



L-Università
ta' Malta

Pre-Flight preparation job crafting opportunities. A sense making study.

Dissertation

Tesmarie Busuttil

Faculty of Economics, Management and Accountancy-
MSc In strategic Management and Digital Marketing

MRK5811 Advanced Research Techniques

Tutor: Prof. Vincent Cassar



University of Malta Library – Electronic Thesis & Dissertations (ETD) Repository

The copyright of this thesis/dissertation belongs to the author. The author's rights in respect of this work are as defined by the Copyright Act (Chapter 415) of the Laws of Malta or as modified by any successive legislation.

Users may access this full-text thesis/dissertation and can make use of the information contained in accordance with the Copyright Act provided that the author must be properly acknowledged. Further distribution or reproduction in any format is prohibited without the prior permission of the copyright holder.

Abstract:

This study aims to examine the influence of pre-flight duty activities and job crafting opportunities on pilot flight performance. The research delves into the potential impact of factors beyond the scope of flying an aircraft and the flight briefings, exploring how these elements may interplay with individual attributes and workplace conditions.

The research's intention is to identify and evaluate how pre-flight factors, such as fatigue stemming from flight duration, job crafting feasibility, circadian rhythms, prior flights, and external factors, influence pilots' decision-making processes during flight. Furthermore, the investigation seeks to ascertain whether external stressors and demanding off-duty commitments can trigger prolonged fatigue, impacting pilots' performance across duty periods.

To achieve these objectives, a qualitative investigation was undertaken, employing focus groups as the research platform. This allowed pilots from diverse airlines to share their perceptions and lived experiences concerning pre-flight activities, job crafting, and their perceived effects on flight performance. Thematic analysis was then deployed to sift through the data, unveiling discernible trends and recurrent themes that emerged from the pilots' narratives. Through open-ended inquiries during the focus group sessions, fruitful discussions were nurtured. The study's central inquiry pertains to the significant influence of pre-flight duty activities and job crafting on pilot flight performance. To comprehend this relationship comprehensively, an exploration of pertinent variables is imperative.

The study findings have practical and theoretical implications, providing significant insights into the issues faced by airline pilots and prospective pathways for overcoming these challenges. The author recommends that airline operators, need to consider the fact that the legal flight time is the maximum, and shouldn't be the norm, as over exertion, might cause fatigue and stress to pilots, additionally the implementation of human factors training, covering sleep, nutrition physical fitness and mental health should be highly integrated into Pilot training.

Acknowledgements:

I would like to extend my heartfelt appreciation to several individuals who have played a significant role in the completion of this dissertation.

First and foremost, I am deeply grateful to my dedicated dissertation supervisor, Prof. Vincent Cassar for his unwavering support, invaluable guidance, and boundless patience throughout this academic journey. His expertise and encouragement have been instrumental in shaping the trajectory of this research, and I am truly indebted to him.

I also wish to express my profound gratitude to my mother, whose unwavering belief in my capabilities has been a constant source of inspiration and to my boyfriend Ryan, your continuous encouragement and understanding have been my pillars of strength.

Table of Contents:

Abstract:	ii
Acknowledgements:	iv
Table of Contents:	v
List of Figures:	xi
List of Tables:	xii
Chapter 1: Introduction	1
1.1. Background and Context	1
1.1.1. Terminology	2
1.2. Research Problem	3
1.3. Aim and Objectives	5
1.4. Research Questions	5
1.5. Dissertation Outline	6
1.6. Summary	7
Chapter 2: Literature Review	8

2.1.	Introduction	8
2.2.	Conceptual Framework	8
2.3.	Fatigue.....	9
2.3.1.	Fatigue in Aviation	10
2.3.2.	Fatigue’s Impact on Flight Performance.....	11
2.3.3.	Types of Fatigue and its Causes.....	13
2.3.4.	External Risk Factors of Fatigue.....	16
2.4.	Job Crafting.....	17
2.5.	Flexible Work Schedules	19
2.6.	Shift Work.....	20
2.7.	On Aircraft Fatigue Management Systems and Countermeasures.....	22
2.8.	Summary	24
Chapter 3:	Methodology.....	1
3.1.	Introduction	1
3.2.	Methodology	1

3.3.	Research Approach	2
3.4.	Participants	3
3.4.1.	Participants and Sampling.....	3
3.4.2.	Research Participants and Code.....	4
3.4.3.	Sample Size and Power.....	4
3.4.4.	Names, Validity and Reliability.....	5
3.5.	Reflexivity	6
3.6.	Ethical Considerations.....	8
3.7.	Summary	10
Chapter 4:	Results and Findings	10
4.1.	Introduction	10
4.2.	Data Analysis Approach.....	11
4.3.	Pre-Flight Activity.....	8
4.4.	In-Flight Procedures.....	10
4.5.	Effect on Performance.....	12

4.6.	Fatigue.....	15
4.7.	Standard Operating Procedures (SOPs)	15
4.8.	Operational Burden	17
4.9.	Summary	18
Chapter 5: Discussion		18
5.1.	Theme 1: Pre-Duty Activity	19
5.1.1.	Communication and work tasks after hours.....	19
5.1.2.	Duration of flight	20
5.2.	Theme 2: Pre-flight Activity	22
5.2.1.	Customization of job schedules	23
5.3.	Theme 3: In Flight.....	24
5.3.1.	Training and guidance:	25
5.4.	Theme 4: Effects on Performance	25
5.4.1.	Balancing strategies	26
5.5.	Summary	27

Chapter 6: Conclusion.....	28
6.1. Overview	28
6.2. Summary of Key Findings	29
6.3. Implications.....	30
6.4. Operational Flexibility	30
6.5. Work-life Balance	31
6.6. Technological Integration	31
6.7. Training and Preparation.....	32
6.8. Communication and Collaboration	32
6.9. Limitations	33
6.9.1. Small Sample Size	33
6.9.2. Demographic Distinctiveness	33
6.9.3. Subjectivity and Bias	34
6.9.4. Temporal and Contextual Limitations	34
6.9.5. Self-selection Bias	34

6.10.	Recommendations	35
6.11.	Conclusion	36
Chapter 7: References		38
Appendix A: Participant Information Letter About the Study		46
Appendix B: Participant’s Consent Form		49
Appendix C: NSO Email		52
Appendix D: Interview Schedule		53

List of Figures:

Figure 1.: Conceptual Framework (Author, 2023)	9
Figure 2.: Root cause analysis of fatigue and areas of influence of fatigue management in aviation. (Wingelaar-Jagt et al., 2021).....	13
Figure 3.: Causes, Symptoms and Consequences of Fatigue (Goker, 2018).....	14
Figure 4.: Model Integrating the findings on job crafting research. (Demerouti, 2014)	18

List of Tables:

Table 1.: Fatigue Countermeasures, adapted from (Caldwell, 2005) by author.	23
Table 2.: Summary of Themes and Sub Themes (Author, 2023)	1
Table 3.: Pre-Duty Activity (Author, 2023).....	2
Table 4.: Pre-Flight Activity (Author, 2023)	8
Table 5.: In Flight Procedures (Author, 2023).....	11
Table 6.: Customisation and its effect on performance (Author, 2023)	12
Table 7.: Hierarchy of Node of Access to Electronic Tools extracted from NVivo (Author, 2023)	27

Chapter 1: Introduction

1.1. Background and Context

The aviation industry serves as a testament to the remarkable ingenuity of human beings, their exceptional engineering capabilities, and the ability to foster worldwide interconnectedness. Aviation, functioning within a multifaceted framework of technological progress, safety measures, and global regulations, plays a crucial role in today's world by enabling worldwide economic activities, tourism, transport, and intercultural interactions (ICAO, 2023). The pilots play a crucial role in ensuring the effectiveness and security of this complex system, as they are responsible for manoeuvring aircrafts, addressing technical issues, and adapting to the ever-changing operational conditions (ICAO Secretariat, 2005).

Nevertheless, the responsibilities of a pilot extend beyond the mere task of operating an aircraft. The pre-flight phase encompasses a range of tasks and choices, highlighting the importance of an in-depth awareness of pilots' responsibilities outside of work, and how these may affect performance. The complex relationship between pre-duty activities and the emerging concept of job crafting in the aviation industry offers a promising area for further investigation and potential new insights. This study aims to address the pressing need for a more comprehensive exploration of these dimensions in order to ascertain their impact on the overall landscape of pilot flight performance.

Within this context, the objective of this study is to provide insight into the complex relationship between pre-duty activities, job crafting opportunities, and pilot flight performance. Despite the fact that the aviation industry and past research have acknowledged the importance of technical

skills, this study focuses on comparably significant non-technical variables, notably fatigue and exhaustion stemming from long work hours, demanding schedules with minimal mandated rest periods, and disruptions to the pilots' personal routines.

This research gap will be bridged by collecting data on pilots' perceptions and opinions regarding how off-flight activities are constructed and how they may influence their in-flight performance. Consequently, the study highlights the necessity of accounting for the potential influence of off-duty commitments on pilot performance in such a dynamic and demanding operational environment.

Before the dissertation title was chosen, the researcher consulted a pilot who is currently pursuing a doctorate in a related field. During this consultation, the pilot delved into the use of accurate terminology and explored the gaps that were encountered in his own research. It was concluded that the term "pre-duty activity" would encompass activities happening prior to the "pre-flight activity". Pre-flight activities could include elements such as the briefing turnaround, flight checks, and any events occurring in the few hours leading up to take off (see section ii. Terminology).

1.1.1. Terminology

In the current study, the terms "Pre-Duty activity" and "Pre-flight activity" will be defined as follows:

Pre- Duty activity will refer to the activities occurring in the pilot's life leading up to the moment of pre-flight. These activities might cause fatigue, stress or impact the pilot's performance.

Pre-Flight activity will denote the point when pilots arrive at the airport and commence their aircraft checks, team briefings, and preparations before flying the aircraft. It involves a standardised process that includes operator requirements, checklists, and recommended procedures. Additionally, the captain can also utilise this opportunity to address expectations and ensure the crew is well-prepared, fostering a team-oriented attitude (Maurino & Salas, 2010).

1.2. Research Problem

When researching for secondary data, the researcher uncovered a substantial body of literature discussing in-flight fatigue. One noteworthy study by Goker (2018), extensively discussed the topic, focusing on how fatigue can lead to cockpit errors that can in turn, adversely affect flight performance. This study also explored methods of measurement and contributing factors to fatigue, such as lack of sleep, extended duty periods, jet or shift work-related fatigue, lack of physical and mental fitness levels, and also high workloads. These insights were drawn from a range of peer-reviewed articles such as Powell (2007) and Sallinen (2017), papers and reports available in reputable academic databases such as Hydi, Elsevier, and relevant aviation journals. However, it is important to note that this contrasts starkly with the limited available data on fatigue during pre-duty activity. It was noted that there is a scarcity of scholarly works in this specific area with very few resources dedicated to the pre-duty phase and an even more pronounced lack of information regarding duty activity in the pre-flight context.

Although regulations do highlight the importance of pilot behaviour outside their duty hours, they do not explicitly specify the types of behaviours pilots are expected to engage in, except for recommendations about utilizing rest periods optimally and ensuring adequate rest. Additionally,

there exists Subpart-FTL ¹ to ensure that pilots are able to operate with an adequate level of alertness, although this does not regulate activities performed by crew members in their free time (EASA, 2023).

Commercial aviation operates around the clock, leading to pilots often working non-traditional and socially-challenging hours with continuously shifting schedules. These conditions present significant barriers to maintaining a healthy lifestyle due to disruptions in routines and no work-life balance (Joan et al., 2020). This suggests that factors affecting a pilot's quality of life outside duty briefing could potentially impact their performance. Therefore, having a choice in flight schedules can enhance their quality of life beyond their specific tasks and, in turn, improve safety.

The researcher's investigation centres on pre-flight duty activities, a critical yet often overlooked aspect of aviation. While much of the existing research focuses on in-flight briefing and the standardized checklists provided by airlines, there is a significant gap when it comes to understanding the activities that occur before the pilot even arrives at the airport. These pre-flight activities have the potential to impact flight performance significantly. Thus, it is essential to investigate this research problem to gain a more comprehensive understanding of the factors that influence pilot performance and safety, particularly those occurring before the flight itself begins.

¹ Flight and Duty Time Limitations (measures to make sure crew fatigue doesn't endanger flight safety)

1.3. Aim and Objectives

This research will explore how activities outside of official duty may impact pilot flight performance. It particularly explores the potential of job crafting as a means of mitigating fatigue, which is a prominent element being investigated as a contributor to human errors.

The main objectives in this research are:

- To investigate the nature and extent of job crafting among pilots
- To examine the effects of job crafting on pre-duty activity and subsequent flight performance
- To determine whether job crafting can serve as an effective strategy in reducing human errors caused by pilot fatigue or stress.

The present study would like to assess whether a pilots' preference for morning flights or evening flights, circadian rhythms (Maurino & Salas, 2010), flexibility in flying, and job crafting can individually or collectively contribute to enhancing their performance by mitigating fatigue caused by pre-duty activities. Additionally, the study will explore recommendations for airline management..

1.4. Research Questions

This research study will adopt a qualitative approach, using an inductive method to explore pilots' experiences and narratives regarding how they shape their life outside work and the potential influence that this might have on their performance while on duty. The data will be analysed using thematic analysis, as it provides accessible and systematic procedures to generate the necessary

themes from the qualitative data collected during focus group discussions. This approach is flexible and can be used to identify patterns within the participants' experiences and perspectives (Clarke & Braun, 2017).

The following research questions will guide the investigation:

Q1: To what extent does pre-duty activity influence subsequent pilot flight performance?

Q2: How does job crafting impact the performance outcome of an airline pilot while on duty?

1.5. Dissertation Outline

The subsequent section presents an outline of the dissertation, providing a comprehensive overview of the forthcoming chapters.

Chapter 2: Literature review

This chapter offers comprehensive insights into the extant secondary sources pertaining to the subject matter of this study. It will delve into the literature related to the objectives outlined earlier. This includes literature discussing pre-flight and in-flight activity, tools used in this process, references to factors such as fatigue and stress, and difficult flight schedules that disrupt pilot work-life balance routines.

Chapter 3: Methodology

This focuses on the methodology employed, specifically focusing on the qualitative research design. Additionally, this chapter outlines and discusses the procedures employed for data

collection and analysis. Any limitations that emerged during the research process will also be discussed.

Chapter 4: Data Analysis and Findings

This chapter will present the primary themes derived from the data collected during the focus groups. This will be followed by a compilation and evaluation of the findings. The researcher performed a comprehensive examination of the results to derive conclusions regarding the prominent themes that emerged.

Chapter 5: Conclusion and Recommendations

This chapter serves as the concluding chapter. It includes a comprehensive synthesis of the research findings; a set of recommendations for future investigations that may pique the interest of researchers, pilots, and airlines.

1.6. Summary

This dissertation aims to provide valuable insights into pre-duty activity and job crafting, specifically their relation to pilot performance and their decision-making processes. The primary objective of this study is to offer valuable insights that can be utilised to improve training programmes, operational strategies, and regulatory frameworks. Ultimately, the goal is to enhance overall safety and effectiveness in aviation, benefitting both pilots and passengers.

Chapter 2: Literature Review

2.1. Introduction

In line with the previous chapter, the dissertation will refer to the research activity of interest as the “pre- duty activity”. The term encompasses the various aspects of how pilots prepare themselves for their work-related duties, manage their work life balance, and adhere to routines that might affect their levels of fatigue. On the other hand, “pre-flight activity” will refer to the procedures that are normally regulated by the airline operators which include pilots’ discussions with their team before boarding the aircraft for the in-flight briefing. These discussions are pivotal for team building, leadership development, and the collection of operational data pertinent to the upcoming flight (Skybrary Aviation Safety, 2023). Additionally, the upcoming section will provide a sketch of how the Literature review will be divided.

2.2. Conceptual Framework

This Literature review will briefly describe the main concepts under consideration. Namely, the risk factors of fatigue and its ultimate effect on pilot performance. Additionally, it will outline key concepts integral to this literature review, where relevant secondary data and existing literature was gathered and reviewed by the researcher to better understand any research gaps. This process involves addressing the research questions, acknowledging underlying assumptions and limitations.

Visual Representation of the Framework:

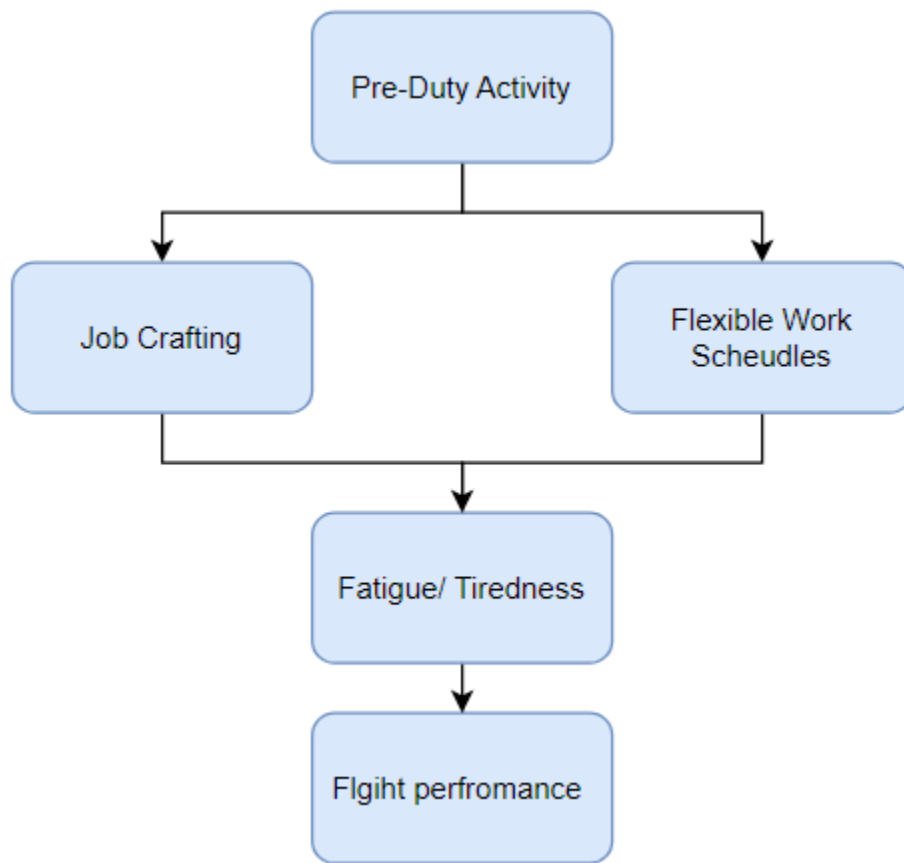


Figure 1.: Conceptual Framework (Author, 2023)

2.3. Fatigue

According to the Oxford English Dictionary, Fatigue in humans is “extreme tiredness arising from mental or physical effort” (Oxford Dictionaries, 2023). However, there are various other definitions which are contingent upon individual experience and context. NASA, for instance, subjectively defined fatigue as “feeling tired, sleepy or exhausted” (Philips, 2015). For the researchers better understanding and intuition on how to understand this concept of fatigue, the

researcher has opted to use a more psychologically oriented definition although not necessarily as accurate and relating to fatigue in aviation as the definition by ICAO which will be discussed further done in the upcoming section. This can be defined as:

the inability to function at the desired level due to incomplete recovery from demands of prior work and other waking activities. Acute fatigue can occur when there is inadequate time to rest and recover from a work period. Cumulative or chronic fatigue occurs when there is insufficient recovery from acute fatigue over time (Gander et al., 2011).

2.3.1. Fatigue in Aviation

Fatigue is a pervasive issue across various industries, but it assumes a particularly critical dimension in high-risk sectors like aviation. In these environments, even minor human errors can have fatal consequences, especially since 70% of accidents and incidents happening in the air are related to human errors and cognitive-related issues (Liu et al., 2016). Fatigue in aviation can have significant consequences for flight safety as it can impair cognitive and motor abilities, leading to decreased reaction times and increased risk of errors (Bendak & Hamad, 2020). The International Civil Aviation Organization (ICAO) provides a specific and aviation-focused definition and defines it as:

a physiological state of reduced mental or physical performance capability resulting from sleep loss or extended wakefulness, circadian phase, or workload (mental and/or physical

activity) that can impair a crew member's alertness and ability to safely operate an aircraft or perform safety related duties (ICAO, 2020).

2.3.2. Fatigue's Impact on Flight Performance

In addition to fully understanding what fatigue in aviation is, it is also necessary to fully comprehend its impact on flight performance.

The concept of flight performance encompasses a multifaceted evaluation of the effectiveness, safety, and efficiency of a flight from the moment of take-off to the point of landing. The process includes a comprehensive assessment of multiple variables, including the technical proficiency of the aircraft and the cognitive aptitude required for vigilant and capable operation within the aviation environment (Dismukes, Goldsmith & Kochan, 2015). This also includes the adherence to pre-established flight plans, skilled execution of flying manoeuvres, efficient communication with air traffic control, competent handling of emergency situations, and proactive mitigation of potential risks. Commercial aviation is fundamentally a collaborative endeavour, where the flight crew collaborates with other key stakeholders such as air traffic control, dispatch and maintenance teams (Dismukes, Goldsmith & Kochan, 2015).

The overall effectiveness of a flight is contingent upon the interplay between the pilot and machine variables, considering the mounting stress loads experienced by both entities. It is worth noting that these stress loads are not equally quantifiable, as aircrafts undergo thorough inspections during each turnaround, while pilots engage in recurrent training sessions conducted fewer times annually, a frequency that is largely dependent on the operator. Research by Haunschild (2002) has shed light on the implications of this discrepancy, which may elucidate the relatively rare

occurrence of accidents stemming from machine malfunctions, with human error emerging as the primary focal point. Consequently, pilots grappling with fatigue, stress, or cognitive strain can potentially impede their ability to maintain optimal flight performance (Haunschild & Sullivan, 2002).

In fact, fatigue has been cited as either a primary cause or a contributing factor in several major aircraft accidents (Wingelaar-Jagtet al., 2021). Additionally, research by Caldwell (2009) also mentions that sleep deprivation, which in turn leads to fatigue, has a negative effect on aircrew, which leads to errors and accidents. A very clear example of fatigue and its impact on a flight is the crash of Air India Express 812, which occurred in 2010. This crash cost multiple lives and residual sleepiness and judgment impairment were believed to have contributed to this accident (Wingelaar-Jagtet al., 2021). In addition, according to the statistical review of the National transportation safety board (NTSB) in America, pilots' personal issues were the main reasons behind accidents between 2012 and 2021.

This issue of fatigue during flights is acknowledged by the aviation industry and attempts have been made to mitigate it by implementing fatigue management and fatigue risk management systems. The diagram below illustrates a root cause analysis of fatigue management in aviation, highlighting the significance of Fatigue Management Systems (FMS) which is a system including set limits addressed to predict risks of fatigue in general and additionally working as an operational countermeasure, along with preventive strategies incorporated in this system to mitigate and reduce fatigue. However, it is important to note that this analysis often doesn't encompass the fatigue that may be mitigated during the pre- duty activity, which occurs before the flight and isn't typically measurable by an FMS.

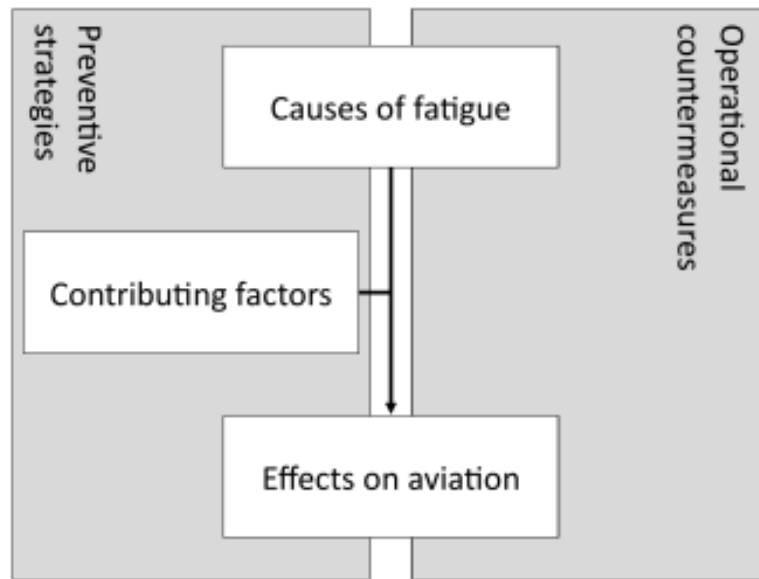


Figure 2.: Root cause analysis of fatigue and areas of influence of fatigue management in aviation. (Wingelaar-Jagt et al., 2021)

2.3.3. Types of Fatigue and its Causes

Fatigue in aviation can be classified into two in categories: acute fatigue and chronic fatigue. Acute fatigue primarily stems from external factors, and can be mitigated by avoiding flight duties, ensuring adequate sleep and rest, and addressing issues with crew scheduling, long duty periods, and jet lag. On the other hand, chronic fatigue is more subjective, and largely depends on individual pilots. It results from persistently-high workloads, mentally and physically demanding tasks, financial problems, lack of mental and physical fitness, and also from personal relationship and family problems. Over time, these factors contribute to the development of long-term chronic fatigue, and it is worth mentioning that all these factors make up the pre-duty activity (Goker, 2018).

The figure below depicts the causes and symptoms of fatigue that ultimately impact a pilot's performance during flight:

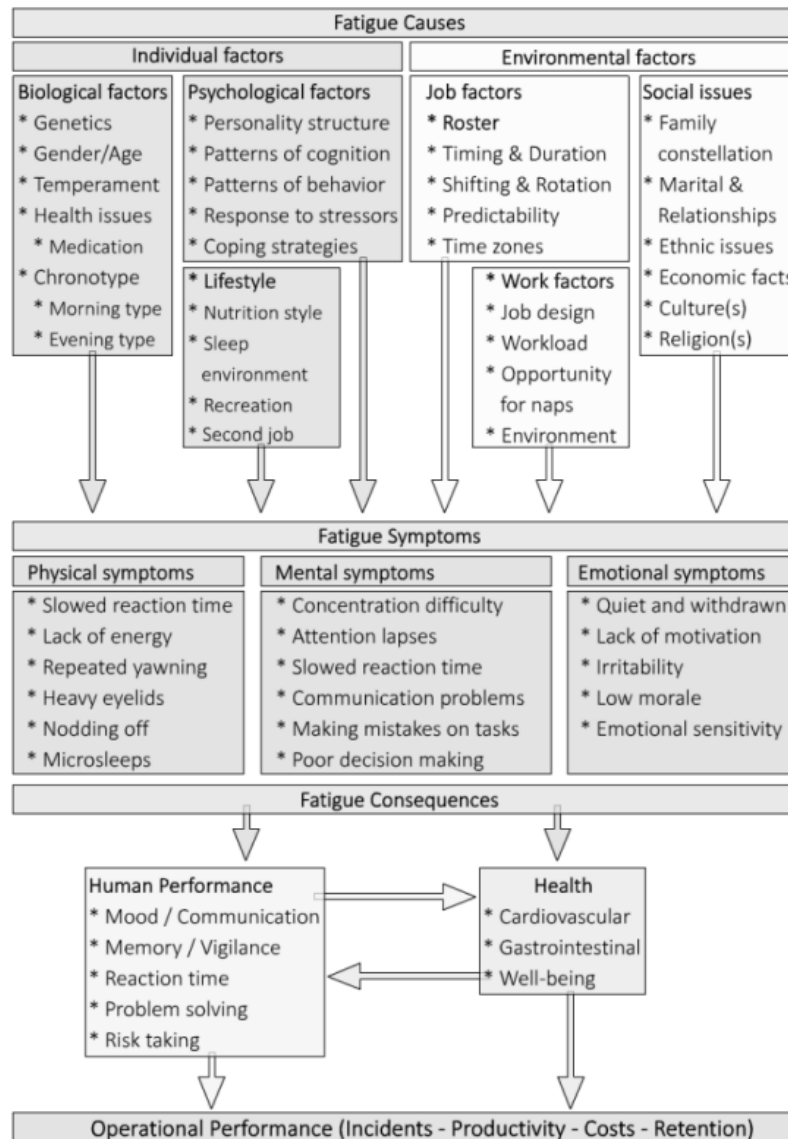


Figure 3.: Causes, Symptoms and Consequences of Fatigue (Goker, 2018)

As depicted in the figure, job-related factors (themes that will be explored in greater detail in this literature review) are categorized as external factors. These factors, if addressed by operators, have the potential to contribute to the reduction of fatigue symptoms, encompassing physical, mental, and emotional aspects. This is mainly because if more flexibility would be given to the pilot to design their work schedule giving them more opportunity to rest, and balance life and work, hence potentially reducing any fatigue symptoms stemming from physical exhaustion.

Discussions within the aviation industry regarding fatigue often operate under the presumption that it doesn't exist. To address this issue and underscore the safety implications of fatigue, the International Air Transport Association (IATA) has published a Fatigue Management Guide. This guide outlines two primary approaches to fatigue management. This first approach entails operators adhering to well-defined and timely limits for pilots while assessing fatigue risks through the Safety Management System (SMS) process. The second approach involves the use of a Fatigue Risk Management System (FRMS) that is approved by IATA (2015). These two approaches delve into considerations such as the quantity and quality of sleep required by pilots, the influence of circadian rhythms on their cognitive and physical performance, and the impact of workload on fatigue. Additionally, despite the existence of these systems it still might not be enough, and various studies in different industries which are also considered high risk discuss this such as Barger (2017) on firefighters, Dara (2019) on surgical intensive care unit nurses, Smiley (2009) on commercial motor carrier industry and also Madeline (2022) discussed and analysed all the latter papers and researcher and concluded that while FRMS are likely to be effective, in organisations characterised by inadequate levels of safety culture maturity and limited resource availability, the successful implementation of these systems may pose significant challenges. in

fact Madeline et al., (2022) discusses that the studies above focus mostly on FRMS implementation and components rather than FRMS effectiveness.

It is therefore apparent that long-term fatigue is already known to exert detrimental effects on both health and performance. However, when considering airline pilots, there is still a significant gap in research on this particular form of fatigue. The risk factors associated with long-term fatigue in airline pilots encompass a spectrum of personal, work-related, health, and lifestyle factors (Drongelen et al., 2016). The risk factors linked to long-term fatigue among airline pilots encompass a wide spectrum of influences, spanning personal, work-related, health, and lifestyle factors. The current study focuses on specific aspects, notably job crafting, flexible work schedules, and shorter work durations. This focus highlights a distinctive research gap within the existing body of knowledge.

2.3.4. External Risk Factors of Fatigue

In the following section, job crafting, flexible schedules, and shift work will be reviewed in terms of their significant concern within the larger spectrum of pilot fatigue and their impact on flight performance. The complex interaction between organisational and scheduling elements is examined as a framework for understanding the various internal and external factors that contribute to fatigue in the aviation industry. The recognition and categorization of various types of fatigue, spanning from acute to chronic manifestations, hold particular importance due to their distinct impact on aviation professionals.

Furthermore, this section discusses the dynamic nature of job crafting, flexible schedules, and shift work as external factors. It examines their inherent potential to improve the problems related to

different forms of fatigue. The discourse expands beyond traditional viewpoints, highlighting the necessity of taking into account acute fatigue, chronic fatigue, and other significant forms of fatigue, including cognitive fatigue and vigilance decrement. Through a meticulous examination of these variables, our objective is to determine the complex network of links that influence the aviation work environment. This attempt will provide valuable insights necessary for the development of efficient strategies to improve pilot's wellbeing and maximise flight efficiency.

2.4. Job Crafting

Job crafting empowers pilots to customize their schedules and tasks, aligning them with their individual needs and personal life. This tailored approach enables the creation of an optimal schedule designed by the pilots themselves. The flexibility afforded by creating their own work schedules plays a pivotal role in mitigating fatigue. It allows pilots to strike a better balance between their professional commitments and personal responsibilities. This equilibrium, as emphasized by Caldwell, contributes to reduced fatigue levels (Caldwell, 2005).

As defined by Dutton's theory (2001) and furtherly researched by Petrou et al, (2018) job crafting refers to the physical and cognitive adjustments individuals make within the tasks and relational boundaries of their work, moreover more recently however those who engage in this proactive approach are referred to as job crafters. There are three key types of job crafting: the first involves employees modifying the activities they perform while executing their work; the second type pertains to cognitive task boundaries, allowing individuals to alter how they perceive their job, whether as a set of discrete tasks, integrated components, or in other ways; the third type focuses on relational boundaries, addressing interactions and the discretion employees exercise in their

job-related relationships (Dutton, 2001). This process enables individuals to actively shape their roles to cultivate a work experience that is more meaningful, engaging, and satisfying. As a result, this can lead to enhanced well-being and improved performance outcomes.

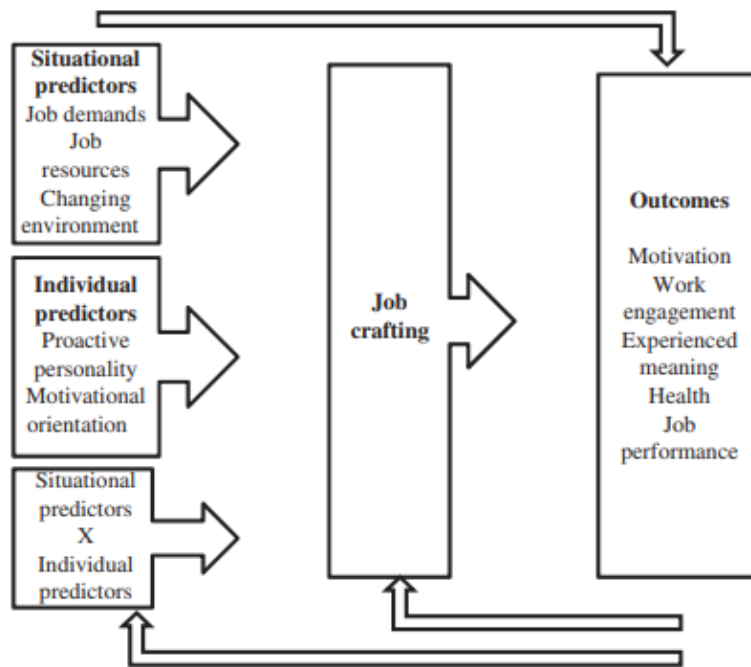


Figure 4.: Model Integrating the findings on job crafting research. (Demerouti, 2014)

Demerouti's research also identified several contributing factors associated with job crafting that have the potential to reduce fatigue during flights. As Figure 2 above which shows, factors such as job autonomy and job challenges which are positively associated with job crafting, while task interdependency presents as a frequent obstacle leading to reduced job crafting among employees (Demerouti, 2014).

The primary driving factors behind individuals' involvement in job crafting activities seem to centre on achieving their goals, enhancing the alignment of their job requirements with their personal attributes, and fostering overall well-being and motivation. Organizations can benefit from the practice of job crafting to not only complement top-down job restructuring but also to gain a competitive advantage in talent acquisition and retention, as this emphasises the role of individual proactivity at work (Hedge & Carter, 2020). This approach allows them to tailor job roles to specific employee groups effectively. Interventions focused on job crafting have proven their effectiveness in enhancing employee engagement by encouraging proactive adjustments to the work environment, particularly by addressing the changes that the employees request or initiate in their jobs and schedules to further their own goals (Tims & Arnold, Job crafting: Towards a new model of individual job redesign, 2010).

2.5. Flexible Work Schedules

Other than job crafting a concept of interest which affects pilot flight performance is the ability to have flexible work schedules. The concept of employees having control over the timing aspects of their work engagements has attracted significant interest because of its potential to improve job outcomes and promote employee well-being (Zhenjing et al., 2022). Employees can have varying work arrangements, affording them the freedom to choose when and where they work for different durations. This choice influences how individuals allocate time at work in relation to non-work activities, such as time spent on caregiving, domestic activities, household work, and leisure (Fagan, 2001). This directly relates to the pre-duty activity, as pilots can ensure a work-life balance that reduces the risk of fatigue or stress before a flight, thereby enhancing flight performance.

In fact, flexible work schedules are becoming an increasingly important topic for industrial and organisational (I/O) psychology because they show how human resource practices are adapting to the changing nature of work. This adaptation becomes evident in a labour force characterised by diverse work time availability and significantly changes the design of work systems to accommodate the demands of a 24-7 global economy (Kossek & Michel, 2011). In fact, there is a growing emphasis on addressing issues related to the design of new collaborative work patterns, as well as evaluating team performance and motivation, and understanding their impact on team stress levels (Conboy & Carroll, 2020).

Wiersma and Hall (2007) emphasise the great significance of work schedule flexibility as a strategic approach for employees to align their professional obligations with personal responsibilities and preferences. Their study concluded that employees with the opportunities to plan their work and careers are more likely to align their goals with the organisation. This results in the employees feeling more valued, hence leading to a higher level of commitment, motivation, and ultimately improved performance (Lips-Wiersma & Hall, 2007).

The connection to job crafting is of particular interest, as self-initiated modifications to one's schedule align with the fundamental principles of flexible scheduling. The proactive behaviour of employees in adjusting their work schedules to suit their personality type plays a crucial role in reducing fatigue and fostering a sense of autonomy.

2.6. Shift Work

Finally, shift work is yet another factor which is likely to increase fatigue and ultimately affects pilot performance. Shift work is a well-established practice involving distributing working hours

across multiple occupational groups to ensure continuous duty performance or production coverage. Shift workers, who operate during non-traditional working hours, typically prior to 7 am and after 6 pm, play a crucial role in various industries (Kazemi et al., 2016). The available evidence indicates that a number of accidents in various industries over the past few decades, including notable ones such as Chernobyl, Three Mile Island, Bhopal, and incidents involving chemical spills into the Rhine and Valdez, have all taken place during night-time hours (Kazemi et al., 2016). Investigations into these accidents have consistently identified shift work and human errors made by control room operators as the primary contributing factors.

Cognitive functions, such as working memory, attention, and information processing speed, are crucial for the successful execution of various tasks. Consequently, any temporary impairment in cognitive and mental performance can have significant repercussions for individuals, particularly in situations that demand prompt and accurate responses. Tucker et al's. (2000) research, for instance, underscores the heightened risk associated with afternoon and night shifts compared to morning shifts. The risk trajectory increases over the course of a shift but decreases after the second hour of a night shift. Furthermore, risk intensifies over consecutive shifts of any type, but particularly more with night shifts, and exhibits notable escalations between rest breaks. There is comprehensive understanding of the advantages that are associated with shift work schedules, particularly in industries with high-risk profiles, such as the aviation industry, wherein cognitive accuracy assumes paramount importance. Furthermore, the correlation between flexible schedules and fatigue management systems (FRMS) underscores a mutually beneficial connection, wherein personalised work hours not only coincide with fatigue mitigation but also enhance overall employee satisfaction and well-being (Sprajcer et al., 2021).

2.7. On Aircraft Fatigue Management Systems and Countermeasures

As previously mentioned, since fatigue stands out as a prominent contributor to errors, the aviation industry has taken significant steps to address it. Even the aircrafts themselves are equipped with alertness models; These come in the form of biomathematical models that incorporate different parameters to calculate a fatigue risk index, thus enabling the accurate prediction of fatigue-related risks during flight (Thomas et al., 2015). Moreover, Airbus, a leading aircraft manufacturer, has expanded one of its zones of tolerance. This expansion allows pilots to engage in a more humanized form of debriefing rather than the typical standardized checklist. However, this occurs after the pre-flight duty activity, which is potentially too late if a pilot is already stressed and tired due to experiences during this pre-duty phase.

Furthermore, as per the below figure, there exist various countermeasures that pilots can contemplate, which the researcher aims to delve into further. These countermeasures hold the promise of mitigating fatigue, both during flight and in the pre-flight phase. The figure below which was adapted by the researcher from Caldwell (Fatigue In Aviation, 2005) depicts how In-flight and pre-flight differ from each other.

The table below divides countermeasures into two distinct phases: in-flight and pre-/post-flight. In-flight countermeasures encompass a range of strategies aimed at mitigating the effects of fatigue and promoting alertness among flight crew members.

Table 1.: *Fatigue Countermeasures, adapted from (Caldwell, 2005) by author.*

In-Flight Countermeasures and Strategies	Pre-/Post flight Countermeasures and Strategies
1. Cockpit Napping 2. Activity Breaks 3. Bunk Sleep 4. In-Flight Rostering 5. Cockpit Lighting	1. Hypnotics 2. Improving Sleep and Alertness i. Healthy Sleep practices ii. Napping iii. Circadian Adjustments iv. Exercise v. Nutrition

These in-flight measures include the practise of cockpit napping, which allows pilots to take short periods of rest during flight. Additionally, activity breaks are used to provide opportunities for physical movement and reduce sedentary behaviour. Bunk sleep facilities are made available to crew members especially in long haul flights, enabling them to obtain longer periods of sleep. These strategies are designed to optimise alertness levels during travelling,

In contrast, countermeasures implemented before and after flights involve the administration of hypnotics to induce sleep and a more comprehensive approach to enhancing sleep quality and alertness through the adoption of healthy sleep habits, strategic napping, adjustments to circadian rhythms, engagement in physical activity, and adherence to a nutritious diet. The above figure serves to visually highlight the subtle distinctions between these approaches similarly to a Fatigue Management System. In general, this framework recognises the complex and diverse aspects of

fatigue management, highlighting the importance of customised strategies depending on the pilots schedule and flight and to address the distinct challenges faced during in-flight and pre-/post-flight phases in aviation operations.

2.8. Summary

Studies have delved into the repercussions of fatigue during flight, with both the International Civil Aviation Organization (ICAO) and aircraft manufacturers implementing risk management systems on aircrafts and specialized pre-flight briefings as part of standard procedures before boarding (Madeline et al., 2022). However, despite the intensive literature discussing the development of Fatigue Risk Management Systems FRMS in flights, a comprehensive review of their effectiveness remains conspicuously absent.

Therefore, pre- duty activity fatigue needs to be given as much importance as in-flight fatigue. This entails recognizing factors that might exert an influence, including the potential impact of job crating, and also pilots' preferences for traveling schedules aimed at mitigating pre-flight fatigue. Notably, job crafting has the potential to yield benefits such as increased job satisfaction, risk reduction, and improved mental health, in stark contrast to the ICAO's definition of fatigue (Tims, Bakker & Derks, 2013).

Chapter 3: Methodology

3.1. Introduction

This chapter provides a comprehensive overview of the research methodology employed to effectively address the objectives of the study. The chapter is divided into five distinct sections: it commences with an introductory segment, which discusses the methodological framework used; the research approach, which includes an examination of constraints and benefits of the chosen approach; a comprehensive account of the participants and their characteristics, which includes the sample size and power; an examination of various data collection techniques and analysis methodologies used; and finally, the ethical considerations and the summary.

3.2. Methodology

This pivotal chapter provides an analysis of the chosen methodological framework for studying the effects of pre-duty activities and job crafting on pilot flight performance. The chapter provides a comprehensive analysis of the methodology for data acquisition, encompassing a thorough examination of the reasoning behind the methodology selection, participant characteristics, reflexivity, and ethical considerations.

The execution of the research is comprehensive, emphasising the utilisation of a qualitative research method for data collection and the adoption of a thematic analysis approach for data analysis. The selection of thematic analysis as the analytical method is due to the rich insights it provides. This is especially the case since data derived from in-depth, semi-structured interviews, initially presented themselves as unstructured.

The researcher then coded the unstructured data into different themes and subthemes, providing a nuanced understanding of each participant's perspective. This coding process enabled the researcher to interpret emergent themes effectively.

3.3. Research Approach

In this investigation, a qualitative research approach was selected to examine how individuals perceive themselves and for them to elaborate their experiences and activities in the pre-duty stage and examines how they attribute significance to their everyday experiences. The selected method for data collection, namely in-depth semi structured interviews, demonstrated flexibility and sensitivity to the contextual factors, thereby aligning with the social context (Hox & Hennie, 2005). Qualitative research is characterised as an approach that is naturalistic and interpretative, with a focus on exploring phenomena from an insider's perspective (Ritchie et al., 2014). The objective of this approach is to analyse phenomena by considering the viewpoints of individuals (Denzin & Lincoln, 2011).

To achieve this, the study used semi-structured interviews to gather data from pilots, with a specific focus on topics related to pre-flight preparations and readiness for duty activities. The participants were asked about their approaches to preparing for flights, the pertinent factors they consider, the extent of fatigue they experience prior to flights, and their levels of comfort in particular situations.

3.4. Participants

3.4.1. Participants and Sampling

The participants interviewed were all commercial airline pilots. All these pilots were based in Malta, where the pool of available pilots is relatively limited. Given this constraint, a snowball sampling approach was utilised, with a focus on selecting participants who possessed direct experience and expertise in the subject matter. A total of eleven interviews with commercial airline pilots were conducted, all of whom were actively involved in flying and possessed the necessary type rating qualifications.

Given the nature of the study, relying on a purposive sample followed by a snowball sampling rather than adhering to a well-defined statistical population framework was justified. This rationale aligns with the essence of qualitative research, which is renowned for its emphasis on capturing the depth and complexity of human experiences, allowing researchers to gain insight into implicit pre-assumptions, interpersonal relations, and the subjective meanings individuals attribute to their actions and interactions (Denzin & Lincoln, 2011). This study's objective is to unravel the multifaceted realities faced by airline pilots, making a qualitative methodology the most suitable choice. The researcher then employed snowball sampling, this involved leveraging existing contacts within the pilot community to identify suitable interviewees.

The study obtained ethics approval and ensured that participants were provided with information letters and consent forms (see Appendix A and B). Prior to commencing any data collection, the researcher submitted the FREC form for approval by the University of Malta. All correspondence to participants was sent via the university email to maintain data security and compliance with

ethical guidelines. The participants were then also compensated with a 10-euro food voucher as a token of appreciation for their time and participation.

3.4.2. Research Participants and Code

For ease of reference and confidentiality purpose each participant was given a code such as participant 1, participant 2, participant 3 etc. and these codes were used during transcription and data analysis as can be seen in the upcoming chapter.

3.4.3. Sample Size and Power

As already stated, this research employs a qualitative methodology to explore the intricate perceptions and experiences of airline pilots within the aviation industry during their pre-duty activity. The chosen qualitative approach stems from the recognition that such an investigation demands an in-depth exploration of individual perspectives, contextual factors, and subjective experiences.

In the context of the aviation industry, precise statistical data can be challenging to obtain due to its unique operational characteristics and the confidentiality often associated with it. Consequently, accurate statistical data detailing the precise number of airline pilots is often not publicly available. In fact, the researcher contacted the National Statistics Office (NSO)(Appendix C), and they had no data available. This absence of accessible data is not uncommon in studies focusing on specialised professional groups, where specific information might be confined due to industry regulations or privacy concerns.

In context of this qualitative research, the primary objective is not to generalise findings to a larger population, but rather to uncover diverse perspectives within a smaller sample that can provide deep insights into research purpose of study. As such, the absence of a full statistical framework for the entire population of airline pilots is less critical. Given the lack of statistical data and the nature of the research, an assumption about the sample was deemed necessary. This assumption was guided by careful consideration of the study's objectives, the feasibility of accessing participants, and the aim of achieving a diversity of experiences and perspectives among the pilots.

Despite these assumptions, rigorous measures were implemented to ensure the credibility and validity of the study. Purposive sampling strategies were employed to select participants who could provide diverse and insightful perspectives on the research topic. Additionally, the researcher actively pursued data saturation to ensure that a comprehensive range of viewpoints was represented within the study.

3.4.4. Names, Validity and Reliability

The researcher's role as the primary instrument necessitated careful consideration of reliability and validity. Comprehensive records were diligently kept in order to monitor and document the in-depth interviews. Gibson (2006) asserts that interviews which employ purposeful sampling, offer comprehensive insights into a particular subject matter. The sessions were conducted online through Teams calls and audio-visual recordings were made. The researcher made sure that the data gathered in a reliable manner, by making use of tables to record data as one can see in the upcoming chapter with the use of NVivo, make use of comprehensive data and constant testing

and comparison of data (Mohaffyza et al., 2015) which will be done during the interviews with pilots.

3.5. Reflexivity

Reflexivity is a fundamental concept which acknowledges that a researcher has bias and perceptions that can influence participant decisions throughout data collection. This aspect is of critical importance, even at the early stages of the research (Johnson, Adkins & Chauvin, 2020). Reflexive practices were maintained throughout the research process to acknowledge and manage potential biases. The researcher achieved this by adhering to a comprehensive interview schedule.

The choice of the research topic was primarily driven by the author's personal interest in the subject matter. The researcher has previously conducted research on the aviation industry as part of their undergraduate studies and had gained practical experience through apprenticeships with various airlines.

Considering that a snowball sampling approach was used, and it has an inherit of bias as people will refer people who they personally know, it is worth noting that to try and mitigate, pilots were selected irrespective of their affiliation with any specific airline. This was achieved by refraining from inquiring about the specific airline the participants were affiliated with. Moreover, the researcher also took precautions to avoid contacting pilots with whom they had previously collaborated, as such contact could have potentially made the participants uncomfortable about sharing information related to specific matters. This approach underscores the researcher's commitment to maintaining impartiality and ensuring the research's credibility.

The researcher created an interview schedule based on the five steps derived from the systematic methodological review by Kallio et al (2016) which focused on semi-structured interview guides. This comprehensive review drew insights from various literature sources, including Cridland (2015) who provided reflections and recommendations on the overall stages of qualitative research, and Chenail (2011) whose research aimed to describe an approach to interviewing participants for addressing instrumentation and research bias.

This five-step process encompasses the following:

1. **Identifying Prerequisites:** This step was addressed in the preceding discussion, considering the study's nature.
2. **Retrieving and Using Previous Knowledge:** The draft of the interview guide was meticulously prepared following an in-depth literature review.
3. **Formulating Preliminary Semi-Structured Interview Guide:** This process can be seen in detail in Appendix D.
4. **Pilot Testing the Guide:** The researcher conducted sample interviews with individuals well-versed in the topic, incorporating changes based on the outcomes of these interviews.
5. **Presenting the Complete Semi-Structured Interview Guide:** The final step involved presenting the comprehensive interview guide, inclusive of prompts and probes designed to facilitate smooth and meaningful conversations during interviews.

The interviews were transcribed faithfully by the researcher and were uploaded on NVivo Software. Subsequently, employing a line-by-line coding technique provided by NVivo, the

researcher meticulously read the transcribed transcripts multiple times during the data analysis process. This program made it easier to organize, code, and analyse the interview transcripts.

The coding procedure entailed labelling portions of text with descriptive labels, allowing the detection of recurring patterns and themes in the data. NVivo's query capabilities were also used to retrieve important information. Word frequency queries, matrices, and coding stripes in the program gave useful insights into the data, aiding in the discovery of patterns and similarities. The researcher then created codes from concepts and ideas that emerged from the transcript whether shared among participants or unique to each. Important notes were labelled, and the results from each participant and conversation were summarised to facilitate the process of coding and to form a thematic analysis.

Finally, the researcher discussed their interpretation of what the findings implied and how they refuted or confirmed the facts found in the literature review. The researcher's ultimate objective was to extract key concepts from participant discussions and formulate a conclusion.

3.6. Ethical Considerations

Ensuring the safeguarding of individuals through the application of suitable ethical principles is a crucial aspect of all research endeavours. However, ethical considerations in qualitative research hold greater ethical significance owing to the in-depth nature of the study method (Arifin, 2018).

It is imperative to conduct research in a manner that mitigates potential psychological and physical harm to both human and animal subjects, while also minimising financial damage to organisations. The data gathered during this study was exclusively utilised for the purposes of this research. Any

information collected was stored securely on a password-protected laptop and access was solely restricted to the researcher. The data was preserved throughout the duration of the study. Upon the completion of the study and the attainment of its objectives and findings, the personal data, including individual interview transcripts, will be expunged. This approach respects the participants' anonymity and provides them with the option to have all their data erased upon request, in accordance with Article 17 of the GDPR Act. This provision, commonly referred to as the "Right to be forgotten," ensures that individuals' personal, moral, and business interests are safeguarded. The primary aims of the General Data Protection Regulation (GDPR) are to safeguard and enhance the rights pertaining to personal data, as implemented on the 25th of May 2018 (European Commission, 2018).

The research participants were provided with a comprehensive information sheet, data sheet, and consent form, which they were required to sign. The data forms presented comprehensive information regarding the study and outlined the intended use of the collected data, it also adhered to the FREC form. The researcher also explicitly enumerated the participants' rights and explicitly guaranteed their full entitlements in accordance with the General Data Protection Regulation (GDPR) Act. It was emphasized that data collection would only proceed after receiving a duly signed consent form from each participant.

During the process of data collection, the likelihood of encountering any physical harm was extremely low. The interviews were conducted remotely, allowing the participants to engage from the convenience of their personal home or secure office settings.

The pilots invited to participate in this study had the full prerogative to decline participation and discontinue their involvement in the study at any point throughout the research endeavour. No personal data from the participants was gathered beyond what was necessary to address the research questions and objectives. The identities of the participants were kept confidential throughout the study, and the names of the affiliated airlines were not disclosed in the final dissertation to enhance their privacy and security.

3.7. Summary

This chapter provides an overview of the research methodology employed in the study. It delineates the approach adopted for gathering primary data, with the specific purpose of addressing the research objectives. The author meticulously examines the methodology employed for data collection, highlighting the adoption of a qualitative approach to generate more comprehensive findings that align with the study's objectives and research inquiries. The primary purpose of this chapter is to establish a robust foundation for the subsequent chapter, which will conduct a descriptive evaluation using the collected data.

Chapter 4: Results and Findings

4.1. Introduction

This chapter will comprehensively present the findings of the study, providing an in-depth analysis of the data collected during the interviews with airline pilots. The data analysis process was conducted using NVivo, enabling the uncovering of significant themes and patterns within the data. This chapter will present the major themes, subthemes, and variations that emerged from the

interviews, supported by NVivo-generated reports and visualisations. Finally, the analysis will also highlight any limitations of the study that could impact the interpretation of results.

4.2. Data Analysis Approach

All interviews were divided into four sections as per the below list:

1. **Perception and Association:** This segment focused on exploring pilots' perceptions and associations related to pre-duty and pre-flight activities. Pilots were questioned about their work routines, and individual preparation.
2. **Impact on Performance:** Delving into the direct impact of these work routines and individual preparation on overall performance, this section aimed to uncover insights into how these aspects contribute to or hinder optimal performance.
3. **Flexibility in Flight Procedures:** This segment examined the adaptability of in-flight procedures. It probed deeper into how factors during pre-duty activities might affect procedures during flight, including addressing risks associated with fatigue and encompassing various types of fatigue.
4. **Customization and Tailoring of Job Activity:** Exploring the potential for customizing and tailoring the job schedule, this section aimed to create a better work-life balance for pilots. The objective was to assess whether such adjustments could positively impact both the pilots' personal well-being and, consequently, their overall performance.

From the aforementioned list, four major themes emerged in the cycle of a pilot's journey. These themes will be further discussed below.

Additionally, the researcher has created a summary of themes and sub-themes derived from the interview areas, presented in the table below for ease of reference.

Table 2.: Summary of Themes and Sub Themes (Author, 2023)

Summary of Themes and Sub Themes.		Themes			
Interview Schedule Areas		Pre Duty Activity	Pre Flight Duty Activity	In Flight	Effects on Performance
	Perception and Association	Getting Ready For Flights Pre Duty Activities Family Responsibilities Communication and Work Tasks After Hours Packing for long trips Adapting to various climates	Checking Pre-Flight Instructions Problems & Documentation Commencement of Duty Time	Duty Activities (Airport / Mid Flight) Training and Guidance	Effects on Performance
	Impact on Performance	Time Management Meals and Planning Choosing between convenience and well-being	Requirement of Legal Documentation	Controlling and Coping with Fatigue	Impact of Pre-Duty Activity on Performance Effect on Fatigue and Performance Balancing Strategies
	Flexibility In-Flight Procedures	Personnel Priorities Work Schedule and Fatigue Management	Flexibility and Pre-Flight Methods	Operational Difficulties and Adaptation	Safety Precautions Adhering of SOPs
	Customization and Tailoring Job Activity	Job Scheduling Discretion and Access to Electronic Tools (Benefit of Electronic Tools) Challenges of Continual Accessibility			Job Adjustment, Advantages and Disadvantages Job Affect, Pilot Wellbeing, and Performance Changes Discretion in assessment training and operations

The first theme uncovered during the data collection gave the researcher in-depth insights into pilots' perceptions on pre-duty activity and the differentiation they make between this and pre-flight duty activity. The main emergent sub themes discussed factors outside aviation, encompassing family responsibilities, physical fitness, routines, engagement, and activities after working hours. Many participants mentioned that despite having strict, legally binding flight time hours, operators often maximise these hours. This practice leaves pilots with insufficient pre-duty time, resulting in pilots not having a good quality of life.

Table 3.: Pre-Duty Activity (Author, 2023)

Pre Duty-Activity	
Sub Theme	Sub-sub themes
<u>Getting Ready for Flight</u>	● Fitness and rest before flight ● Describing work routines
<u>Pre-duty Activities</u>	● Comfortable pre-duty activities ● Individual preparation ● Family conflicts (possible effects of work stress on family)
<u>Family Responsibilities</u>	● Missing family moments due to work schedules ● Continued engagement in activities after working hours.

	• Time management • Mela planning
<u>Long trips</u>	• Packing for long trips • Adapting to various climates
<u>Personnel Priorities, Work schedule and fatigue management</u>	• Relaxation in schedule • CRM and leadership • Flight timing and disintegration
<u>Job scheduling (discretion to electronic tools (benefit of electronic tools)</u>	• Minimum reserve pilot requirements • Trust in airline • Quality of life and feedback • Decision making and discretion. • Integrated systems, electronic tools and documentation • Digital systems and electronic bag • Confidence building (adherence to standard procedures.
<u>Communication and work tasks after hours</u>	• Choosing between convenience and well being

This table is showing the main emergent themes as discussed in the beginning of this chapter and what sub themes emerged, for instance when it comes to the “getting ready for flight”, two sub themes emerged that of fitness and rest before flight and work routines, where pilots emphasised the critical nature of fitness, rest, being mentally prepared and abstaining from alcohol consumption in the 12 hours preceding a flight. These practices are vital as they ensure pilots are in the best condition for flying.

“So preflight duty activity first of all, the first idea is the rest before the flight. Secondly obviously that you are fit to fly, so we're rested, no alcohol from 12 hours, and being comfortable and aware, then of course, it's reporting to work”.

Maintaining physical and mental fitness is directly linked to the safety and efficiency of the flight and being well-rested and free from the influence of alcohol allows pilots to maintain a high level of alertness and concentration. The research objective to understand pilots' perceptions and associations with pre-flight activities is addressed by highlighting how these practices contribute to their readiness for flight.

In the pre-duty activity's theme various other subthemes emerged as per the above figure and these are closely tied to individual preparation and comfort during pre-duty activities. Pilots mentioned that before embarking on an early morning flight, they follow a sequence of actions that include waking up early, taking a shower, and enjoying a cup of coffee. These comfort-driven rituals are essential for setting a positive tone for the day. Pilots acknowledge that a relaxed and well-prepared pre-duty routine translates to less stress and a more organised approach to all tasks. In this way,

the research objective of understanding how pilots' pre-duty activities influence their well-being and readiness is explored.

Within this theme, more sub themes emerged relating to family conflicts and family responsibilities. Discussions also covered meal plans and time management; in fact, pilots regard everyday morning responsibilities, such as ensuring children attend school and managing household chores, as essential components of their lives. These responsibilities impact their routine, particularly when they are in Malta. The challenge of balancing responsibilities and pre-duty activities was exposed as being significantly important among participants, particularly in terms of communication and obligations that extended beyond the legally defined duty hours.

Pilots described the critical importance of time management for pre-duty activities. A pilot shared, "Time management is crucial. Being late can create chaos." Under the sub-theme of on-time performance, pilots emphasise the importance of readiness before and during flight, which directly influences punctuality. One pilot expressed that "being fully prepared before the flight ensures we can maintain an on-time performance."

Pilots acknowledged the adverse effects of not getting enough sleep and failing to consume adequate meals before a flight. As one pilot mentioned that "lack of sleep and proper meals can lead to fatigue during the flight." They recognize that pre-duty activities have broader consequences, impacting safety and operational efficiency; in fact, another pilot stated: "our preparations impact not only our performance but also the safety and efficiency of the flight".

Additionally, when it comes to personnel priorities, work schedule, and fatigue management in the pre-duty activity phase, the sub themes of relaxation in schedules, Crew Resource Management

(CRM) and leadership emerged, as the interviews indicate that personnel actively seek to minimise their workloads to maintain job satisfaction and peak alertness during flights. A pilot's perspective reflects this: "minimising workloads helps us stay satisfied and alert during flights." The implementation of CRM and the presence of strong leadership were said to serve as protective measures against adverse outcomes. A pilot shared their perspective: "CRM principles and effective leadership protect us from adverse outcomes." This underscores the importance of structured management in optimising performance and enhancing safety during flights.

Under the sub-theme of flight timing, pilots emphasise the importance of maintaining proper schedules while being prepared to overcome anticipated challenges. One interviewee mentioned "proper schedules are essential, but we're always prepared to overcome challenges." This highlights the delicate balance between precision and adaptability that is required when managing flight timing.

The last main theme emerging from the pre-duty activity section is job scheduling, discretion and access to electronic tools. Subthemes within this category, such as trust in airline decision-making and discretion, integrated systems and electronic tools, and documentation, have surfaced. Pilots discussed how customization can play a role in fulfilling minimum-reserve pilot requirements. Interviews indicated that customization's effectiveness varies with age and experience, as different age groups and experience levels have distinct needs. This sub-theme explores how customization helps meet essential pilot requirements and fosters trust between aviation professionals and their airline. Trust is built on the flexibility and support provided through customisation which eventually can enhance the quality of life for aviation professionals and promote feedback

mechanisms. This sub-theme addresses the research objective of understanding how customization improves the overall quality of life and encourages feedback processes.

The impact of customization on decisions related to fuel and safety was explored as it can affect the decision-making processes. Additionally, it is vital for workload distribution and data access via digital systems and electronic bags. This sub-theme accentuates how customization in digital systems assists with managing workloads and accessing crucial data. It supports confidence building through training and evaluation and emphasises the importance of confidence in executing customised job activities. It directly addresses the research objective of understanding how customization fosters confidence and competence among aviation professionals. In a multicultural context, customization can introduce challenges related to adherence to standard procedures. This sub-theme explores the interplay between customization and multicultural considerations.

The insights derived from the thematic analysis align closely with the research objectives, shedding light on how pilots perceive and associate their pre-duty and pre-flight activities in relation to flight safety and performance. The themes encompass crucial aspects such as physical and mental fitness, decision-making processes for route planning, and the interplay of personal and professional responsibilities.

4.3. Pre-Flight Activity

The upcoming table will discuss and unravel themes that fall under pre-flight activity. During data collection, questions were directed towards the commencement of work duty, encompassing briefing, crew communication, pre-flight activity, and any distinctions from the pre-duty activity. The emergent sub themes were as follows:

Table 4.: Pre-Flight Activity (Author, 2023)

Pre-Flight Activity	
Sub Theme	Emergent sub themes
<u>Checking pre-flight instructions</u>	● Instructions ● Decision making to reach a conclusion (decision to proceed with a flight or cancel it) ● Route planning and weather ● Problems and documentation
<u>Requirement of legal documentation</u>	● Pre-duty activity and its effects (activity before any duty starts) ● Pre-flight activity and its effects (once pilot is at the airport)
<u>Flexibility and pre-flight Methods</u>	● Dispatcher communication ● Importance of standardisation

From the theme of checking pre-flight instructions, the thematic observation revealed that, for pilots, receiving clear and pertinent instructions before a flight is of utmost importance. These instructions typically include details about weather conditions and crew fitness reports. Such information significantly impacts pre-flight and overall flight experiences as understanding weather conditions is crucial for effective flight planning and in-flight decision-making. Furthermore, evaluating crew fitness to fly is essential for ensuring the safety and readiness of the team. This aspect aligns with the research objective of exploring pilots' perceptions and associations regarding the instructions they receive, underscoring how these instructions ultimately influence their pre-flight activities and contribute to the success of their flights.

Regarding route planning and weather assessment, pilots engage in detailed route planning that includes checking fuel requirements, studying weather charts, and reviewing airport details. This process helps them make informed decisions about the flight, ensuring that they have adequate fuel reserves and are prepared to navigate through various weather conditions. By addressing these aspects, pilots are actively managing the safety and efficiency of their flights. Moreover, they emphasise the crucial nature of maintaining up-to-date legal documentation and systems to comply with regulations. According to one pilot, "ensuring all documents are in order is non-negotiable. It's a legal obligation."

When it came to pre-flight Activity and its effects, pilots offered specific explanations about how pre-flight duties affect their performance. One pilot stated, "checking the aircraft thoroughly

ensures everything is in order, which makes me feel more confident during the flight." This demonstrates the direct relationship between pre-flight actions and subsequent performance.

Moreover, in the theme of flexibility and preflight methods, the sub themes discussed the importance of standardisation and communication with dispatchers and ground crew, as one pilot pointed out: "effective communication with dispatchers is key to pre-flight methods." Standardisation is perceived as a vital element in optimising pre-flight methods. Pilots understand that standardised procedures significantly contribute to efficient pre-flight processes and ensure consistency. As one pilot emphasised: "standardisation helps us streamline pre-flight methods and ensures consistency." This insight underscores the value of uniform procedures in enhancing operational efficiency.

In conclusion, the interpretations drawn from the pre-flight activities table illuminate pilots' awareness of the diverse factors influencing them before take-off. They emphasise the significance of communication, time management, legal compliance, fatigue management, and safety measures when trying to optimise their performance to ensure safe flight operations.

4.4. In-Flight Procedures

In-Flight Procedures was the least discussed theme with the pilots as it was not part of the scope; however, all factors happening before take-off had an impact on the in-flight performance. Here the researcher delved into understanding airport duty, mid-flight rests, coping with fatigue, and an additional subtheme that arose in this section was the stress experienced by training pilots when they have a pilot in training co-piloting with them. Despite being a less explored theme, the impact

of pre-flight factors on in-flight performance became evident, emphasizing the interconnectedness of various phases of a pilot's journey.

Table 5.: In Flight Procedures (Author, 2023)

In Flight procedures	
Sub Themes	Emergent themes
<u>Duty Activity</u>	● Duty at airport ● Mid-flight activities
<u>Training and Guidance</u>	● Giving instructions to new pilots ● Training
<u>Controlling and Coping with Fatigue</u>	● Dealing with fatigue during and before a flight ● Safety and legal Measures

When pilots are on duty at the airport, they prioritize their work-related tasks and avoid involving themselves in family responsibilities. The separation of work and personal matters is a key aspect of their duty activities. The research objective of comprehending how pilots manage the boundaries between their professional and personal lives is addressed by emphasizing the importance of keeping family responsibilities distinct from their obligations at the airport. Providing instructions to new pilots and training junior pilots as captains is a common practice among experienced pilots. These mentorship and training activities aim to transfer knowledge,

skills, and best practices, ensuring the safe and efficient operation of flights. They contribute to safety, a balance between safety and commercial considerations, and also to the continuous improvement in aviation. The research objective of understanding how training and mentorship impact flight safety is addressed by emphasising their role in maintaining high safety standards and preparing the next generation of aviators. Pilots elaborated on strategies of dealing with fatigue before and during a flight, considering external factors such as social commitments. The theme of controlling and coping with fatigue involves strategies that prioritise safety and legal compliance. These strategies demonstrate a comprehensive approach to addressing fatigue in the aviation industry, ensuring not only performance optimization but also adherence to regulatory standards.

4.5. Effect on Performance

Moving on to the next major theme, which is the customization and tailoring of job activity and its effects on performance, the researcher aimed to understand how, despite some pilots mentioning their preference for schedules and planning ahead, as referenced by a pilot: “...we depend on planning, checklists and organization...”, they would still be interested in having more control over the customisation of their job schedules to balance their work and life. Additionally, this theme delves into the impact of all the above stages on the performance itself.

Table 6.: Customisation and its effect on performance (Author, 2023)

Customisation and its effect on performance	
Sub Theme	Emergent Themes

<u>Effects on Performance</u>	● Correlation between performance and mental state.
<u>The Impact of Pre-Duty Activity on Performance</u>	● Attention and physical activity. ● Duration of cardiac rhythm and duties ● Sleep and rest
<u>Effect of Fatigue on Safety and Performance</u>	● Fatigue ● Difference between pre-flight and in-flight fatigue ● Handling and reporting fatigue ● Crew coordination and mitigation
<u>Safety Precautions, Relaxation, and SOP (Standard Operating Procedures)</u>	● Adhering to the SOPs ● Personnel inputs ● Reasons for diverting from SOPs ● Relaxation of SOPs ● Adaptation of procedure
<u>Job Adjustments, Advantages and Disadvantages</u>	● Advantages of customization ● Fatigue and productivity ● Effect on workload ● Restriction in aviation ● Role based on age and experience

	● Management, fatigue reporting, and culture
<u>Job Affect, Pilot Well Being, and Performance Changes</u>	● Safety margins ● Standardisation effects ● Operational burdens
<u>Discretion in Assessment, Training and Operations.</u>	● Training feedback, improvement, support, and training ● Participation and motivation ● Safety as the top priority

Pilots are aware of the correlation between their mental state and work performance. To enhance performance, they focus on managing their stress levels and mental well-being. Effective stress management, including the use of established coping strategies and maintaining personal well-being, plays a vital role in enhancing performance. All participants stressed the importance of being physically active before a flight, as it contributes to mental alertness and focus. One interviewee succinctly expressed this connection by stating that "staying active keeps my mind alert."

Moreover, discussions extended to their physical well-being, including discussions about their cardiac rhythms and the potential impact of stress-induced irregular heart rhythms on performance. Interviews revealed that the effect of rest before a flight varies from person to person. From the

data gathered, the researcher noted that the perspective among pilots is that rest requirements are not uniform, emphasising the need to consider personal variations when trying to optimise performance.

4.6. Fatigue

Interviews uncovered a shared recognition among pilots regarding the significance of acknowledging and managing fatigue. As one pilot noted, "balancing work and personal life is essential to mitigate fatigue". This indicates the need for a holistic approach to fatigue management, acknowledging external factors like social commitments when dealing with fatigue. Pilots demonstrate a nuanced understanding of the differences between pre-flight and in-flight fatigue. They recognize that pre-flight fatigue has less margin for error compared to in-flight fatigue. Understanding these distinctions is crucial for effective fatigue-management strategies and performance optimisation. Participants shared insights on how to handle and report fatigue, with the burden of addressing fatigue considered to be less overwhelming. This reflects their structured approach to fatigue management, encompassing both pre-flight and in-flight strategies.

4.7. Standard Operating Procedures (SOPs)

Under this sub-theme of crew coordination and mitigation, pilots discussed strategies to ensure effective crew coordination and mitigation of fatigue. Effective coordination helps address safety concerns and maintain optimal performance during flight operations. The commitment to adhering to Standard Operating Procedures (SOPs) is a foundational aspect of aviation safety. Pilots expressed unwavering dedication to this principle, as illustrated by a quote from one interviewee: "SOPs are our guiding principles. We never compromise on following them". This unwavering

commitment underscores the critical role of SOPs in ensuring safety and the pilots' non-negotiable adherence to them. Interviews shed light on the collective effort made by aviation personnel to uphold the rigorous standards of SOPs. One pilot described this effort as a: "collective effort. We struggle to ensure everyone follows the SOPs." This emphasises the collaborative nature of aviation, where every member of the crew plays a vital role in maintaining strict adherence to SOPs and consequently, to the overall safety of the flight.

While SOP adherence is non-negotiable, interviewees also acknowledged that there may be situations where deviation is necessary, but always with safety as the utmost priority. A pilot's insight provides clarity: "we never deviate from SOP unless it's a matter of safety." This shows a balance between rigid adherence to established procedures and the flexibility required to prioritise safety when circumstances demand such a deviation. Pilots discussed situations where relaxation within the bounds of SOPs was essential, but only if approached with caution and justified reasons. "We may relax SOPs, but with due warnings and justifiable reasons." This reflects the careful consideration given to relaxing SOPs when the situation warrants it, highlighting the principle of 'safety first.' Adaptability within the framework of SOPs is a crucial component of ensuring flight safety. Pilots emphasized the existence of methods for adapting procedures when circumstances dictate it, underscoring how this adaptability should always align with the overarching goals of safety and efficiency. As expressed through a pilot's perspective: "we have methods for adapting procedures when necessary." This highlights the commitment to maintaining safety standards even in situations that may require a deviation from standard procedures.

The theme of job adjustments discusses the benefits of customising job activities. Interviews revealed that customization plays a crucial role in enhancing pilot productivity by addressing

individual needs. One pilot mentioned: "customization helps manage fatigue effectively, which is crucial for maintaining optimal performance.". Customization's impact on fatigue is a critical aspect explored under this sub-theme. It was observed that tailoring job activities can lead to a reduction in fatigue, ultimately contributing to increased productivity. Customisation was found to reduce work stress and workload, aligning with the research objective to assess how customising job activities can alleviate job-related stress.

4.8. Operational Burden

The sub-theme indicates that customization can help overcome the operational burden faced by aviation professionals. By tailoring their job activities, pilots can alleviate burdens and stress.

The data examination revealed a prominent theme regarding the operational setting and its influence on pre-duty and pre-flight activities. The experiences of the participants revealed how diverse operational circumstances influenced their roles and responsibilities. A prevalent sense of routine and preparedness was exhibited throughout planned activities. Within this context, most pre-flight procedures were efficiently handled by the airline firm, resulting in a smoother and more organised workflow. Expressing this, one participant remarked, "in a scheduled operation, you know that you're going to find things prepared for you." This sense of certainty, along with well-established processes in planned operations, resulted in a more controlled and less stressful pre-flight environment.

Under the sub-theme of 'Training Feedback, Improvement, Support, and Training', it was evident that feedback and improvement are central to the discretion exercised in assessment and training.

Customization emerges as a valuable tool in enhancing job activities through feedback mechanisms, thereby recognizing individual efforts and serving as a motivational factor.

4.9. Summary

Pilots' emphasis on maintaining readiness for flight, managing stress, and training the next generation of aviators collectively contribute to the safety and efficiency of their operations. These findings underscore the significance of both pre-duty and pre-flight activities in shaping flight outcomes, emphasising the need for a holistic approach to pilot well-being and training. The study distinguishes between pre-duty and general duty activities, addressing the blurred line between these aspects, all of which align with the research objectives aimed at enhancing flight safety and performance. This research is crucial for its illumination of the distinct experiences of airline pilots, thereby contributing to the broader literature on aviation, work-life balance, and human factors in aviation safety. Nonetheless, it is essential to acknowledge the study's limitations, such as the relatively small sample size, potential memory bias in participant responses, and the necessity for further extensive research to explore similar themes among larger and more diverse pilot populations.

Chapter 5: Discussion

In this chapter, the researcher will compare the findings uncovered and outlined in chapter four with existing literature. The study will delve into the implications of these findings, drawing connections to relevant literature and theories. This comparative analysis aims to enrich our understanding of the research outcomes by situating them within the broader context of existing knowledge and theoretical frameworks.

5.1. Theme 1: Pre-Duty Activity

Pre-duty activity emerged as a primary theme discussed both in the literature and the results findings. This attention is notable because of the relative scarcity of information on pre-duty activities in the existing literature. The results indicated that, despite some overlap with pre-flight activities, pilots distinguish pre-duty activities as a distinct and noteworthy aspect of their professional routines. The existing literature primarily focused on what happens during the pre-flight phase, encompassing pilots' activities upon arrival at the airport, their duties, briefing, crew communication and preparation before taking off. However, there was a notable gap in addressing the preceding activity -the everyday life of the pilot. The results of the study shed light on the significance of this previously understudied aspect, revealing that the pilots' everyday lives significantly impact their performance. One author that briefly discussed pre-duty activities was Goker (2018), who mentioned that high workloads, mentally and physically demanding tasks, financial problems, lack of both mental and physical fitness, and personal relationships and family problems are main issues which contribute to the development of fatigue during pre-duty activity. He postulated that this potentially impacts performance.

5.1.1. Communication and work tasks after hours

This sub theme was consistently highlighted throughout the research, and its recurrence is evident in the final theme discussed in this chapter. This repetition emphasizes the cyclic nature of the stages in a pilot's journey. The results revealed in this research further delve into the interconnectedness and impact of these stages, portraying the pilot's journey as an ongoing cycle with interwoven influences and considerations.

The persistence of work-related communication and duties even while participants were officially off duty, emerged as an important feature within this topic. Many pilots mentioned situations in which they were on calls or participated in work-related activities outside of their legally specified duty hours. "Even when I'm off duty, I'm sometimes looking at flight plans or checking aviation apps," one participant stated bluntly. It's difficult to switch off totally." The fusion of work and personal time posed new issues; while technological tools and constant connectivity allowed pilots to obtain crucial information and communicate with co-workers, it also meant that the barrier between duty and personal life grew increasingly blurred. This was discussed in the literature in the section of types of fatigue and its causes, where the study by Goker (2018) mentioned that there is an overlap in the factors that make up the pre-duty activity, subsequently impacting rest and relaxation. Pilots frequently felt obligated to engage in work-related matters, even during their time off, illustrating the challenges posed by the integration of work into personal life.

5.1.2. Duration of flight

Moreover, pilots discussing long haul flights brought to light a prominent theme concerning the necessary preparations and lifestyle adjustments essential for these extended journeys. This often came at the cost of their personal lives, echoing sentiments discussed in the literature by Joan and colleagues (2020), who suggested that factors affecting a pilot's quality of life outside duty briefing could also impact their performance. This subject focused on the many facets of pre-duty and pre-flight preparations, such as preparing for long travels, adjusting to different climates, and handling technology tools and applications to help them with their job.

"If I'm going away for 20 days, that means I need to make sure I can pack for 20 days...Do I need to pack summer or winter clothes?" One pilot elegantly summarised the heart of this issue. This comment perfectly described the rigorous planning and lifestyle modifications that airline pilots must make before going on long travels. Participants emphasised that being prepared for travels lasting 20 days or longer required substantial preparation. Given the erratic nature of airline scheduling, pilots needed to ensure they carried enough clothes, equipment, and personal items to survive the whole trip.

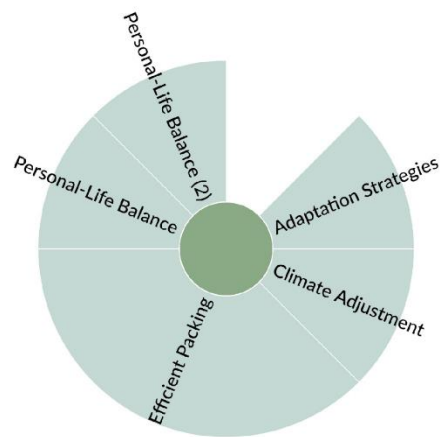


Figure 5: Lifestyle Adjustment extracted from NVivo (Author, 2023)

This planning extended beyond simply packing a bag, as pilots frequently had to cater for many sorts of activities and weather situations that they would face throughout their flights. This component of pre-duty preparation not only amplifies the challenges of packing but also underscores the adaptability essential in the lifestyle of an airline pilot. Adapting to diverse climates demands not only appropriate clothing but also necessitates mental preparedness to swiftly transition from one environment to another.

5.2. Theme 2: Pre-flight Activity

Pre-flight activity was also another major theme in this study. Firstly, because it follows the pre-duty activity, and secondly, because all factors that occur in pre-duty activity now start having effect on the pilots flying performance. If the pilot is not fit to fly or feeling fatigued, this is the critical juncture to address such concerns. In the literature, various authors discuss pre-flight activity before delving into in-flight fatigue, which is a highly researched topic compared to pre-duty activity.

Studies by Caldwell (2015), Madeline et al (2022) and Tims, Bakker & Derks (2013), all discuss the pre-flight stage, and they highlight the importance of countermeasures that pilots need to consider in the pre-duty activity. This preparation is crucial for feeling adequately ready for the subsequent pre-flight stage. In Table 1, table of countermeasures found in the literature review reveals the sub themes uncovered in the results and findings. Pilots highlighted the importance of healthy sleep practices, regular exercise, being mentally prepared, and having sufficient rest and time to adjust to circadian rhythms.

Despite pilots acknowledging the significance of these countermeasures, data from the interviews, similar to the literature, mentioned a critical issue - the limited time available for them to adopt these countermeasures. The maximization of duty time by operators, excluding commuting time and time for a pilot to run personal errands and communicate with their family before going to sleep, constrains pilots' ability to adopt these countermeasures.

5.2.1. Customization of job schedules

The literature on job scheduling, discretion, and access to electronic tools is also relatively sparse. However, existing research as demonstrated by Kossek and Michel (2011), found that employees who had more flexibility in their work schedules were more satisfied with their jobs and reported lower levels of stress. Another study by Sparajcer and colleagues (2021) found that employees who had access to the latest electronic tools and documentation were more productive and more efficient and also highlight that personalised work hours not only align with fatigue mitigation, but also enhance overall employee satisfaction and well-being.

Pilots in this research wanted more input into their job scheduling and access to the latest electronic tools and documentation, as they mentioned that these factors could help improve their quality of life, their overall efficiency, and eventually, the safety of flight. The research findings suggest that operators should give pilots more input into their job scheduling and provide them with electronic tools and documentation that aid in facilitating their pre-duty activity. These electronic tools could allow pilots to request specific shifts or days off, as well as access other necessary documentation for flying, enabling better planning. The literature aligns with these results regarding job scheduling, as Hedge and Carter (2020) mention that adopting this approach of job tailoring can provide operators with a competitive advantage and enhance talent acquisition. Therefore, both pilots and operators stand to benefit from a more flexible and tailored approach to job scheduling.

One pilot, as mentioned in the results, stated that pilots like planning and checklists. For this particular pilot, having the ability to customize the job schedule might not be ideal. It is worth noting that this pilot had the least experience compared to the other participants. This perspective

aligns with Conboy and Carroll's (2020) study, which emphasizes that issues associated with job design might effect team stress levels. While it may not represent the majority view, this perspective reflects pilots' varying attitudes towards the idea of job crafting or customization, underlining the importance of considering individual preferences and experiences in job design.

5.3. Theme 3: In Flight

Despite in-flight activities not being part of the initial research focus, they emerged during the data collection and analysis. Pilots considered the entire journey as one continuous cycle, recognizing that whatever occurred during the pre-duty or pre-flight stages could have consequences during the in-flight phase, potentially leading to serious problems for the safety of both the pilots and the passengers. Research discussing in-flight fatigue is abundant, Thomas et al's (2015) study mentions the various systems implemented in the aircraft itself such as the fatigue management system, which aids in reducing a pilot's fatigue. Their study also underscores the importance of communication during flight, as this is a good prevention of fatigue. This theme of communication similarly emerged in the results, emphasizing the need for effective communication among diverse team members and stakeholders in order to address the problems connected with pre-flight operations. Pilots must maintain regular communication with the operations team to receive updates, flight plan changes, and mission-critical information. Clear and effective communication was deemed critical for synchronising efforts and ensuring the successful execution of these dynamic flights.

5.3.1. Training and guidance:

The pilots articulated training as a pivotal element contributing to effective performance and safety in flight. Training plays a crucial role in upholding high safety standards, especially when finding an equilibrium between safety and commercial considerations, and fostering a culture of continuous improvement in aviation. The dynamic interaction between seasoned pilots and those undergoing training is fundamental when ensuring that the next generation of aviators is well-prepared and knowledgeable.

In the literature, both Haunschild (2002) and Dismukes (2015) delve into the standards of proficiency required. Haunschild (2002) further explores discrepancies that may lead to rare occurrences of accidents, often originating from machine malfunction, with human errors identified as the primary focal point. According to the study's results, participants noted that although they are trained on simulators for various in-flight situations, simulator training may not adequately replicate the fatigue levels, stress and cognitive strains that could impact optimal flight performance. Dismuke's study (2015) also emphasizes that a comprehensive assessment of multiple variables, including technical proficiency and cognitive aptitude essential for vigilant and capable operation, goes beyond mere training.

5.4. Theme 4: Effects on Performance

The central discourse within this theme revolves around the imperative need for airline operators to adopt balancing strategies within their organizational cultures, with a specific focus on the well-being of pilots. Although technology emerged as a prominent aspect in the results section, its

discussion was relatively limited in the existing literature. Participants acknowledged the necessity of developing strategies to balance the benefits of technological tools with their own well-being.

5.4.1. Balancing strategies

Some pilots took explicit steps to set boundaries by turning off work-related messages during off-duty hours or setting aside certain times to monitor operational data. While these techniques sought to restore some distinction between work and personal life, participants noted that the pervasiveness of technological tools was a difficult issue. The advantages of improved efficiency and accessibility have to be balanced against the risks of reduced downtime and higher stress.

Notably, research by Fagan in 2001 discussed the need to switch off from duty once a pilot is in the pre-duty activity phase. The decision to either continuously check the electronic flight bag at home during pre-duty phase, or to check it during the pre-flight phase will influence how an individual allocates time between work and non-work activities.

As seen in the table below, derived from NVivo, this balance entailed optimising the use of technological tools to increase job productivity while also creating boundaries to safeguard personal time and mental health. Some pilots implemented practises such as shutting off work-related messages during off-duty periods or setting aside specified times to monitor operational information. The implementation of such initiatives aimed to enhance the delineation between work and personal life for airline pilots. Balancing these benefits and obstacles was critical for maintaining pilots' well-being and performance in an industry that operates seamlessly across global time zones.

Table 7.: Hierarchy of Node of Access to Electronic Tools extracted from NVivo (Author, 2023)

Access to Electronic Tools	
Work-Life Boundaries	Work Accessibility
Off-Duty Technology Use	Electronic Flight Bags

5.5. Summary

This chapter significantly contributes to enriching the reader’s understanding of the airline pilot experience, offering in-depth insights essential to a pilot’s wellbeing. Overall, the findings and results of this research are consistent with the available and existing literature on the aviation industry and pilots’ safety and performance. This study offers a valuable contribution to the field by focusing on the often overlooked stages of pre-duty and pre-flight activities, which are essential

for ensuring the safety and efficiency of overall aviation operations and, consequently, a safe and effective performance.

Chapter 6: Conclusion

6.1. Overview

In the concluding chapter of this research, a comprehensive exploration of the implications and conclusions derived from the study is undertaken. This exploration delves into the broader context of aviation and the intricate balance between work and life for pilots. This chapter meticulously synthesizes insights from the findings, providing a nuanced analysis of the practical, theoretical, and policy-related implications of the research to the aviation field. Furthermore, it critically assesses the limits that influenced the research methodology and the interpretation of outcomes, providing valuable insights for future research initiatives. Finally, new research directions are proposed based on the study's limitations and conclusions.

Meticulously examining the research objectives, the study reveals a profound interplay between pre-duty responsibilities, pre-flight activities, and the various factors that influence airline pilot performance. The study highlights the need for comprehensive training programmes that address not only technical skills but also factors such as fatigue management and stress reduction. Additionally, the results suggest that implementing regular performance evaluations and providing ongoing support for pilots can greatly enhance their overall well-being and job satisfaction, ultimately leading to safer and more efficient airline operations.

6.2. Summary of Key Findings

The research delved into a comprehensive examination of data obtained through interviews with airline pilots, revealing key themes and subthemes that offer unique insights into their experiences and concerns.

Firstly, the operational setting emerged as a crucial factor influencing performance, notably observed in two distinct contexts: planned operations and last-minute charter operations. Pilots displayed a sense of routine and preparedness for planned operations, while last-minute charters demanded agility and readiness for the unexpected and revealed difficulties such as ad hoc planning, unpredictability, and the need for constant communication between pilots and operations.

Secondly, the integration of technological tools, including electronic flight baggage and aviation-related applications, provided efficiency but posed challenges with maintaining distinct professional and personal boundaries as these technologies were used outside of working hours. The study discovered that technology influenced pilots' work-life balance, eliciting various perceptions regarding its convenience and the struggle against continual work-related connectivity during off-duty hours. Off-duty responsibilities also played a role, with aspects like physical fitness, rest, and the avoidance of alcohol within the prescribed 12-hour window affecting performance.

Moreover, the impact of lifestyle changes due to long-distance travel on pilots' coping mechanisms was diverse, indicating variations in managing job demands. These findings align with broader

aviation discourse, highlighting the enduring importance of these preparatory elements for the airline industry.

Finally, fatigue and strict adherence to Standard Operating Procedures (SOPs), a cornerstone of aviation safety, were also found to impact performance. The study prompts a call for a nuanced approach to accommodate the evolving operational demands faced by pilots, as a more balanced approach would allow flexibility without compromising safety.

In summary, the study advocates for a proactive stance within the aviation industry, emphasizing the importance of pilot training to address these complexities. Moreover, it stresses the significance of open communication, efficient fatigue management, and a balanced approach between standard procedures and adaptability. These efforts are pivotal for improving in-flight performance and maintaining safety standards in air travel operations. Notably, the sentiment among pilots regarding the 12-hour flight time limitation suggests that it should not be considered the norm, as observed in certain operational practices.

6.3. Implications

The study's findings have practical and theoretical implications, providing significant insights into the issues faced by airline pilots and prospective pathways for overcoming these challenges.

6.4. Operational Flexibility

A major implication of the study lies in the need for enhanced operational flexibility among airline pilots. The stark contrast between planned operations and last-minute charter operations emphasises the need for pilots to have a varied skill set that allows them to easily move between

these two operational settings. This versatility is critical in today's aviation sector, where adaptability and responsiveness are highly appreciated. Airlines and pilot training programmes should explore including adaptation training in their curricula to better prepare pilots for the diverse needs of various operating environments. This proactive approach may result in more diverse and skilled pilots who are more suited to the aviation industry's dynamic character.

6.5. Work-life Balance

The study's findings of blurred borders between duty and pre-duty activities highlight the critical challenge of maintaining a healthy work-life balance for airline pilots. The persistence of these professionals beyond their legally designated work hours due to preparatory responsibilities and ongoing communication necessitates acknowledgment and resolution by airlines. Airlines should provide pilots with resources and support to effectively manage their personal and professional lives. This involves implementing regulations that promote proper rest times and fostering a positive culture among pilots. Recognising the significance of work-life balance not only improves pilot happiness, but it also improves safety by lowering the probability of fatigue-related mishaps.

6.6. Technological Integration

The research examines the benefits and drawbacks of incorporating technological equipment into pilots' daily lives. While these technologies improve efficiency and production, they concurrently present challenges related to disconnecting from work during off-duty periods. Airlines must create and implement rules and procedures that address the influence of technology on pilot well-being. Setting explicit boundaries for the use of electronic tools during off-duty hours, giving training on efficient time management, and encouraging pilots to disconnect when they are not on

duty are all examples of how this may be accomplished. Recognising the possible drawbacks of technological integration is critical for keeping pilots' mental and emotional health in check, eventually boosting overall performance and safety.

6.7. Training and Preparation

The differences in pre-flight activities across operating contexts highlight the necessity for customised training and preparation tactics. Airlines and training programmes should concentrate on providing pilots with the skills and knowledge necessary to manage both regular and dynamic circumstances. This method guarantees that pilots are well prepared, regardless of the operational environment in which they find themselves. By customizing training to meet specific operational requirements, airlines can enhance pilot preparedness, confidence, and overall safety standards.

6.8. Communication and Collaboration

The study findings underscore the significance of effective communication and collaboration, particularly among pilots involved in charter operations. Successful collaboration is critical in these dynamic settings for guaranteeing safe and efficient flight operations. Airlines should invest in improving communication channels and cultivating a collaborative culture among their crew and pilots. This might include improving communication protocols, adopting sophisticated collaboration technologies, and giving both teamwork and decision-making training. Effective communication and teamwork improve not just operational efficiency but also safety in complicated, time-sensitive circumstances.

Finally, the study's conclusions have far-reaching consequences for several aspects of the aviation business, ranging from pilot training to airline regulations and procedures. Recognising and resolving the study's difficulties and potential can lead to safer, more efficient, and more fulfilling jobs for airline pilots. These implications also contribute to the larger area of aviation study by offering insight on the complex interplay between operational context, technology, and pilot well-being.

6.9. Limitations

6.9.1. Small Sample Size

One disadvantage of this study is the very limited sample size. While the insights acquired from the participants have been beneficial in understanding the experiences and issues of airline pilots, the restricted number of participants may hamper the generalizability of the findings. The aviation sector is characterised by tremendous diversity, with pilots operating in varied settings and contexts. A larger and more varied sample would have allowed for a deeper and more thorough understanding of these experiences and issues, and would have accounted for the diversity existing within the pilot groups.

6.9.2. Demographic Distinctiveness

The study largely focused on a specific set of airline pilots. While these individuals gave substantial insights, their experiences may not fully capture the diverse range of perspectives within the broader pilot community. Factors such as seniority, gender, aircraft type, and airline regulations can significantly influence pilots' experiences. This demographic specificity might

limit the applicability of the findings to pilots from different backgrounds or other segments of the aviation industry.

6.9.3. Subjectivity and Bias

Although every attempt was made to ensure neutrality during data collection and analysis, the process of interpreting data qualitatively may be impacted by the viewpoints of the researcher. Similarly, individuals may have supplied comments based on their personal experiences and views, bringing subjectivity to the findings. Although the use of NVivo and rigorous coding techniques was applied to limit these biases, complete elimination of subjectivity in qualitative research remains challenging.

6.9.4. Temporal and Contextual Limitations

The findings given in this study are particular to the period and environment in which the research was conducted. The aviation industry is subject to continuous technological, regulatory, and operational change. As a result, findings may not fully reflect the problems and experiences of pilots in the future or in different industry situations. This restriction underscores the need to examine findings within their specific temporal and contextual framework.

6.9.5. Self-selection Bias

There is a constraint linked to the process of participant self-selection. In qualitative research, the recruitment of subjects typically includes self-selection. Individuals who voluntarily participated may possess unique viewpoints that differ from those who declined participation. This self-

selection might limit the study's ability to capture the entire spectrum of experiences within the pilot community.

Finally, the study's reliance on self-reported data and its focus on a specific geographical context (Malta) may restrict the generalizability of the findings to a broader audience and context.

6.10. Recommendations

The following are recommendations determined by the researcher: Firstly, operators need to prioritise the well-being of pilots as optimal pilot performance is paramount to maintaining the highest standards of safety in aviation. Adequate rest, physical fitness, and sobriety must be prioritised during pilot pre-duty preparations to minimise the risk of fatigue-related incidents. Comprehensive fatigue-management strategies, including pilot education and support mechanisms are essential to address fatigue and its potential impact on performance. Open communication channels must be established to enable pilots to express concerns without fear of negative consequences. Pilot training programmes should incorporate customization and adaptation to cater to diverse learning styles and experiences, ensuring that pilots are equipped with the necessary skills and knowledge to handle a wide range of flight scenarios.

Secondly, a culture of awareness and openness must be cultivated within aviation organisations, encouraging pilots to acknowledge and report fatigue without fear of repercussions. A cultural shift is imperative, placing well-being, safety, and performance at the forefront of aviation priorities. Pilots require a delicate balance between standardised procedures and flexibility in aviation operations, allowing for adjustments to accommodate individual needs and circumstances.

Regular reviews and updates of regulations are necessary to align with the evolving aviation landscape and advances in understanding pilot performance.

These research findings should be considered in policy development to inform safer and more effective flight operations. Comprehensive human factors training for pilots, encompassing sleep, nutrition, physical fitness, and mental health is crucial for optimal performance. Integrating human factors training into recurrent training programmes would ensure continuous awareness and skill development. Further research in aviation human factors is encouraged, particularly exploring the relationship between pre-flight preparations, in-flight performance, and safety.

The development and adoption of innovative technologies and practices that support pilot well-being, performance, and safety should be promoted. In addition, collaboration and knowledge sharing among airlines, regulators, and industry stakeholders are essential to foster this culture of continuous improvement. Sharing best practices, data, and research findings will elevate the overall safety and efficiency of the aviation industry.

6.11. Conclusion

In conclusion, this study primarily gives insight into the nuanced landscape of pre-duty and pre-flight tasks encountered by airline pilots. The enormous influence of the operational environment has been demonstrated, presenting pilots with the challenge of adapting to changing events and expertly navigating the sensitive line between their professional commitments and personal lives. This study's practical implications are immense, providing useful information for airlines, training programmes, and industry rules. Prioritising airline pilots' well-being and performance is not only beneficial for individual professionals, but it is also critical for the aviation industry's overall safety

and operational efficiency. Finally, the study aims to serve as a foundation for future research projects and, more significantly, as a catalyst for beneficial changes within the aviation sector.

Chapter 7: References

- Arifin, S. R. (2018). Ethical Considerations in Qualitative Study. *International Journal of Care Scholars*, 1(2), 30-33.
- Barger, L., O'Brien, C., Sullivan, J., Wang, W., Lockley, S., Qadri, S., . . . Czeisler, C. (2017). 1176 Fatigue Risk Management Program Increases sleep and alertness in firefighters. *Journal of sleep and sleep disorders*, 40, A439-A439.
- Bendak, S., & Hamad, S. R. (2020). Fatigue in aviation: A systematic review of the literature. *International Journal of Industrial Ergonomics*, 76(102928), 1-7.
- Caldwell, J. A. (2005). Fatigue In Aviation. *Travel Medicine and Infectious Disease*, 3(2), 85-96.
- Chenail, R. (2011). Interviewing the Investigator: strategies for addressing instrumentation and researcher bias concerns in qualitative research. *The Qualitative Report*, 16(1), 255–262.
- Clarke, V., & Braun, V. (2017, December 9). Thematic Analysis. *The Journal of Positive Psychology*, 12(3), 297-298.
- Conboy, K., & Carroll, N. (2020). Normalising the “new normal”: Changing tech-driven work practices under time pressure. *International Journal of Information Management*, 55(102186). doi:<https://doi.org/10.1016/j.ijinfomgt.2020.102186>
- Cridland, E., Jones, S., Caputi, P., & Magee, C. (2015). Qualitative research with families living with autism spectrum disorder: recommendations for conducting semistructured interviews. *Journal of Intellectual & Developmental Disability*, 40(1), 78-91.

- Demerouti, E. (2014). Design Your Own Job Through Job Crafting. *European Psychologist*, 19(4), 237-247.
- Denzin, N. K., & Lincoln, Y. S. (2011). The Sage Handbook Of Qualitative Research. In V. Knight (Ed.), *Evaluation as a relationally responsible Practice* (pp. 669-670). London UK: SAGE Publications.
- Dismukes, K. R., Goldsmith, T. E., & Kochan, J. A. (2015). *Effects of Acute Stress on Aircrew Performance: Literature Review and Analysis of Operational Aspects*. California: National Aeronautics and Space Administration. Retrieved from file:///C:/Users/Tesmarie/Downloads/NASA_TM_2015_218930-2.pdf
- Drongelen, A., R. L. Boot, C., Hlobil, H., Smid, T., & van der Beek, A. (2016). Risk Factors for fatigue among airline pilots. *Int Arch Occup Environ Health*. doi:10.1007/s00420-016-1170-2
- Dutton, J. E. (2001, April 2). Crafting a job: revisioning employees as active crafters of thier work. *Academy of Managment*, p. 179.
- EASA. (2023). *Regulations, European Union Aviation Safety Agency 2023*. Retrieved August 23, 2023, from <https://www.easa.europa.eu/en/the-agency/faqs/regulations>
- European Commission. (2018, January 24). *COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT AND THE COUNCIL Stronger protection, new opportunities - Commission guidance on the direct application of the General Data*

Protection Regulation as of 25 May 2018. Retrieved August 20, 2023, from <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2018:43:FIN>

Fagan, C. (2001). The temporal reorganization of employment and the household rhythm of work schedules: The implications for gender and class relations. *American Behavioural Scientists*, 44(7), 1199-1212.

Gander, P., Hartley, L., Powell, D., Cabon, P., Hitchcock, E., Mills, A., & Popkin, S. (2011). Fatigue risk management: Organizational factors at the regulatory and industry/company Level. *Accident Analysis and Prevention*, 43, 573-590. Retrieved from <https://pdf.sciencedirectassets.com/271664/1-s2.0-S0001457510X00082/1-s2.0-S000145750900308X/main.pdf?X-Amz-Security-Token=IQoJb3JpZ2luX2VjEDgaCXVzLWVhc3QtMSJIMEYCIQDRE11BwQDENtUOxN2eFrFvqTattU2vwdGQPapAIGXGwIhAPtGuZQfJld1TKREehi5QeTs%2BJijgyZNf evRKPzy8e>

Gibson, W. (2006). A companion to Qualitative Research. *Sociological Research Online*, 11(3), 162-163.

Goker, Z. (2018). Fatigue in The Aviation: An Overview of The Measurements and Countermeasures. *Journal of Aviation*, 2(2), 185-194.

Goker, Z. (2018). Fatigue in The Aviation: An Overview of The Measurements and Countermeasures. *Journal of Aviation*, 2(2), 185-194. doi:<https://dergipark.org.tr/en/download/article-file/598864>

- Haunschild, P. R., & Sullivan, B. N. (2002). Learning from complexity: Effects of Prior Accidents and Incidents on Airlines Learning. *Administrative Science Quarterly*, 47(4), 609-643.
- Hedge, J. H., & Carter, G. C. (2020). Individuals and Organaizations. In J. W. Hedge, & G. W. Carter, *Career Pathways from school to retirement* (pp. 172-179). New York: Oxford University Press.
- IATA. (2015). *Fatigue Managment Guide for Airline Operators*. IATA.
- ICAO. (2020). *Fatigue Managment*. Retrieved February 2, 2023, from https://www.icao.int/safety/fatiguemanagement/ArticlesPublications/Flyer_US-Letter_ANB-Fatigue-Management_2013-08-23.pdf
- ICAO. (2023). *ICAO: Future of Aviation*. Retrieved September 17, 2023, from <https://www.icao.int/Meetings/FutureOfAviation/Pages/default.aspx>
- ICAO Secretariat. (2005, June 1). *ICAO Secretariat study on the safety and security aspects of economic liberalization*. Retrieved September 17, 2023, from https://www.icao.int/sustainability/Documents/SafetySecurityStudy_en.pdf
- Jing, L., Alessandro, G., Subramanian, R., Yixiang, L., & Roberto, S. (2016). Cognitive pilot-aircraft interface for single-pilot operations. *Knowledge-Based Systems*, 112, 37-53.
- Joan, C., Cullen, P., Anwer, S., Gaynor, K., & Wilson, S. (2020, July 6). The Requirements for New Tools for Use by Pilots and the Aviaiton Industry to Manage Risks Pertaining to

Work-Related Stress (WRS) and Wellbeing, and the Ensuing Impact on Performance and Safety. *Technologies*, 8(40), 3-5.

Johnson, J. L., Adkins, D., & Chauvin, S. (2020). A Review of the Quality Indicators of Rigor in Qualitative Research. *American Journal of Pharmaceutical Education*, 84(1). doi:10.5688/ajpe7120

Kallio, H., Pietila, A.-M., Johnson, M., & Kangasniemi, M. (2016). Systematic methodological review: developing a framework for a qualitative semi-structured interview guide. *Journal of Advanced Nursing*, 72(12), 2954-2965.

Karatepe, O. M., & Eslamlou, A. (2017). Outcomes of job crafting among flight attendants. *Journal of Air Transport Management*, 62, 34-43.

Kazemi, R., Haidarimoghadam, R., Motamedzadeh, M., Golmohamadi, R., Soltanian, A., & Zoghipaydar, M. R. (2016). Effects of Shift Work on Cognitive Performance, Sleep Quality, and Sleepiness among Petrochemical Control Room Operators. *J Circadian Rhythms*, 14(1). doi:10.5334/jcr.134

Kossek, E. E., & Michel, J. S. (2011). Flexible Work Schedules. *APA Handbook of industrial and organizational Psychology*, 1, 535-572.

Lips-Wiersma, M., & Hall, T. D. (2007). Organizational Career Development is not Dead: A Case Study on Managing the New Career During Organizational Change. *Journal of Organizational Behaviour*, 28(6), 771-792.

- Lisa C, T., Christopher , G., Robert, G., & Kimberly, C. (2015). Fatigue detection in commercial flight operations:Results using physiological measures. *Procedia Manufacturing*, 3(2357-2364).
- Liu, J., Alessandro, G., Subramanian, R., Yixiang, L., & Roberto, S. (2016). Cognitive pilot-aircraft interface for single-pilot operations. *Knowledge-Based Systems*, 112, 37-53.
- Madeline, S., Matthew J.W, T., Charli , S., Meagan E., C., Diane B., B., Imelda S, W., . . . Drew, D. (2022). How effective are Fatigue Risk Managment systems(FRMS)? *Accident Analysis and Prevention*, 165(106398).
- Madeline, S., Matthew J.W, T., Charli, S., Meagan E, C., Diane B, B., Imelda S, W., . . . Drew, D. (2022). How effective are Fatigue Risk Management Systems (FRMS)? A review. *Accident Analysis and Prevention*, 165(106398).
- Maurino, D., & Salas, E. (2010). *Human Factors in Aviation* (2 ed.). London: Elsevier. Retrieved from <https://ebookcentral-proquest-com.ejournals.um.edu.mt/lib/ummt/reader.action?docID=534983#>
- Mohaffyza, M., Sulaiman, N., Kaihrol, S. M., & Salleh, K. M. (2015). Measuring the Validity and Reliability of Research Instruments. *Procedia- Social and Behavioral Sciences*, 204, 164-171. doi:10.1016/j.sbspro.2015.08.129
- Oxford Dictionaries. (2023). OXFORD Dictionaries. In *Defintion of Fatigue in English*. Oxford Dictionaries Online.

- Petrou, P., Denerouti, E., & Schaufeli, W. (2018). Crafting the change: The role of employee job crafting behaviours for successful organizational change. *Journal of Management*, 44(5), 1766-1792.
- Philips, R. O. (2015). A review of definitions of fatigue – And a step towards a whole definition. *Transportation Research Part F: Traffic Psychology and Behaviour*, 29, 48-56.
- S, D. (2019). Impact of Fatigue Risk Management System on fatigue and situation awareness of surgical intensive care unit nurses. *Internal Medicine Journal*, 49, 19-19.
- Skybrary Aviation Safety. (2023). *Flight Preparation and Conducting Effective Briefings (OGHFA BN)*. Retrieved August 28, 2023, from <https://skybrary.aero/articles/flight-preparation-and-conducting-effective-briefings-oghfa-bn>
- Smiley, A., Tom Smahel, M., Diane B, B., Philippe, B., John, R., Melodie, T., . . . Kevin B, G. (2009). *Effects of a fatigue management program on fatigue in the commercial motor carrier industry*. Canada: Human Factors North Inc.
- Sprajcer, M., Thomas, M. J., Sargent, C., Crowther, M. E., Boivin, D. B., Wong, I. S., . . . Dawson, D. (2021). How effective are Fatigue Risk Management Systems (FRMS)? A review. *Accident Analysis and Prevention*, 165. Retrieved from https://www.researchgate.net/publication/355725057_How_effective_are_Fatigue_Risk_Management_Systems_FRMS_A_review
- Thomas, L., Gast, C., Grube, R., & Craig, K. (2015). Fatigue detection in commercial flight operations: Results using physiological measures. *Procedia Manufacturing*, 3(2357-2364).

- Tims, M., & Arnold, B. B. (2010). Job crafting: Towards a new model of individual job redesign. *SA Journal of Industrial Psychology*, 36(2), 1-9.
- Tims, M., Bakker, A., & Derks, D. (2013). The impact of job crafting on job demands, job resources, and well being. . *Journal of Occupational Health Psychology*, 18(2), 230-240.
- Wingelaar-Jagt, Y., Thijs T, W., Wim J, R., & Johannes G, R. (2021). Fatigue in Aviation: Safety Preventive strategies and Pharmacological Interventions. *Frontiers in Physiology*, 12(712628), 2-3. doi:10.3389/fphys.2021.712628
- Yara Q, W.-J., Thijs T, W., Wim J, R., & Johannes G, R. (2021). Fatigue in Aviation: Safety Preventive strategies and Pharmacological Interventions. *Frontiers in Physiology*, 12(712628), 2-3. doi:10.3389/fphys.2021.712628
- Zhenjing, G., Chupradit, S., Yen Ku, K., Nassani, A., & Haffar, M. (2022). Impact of Employees' Workplace Environment on Employees' Performance: A Multi-Mediation Model. *Frontiers in Public Health*, 10(890400). doi:10.3389/fpubh.2022.890400

Appendix A: Participant Information Letter About the Study

My name is Tesmarie Busuttil, and I am an student at the University of Malta, reading for an MSC Strategic Management and Digital Marketing. I am presently conducting research as part of my thesis titled Pre-Flight preparation and opportunities for job crafting: A sense-making study. This is being supervised by Prof. Vincent Cassar, (Vincent.cassar@um.edu.mt) The aim of my study is to make sense of pilots' perceptions and experiences of pre-flight duty activity and job crafting, as well as their perspectives on the effects of these elements on flight performance.

Your Participation

Any data collected from this research will be used solely for purposes of this study. You have been chosen because you are a pilot working in the aviation industry. Should you choose to participate, you will be asked to attend a maximum of 1 hour focus group at the University of Malta. Data collected will be transcribed and pseudonymised for confidentiality purposes through use of a coding system. Participation in this study is entirely voluntary; in other words, you are free to accept or refuse to participate, without needing to give a reason.

You are also free to withdraw from the study at any time, without needing to provide any explanation and without any negative repercussions for you. Should you choose to withdraw, any data collected from you will be erased as long as this is technically possible (for example, before it is anonymised or published), unless erasure of data would render impossible or seriously impair achievement of the research objectives, in which case it shall be retained in an anonymised form. If you choose to participate, please note that there are no direct benefits to you but there might be

benefits contributing to the aviation industry as a whole and the implementation of job crafting possibilities within the industry. Your participation does not entail any known or anticipated risks.

Data Management

All information which is collected about you during the research will be kept strictly confidential so that only the researcher carrying out the research will have access to such information and will not be shared with any other individuals. Participants should note that data collected from this project may be retained and published in an anonymized form. By agreeing to participate in this project, you are consenting to the retention and publication of data. Please also note that, as a participant, you have the right under the General Data Protection Regulation (GDPR) and national legislation to access, rectify and where applicable ask for the data concerning you to be erased. All data collected will be erased in an anonymised form on completion of the research after results publication within 3 months of completion of the study. Your identity will be revealed/attribution only with your consent. If you wish to complain or have any concerns about any aspect of the way in which you have been approached or treated during this study, please contact tesmarie.busuttil.22@um.edu.mt

Participant's consent

- ☐ I hereby declare to have read the information about the nature of the study, my involvement and data management.
- ☐ I have had the opportunity to ask questions about the study and my questions have been satisfactorily answered.
- ☐ I declare that I am 18 years or older.

- ☐ I understand that should I have any further queries, I can contact Tesmarie Busuttil (Tesmarie.busuttil.22@um.edu.mt and Prof. Vincent Cassar (Vincent.cassar@um.edu.mt)
- ☐ I agree to participate in this research study.

MARK ONLY IF APPLICABLE

- ☐ I agree to be identified in the research records.
- ☐ I agree to be identified in the research publication

Participant's name (in block)

Researcher's name (in block)

Participant's signature

Researcher's signature

Date

Appendix B: Participant's Consent Form

Pre-Flight preparation and opportunities for job crafting: A sense-making study

I, the undersigned, give my consent to take part in the study conducted by Tesmarie Busuttill This consent form specifies the terms of my participation in this research study.

1. I have been given written and/or verbal information about the purpose of the study; I have had the opportunity to ask questions and any questions that I had were answered fully and to my satisfaction.
2. I also understand that I am free to accept to participate, or to refuse or stop participation at any time without giving any reason and without any penalty. Should I choose to participate, I may choose to decline to answer any questions asked. If I choose to withdraw from the study, any data collected from me will be erased as long as this is technically possible (for example, before it is anonymised or published), unless erasure of data would render impossible or seriously impair achievement of the research objectives, in which case it shall be retained in an anonymised form.
3. I understand that I have been invited to participate in a Focus group in which the researcher will ask questions about the research topic to make sense of pilots' perceptions and experiences of pre-flight duty activity and job crafting, as well as their perspectives on the effects of these elements on flight performance.
4. I am aware that the focus group will take approximately 1 hour. I understand that the focus group is to be conducted in a place and at a time that is convenient for me.
5. I understand that my participation does not entail any known or anticipated risks.

6. I understand that there are no direct benefits to me from participating in this study but there might be benefits contributing to the aviation industry as a whole and the implementation of job crafting possibilities within the industry.
7. I understand that, under the General Data Protection Regulation (GDPR) and national legislation, I have the right to access, rectify, and where applicable, ask for the data concerning me to be erased.
8. I understand that all data collected will be erased in an anonymised form on completion of the research after results publication within three months of completion of the study.
9. I have been provided with a copy of the information letter and understand that I will also be given a copy of this consent form.

I have read and understood the above statements and agree to participate in this study.

10. I am aware that focus group discussions should be considered confidential and that I should not disclose details of those participating and/or of the nature of discussions to others.
11. I am aware that my data will be pseudonymised, i.e., my identity will not be noted on transcripts or notes from my interview, but instead, a code will be assigned. The codes that link my data to my identity will be stored securely and separately from the data, in an encrypted file on the researcher's password-protected computer, and only the researcher will have access to this information. Any hard-copy materials will be placed in a locked cabinet/drawer. Any material that identifies me as a participant in this study will be stored securely for the duration of the study.
12. I am aware that my identity and personal information will not be revealed in any publications, reports or presentations arising from this research.

Name of participant: _____

Signature: _____

Date: _____

Tesmarie Busuttil

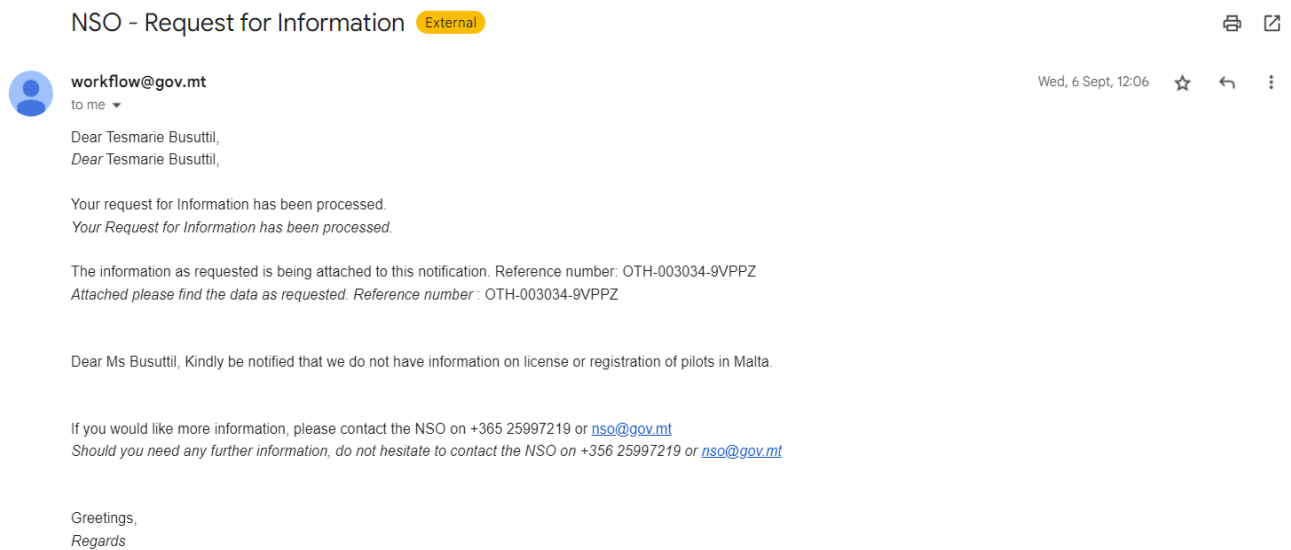
Prof. Vincent Cassar

Tesmarie.busuttil.22@um.edu.mt

vincent.cassar@um.edu.mt

+356 2340 3479

Appendix C: NSO Email



Appendix D: Interview Schedule

Interview schedule

RQ1: To what extent does pre-flight Duty activity influence subsequent pilot flight performance?

1. What words, ideas or images come to mind when I mention “pre-flight duty” activity?
(Duty activity being activity in between flights or prior flights(before arriving to the airport for debriefing))
2. How would you consider duty activity different from pre-flight? (Any association there is, or ways of a pilot preparing oneself in these two different scenarios)
3. Do you think that pre-flight duty activity affects performance? (How, why if answer is yes, if not, why?)
4. Does pre-flight fatigue differ from in-flight fatigue in terms of its impact on your performance and safety? (If so, how do you manage or cope with fatigue before and during a flight?)

RQ2: How does job crafting impact the performance outcome of an airline pilot while on duty?

7. Do you feel the pre-flight standard procedures allow enough flexibility for presenting your personal inputs? (if, so how can it be better, if it allows you to decide on flight parameters)
8. Do you feel that pre-set schedules are ideal for performing your work? (if not, what needs to change or what can be done for improvement)

9. Having the opportunity and ability to customize or tailor your job activity would this improve your flight performance? (Why, why not, can you elaborate on any drawbacks or benefits you foresee?)
10. Are there any specific areas within your job where you would like to have more discretion or the ability to make changes? (How do you think this would impact motivation and engagement)