonal activities on the flight deck such as effective team creation and its maintenance, decision-making, problem-solving, leadership, and thus, to shift focus from individual-level to crew-level aspects of training all the participants of operations in the aviation industry.

Though the perception of cockpit crew members and the nuances of their work have undergone significant changes, requirements for pilots at the stage of their selection and training remained the same: individual proficiency is still considered to be one of the main criteria (Helmreich & Foushee, 2010).

Therefore, there seems to be a conflict in all of the above: the need to remain an independent, single individual and at the same time to effectively perform teamwork. CRM is precisely designed to resolve this type of conflict as well as to adopt a leadership style beneficial

for safe flight operations in terms of crew coordination and thus, to decrease the probability of human error.

Crew Resource Management and Communication

Communication plays a crucial role in flight operations in the aviation industry. Accident investigations and reports provided by NTSB in the study period during 1978 – 1990 reveal the tragic consequences of ineffective/insufficient communication between pilots on the flight deck and with ATCs. "…over 70% of aviation accidents resulted from crew coordination or communication problems (as opposed to lack of individual technical skills, Lautman & Gallimore, 1987)" (Orasanu, 2010, p. 148). Noteworthy, the same researcher in the next 3d edition of the book "Crew Resource Management" published in 2019, has not replicated this statistical data. Moreover, neither the International Civil Aviation Organization (ICAO) Safety Report nor Statistical Summary of Commercial Jet Airplane Accidents: Worldwide operations 1959 – 2019 conducted by Boeing, provided causes of those accidents, they both only determined the occurrence categories (Boeing, 2020). Therefore, it is one of the questions that need to be addressed to the informants in this research project.

Unlike accidents, incident reports are voluntary and certainly, anonymous for pilots and ATCs. This precious data is used for preventive study, not as a punishment instrument for their mistakes (Tajima, 2004). Numerous organizations are collecting this type of data worldwide. To name a few: airlines, unions, Aviation Safety Reporting System (ASRS), Aviation Safety Information Analysis and Sharing (ASIAS), etc. Thus, statistics collected between 1978 and 1981 revealed approximately the same, as accidents, percentage (about 70% or 28.000) of reports stated ineffective communication as a problem leading to an incident (Orasanu, 2019, p. 106).

However, these data to some extent may be considered biased due to the inability to control and prove it by analysing the information extracted from Cockpit Voice Recorder (CVR). In practice, it means pilots/ATCs' subjective self-reports that may contain a reduced number of details or failures led to an incident while the rest was not simply recognized as such by the reporter.

Notwithstanding, frequently repeated cases yet can depict problematic spots in the field. Thus, ASRS reports detected the following information transfer problems: a) *Inaccuracy in problem transfer*; b) *Unawareness that information needs to be communicated/transferred.*

According to Billings & Cheaney (1981 as cited by Kanki, 2019, p. 106), communication problems implicate both: individual failures, for example, failure to monitor, distraction or smugness, and system factors such as immense workload or radio frequency saturation.
"In addition, communication is often the behavioral indicator of other CRM functions such as decision-making, problem solving, resource and workload management" (Kanki, 2019, p. 111).

Communication functions

It is known that communication carries out several functions simultaneously and therefore, it illustrates the effectiveness of crew performance. Analysing the communication during the flight it is possible to state whether tasks were performed under normal procedures or if any problem occurred. As it is also been found out, timely and efficient communication allows cockpit crew to reduce the workload at particularly critical moments of the flight.

Following five functions of communication are considered to be a tool for accomplishing CRM objectives:

1. Communication conveys information
2. Communication establishes interpersonal/team relationships

3. Communication establishes predictable behavior and expectations
4. Communication maintains attention to task and a situational awareness
5. Communication is a management tool

(Kanki, 2019, p. 113).

For example, captain's presence on the pre-flight briefing may serve numerous functions at the same time: to provide flight related operational information, to set up the leadership relationship with the whole crew including flight attendants, to articulate his/her expectations, and simultaneously, to demonstrate management style (Kanki, 2019).

However, all these functions have their related problems potentially leading to miscommunication.

Table 5-Functions of Communication and Related Problems

Functions of communication	**Related problems**
Communication conveys information	Deficiency of information, reduced or inaccurate information
Communication establishes interpersonal/team relationships	Interpersonal strain, vagueness, uncertainty, unclear role- or leadership style
Communication establishes predictable behavior and expectations	Nonstandard, unexpected behavior
Communication maintains attention to task and a situational awareness	Loss of alertness, monitoring, situational awareness
Communication is a management tool	Deficiency of or inefficient management of tasks, time, resources, or/and workload

(Adopted from Kanki, 2019, p. 114).

Communication between cockpit crew members and ATCs occupies a special place among all communication in the aviation industry as it is mostly associated with risk. Tajima referring to numerous scholars (Goffman, 1981; Sullivan & Girginer, 2002) defines it as "successive one-to-one interaction with multiple ratified participants, both addressed and unaddressed" (p. 454).

Though communication between pilots and ATCs is highly regulated, formulated, and standardized: it has its own alphabet, vocabulary, and phraseology aiming to make it mistake-free, miscommunication still occurs (Tables 1-3 alpha bravo echo; Chapter 2.4.1 Language.) Orasanu, Davison &Fisher (1997 as cited by Tajima, 2004, p.454) found out three most repeating models of miscommunication between pilots and ATC: "*wrong information*", "*loss of situation awareness*", and *"lack of shared situation models".* Noteworthy, "*loss of situation awareness"* derived from another, Language, aspect influencing communication, from so called "*Code-switching*" phenomenon, when local pilots in non-English speaking airspace communicating ATC in local languages thus, making other pilots who are not able to speak and understand local language - "blind". The fact is that during the flight, pilots are guided not only by the information addressed to them but also by monitoring information addressed to other airplanes flying nearby, thereby "visualizing" the airspace around them. Therefore, "party-line information" articulated in local language makes them unable to collect such important data regarding the number of airplanes around, their directions, altitudes, and positions relative to themselves (Tajima, 2004).

As an example of *"wrong information*" could be mentioned lack of proficiency in English, particularly deficiency of "native sense" about prepositions in English when pilot hears "two" instead of "to" and vice versa. *"Lack of shared situation models"* was defined by Orasanu et al (1997, as cited by Tajima, 2004) as "a failure of participants to build a shared understanding

of the situation at a team level" (p.455). In practice, it means that for example, a pilot's report about mechanical or technical trouble may be perceived by pilots as an emergency while ATC more likely will interpret it as a trouble.

Communication context

Communication in the aviation industry is highly contextualized. Thus, contexts are affecting the way the information is conducted, its content, and the effectiveness of the communication from the receiver's point of view. Thus, Kanki (2019, pp. 125-126) suggested four different communication contexts:

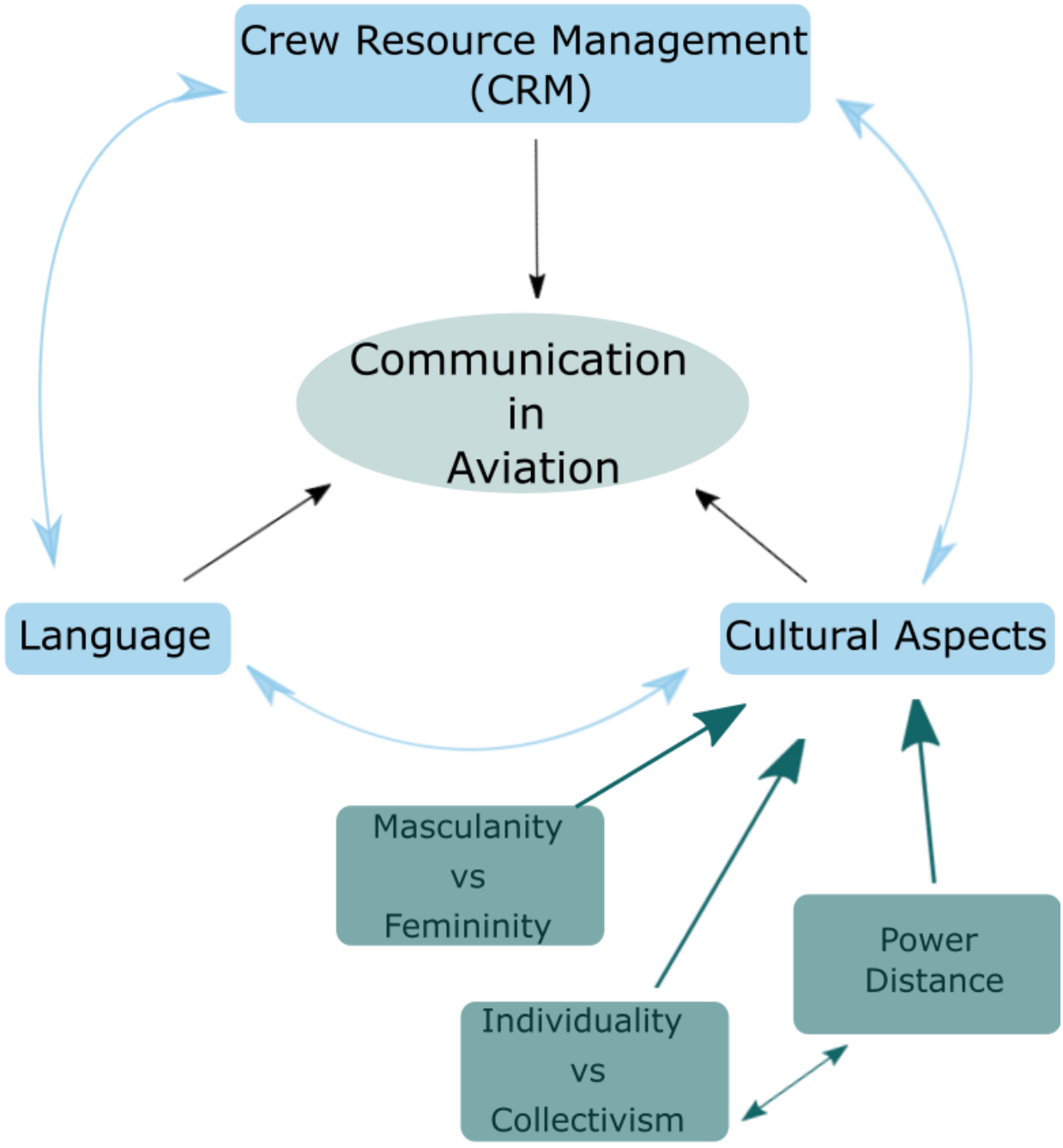
1. *The physical context* incorporates such parameters as the noise level in the cockpit and type of communication: face-to-face (between pilots/flight attendants) or remote (with ATCs). Noteworthy, the speech on the flight deck may be accompanied by pointing to an indicators panel or displays, and therefore, analysis of cockpit voice recorder audio statement like "It does not look right" will not make sense for the investigator. Here the earlier discussed "lack of shared situation model" comes into play.
2. *The social and organizational context* brings up to the table the role differences: pilot-to-pilot and pilot-to-ATC communication. The role difference on the flight deck is referred to as the authority aspect which is often determined by airlines' policies and regulations. Thus, the phrase "Would you like to pull out the checklist" pronounced by the captain will more likely be perceived as a command simultaneously, being told by the First Officer will most likely be seen as a question. And again, this context is highly interdependent with such cultural aspects as Power distance (Kanki, 2019, p. 126).

3. *The task and operational context* are related to the phase of the flight. Thus, mitigated speech is less likely to be used in nonstandard/emergencies as it is considered to be ineffective in making requests and giving orders. The challenge for pilots here is to recognize their status in time.
4. *The speech and linguistic context* represented by language grammatical and discourse rules, in some cases going alone with language and cultural dissimilarities for example, in the accident with Avianca flight 052 where co-pilot tried to request landing priority due to fuel shortage literally announcing the emergency situation by the phrases “I think we need priority…” and “We’re running out of fuel, sir” which was not recognized by ATC as an emergency at all (Hazrati, 2015, pp. 245-246).

2.5 Conceptual Model

The literature review provided above revealed the existence of certain interrelated aspects influencing communication on the flight deck. The aspects are depicted in the conceptual model (Figure 1). A large body of literature proposed the following factors: Language, Cultural aspects including Power Distance, Masculinity vs. Femininity, Individualism vs. Collectivism, and CRM as factors that united all the aspects mentioned above, to affect the communication in the cockpit.

Figure 1-Factors Influencing Communication in Aviation Industry



(Cultural aspects adopted from Hofstede, 2010)

3 Methodology

This section of the thesis is an explanation of methodological procedures and steps applied for gathering empirical data. The following chapters such as research design, qualitative method, data collection and analyses, interview technique, and interview gathering procedures will describe how the data were conducted. In addition, such important aspects for social research as reliability, validity, and generalization of the collected data will be addressed.

Throughout this empirical study, "Seven Stages of Interview Study" proposed by Brinkmann & Kvale (Brinkmann & Kvale, 2015) have been followed. This proposed guideline was selected due to its structural robustness and comprehensive functionality. The study suggests following seven steps namely *Thematizing, Designing, Interviewing, Transcribing, Analyzing, Verifying, Reporting.* These steps have been applied to the empirical study to ensure a well-organized coverage of the topic. In the following chapters, different stages of the empirical study were introduced in accordance with the guideline by Brinkmann & Kvale.

3.1 Research Design

According to Neuman (2014), *social research* is a "way to find answers to questions" (p.16). More specifically, it is a continuum process of obtaining knowledge with help of principals, outlooks, and ideas in terms of methodology and certain techniques and strategies that are methods of inquiry.

Qualitative and *Quantitative* designs are two main research designs representing social research. Though both serve the same goal which is the collection and analysis of data, tools and techniques to reach that goal differ significantly.

For this thesis, a qualitative research design has been utilized as it is the most appropriate method to find substantial answers to the research questions.

Thus, both the In-depth interview technique and purposive sampling inherent in this method allow the researcher to dig deeper into the study subject, get clarifications and explanations of the study phenomenon. Eventually, with help of additional questions, to find out new details and nuances of the phenomenon which have not been described in the previous studies/literature were aimed to be revealed. *The qualitative research method* is an approach that allows the researcher to study people's experiences in detail with help of a specific set of research techniques. For example, in-depth interviews, observations, or life histories happen to be possible to evaluate regarding the interest of research. One of the advantages of this method is that it grants researchers the possibility to study participants in their natural settings and simultaneously it helps to see the discovered issues by participants' eyes from their perspective (Hennink et al, 2020).

Another fundamental difference between these two research methods lies in the way of recording and analyzing collected data. Thus, quantitative research implies targeting a larger amount of people, cases, or units, and further analysis of data conducted from them in a way that quantities could be discussed and compared. The qualitative research method in its turn assumes engaging of fewer participants but implies a deeper examination of a bigger variety of diverse features in form of words or images conducted from in-depth interviews or observations (Neuman, 2014, p.35-36). Thus, the empirical data in this research project has been collected in the form of words

that corresponds to the qualitative research method. Besides, this method is beneficial for this study project as it is, to a much greater extent flexible comparing to quantitative research. Therefore, it allows to simultaneously run the processes of collecting and analyzing the data, developing and transfiguring theory and, refocusing the research questions if needed, as these processes tend to influence one another (Maxwell, 2013).

After framing the research as qualitative research, questions to be asked during the interviews are structured in a way so interviewees could answer without feeling any kind of limitation of speaking their ideas and experiences freely. Interview questions also were prepared in an open-ended manner using “What…?”, “How…?”, “To what extent…?”, “Why…?” question types to explore more on the questions of interest from the interviewees. Following the preparation of the questions, another aspect of the interviews like deciding the individual interviewees have been selected purposefully so a desired set of informants could be gathered.

The question structuring and the semi-structuring the interviews parts are completed in accordance and correspondence to *Themetazing* and *Designing* steps, respectively, of the guideline proposed by Brinkmann & Kvale (2015).

3.1.1 Exploratory and Descriptive Research

There is a great variety of *Exploratory research* definitions. However, most of them agree that it is research that focuses on little-studied areas or phenomena that allows the researcher to develop initial ideas and create questions for further studies and therefore, asks the question “What?” (Davies, 2006; Neuman, 2014).

Descriptive research implies the availability of certain knowledge of the studied phenomena, and requires deeper investigation and thus, focuses on "Who?" and "How?" questions (Neuman, 2014).

Neuman (2014, p. 31) states that in a qualitative study, descriptive and exploratory designs often go together. Due to the qualitative method's flexibility inherent in the idea of in-depth interviews with its open-ended questions, there is a possibility of discovering new issues, details, or circumstances even in a seemingly well-studied phenomenon. Thus, this research project utilizes a descriptive and partly exploratory research design.

The role and influence of communication on flight safety in the aviation industry is a rather broad-studied phenomenon. Yet this question is mostly emphasized from English-speaking researchers' perspectives. There seems to be little evidence of studies exploring this question from non-English speakers' perspectives conducted in non-English countries and published in English. Therefore, the use of both descriptive and partly exploratory research design seems to be beneficial considering the goal to investigate the current situation with communication on the flight deck in airlines located in Asian, Middle Eastern, East European, and West European countries as well as to attempt to find out reasons for miscommunication and its possible solutions.

3.2 Researcher's reflexivity

The researcher's reflexivity process appears to be an important part of a qualitative research project. It implicates the researcher's conscious self-reflection on his/her subjectivity

during the whole project, including stages of determining research design, participants selection, data collection, interpretation, and its presentation (Henning et al, 2020).

Two main reflexivity aspects that can affect the collected data could be named as Personal reflexivity and Interpersonal reflexivity. *Personal reflexivity* implies the potential influence of the researcher's own background and assumptions on the research process (Hennink et al, 2020). Thus, my previous working experience in the airlines as a flight attendant has affected the choice of the research question in this project. My own assumptions gained during six and half years of every- day observations on the flight deck and communication with pilots as well as my theoretical knowledge in philology (my first Bachelor's degree) obviously influenced my interview questions and further, the interpretation of the collected information.

Interpersonal reflexivity is related to the researcher's ability to establish a good rapport with his/her interviewee through creating a favorable interview context and comfortable atmosphere. In this research project, all the interviews were conducted online via Teams or Zoom, so that informants could pick themselves date, time, and place where they would feel most comfortable. Besides, the interview guide was created in accordance with the semi-structured interview technique which implies a certain format aimed to contribute to the establishment of rapport/trust between researcher and interviewee (Hennink et al, 2020).

3.3 Interview

This chapter is devoted to the narration of the data collection process including interview technique and interview conducting process.

3.3.1 Interview Technique

Conversation through dialog as a knowledge obtaining method is known since the times of ancient Greece. However, the term Interview has rather a recent origin, starting from the 17th century. Interestingly, up to the 19th century, this method has been appreciated neither by the interviewees themselves nor by the journalists. And only in the 20th century interview technique has gained acceptance in the social sciences (Brinkmann & Kvale, 2015, p. 11). The main purpose of research interviews is to produce knowledge through inter–action between interlocutors, an inter-change of views of two people interested in the same topic or theme (Brinkmann & Kvale, 2015).

This research project aims to explore and describe in-depth pilots' views on efficient communication on the flight deck, their perception of factors affecting communication, and their vision of measures that could help to improve communication and therefore, contribute to safer flights' operations.

In the phase of planning, designing, and conducting an interview guide for this project, the Seven Stages of Interview Study proposed by Brinkmann & Kvale (2015) have been taken into consideration to increase the feasibility of research' findings.

1. Thematizing. Based on the literature review, the main research question of this study has been formulated. Questions like "What", "To what extent", "How" and "Why" formed the interview guide for the detailed exploration.

2. Designing. A semi-structured interview with 6 pilots in Asian, Middle Eastern, and European countries has been conducted.

3. Interviewing. A detailed interview guide with main and following up questions has been used for online interviews, which lasted approximately 50 – 1hour 15 minutes and have been audio recorded.

4. Transcribing. All 6 interviews with informants have been transcribed manually and randomly double-checked for any kind of typo and/ or misunderstanding.

5. Analysing. The collected data will be analyzed with emphasis on meaning and language.

6. Verifying. Principals of Reliability and Validity have been and will be considered throughout the entire research study. Several checks were conducted during different stages of the project.

7. Reporting. Results of the collected data will be presented further in this thesis.

3.3.2 Interview guide's structure

A semi-structured interview guide in form of sets of questions depicting central issues to be explored was used as an instrument of an in-depth interview with all informants. It consists of *introduction*, *opening questions*, *key questions*, and *closing questions* (Hennink et all, 2020)

Introduction's target is to ensure informant in anonymity and confidentiality of collected data, to remind him/her about the main purpose of the research project, and to get permission for audio-recording. *Opening questions* are aimed to establish trust between researcher and informant and simultaneously, to gain interviewee's background information assumed to be important for further analysis. *The key questions'* set is divided into groups of questions referred to three aspects that are believed to have an impact on flights' safety: language, CRM, and cultural characteristics. The literature review emphasized CRM, language, and culture as three

key aspects affecting communication on the flight deck and therefore, potentially influencing flight operations' safety. These questions are aimed to find out the core information presumed to answer the research question of the project. *Closing questions* in its' turn are intended to ask the informants whether they have anything to add or specify and should be more general questions such as for example, the informant's plans for the future or questions about implications related to the main topic of the study. In addition, the role of closing questions for the interviewer is to start distancing from the interviewee and thus, to loosen up their "connection" created during the interview. It is assumed to be an ethically correctly finalizing of the interview (Hennink et all, 2020).

3.3.3 Participants' selection

Sample selection is an essential part of any research project. Unlike quantitative, qualitative research intends a category of sampling which is called *purposeful selection* or *purposive sampling* (Light et all, 1990, & Palys, 2008; as cited by Maxwell, 2013, p. 96-97). *Purposive sampling* is "a form of non-probability sampling in which decisions concerning the individuals to be included in the sample are taken by the researcher, based upon a variety of criteria…" (Oliver, 2006, p. 244). This sampling method implies a deliberate choice of informants corresponding to the specific settings related to the research' purpose.

For this research study, purposive and convenience sampling methods were applied due to difficulties in gaining access to informants and their relatively rare distribution in the population (Maxwell, 2013). Thus, the research question of the study required targeting pilots of both genders in different ranks, representing various countries and cultures, having experiences of

international flights, and preferably have been working for more than one airline. It worth to be mentioned, that unlike anticipated, the main challenge lied not in recruiting female pilots for the interview taking into consideration their 5,1 % representativeness out of all pilots worldwide (ISA, 2021), but targeting male pilots having experienced flying with their female colleagues.

3.3.4 Informants' Recruitment

Hennink et al. (2011) emphasized the necessity to determine the population that is planned to be studied during the research project. It allows the researcher to define not only the participants best suited for the study purpose, by meeting the criteria of a research question, but also the best method to target them. Informants' recruitment process was determined in accordance with the studied phenomenon of communication issues in the aviation industry. Accordingly, when recruiting participants, their gender, age, work experiences, rank, origin, and subjective sense of belonging to a particular culture were taken into consideration. Assuming that gender, age, seniority, and rank can make difference in various countries and cultures, pilots representing Asian, West European, and East European countries were recruited for this research project. It worth to be mentioned that participants representing East Europe have international work experiences as they are currently employed by Middle Eastern and Asian airlines and consequently, exposed to Middle Eastern and Asian cultures.

Due to anonymity reasons, neither names nor airlines participants were/are working for were provided in this thesis. Notwithstanding, to distinguish them from one another, their names are coded as Informant A, B, C, and consequently, the airlines they had been/currently employed in are classified (coded) as Airlines 1, 2, 3, etc.

Table 6-The Overview of the Informants

Informant	Gender	Current rank /previous rank	Mother tongue/ other spoken languages	Airlines
Informant A	Female	Captain	German (L1) English (L2) Spanish (L2) French (L2) Italian (L2)	Airlines 1 (Air 1)
Informant B	Male	Captain /ex-instructor	Russian (L1) English (L2)	Airlines 2 (Air 2), Airlines 3 (Air 3), Airlines 4 (Air 4), Airlines 5 (Air 5), Airlines 6 (Air 6)
Informant C	Male	First Officer /ex-Captain/ TRI / TRE	Russian (L1) English (L2)	Airlines 7 (Air 7), Airlines 8 (Air 8), Airlines 9 (Air9)
Informant D	Female	First Officer	Asian lang (L1) English (L2)	Airlines 10 (Air 10)
Informant E	Male	First Officer	Russian (L1) Greek (L1) English (L2)	Airlines 5 (Air 5), Airlines 7 (Air 7), Airlines 9 (Air 9)
Informant F	Male	Captain	Spanish (L1) English (L2)	Airlines 11 (Air 11), Airlines 12 (Air 12), Airlines 13 (Air 13), Airlines 14 (Air 14)

*L1 – First language/mother tongue
*L2 – Second Language

**TRI – Type Rating Instructor
***TRE – Type Rating Examiner

3.3.5 Sample Presentation

Initially, there have been planned to conduct nine interviews: 3 with female pilots and 6 with male pilots, but due to different reasons, including Covid-19, 3 potential informants withdrew themselves from the project.

All in-depth interviews in this research project were conducted online via Zoom or Teams due to Covid-19 restrictions as well as informants' remoteness due to the specificity of their occupation. All the personal information about informants as well as airlines they are working for has been coded in accordance with regulations and depicted in Table 6.

It worth to be mentioned, female Informant's D mother tongue has been coded as Asian language due to anonymity reasons, as naming her mother tongue can make her personality recognizable. She is employed by one of the Asian airlines operating both domestically and internationally, short-haul flights only, in the nearby regions (Laos, Cambodia, and Myanmar).

Informant A, a female captain is currently employed by one of the national carriers in a West European country, operating flights all over the world, having 20 years seniority. Both Informant A and Informant D have been working for only one airline since the beginning of their career in the aviation industry.

All male informants, on the contrary, have got international work experiences from several different airlines, registered in East European, Middle Eastern, Asian, and North American countries, operating all over the world. Noteworthy, Informant B and Informant C have previously been working in higher ranks (as instructors) comparing to their current position.

All the informants belong to the same age category 35 - 45 years old.

The following chapters relate to conducting the interviews and the structure of the interview guide. These chapters and their context have been designed in a structure so that they could regard the *Interviewing step of the* guideline proposed by Brinkmann & Kvale (2015).

3.3.6 The Pilot-test

The *pilot-test* as a tool of "*testing the effectiveness of a data collection instrument by conducting a mock interview, reviewing the outcome, and modifying the instrument where needed*" has been applied in this research project (Hennink et al, 2020, p. 329). Thus, it revealed the necessity of some minor changes that needed to be implemented. Accordingly, the questions were reorganized in a slightly different order, some of them were reformulated and shortened for informants' convenience.

In addition, the *probe* technique has been used during the interviews. Namely, the *simplest motivational* probe like verbal "ah-ha", "ok", and non-verbal such as nodding, eye contact, and body language (for example, leaning forward). It aimed to demonstrate the interviewer's interest and acknowledgment of what has been said and concurrently, to motivate the informants to share their thoughts.

To verify the researcher's correct understanding of the collected data, the *reflective probe* in form of repeating or paraphrasing questions has been applied. The following question "So what you are saying means…is that correct?" contributed to a better understanding of the collected data and minimizing the possibility of its misinterpretation.

The *expansive probe* technique with its questions such as “Can you give me an example of the situation?” or “Could you please describe the situation and circumstances in detail?” allowed the researcher to get deeper into the studied phenomena and to gain some valuable details for analysis.

Finally, the *silent probe* technique gave the informants the opportunity to think and reflect on the points which have been touched upon during the interview and therefore, facilitated the collection of even more data (Hennink et al., 2020, p.132).

3.3.7 Conducting Semi-Structured In-depth Interview

The semi-structured interview is “*an interview with the purpose to obtaining descriptions of the life world of the interviewee in order to interpret the meaning of the describes phenomena”* (Brinkman & Kvale, 2015, p. 6). The advantage of such type of interview for this research project lies in its position between everyday unstructured conversation and closed structured questionnaire. Thus, it provides the interviewer with certain guidance throughout the interview and therefore, guarantees the coverage of the same topics and questions by every informant. Simultaneously, it gives the interviewee some freedom and opportunity to touch upon topics that have not been assessed during planning the project but worth to be mentioned and analyzed. Thus, the semi-structured interview technique provides the interviewer with a certain flexibility to adapt interview questions in accordance with issues arising directly in the process of collecting information and allows to ask additional questions for more thorough clarification (Brinkmann & Kvale, 2015).

During in-depth interviews, the informants shared their experiences related to communication on the flight deck, certain issues, and their vision of measures that could improve communication.

3.4 Data collection

For this research project, a total of six interviews with captains and first officers of both genders representing Asian, Middle Eastern, West European, and East European countries were conducted. Interview duration varied from 40 minutes to 1 hour 15 minutes. At the beginning of each interview, the interviewee was once again informed about his/her right to withdraw himself/herself from the project at any stage with no consequences.

The collected data were transcribed, anonymized, and stored separately from the overview of informants on an encrypted memory stick. All transcribed interviews consisted of questions, interviewees' answers, and interviewer comments, including pauses and specific aspects of speech that seemed to be important details for further analysis.

The main language of the interviews was English; therefore, translation was not required. However, to avoid any kind of misunderstanding, some word expressions and specific aviation terms were translated into the researcher's mother tongue.

3.5 Transcribing

During this empirical study, interviews were scheduled as one interview per day. While conducting, the interviews were recorded using a safe audio recording device that did not have an internet connection. Recordings were transcribed into written documents immediately after each interview. Every sentence and expression were double checked to prevent any

misunderstanding. In rare cases of not being able to understand the audio recording clearly, interviewees were later contacted again, as agreed beforehand, to clarify all ambiguities without leaving any room for doubts.

3.6 Data Analysis

Qualitative analysis of the data is considered as the conversion of the data into a more understandable, reliable, and insightful version of the data (Gibbs,2007). Unlike quantitative data analysis, in qualitative data analysis, it is difficult to separate data collection from the analysis since they are interconnected to each other by their nature. In this study too, qualitative data analysis was conducted starting from data collection. This was done by asking informants open-ended questions so that allowing them to use "*narration*" that shows not only the subject from their perspective but also how they position themselves in the subject.

In addition to, qualitative data analysis during data collection, qualitative data also were analyzed in an *analytic cycle approach* that consists of description, comparison, categorization, conceptualization (Hennink et al, 2020). In this research study, qualitative data gathered from the informant interviews were analyzed in a manner according to the analytic cycle approach.

3.7 Reliability and validity

Reliability and validity are considered to be central methodological principles of any social research, characterizing its quality. The notions of reliability and validity indicate how accurately the measurements of research are done and the correlation between concrete measurements and the construct they aim to measure (Kvale, 1996; Neuman, 2014).

3.7.1 Reliability

The conception of reliability illustrates dependability or consistency. It proposes that similar or identical conditions yield repeated and stable results or effects. Noteworthy, the term reliability in qualitative research is used infrequently as it is mostly associated with quantitative measurements. However, the trustworthiness of the results or findings of the research plays an important role in both quantitative and qualitative research (Neuman, 2014; Brinkmann & Kvale, 2015).

To provide trustworthiness in this research all interviews with informants have been recorded by an audio recording device, consequently helping to minimize the possibility of either losing or distorting valuable information gathered from the participants. Moreover, the interviews were transcribed for data reliability escalating (Gibbs, 2007). Also, to increase the degree of reliability of this study, the transcription reliability has been randomly checked by making two transcriptions of the same interview passage (Gibbs, 2007; Brinkmann & Kvale, 2015). In addition, there was an agreement between the researcher and informants that both sides may feel free to ask clarifying questions when / if needed at any stage of the project: pre-, during- and after the interview.

To provide consistency in qualitative research, Neuman (2014) proposed to utilize the following techniques: interviews, participation, photographs, or document studies. In this research, the technique of interviews has been applied.

According to Gibbs (2007), certain reliability methods are helping to verify and increase the reliability of social research. Thus, in this study pilot-testing method has been used. What

precisely has been done is that the interview guide has been pre-tested on one flight attendant – an individual tightly connected to the aviation industry and familiar with its reality and one pilot who refused to become an interviewee but agreed to test the interview guide. These interviews have been video recorded in order to emphasize the interviewer's attention to interviewees' body language. Later, during the interviews with informants which have been audio recorded I made notes regarding my interlocutors' body language. It contributed to saving time for data analysis but simultaneously, allowed to capture valuable details (Brinkmann & Kvale, 2015).

3.7.2 Validity

The conception of validity is related to truthfulness and credibility, particularly to the link between construct and collected data. However, in qualitative research investigators are more interested in *authenticity* rather than *validity*. Authenticity is defined as "giving a fair, honest, and balanced account of social life from the viewpoint of someone who lives it" (Neuman, 2014, p. 145). It is believed, qualitative researchers are less engrossed in matching an abstract concept to empirical data but more concerned in depicting a true experience of their unit of analysis. There are several threats qualitative research may risk being exposed to. To name a few: is a potential researcher's biased approach both while conducting an interview by formulating questions in a certain way, using a particular language, and during the analysis of collected data (Brinkmann & Kvale, 2015).

According to Miles & Huberman (1994 as cited by Brinkmann & Kvale, 2015, p. 285), there are no particular criterions or principles providing validity of qualitative research. They

recommend inspecting sources of possible biases by applying diverse tactics to test and confirm the qualitative discovery.

The aforementioned tactics were practiced in this research project to minimize validity threats and to boost the credibility of findings.

Firstly, I checked my interview guide for leading questions and asked for feedback regarding this issue during the pre-test in order to diminish accidental influence on interlocuters' answers. Also, at the same stage of my research project, I rephrased some questions which turned to be unclear or vague.

Secondly, I tried to be as neutral as possible to minimize my subjective vision of the research question. During interviews I kept asking questions without expressing my opinion on discussed topics, simultaneously observing my interlocuters' body language, and making notes.

Lastly, in this thesis, I used the tactic of informants' feedback. I sent the transcribed interview to those informants who were willing to check whether the interview has been transcribed properly, the questions and answers have been understood correctly, information has not been distorted by the interviewer.

3.8 Generalization

If the results of research project based on interviews seem to be reliable and valid, the next question that arises is whether those findings can be applicable to other subjects in different settings whether they may be generalized?

One of the main concerns of generalization in a qualitative study is based on the methods of drawing samples and their size (Brinkmann & Kvale, 2015). Thus, it is believed in order to be suitable for the *Statistical form* of generalization, the sample needs to be random and

representative enough, which is not the case in this research project. Therefore, *Purposive sampling* and *Snowball (network or chain referral) sampling* methods have been applied (Neuman, 2014; Meltzoff & Cooper, 2018).

However, it seems to be possible to employ such generalization form as *Naturalistic generalization* founded on personal experience – tacit knowledge that drives to expectations which in its turn may lead to certain propositional knowledge (Brinkmann & Kvale, 2015). Besides, Kvale (1996) is considering the possibility of *Analytical Generalization* in qualitative research, namely: conducting a new quantitative study based on the findings of the previous qualitative study, in case if assessed situations are similar.

3.9 Ethical considerations

During planning, designing, and conducting this qualitative research several ethical issues were considered. Thus, Informed Consent as one of the fundamental ethical principles has been applied on the stage of targeting informants for this research project (Gibbs, 2007; Blaikie, 2010; Neuman, 2014; Brinkmann & Kvale, 2015). All six male and female pilots employed at the airlines in Asian, Middle Eastern, and European countries both as locals and expats, were initially contacted in written form either by e-mail or via social media. They all received an Information letter containing clarifications of the research project, its topic, objectives, main focus area, and design. Besides, all informants were assured of the anonymity of the research. Also, they all were informed of being audio recorded during the interview and expressed their consent by signing the Information letter.

The self-determination principle as part of Informed Consent has been applied in this research project. All informants were provided with the information stated their voluntary

participation in the research as well as the ability to withdraw themselves from the project at any time without penalty (Neuman, 2014).

The next principles which needed to be taken into consideration were anonymity and confidentiality (Gibbs, 2007; Neuman, 2014). The informants were assured from the very beginning that transcripts of the interview will not contain any identifiable information. Simultaneously, the list of names and airlines will be coded and stored separately from transcripts. Audio recordings of the interviews will be stored on an encrypted separate device and deleted at the end of the project.

It needs to be mentioned that some type of personal data such as airlines the participants are/were working for, the origin, age, and gender of those participants (especially in case of female pilots this information makes them easily identifiable as there is no more than 5,1% of female pilots worldwide (ISA, 2021)) has been collected and recorded for this research project. Therefore, the Norwegian Center for Research Data (NSD) has been contacted, an application form has been filled in, processed and later this research project has been approved by the abovementioned organization.

Finally, following one of suggested by Gibbs (2007) ethical principles “Feedback”, together with my gratitude to my informants I sent them a summary of this research results. Thus, I expressed my appreciation of their efforts and valuable contribution to this study project and its outcome.

4 Findings

This chapter is dedicated to the findings revealed from the interviews conducted with pilots of Asian, East European, and West European origin and employed by European, Asian, North American, and Middle Eastern airlines, operating all around the world. It starts with a presentation of the role of communication for pilots, covering three factors: Language, Cultural aspects, and CRM influencing the communication, accompanied by informants' vision of aspects contributing to safer flight operations.

4.1 The role of communication in flights operations

Based on the data collected during in-depth interviews, it was found out that communication plays a significant role in the process of providing flight safety in the aviation industry. Thus, Informant A stated: “Ah very, very high role, maybe one of the most important roles in the cockpit”. Informant D echoes the previous interlocutor:

“That’s a very big question! I think it’s the main role! We are flying two men crew, so we have to communicate with each other a lot: confirming all the checklists, confirming all the procedures. Whatever you do you have to confirm it before actually pushing on the button or doing something”.

Informant E and Informant F, in their turn, ascribed leading roles to communication on the flight deck. Thus, Informant F stated: “Communication plays a key role in aviation as an aircraft depends on it not only for its internal operation but also externally with traffic control”. Informant E highlighted: “I think it’s the most important role! Without communication, nothing will happen! Nothing! So, it’s the most important role!”

At the same time, Informant A, Informant B, and Informant F described efficient communication as following:

Informant A: “Precise! State what you want without drifting apart from the theme and without being emotional with it”. Informant B: “Efficient language, which is clarifying any ambiguities, and understanding what person exactly mean”. Informant D got along with her female colleague: “Precise, I think. Like telling your co-workers whatever you need, so they understand right away what you really want them to do”. Informant F: “Efficient communication is when you exchange information in an efficient way without ambiguities”.

4.2 Language issues

According to the testimony of the most interviewed pilot for this thesis, the language, as a whole, and specifically pronunciation turned out to be one of the most critical issues of communication in the aviation industry.

Thus, Informant A mentioned *dialect* as one of the specific language issues affecting everyday work life: "…in my country we have different dialects, and it might be a little thing. People from the capital speak correct German, but (you can) meet somebody from the countryside whose dialect is not easy to understand. But in the cockpit, we usually speak proper German". And later, providing an example of the situation where communication was connected to safety issues. She explains as: "I heard stories when commanders wanted something. But it was not understood certainly, and the second pilot did something else because he understood it wrong… maybe it was not clear enough pronunciation". Informant A also specified that pronunciation used to be an issue during the flights to Russia: "With Russia it used to be a problem to understand English pronunciation before, but not anymore". Later she stated: "They fixed it. Now (international) pilots understand Russian ATCs and other Russian pilots".

Another female pilot, Informant D, described participation in a similar situation. During the flight as a trainee, she misunderstood one of her French instructor's commands due to *pronunciation*. The instructor gave her a command "Trim, trim!" But she interpreted it as "Climb, climb!" and she acted opposite to the command's implication which led to the necessity of taking over the control of the aircraft by her instructor to maintain the safety of the flight.

Informant C mentioned *pronunciation* in terms of cultural differences question, which points toward these two factors' mutual interrelation and interdependency. Talking about cultural peculiarities of the Hindus and UK resident pilots and ATCs, he mentioned: "…that's another thing, I mean the pronunciation and the way they speak …they speak very fast! …they pretend that their English is the best English". Later, Informant C confirmed his assumption regarding language and cultural aspects of Indian pilots, UK residents, by providing one more example of an unsuccessful communication with another Hindu pilot:

"…I had an issue with one guy. He was a young captain, he just went through his promotion process, and that happened during the flight… So, it was three days trip actually. And I'm like, ok this is the captain, he is very good, he is, you know like, he is funny, and he is like: "I'm the best, I know everything, you know nothing!". That was his positioning! And I asked him a question during the preparation of the cockpit, I asked him something. So, he told me, but I did not understand what his answer was, I asked him to say it again. The words he used: he did not change anything, he told me same phrase with the same speed of the speech. I am like, "I can try it again". Because I did not get the answer again. He is like: "Ahh, well your level of English is very questionable! How did you even get through the process?".

Later in the interview, Informant C highlighted the same captain having communication issues with a flight attendant and the purser during the same trip, and at the end of the flight willing to report those two to the management of the airlines that they all were working for.

Another language factor highlighted by Informant A and Informant C being as called *Code Switching* meaning switching language of communication from English to the local language during the information transmission sessions between ATCs and local pilots. Thus, Informant A stated:

"…sometimes when we fly to Spain or France, I see my co-pilots understanding nothing when local pilots speak their mother language with ATCs. I know what local pilots are talking about because, I understand some words such as wind conditions or runway, or keep take off. So I know what local pilots and ATC's are talking about. But for others, it is very hard if local pilots don't speak English with the ATCs". Later, listing destinations that are particularly challenging in terms of communication and language, she noted: "In China for sure!... So, if you don't understand the language…But in China, I don't speak a word, so…". It worth to be mentioned, Informant A speaks French, Spanish, and Italian as second languages.

Informant C confirmed the presence of the same phenomenon in Latin American countries, particularly in Brazil. Thus, Informant C refers to his colleague, the Air 9 pilots, who stated the use of local language between ATCs and local pilots in Rio de Janeiro during their unexplained progression in the queue for take-off.

"…I flew with the captain who told me this story, he is a local guy he is from Brazil. It was the departure from Rio de Janeiro, they were in a queue and they had two aircrafts ahead….And all of a sudden, the ATC asks. "Air 9, are you ready for take-off?" And my colleagues: "Ok, yes of course we are ready, yeah, yeah, yeah, let's go". So, they are lining up meanwhile, those two pilots (of two aircrafts who are ahead in the queue) are discussing something with the ATC on the local language (Portugese). … And the captain who was not a captain flying, he was observing, seating on the jump seat in cockpit asked flying pilots: "Do you know why they has changed the queue order and now we are the first ones in the queue? The ATC felt that it could be complicated (for him) to explain in English the current situation… They were actually changing the runway. The wind has changed, it was tail wind actually, like 12 or close to 14

knots…. So, ATC decided that it could be complicated for him, but the situation he put Air 9 crew…I can't say it was a critical situation, it was still acceptable. That certain type of aircraft (Boeing 777) could accept up to 15 knots of tail wind, but anyway the performances are compromised, and we have to recalculate it, but he did not notify the crew".

Later, Informant C shared a story of an ATC in the same country ignoring a deviation request due to weather conditions on the approach of an international pilot made in English, while all requests of the local pilots made in Portuguese were processed. He explained as;

"And the ATC, he was ignoring requests in English, he was given the instructions to the local pilot because for him, I think, it was complicated to switch between English and the local language."

Informant E, pointed out several times during his interview about the phenomenon called *the deviation from phraseology* in the aviation industry. While answering the question about specific issues that are important for flight safety, he noted that

"To maintain the standards everyone should follow those standards. It would be much easier if no one deviates from the standards in aviation, I'm not talking about plain English, I'm talking about phraseology, SOPs, in the way they supposed to be phrased and said. If everybody complies for that, that's easy. But if you have deviations and if somebody is using non-standard phraseology and non-standard SOPs, it becomes an issue"

The following example provided by Informant E is related to both *pronunciation* and *deviation from the phraseology*

"For example, the guy can speak English, but he can chew some words, so you don't understand from the first time what he wants to say. He can speak the language, but his accent is not the best. It was not understandable. For example, I flew over Australia today, and they prefer their

strange number 7. They don't say SEVEN, they say SIDEN or something like that. So, if you don't know or if you don't have the association, you will not understand what they are saying".

Later Informant E also highlighted that

"Americans (in the US and Canada) don't use standard phraseology, the ATC guys, they use their own phraseology. So, if you don't know that, it can be misunderstood… In the United States, they use plain language in aviation… They just use plain language sometimes, most of the time!... Maybe they understand what you are saying, but sometimes WE don't understand what they are saying, plus their accent…"

4.3 Cultural issues

Cultural aspects are viewed by the majority of the informants as the most represented issues related to communication. It is noteworthy that among the three aspects mentioned in the Chapter the Cultural Aspects, the Power Distance (PDI) stands out.

4.3.1 Masculinity vs. Femininity (MAS)

Data collected during the interviews revealed no significant difference in communication between opposite gender pilots on the flight deck or any serious misunderstanding. Thus, Informant C stated as such "No, it's actually no difference. Apart from…what are the pilots talking about? … You have fewer options…You talk about something different (comparing to male pilots), and you have to think that it is a girl next to you". Female pilot, Informant D, confirms the words of her male colleague:

"In terms of work, it is not, because everyone is professional, they know what they do! … I think it depends on people rather than on gender. Sometimes when I feel being closer to the captain,

then I will be more open. If we have a lot to talk about, if we have a lot of things in common, we are interested in the same things, so we talk a lot during the flights…
In terms of having a normal conversation or in terms of personal, I think flying with female pilots is a bit easier. Themes to talk about: you have a lot of things in common, like cosmetics, skincare, or whatever. For a guy, you have to really think: what are we gonna talk about today? Something like that. Sometimes you just run out of things to talk about during the long flights".

However, Informant A and Informant C stated some masculine behavior traits inherent by female pilots. Informant A provided an example of a captain with military background flying for the first time with a female pilot (i.e. with her). The captain confessed before the flight: "I have to tell you now that you are the first female pilot I'm flying with and I'm not very sure if I know what I have to expect". After the flight, he exclaimed: "I did not even think about upfront, because it was like working with a guy!". "It was a really good compliment to me" Informant A stated. Additionally, Informant C noticed that another female pilot: "…did not take much care of her hair, was more like a man…because you have to act like a man at work, you have to be firm, you have to demand…you have to be a captain, so you have to control your crew and you have to prove that you are the captain". Informant D, a female First Officer, also remembered: "Yeah, I got this comment from the cabin crew that my announcement is kind of soft, it's hard to hear (the Informant demonstrated soft mumbling). So, I had to make my voice a little bit louder and stronger".

4.3.2 Power distance (PDI)

The presence of such an aspect as Power Distance was illustrated with the examples provided by Informant B, Informant C, Informant D, and Informant E.

Informant B yielded an example of an incident due to the power distance issue between a Chinese flight instructor and a Korean captain who did not dare to contradict the instructor, and followed his advice ending up with having the airplane took off the runway into the ground: "I want you to keep run with this taxiway," said the flight instructor. And because the airplane speed was still high, it was almost impossible to do that. But the Korean captain instead of saying: "I cannot do that!", just started questioning the flight instructor making sure if he (flight instructor) really wants him (Korean captain) to go to this particular taxi exit?... So, they ended up off the runway, off the taxiway through the grass…"

Informant C shared a story of one flight with the captain, originating from Colombia, and their disagreement during pre-flight briefing upon gaining specific information from ATC on a certain altitude, which could have led to a conflict escalation in the cockpit during the flight. "He is from Colombia, very hot guy! Explosive: …from a calm person to a very aggressive guy…I was thinking he would punch me; he would definitely punch me right now!... And you know what? I kind of understood him. Because most guys don't ask anything, they say: "Ok, I don't have any question. Well, I don't have anything to discuss". And I was the first one who asked something, and I was the first one for him who told him that he is not right. And I'm just a FO (first officer)".

Informant D drew particular attention to the importance of age, rank, and seniority in the Asian culture:

“Sometimes you really have to find a pause and say: “Excuse me, I have to really do something”. You know, making him (captain) feel like I don’t like to listen to him…I think this is the main factor of age, rank, and seniority, it’s like when they (captains) are older, then you have to really find the way to make them, like to find a pause and to do it polite, because in Asian culture we respect senior people a lot. You cannot make things like rapid, you have to slowly tell them, something like that”.

Informant E emphasized the importance of experiences for a lower rank person on the flight deck in terms of dealing with the Power distance phenomenon. Thus, answering the question about the ability to challenge a higher rank person’s decision or judgment he said:

“I consider myself as an experienced first officer now and I don’t really care who is the captain, instructor, or examiner, I don’t really care! If I see something I don’t like, I will say it! And at the end of the day, he will say: “Thank you”, because otherwise it is gonna be his mistake, and if this mistake is gonna be made, both of crew members are gonna be blamed for that mistake. So, it does not matter who says it: captain or first officer, second officer or safety pilot, it is all values!

Later in the interview Informant A continues:

“The hierarchy is flatter now than 15 years ago, but still here is a captain and here is first officer and yeah, we are trained to do everything as a team, but to make a decision, of course we consider everything, but if there is no consensus the final decision is on the commander”.

Informant B specified:

“Decades ago, captain’s authority used to be “paternalistic” thing. So whatever captain said, it was the last thing. But nowadays, we kind of almost equalized for that meaning, almost equalized! We have to maintain slight gradience from the right seat to the left seat (from first

officer to captain), and all the conclusions and all the discussions we put together in a same place to make collaborated decision. And you know, I found personally for myself it's an important thing to discuss everything and to take decision kind of together, though captain has the final responsibility for sure".

Later he continues:

"If I see that my first officer is on the same level as me to operating the machine, to manipulating control, he does not have any manipulating control issues and stuff, he is experienced. So, if I feel I'm ok to leave the control duties on him, it's not a problem".

4.3.3 Individualism vs. Collectivism (IDV)

The following statement of Informant E is related to both Power Distance and Individualism vs. Collectivism categories:

"…when you are a new young first officer it is not very easy to take control from the captain in the emergency, it's not easy! People (teachers and examinators) are saying: "You have to, if you see something that you don't like, you have to take over!". You cannot do that!!! How can you take over from the captain? He is not gonna give you the controls! How are you gonna do it? Are you gonna hit him? Ahah (sarcastically laughing). So that's not serious, you know!"

Later in the interview Informant E reflected on his experience from Air 7 (Russia) about captains making decisions about take-off under changing conditions individually, without any coordination with other crew members:

"For example, sometimes when ATC gives you clearance to enter the runway from a certain intersection, you have to recalculate the performance no matter what. Just by experience, these captains know that they can take-off from this intersection, but I mean, if you want to do it properly, you have to recalculate the performance! …You still have to do the calculation to be sure. Basically, the ATC gives you: "Ok, are you ready to take-off from this intersection because the runway is shorter now?". Sometimes they reply as "Yeah, it's not a problem, I know that we can take-off from here". Yeah, but you know that you have to recalculate! Probably you know, I'm 100 % sure that he knows, but we have to make sure, because mistakes can happen, and you are carrying human lives! And it is not the proper way to do that! Yeah, I experienced things like that".

He also explained that some captains' behavior by their initial origin from the military air force and suggested that it was the main reason for not complying with CRM regulations by these captains. Providing an example of a situation where his colleague in the cockpit behaved as an individual rather than a team member, Informant E stated:

"…I have seen those things more while in Russian airlines, especially while flying for Air 7. I guess, maybe things have changed because I joined that airline in 2009, maybe things have changed because new younger guys are coming and they are more into CRM, and first of all, they can speak English much better, so the CRM is much better. The older generation guys, the former military guys, they were taught like this. If you are the only one in the cockpit of a fighter jet, you don't have responsibility for 300 passengers, you just have responsibility for yourself and the airplane, if something happens you will eject. And when they come to civil aviation, they transfer this mentality to civil aviation. And I think if you learn something while you are young and it is basic for you, you try to implement it, and in an emergency situation you will try to

bring what you know best from your previous experiences, and you neglect everything else, and you are making a decision by yourself…. I'm not saying that they are bad pilots, it's just the CRM, it is like they don't care about what the first officer has to say".

Informant D remembered a situation from one of her flights as a trainee when she was reluctant to question her instructor's actions, not daring to interfere: "I thought ok, he is an instructor, and I don't want to say a thing, so I just let him do it". I did not address it directly to him. I asked my friends afterward: "Is it correct?" or something like that. We discussed it later. I never directly told him like: "What are you doing?".

On the contrary, Informant A and Informant B, both currently in captain's rank, demonstrated their openness towards free communication between captain and co-pilot and the possibility to delegate control over the airplane to their first officers in a non-standard situation. Thus, Informant A answering the question to what extent her lower rank colleagues are able / allowed to challenge her decisions, commands, and judgments, stated: "Just 9 from 10, yeah, 9 from 10! You know, I want them to question me because if I do a mistake… We work together and discuss that maybe there is any better idea or other option which I did not see before so, yes!". Later in the interview, she continues:

"The hierarchy is flatter now than 15 years ago, but still here is a captain and here is a first officer and yeah, we are trained to do everything as a team, but to make a decision, of course, we consider everything, but if there is no consensus, the final decision is on the commander".

Informant B specified:

"Decades ago, captain's authority used to be a "paternalistic" thing. So, whatever the captain said, it was the last thing. But nowadays, we are kind of almost equalized for that meaning, almost equalized! We have to maintain slight gradience from the right seat to the left seat (from

the first officer to the captain), and all the conclusions and all the discussions we put together in the same place to make a collaborated decision. And you know, I found personally for myself it's an important thing to discuss everything and to take decision kind of together, though captain has the final responsibility for sure".

Later he continues: "If I see that my first officer is on the same level as me to operate the machine, to manipulate the controls, he does not have any manipulating control issues and stuff, he is experienced. So, if I feel I'm ok to leave the control duties on him, it's not a problem".

4.4 CRM issues

CRM course is viewed as a very important part of both initial and recurrent training by all the informants in all the airlines they had worked/are currently working for. Its frequency varies from annual training to once per two- or three years, organized and taught in different ways depending on the airlines. Noteworthy, its frequency is higher (annual training) in the airlines registered in Middle Eastern and Asian countries. In some airlines, it is a pure CRM course, while in other companies it can be combined with technical questions and issues. Thus, Informant C compared his experiences in terms of CRM course from two airlines registered in Eastern Europe and the Middle East, operating all over the world:

"I can't remember precisely how it was in Russia,… it's either once in two or three years, they are constantly changing the regulations. Here in Air 9 (one of the leading Middle Eastern airlines), when I just joined the company, we did that 1st course… They call it CRM technical annual training so, they combine CRM and technical stuff… So, we do it every year in our company…".

Informant E confirmed that the frequency of CRM courses in the Air 9 and emphasized its importance for pilots:

"That's why I'm saying: "CRM needs to be maintained in the cockpit! The culture of CRM needs to be there! That means that the captain and the first officer, they have to interact and listen to each other, not just following the commands of the captain: "Do this, do that!". That's how I see it".

Later he specified:

"I haven't flown for already about 6 years here in the company (Air 9) with people without CRM. I mean, even if the guy is tough and rough, he still has CRM, because if he does not have it, for example, you can report on him that he is not doing what he is supposed to do. You can report him for making decision without consulting you so…It's very straightforward here. If you don't comply, you are out!"

Informant A confirmed the importance of CRM for pilots and safety:

"(We have it) every recurrent training, so once a year we do it. With the flight attendants every two years. You know, if get requalified to a new airplane so, CRM is a part of it (too). And we had it all the 20 years. Maybe, it is the reason why there are not so many problems (smiling)".

Noteworthy, Informant B and Informant E while answering the question related to cultural aspects, particularly Individualism vs. Collectivism, mentioned CRM which points toward interrelation between these two categories. Thus, Informant B stated:

"…if you feel uncomfortable at any given time, just speak up!!! Let me know right away! And we will discuss it, that's it! And it's happening, a minor thing, but it's happening on every flight, I can tell you right away. Every flight! Like: "Do you mean that?", "Are you sure?", "You confirm?" or you check "Yes, yes, yes…", "You know, I think it's better to do that! Ahh, ok let's

do that!". It's constantly, it is a part of intercommunication and it is good CRM, I think (smiling)".

4.5 Unexpected finding

Interview with Informant B revealed one rather unexpected finding which captain himself could not relate to any of the abovementioned categories. Reflecting on the question where communication was connected to the safety issue, he provided an example of an international flight with Air 6 to Chicago:

"Anyway, in that particular flight the active first officer, a Chinese guy, he tried to respond to the ATC back instead of that another airplane (crew). We just stopped him saying "Buddy, it's not for us, it's for our company but the other traffic, they just landed. And something went (wrong) on his brain, you know, he just like "game over", he just (got) frozen: no reaction, nothing! Just like this (the Informant shows frozen face and body posture, looking like in eternity or through the wall, demonstrating empty glance). And he stayed in that situation (posture) for several minutes, 2-3 minutes. And we, expat pilots, we did not know that feature of local (Chinese) guys, so ahh, somebody tried to wake him up, like saying: "Hey hey, are you ok?" and the other Chinese captain said: "He is ok, he will recover, just let it go, give it some time". He's been whatever, like resetting or how to call this physiology thing… But after about 3 min he said: "Well I'm ok, captain I'm back, I'm here" and afterward normally worked. So, this kind of peculiarity I found just in China, I have never seen it in the rest of the world! But it appeared (to be) normal to them. It was not really safety compromised (in that particular flight), it's a lot of back up here, but you know, potentially it is a threat".

The Informant was asked a clarifying question: "**So, do you relate it to the cultural aspect category? Is that what you mean?"** as previously we were discussing the role of cultural aspects in safe flight operations. Informant B replied: "I'm not sure, because I have never seen it anywhere else. I have just seen it in China and not just one time. I see it pretty much often! So mmm (pause)".

4.6 Summarizing factors influencing communication in the cockpit

All the informants considered communication as one of the most crucial factors of safe flight operations. The majority of interviewees highlighted that language and cultural aspects as the most representing factors influencing communication. They pointed out "Code-switch", pronunciation and accent regarding Language and Power Distance and Individualism vs. Collectivism regarding Cultural aspects as standing out factors. All the informants noted the particular importance of CRM for flight safety in the aviation industry. The data collected revealed no cases among the informants, where communication became an issue of flight safety. However, Informant B and Informant E provided examples where inefficient communication could potentially become a threat.

5 Discussion

This research project investigates the role of communication in flight safety in the aviation industry, as well as three key aspects: Language, Culture, and CRM, affecting communication. Connecting theoretical objectives with findings extracted from data collected during in-depth

interviews, I will ascertain factors affecting communication significantly, highlight the most challenging regions on the map in terms of language, culture, and communication. I will also share the pilots' vision of tools and aspects that may help in resolving communication issues.

5.1 The role of communication in the aviation industry

The data collected during in-depth interviews revealed the key role of communication to ensure flight safety. Pilots' vision of the essential role of communication correlates with the theory of communication in the aviation industry implying equal importance of communication and technical proficiency (Tajima, 2004).

It worth mentioning, the choice of words used by pilots of the opposite gender to describe efficient communication varies. Thus, both female pilots characterized it by the adjective "Precise", in other words – direct, without inclinations. This may indirectly confirm that female pilots' aspiration to adopt some of the traits inherent from their male colleagues, what the male pilots have repeatedly voiced in their interviews (McCarthy et al, 2015). Male pilots in their turns, used the noun "Ambiguity" that needs to be avoided. Despite the choice of vocabulary, both genders' pilots converged on the following: efficient communication should serve its main purpose of transferring information directly, without drifting from the topic and without emotions (Kanki, 2019).

5.2 Factors that contribute to communication practices in the cockpit

5.2.1 Language

Informant A and Informant E highlighted that over the years situations related to language and CRM in terms of Power Distance in Russian airspace have significantly changed. Informant E stated that the new generation of Russian pilots significantly improved their aviation English language proficiency, also CRM has moved to the next level. Informant A in her turn compared her experiences of dealing with Russian ATCs nearly twenty years ago. That time she experienced severe misunderstanding due to pronunciation. Nowadays, Russian ATCs' English language proficiency has been unquestionably improved. This testimony of Informant E and Informant A allowed suggesting that the American CRM training model is applicable to other cultures and works for the favour (Orasanu et al, 1997). Both Informant C and Informant F mentioned Indian pronunciation as a hard one to deal with. It depicts certain spot on the map which need to be taken into consideration in terms of improving language proficiency (Merritt & Maurino, 2004).

The Code-switching phenomenon appeared to be a serious issue in the communication between flight crews and ATCs. Such a phenomenon has been observed by the informants in the airspace of China, France, Spain, and Brazil which continues filling up the map of problematic interfaces in terms of language and cultural aspects (Merritt & Maurino, 2004).

Informant A pointed out the importance for flight crews of so-called "visualization" of airspace by monitoring other traffic information transmission sessions. When this

communication is performed in the local language, the international flight crews sharing the same airspace are deprived of the opportunity to freely navigate in space. In case of emergency with one of the traffic participants, the loss of situation awareness may become a serious threat for all the traffickers in shared airspace (Tajuma, 2004).

Another serious aspect articulated by Informant C and Informant E was Deviation from aviation Phraseology by Australian and American ATCs which is often paired with pronunciation and accent issues. They both confirmed the high frequency of such cases, and the necessity to customize themselves about this peculiarity of local ATC. This statement testifies no significant changes in dominant model participants' behavior. There is little or no evidence of joint effort from native English speakers in resolving language issues in the aviation industry. On the contrary, all three pilots with Russian origin confirmed the necessity to accustom themselves to Anglos' linguistic peculiarities and their own desire to improve their English language level (Merritt & Maurino, 2004).

5.2.2 Cultural aspects

The influence of cultural aspects on communication in the cockpit, particularly Power Distance and Individualism vs. Collectivism, appeared to be one of the biggest issues revealed from the data collected.

Regarding Power Distance, Informant C, currently in the first officer position, provided an example of being personally exposed to the captain's aggressive behavior due to an attempt to argue with the captain, providing clarification upon a question that arose in the pre-flight briefing. Despite the fact that Informant C originates from Russia, with one of the highest Power Distance Indexes, it worth to be mentioned, that he has previously been in the captain's and

instructor's positions (Hofstede et al, 2010). Accordingly, he has adopted both first officer and captain's mentality, which he applied in that situation. His further reasoning suggests that he perfectly understood and realized the current situation, possible risks, and preferred to deescalate the conflict by apologizing to the captain. However, he reserved the opportunity to again doubt the captain's decision or opinion, if the situation requires so.

On the contrary, Informant E (experienced as the first officer and never been in captain's position), denied the possibility to take over controls from the captain and even challenge captain's decision arguing that captains refuse to listen to co-pilots' opinion (talking about his working experiences in Air 5 and Air 7 in Russia). However, he specified that in Air 9 (where he is currently working for) situation with CRM and accordingly with Power Distance is much better, although Air 9 is registered as one of highest PDI in the country with a PDI of 80. Nevertheless, Informant E stated that he could always challenge his captains' decisions in Air 9 and could step up if a situation is related to flight safety. This was probably made possible due to the exclusive priority of flight safety in Air 9 and, accordingly the CRM, which has repeatedly been voiced during the interviews by Informant C and Informant E, both currently operating in Air 9. This fact makes it possible to assume that CRM training programs being specifically created and oriented to American pilots are also working in other cultures and societies (Orasanu et al, 1997).

Informant A and Informant B, both currently occupying captain's position in their airlines, on the contrary, stated their openness for criticism and challenge from the first officers' side. Though Informant B originates from Russia, the country with one of the highest PDI (93) (Hofstede et al, 2010), his working experiences are extended all the way to Asia and North America. Presumably, he adopted Northern American mentality, where is the PDI is rather low

(47) compare to Russia. Informant A in her turn represents a country with one of the lowest PDI, therefore demonstrates almost complete openness towards constructive criticism (9 of 10) (Hofstede et al, 2010).

Informant D in her turn, raised the issue of hierarchy and respect for the older generation in Asian culture. Thus, first officers tend to feel subordinate to captains and sometimes need to wait for the pause to make a communication session with ATC or to follow any other routine. Also, they need to do it slowly, not rapidly interrupting. She specified, otherwise this behavior will be viewed by captains as disrespectful on the part of the first officers (Kim et al, 2004, pp. 148-149).

In terms of the Individualism vs. Collectivism aspect, Informant E mentioned some Russian captains' tendency of ignoring SOPs and manual prescriptions concerning recalculation of take-off data under changing conditions. Thus, he provided examples of captains taking decisions individually, relying on their experiences, neglecting their first officers' concerns and prescriptions of regulatory documents. This captains' behavior goes a line with the situation on the flight deck in the KLM airplane in 1978 (Roitsch et al, 1978). He emphasized several times the importance of this procedure for flight safety. Informant C confirmed the particular significance of the recalculation procedure for safe take-off in the context of the language issue that arose in Rio de Janeiro airport in Brazil.

Informant D provided an example of being reluctant as a trainee to step up and question her instructor's decision. From one point of view, it is natural for trainee to be reluctant to challenge instructor's decision. But from the other side, there could been a trace of Individualism vs. Collectivism issue of not be willing to express one's opinion directly as it is typical for

representatives of countries with a high degree of individualism. As Informant D associates herself with Asian culture, which is according to Kim et al (2004) is characterized by indirect verbal communication. However, Masculinity vs. Femininity issues do not seem to be a case in this situation, as during the entire interview no manifestations of this phenomenon were noticed.

Regarding the Masculinity vs. Femininity cultural aspect, no serious issue in terms of communication between opposite gender flight crews has been revealed. All male informants provided truly positive feedback about female colleague's presence in the cockpit. They described the psychological atmosphere with female colleagues on the flight deck as more relaxing, calm, and less competitive. So did the female pilots. Both one female and two male pilots pointed out some female pilots' aspirations to inherent their male colleagues' traits. However, another female pilot stated no difference in communication at all.

The only inconvenience that has been voiced by pilots of both genders was the occasional difficulty in choosing a topic for a conversation with a colleague of the opposite gender during the long-haul flights (McCarthy et al, 2015). This Indicates that previously encountered issues in communication have been resolved over time by mutual input of both genders: female pilots adopted some masculine traits while male pilots learned to respect female colleagues as equal, without attempts to dominate over.

5.2.3 CRM

All the informants stated that CRM is a top priority tool in a pilot's life. Noteworthy, the special attention to CRM training course is paid in the Air 9, registered in one of the Middle Eastern

countries. Despite the diversity of nationalities representing this airline, CRM is on a very high level as safety is considered as the priority of Air 9. Both Informant C and Informant E mentioned the high frequency of CRM training courses in the airline they are working for. Besides, Informant E stated that despite the cultural aspects and peculiarities of every individual in the airlines, everybody is complying with the CRM. This fact makes it possible to assume that the effect of CRM stands over the cultural issues of an individual (Orasanu et al, 1997).

Noteworthy, Informant A (the captain, originate from the country with low Power Distance Index and relatively high Individualism level), who is following CRM training on the regular basis of recurrent training, demonstrated openness towards co-pilot's critique and challenges. Informant B (the captain, originates from Eastern Europe but currently living and working in Canada) articulated receptiveness towards first officers' challenges to rather a great extent. Informant C and Informant E, both in the position of the first officer working for the Air 9 with a high level of CRM reserved the right to questioning captains in terms of maintaining the safety of the flight. It yields about the leading role of CRM in flight safety.

6 Conclusion

The goal of this research project was to find out to what extent does communication affects flight safety in an intercultural environment, and to highlight the aspects that influence communication the most, according to pilots operating all over the world.

It has been found out that communication plays an essential role in safe flights' operations. To a very high extent, it is affected by language in terms of pronunciation, English language proficiency, and s called the "code-switching" phenomenon. There is also a trace of cultural issues such as Power Distance and Individualism vs. Collectivism influencing communication on the flight deck.

The finding of this research project in the CRM field revealed a positive influence on flight safety and high interrelation between CRM, language, and cultural issues. In some cases, there is evidence of CRM prevailing above other aforementioned dimensions.

The findings provide a clear understanding of what issues have been successfully overcome over the years, the nowadays situation with communication on the flight deck, and the remaining issues that are still influencing communication and therefore, potentially creating threats for flight safety.

Thus, according to direct pilots' statements no significant effect of miscommunication on flight safety has been revealed. However, indirectly, by constantly repeating the necessity of improving English proficiency, they let the researcher know how important this aspect is in safe flights' operations. Nevertheless, incidents caused by different issues, including

miscommunication, still happen. This fact yields for the necessity of improvement in the communication strategies.

When it comes to language and cultural perspectives of communication, to solve those issues compound affords of all stakeholders of the industry need to be implemented. It means that all ATCs and pilots, including English native speakers, need to comply with international requirements related to language proficiency such as phraseology, terminology, and pronunciation/accent. As the main purpose of communication in the aviation industry is not to be fluent in English, but to understand what other participants have to say to you and to be understood by them. In addition, it is essential to pay special attention to language and culture interdependence, explaining the effect of own culture on communication in the second language in order to avoid serious misunderstanding, especially in critical situations.

6.1 Limitations

There should be mentioned some limitations of this research project.

Firstly, as it follows from the concept of the qualitative research method and its in-depth interview tool implemented in this study, the size of the informants' sample does not allow to generalize the findings. Therefore, further research is needed to find out whether the findings of this study are applicable to other airlines and countries.

Secondly, equal distribution of representatives of the same culture, language, gender, and airlines interviewed for this paper would have provided more precise and thorough data for analyses.

6.2 Proposal for future research

In order to acquire the whole picture of the situation with communication in an intercultural aviation environment, representatives of countries, cultures, and languages mentioned in this thesis need to be interviewed.

I would like to emphasize the necessity of further quantitative research in communication in the aviation industry targeting an even quantity of participants, both pilots, and ATC, worldwide, non-native speakers in English, both genders, representatives of different cultures and languages.

Besides, the unexpected finding of this research, stated by Informant B regarding unusual "freezing" reaction while operating with his Chinese colleagues, worth to be explored in more detail. For this purpose, some other expats pilots working for Chinese airlines need to be interviewed, as according to Informant B for local pilots it does not seem to be an issue. However, as Informant B stated, it could become a threat if something similar happens during a critical stage of the flight such as take-off or landing.

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8 Appendix

8.1 List of Tables

8.2 List of Figures

8.3 Interview Guide for Informants

Interview guide

***Personal Information about informant*:**

· Your age, and origin (ethnicity) please! What culture do you associate yourself with?
· The name of airlines you had worked / are currently working for, years, country(s)
· Your current rank and seniority please!
· Your mother tongue / eventually other spoken foreign languages and its levels (A1-B2, fluent speaker) please!

Let's get started ☺

Opening questions

- **What role does communication play for pilots?**
- **What do you associate with efficient communication?**

- **How does language affect your everyday work, if at all?**
- **Are there any specific language issues that affect your everyday work life?**

⇒ How do you handle these issues?

- **What are the main challenges?**
- **Have you ever experienced situations where communication was connected to safety issues?**
- **Where do you see the main challenges?**

Key questions

Communication.

- **Can you describe any misunderstanding that you might have experienced while communicating with ATC, your colleagues in cockpit or flight attendants?**

⇒ In your experience how often do misunderstandings happen?
⇒ What language were you speaking? Can you please give examples?
⇒ What kind of consequences did it have, if any?
⇒ To what extent did this miscommunication affect your efficiency / psychological atmosphere in cockpit/ working environment in general? Can you give any example?

- **What flight destinations (airports/ countries) in terms of communication and language are the most challenging for you? Why?**

⇒ In your experience, what communication challenges are there in flights to non-English speaking countries comparing to English-speaking countries, if at all? Please, specify which countries are those.

- **Are there any other specific issues you think are important / relevant for the flight safety?** related to communication.

Other Cultural Dimensions / Aspects

- **Have you ever been flying with colleagues of the opposite gender?**
- **Have you experienced any difference from flying with colleagues of the same gender?**

⇒ How did you feel about it?

- **How does the atmosphere in cockpit differ to flying with the same gender colleagues?**
- **Have you experienced any communication difference?**

⇒ In what aspects? Could you please provide any example?

- **Can you describe any misunderstanding that you might have experienced communicating with your colleagues (Captains / First Officers) or ATC of the opposite gender?**

⇒ What was it related to?
⇒ How did you and your colleagues handle it?
⇒ To what extent did it affect the flight outcome?
⇒ What were the consequences / occurrences, if any?

- **Have you ever experienced any flight deck / cabin crew / ATCs make gender related comments or jokes, positive or negative?**

- **How did it affect your work performance, if at all?**

⇒ **What culture/s did that /those person/s belong to?**

- **Can you describe any cultural differences that you might have experienced communicating with your colleagues, flight attendants, ATC?**

⇒ What cultures did those communicating participants belong to?
⇒ What kinds of differences were they?
⇒ How did they affect communication?
⇒ What languages were / are spoken?
⇒ How did you and your colleagues handle this?
⇒ What were the consequences / occurrences, if any?
⇒ Could you please provide example/s?

CRM (Crew Resource Management).

- **How often do you take this CRM course, if ever?**
- **What did you learn from it?**
- **To what extent does it help to make communication more efficient? Please examples if possible?**
- **Is your annual simulator training individual or in a team?**
- **To what extent are you (if in lower rank) able to challenge or question the judgement of a higher status person? (For captains, on the contrary, a lower rank person to challenge your decisions/opinion?)**
- **In your crew in the cockpit who is supposed to take charge in a nonstandard situation?**
- **Have you ever been reluctant to ask for clarification or guidance due to any reason?**

⇒ If yes, please describe the situation and circumstances in details.
⇒ How did you handle the situation?
⇒ What consequences did it lead to, if any?

- **Can you describe situation/s that you might have experienced when you or your colleagues behaved as an individual rather than a team player/member?**

⇒ What was the reason for that?
⇒ In what airlines and country did it happen?
⇒ What were the consequences, if any?
⇒

English language course. (In case if language issues were figured out)

- **How often do you take English language courses, if at all?**

- **What language is used for communication / teaching purpose during those English language courses? (Following up explanation if necessary: English / mother tongue/ other common language)**
- **What do you do during those courses?**

⇒ What aspects do you learn?

- **To what extent do teachers emphasize the importance of cultural aspects in learning English, if they do it at all?**

- **How important are those cultural aspects for you in your flight operations?**

- **Have you ever experienced people change language from English to their mother tongue while communicating with your colleagues in cockpit? ("Code switching")**

⇒ **How did that make you feel?**

⇒ How did you handle the situation?

⇒ Have you ever experienced while communicating with ATC in non-English-speaking countries, speaking in English to foreign pilots, but simultaneously speaking in the local language to local pilots ("Dual language switching")?

⇒ To what extent did it affect the flight operation?

⇒ Did it cause any consequences? Can you please provide an example / s?

- **If you were to choose what to learn during English language courses, what aspects/topics would it be?**

⇒ Where would you focus your special attention? Why?

⇒ Is there an opportunity to do so during the courses?

Closing questions

- In your opinion what aspects / dimensions in terms of communication could contribute to a safer flights' operations?
- **Is there anything else you would like to add?**

Thank you very much for sharing your experiences with me!

8.4 Information letter

Are you interested in taking part in the research project ” The role and influence of communication on flight safety in the aviation industry”?

This is an inquiry about participation in a research project where the main purpose is to find out what role does communication play in aviation industry and how does it affect flights’ safety. In this letter we will give you information about the purpose of the project and what your participation will involve.

Purpose of the project

This project is conducted by the student researcher, Nataliya Martynova, under supervision of Tone Therese Linge, associated professor at the Norwegian School of Hotel Management, Faculty of Social Science, University of Stavanger. It is planned to include 8 to 10 informants, pilots, both captains and first officers, of different age, origin, seniority, working for different airlines all over the world. The main questions that will be asked are: what aspects (e.g. language, culture, psychological and technical issues) are influencing communication and what could be done to enhance communication success and, consequently, to make flights safer.

The research question of this project is: How does communication affect flight safety in an inter-cultural working environment? The role of Crew Resource Management (CRM), language and cultural aspects in safe flights' operations.

It is a master's thesis, and the collected personal data will only be used for educational purpose.

Who is responsible for the research project?

University of Stavanger is the institution responsible for the project.

Why are you being asked to participate?

You are being asked to participate in this project because you work in the aviation industry as a pilot / first officer and have experiences from different airlines.

What does participation involve for you?

If you chose to take part in the project, this will involve that you participate in an online interview via Skype, Zoom or Teams. It will take approx. 45 - 50 minutes. The interview consists of several groups of questions related to: background information, language, and communication. The information will be recorded electronically as a sound recording. All sound recordings will be treated anonymously and deleted after the project is finished.

Participation is voluntary

Participation in the project is voluntary. If you chose to participate, you can withdraw your consent at any time without giving a reason. All information about you will then be made anonymous. There will be no negative consequences for you if you chose not to participate or later decide to withdraw.

It will not affect your place of work and employer.

Your personal privacy – how we will store and use your personal data

We will only use your personal data for the purpose(s) specified in this information letter. We will process your personal data confidentially and in accordance with data protection legislation (the General Data Protection Regulation and Personal Data Act).

Only the student researcher and supervisor will have access to the personal data.

Your name and contact details will be replaced with a code. The list of names, contact details and respective codes will be stored separately from the rest of the collected data». The data will be stored on an encrypted external store jet.

What will happen to your personal data at the end of the research project?

The project is scheduled to end of September 2021. The personal data, including any digital recordings, will be deleted at the end of the project.

Your rights

So long as you can be identified in the collected data, you have the right to:

- access the personal data that is being processed about you
- request that your personal data is deleted
- request that incorrect personal data about you is corrected/rectified
- receive a copy of your personal data (data portability), and
- send a complaint to the Data Protection Officer or The Norwegian Data Protection Authority regarding the processing of your personal data

What gives us the right to process your personal data?

We will process your personal data based on your consent.

Based on an agreement with University of Stavanger, NSD – The Norwegian Centre for Research Data AS has assessed that the processing of personal data in this project is in accordance with data protection legislation.

Where can I find out more?

If you have questions about the project, or want to exercise your rights, contact:

- University of Stavanger via Nataliya Martynova, student researcher (n.martynova@stud.uis.no), Tone Therese Linge, supervisor (tone.linge@uis.no) *?*
- Data Protection Officer: personvernombud@uis.no
- NSD – The Norwegian Centre for Research Data AS, by email: (personverntjenester@nsd.no) or by telephone: +47 55 58 21 17.

Yours sincerely,

Project Leader
Tone Therese Linge

Student Nataliya Martynova

Consent form

I have received and understood information about the project *"The role and influence of communication on flight safety in the aviation industry" and* have been given the opportunity to ask questions. I give consent:

☐ to participate in an interview

I give consent for my personal data to be processed until the end date of the project, approx. September 2021

(Signed by participant, date)