DOI: 10.2478/fas-2020-0001
FATIGUE OF AIRCRAFT STRUCTURES
Volume 2020: Issue 12, pp. 1-14

THE ROLE OF LEADERSHIP IN AVIATION SAFETY AND AIRCRAFT AIRWORTHINESS

Ayiei Ayiei[1] • ORCID 0000-0002-4420-4465,
Luke Pollock[1] • ORCID 0000-0003-4692-616X,
Fatima Najeeb Khan[2] • ORCID 0000-0002-8995-2600,
John Murray[3] • ORCID 0000-0002-9580-3572,
Glenn Baxter[4] • ORCID 0000-0001-5910-622X,
Graham Wild[5] • ORCID 0000-0003-1223-4675.

[1] School of Engineering, RMIT University, Melbourne 3000, Australia
[2] The University of Management and Technology, Johar Town, Lahore, Punjab 54770, Pakistan
[3] School of Engineering, Edith Cowan University, Joondalup 6027, Australia
[4] School of Tourism and Hospitality Management, Suan Dusit University, Thailand
[5] School of Engineering and Information Technology, UNSW, Canberra 2612, Australia

g.wild@adfa.edu.au

ABSTRACT

Ensuring aircraft are technically safe to operate is the realm of airworthiness, literally worthy of being in the air. This is achieved not only with technological tools and techniques, or with just personnel and manpower, it is guided and supervised by managers and leaders. As such, the objective of this paper is to understand the role leadership plays in maintaining aviation safety and aircraft airworthiness. To this end, a case study of the Hawker Sidley Nimrod XV230 accident that occurred on September 2, 2006 near Kandahar in Afghanistan, was utilized. The study concluded that leadership is a key aspect, specifically finding that leaders are responsible for articulating the organizations vision, strategic objective setting, and monitoring the achievement of those objectives. It was concluded that operational airworthiness is directly dependent on the leadership ability to provide direction, workplace culture, continued learning, and establish risk management systems for safe and airworthy operations.

Keywords: aviation safety, airworthiness, aircraft accidents, leadership
Article Category: Research Article

INTRODUCTION

The global aviation industry is comprised of three key segments: general aviation, commercial aviation, and military aviation [1]. Commercial aviation plays a critical role

in the global economy by facilitating commerce, tourism, and world trade. Commercial aviation is undertaken in a value chain where the key stakeholders are aircraft manufacturers, aircraft maintenance organizations, airlines, airports, ground handling agents, tour operators and in-flight catering firms [2]. In 2018, the world's airlines carried 4.32 billion passengers and 58 million tonnes of air cargo on their scheduled services [3]. Safety is the principal concern of the global aviation industry [4]. Airworthiness plays a fundamental role in underpinning the industry's objective of safe aircraft operations.

Aircraft maintenance in particular has been identified a key issue in aviation safety, contributing to a number of accidents and incidents in the industry [5]. In the last decade the number of officially reported accidents that has resulted from technical issues, referred to as a system component failure, has been around 22% [6]. Of these, most of them are the result of issues not associated with the engine (non-powerplant, NP, issue), around 16% of the total accidents; while approximately 6% of the total accidents are due to issues with the engine (powerplant, PP). Combined, these technical issues account for the most common issue in aircraft accidents (abnormal runway contact is the next most common in 18% of cases). Ensuring these technical issues do not result in accidents (serious injury and/or damage, or potentially even death and/or destruction) is the purview of the many airworthiness [7]. While there is a well-known growth is air traffic, both passengers and cargo (when there is not a global crisis), there is also a growing number of safety occurrences. This fact is obfuscated by the industry trend to report accidents as a "risk" relative to the amount of traffic (departure, kilometers, passengers etc). As such, there is a need at all levels to improve safety in the aviation industry, and leadership in technical organizations is as important as leadership in operational organizations (such as airlines).

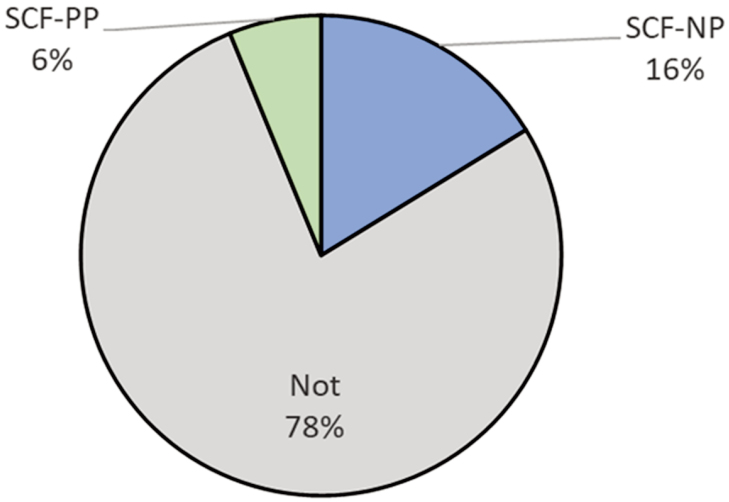

Figure 1. The distribution of ICAO official accidents from 2008 to 2019 due to system component failures (technical issues), both the powerplant (PP) and non-powerplant (NP).

There is an extensive body of literature devoted to airworthiness (see, for example, [8]) and organizational leadership [9, 10, 11]. However, there has been no previously reported study that has examined the role of leadership in aviation safety and aircraft airworthiness, only prior work highlighting the importance of leadership and effective communication [12]. While previous work on the case of the Hawker Sidley Nimrod XV230 accident [13], leadership is only mentioned as having a role, and is not examined. The objective of this paper is to address this apparent gap in the literature by examining the leadership and culture component and its importance in maintaining aviation safety and aircraft airworthiness.

MATERIALS AND METHODS

While quantitative approaches may attempt to assign a numerical factor to management in aviation safety, as has been done in previous work [14], to fully explore the relationship between airworthiness and leadership require an initial qualitative study. The research method utilized in this work is a case study. The case study is a thorough investigation of a "case" example displaying the specific phenomenon that is the subject of the "study" [15]. The case example is purposively sampled (selected) to highlight the phenomena, and correctly contextualize it. The case is studied in depth with an aim towards developing knowledge and understanding of the phenomena, how the phenomena varies or changes (as a qualitative developmental design), and/or to provide initial support for a research hypothesis to then direct further research and investigation [16]. The limitation of the case study is that any findings may not be transferable to other cases, but will still be valid about the underlying phenomena, assuming the case has been well selected. In this work we have utilized documents in the form of official government reports into and following the case study, there is also qualitative data presented by key informants who were part of the case study, in addition to supporting material from journalistic sources. This triangulation of data is used to provide validity and reliability in the qualitative research process.

RESULTS

The Case

The Hawker Sidley Nimrod was Britain's new maritime patrol aircraft and entered service in 1969. It was a repurposing of the infamous de Havilland Comet. The Comet is infamous as it is the aircraft associated with the development of the "black box", or as it is technically known, the flight data recorder. This was because there were a number of incidents where what should had been perfectly serviceable and reasonable new Comets aircraft were lost in flight, along with all passengers. The initial design of the Comet had windows that were too large and square, resulting in stress concentrations and failures in the airframes which were pressurized so the jet could fly at high altitudes. The Comet evolved, and the issues were address, and the 4th version of this aircraft was the basis of the Nimrod. The first Nimrod to enter service was the XV230. The Nimrod is pictured in Figure 2.

Figure 2. The Hawker Sidley Nimrod, XV230, the aircraft lost in the case accident, along with all crew onboard (Crown copyright, The Nimrod Review).

The following example of an aircraft accident sets the context for the present paper and highlights the devastation associated with aircraft accidents. On 2nd September 2nd, 2006, RAF Nimrod XV230 is reported to have suffered a catastrophic mid-air fire. The aircraft was on a routine mission in the Helmand Province in Afghanistan. The accident led to the death of all 14 service personnel on board, becoming the biggest source of life of British service personnel in one single incident since the Falklands War. The fire was caused by leaking fuel ignited by an exposed hot cross-feed pipe. These lives were lost not by enemy fire but rather a technical failure, an accident that was waiting to happen. The Defence Aviation and Air Force Safety, together with Hon Sir Charles Haddon-Cave QC, who lead the inquiry into the accident [17], presented the case to the Australian Defence College in 2014 and outlined the findings of the assessment [18].

Hon Sir Charles Haddon-Cave noted that even though catastrophic accidents have been reported in various parts of the world, such as the Fukushima, Malaysian Airways Flight 370, as well as Deepwater Horizon, among others, in addition to aircraft accidents, it could be surmised that there were essentially no accidents as the principles underlying all these incidents was the same. The presentation surmised that these incidents and accidents were related to airworthiness. With specificity to the RAF Nimrod XV230 case, the assessment showed that the factors that led to the accident could be traced to what had happened for over 30 years, and these included: poor design and modifications to the hot pipes and the fuselage, the high risk history of fuel tanks captured in the 1970s and 1980s and the resultant normalization of the deviance, increased operational activity of the aircraft in theatres in the 1990s and 2000s, increased maintenance problems associated with an fleet of aging aircrafts, organizational changes and budgetary cuts in the Ministry of Defence between 2000 and 2005, outsourcing of the responsibility for keeping the Nimrod aircrafts safe between 2004 and 2005, and finally the air to air refueling which caused the inevitable. Reports submitted to the RAF

noted that the aircraft had a fuel leak in 2005, and this needed to be rectified prior to operation in Afghanistan. Additional reports also showed the operational environment (hot on the ground, 40°C, and cold in the air, -40°C) were causing further issues with the known fuel leak. This highlights the fact the issue was not even a surprise or mystery, it was a latent failure, just waiting to happen. That is, the accident was caused by organizational issues including leadership and culture, principles and professionalism, simplicity, and safety.

The Concept of Aircraft Airworthiness

Airworthiness refers to the condition of an item or part of an item that allows the item to operate in a safe manner necessary for it to complete the intended mission. For an aircraft, the basic definition would be the condition of an aircraft that allows it to operate in a safe manner and achieve its intended function. On the other hand, continuing airworthiness is maintenance performed by approved personnel and organisations through the full-service life of an aircraft or parts of aircraft in a manner that allows it to operate safely and achieve its intended functions. That is aircraft airworthiness covers technical and non-technical activities necessary to design, certify, produce, maintain, and operate it throughout its service life [19]. Accidents related to airworthiness issues are often traced to human errors, either during flight or during maintenance, in the case of an anomalous decision made in the process of resolving or mitigating a risk [20].

A more comprehensive definition of airworthiness has been presented by the Australian Defense Force (ADF). According to the ADF, airworthiness refers to the condition of the aircraft that provides the basis for judging its suitability in achieving its functions, and this judgement relates to the design, construction, maintenance and the standards and limitations of operation, by competent and approved individuals working for an approved and certified organization. An aircraft is deemed to have achieved the required standards of airworthiness if it certifies the prescriptive requirements under different airworthiness categories [21]. The United Kingdom Military of Defense defines airworthiness as the ability of an aircraft or aircraft system to achieve safe operation without any significant hazard to flight and ground crew, passengers, air cargo, the general public or property [22].

There are various concepts underlying airworthiness. The first is the idea of proactive safety. From the beginning of aviation, there has been a dependence on incident and accident investigation, not only to establish the causes, but also to provide evidence for the incremental safety improvements. The lessons that are learnt from incident and accident investigation are used to develop and improve training processes, standardize operational procedures, develop checklists, and provide information to the necessary personnel involved in decision-making [20].

Over the years, incident and accident investigation reports have routinely stated that a majority of airworthiness-related accidents are caused by a precursor of events [23]. These include:

- incomplete or incorrect designs,
- procedures and checklists that do not incorporate the probability of human errors,
- inadequate training for aircraft personnel, inadequate repairs and maintenance,

- flaws in manufacturing processes, and
- management decisions that normalize organizational processes that predispose the aircraft and crew to higher likelihoods of incidents and accidents.

In a very safe system such as modern aviation the greatest threat to safety is seen by Dekker [24] as a drift into failure. This drift is where the practices of the workers slowly move away from the promulgated procedures. The drift arises as workers deal with time and production pressures [25]. When an accident does occur after work practices have drifted from promulgated procedures and in hindsight it appears as the cause of the accident was the lack of correct following of the procedures as causation, it is seen by Dekker [24] as a very unsatisfactory way of explaining this why the accident happened. The drift of practice away from promulgated procedures is incremental. Accidents in a very safe industry such as aviation, rarely happen because of large or unorthodox movements away from promulgated procedures [24]. Because of the incremental nature of the drift it is difficult to notice and therefore does not attract attention. This drift is not something that may happen but is unremitting. It may at times be only a slow drift or at other times even give the appearance of not happening at all, and at other times seem that the practice has become settled. At other times it may give the appearance of being continually unsettled. However, the practise drift is never still, it is always moving and changing [24]. In describing this practise drift within organisations Vaughan [26] uses the language of "organisational deviance" which she takes to be "routine nonconformity: a predictable and recurring product of all socially organised systems" (p. 274).

Another component of airworthiness is risk evaluation. At the heart of determining what is wrong or what could go wrong are various methods of risk management that seek to measure the risk of occurrence of a specific incident or accident. Risk management entails risk evaluation which encompasses identifying the event or scenario of interest, determining the likelihood of occurrence, and establishing the possible consequences. Continuing airworthiness risk evaluation involves routine collection of high-quality data, establishment of incident trends, identification of flaws in the system, and development of corrective actions in addition to continuous monitoring [20]. Clothier et al. [23] reiterate that risk should be assessed based on particular risk criteria for different scenarios and systematic decisions made in setting controls to guide appropriate treatment of risks over time.

From the analysis, airworthiness is not only influenced by aircraft related factors such as design, manufacture, and maintenance but also by the management system, hence there is a need to evaluate how organizational processes influence airworthiness. In Australia, the responsibility of managing safety in military aviation falls under the Defence Aviation Safety Program, which is administered by three agencies: the Australian Defence Force, Directorate of Defence Aviation and Air Force Safety, and Airworthiness Coordination and Policy Agency. These regulators develop and publish operational airworthiness regulations which define the standards that aircraft must comply with. There are two types of airworthiness. Technical airworthiness is concerned with the design, construction, and maintenance of aircraft to approved standards. Operational airworthiness is concerned with human performance and all

aspects of organizations which influence the operation of the aircraft within acceptance levels of risk [27]. Figure 3 shows the typical organizational structure of an airworthiness system, as defined by ICAO. Leadership in this complex organization is therefore a very important element to achieve operational airworthiness, and comes from many places, in the government and in the operator.

Leadership and Airworthiness

In the Nimrod case, the incident investigation revealed that it was caused by a host of organizational issues. One of the issues isolated was leadership. In order to prevent future accidents, Hon Sir Charles Haddon-Cave narrowed down on a set of new principles he called the 'LIPS' principles, noting that while rules are not necessarily sacred, principles are sacred. LIPS consists of four components: leadership, independence, people, and simplicity. In terms of leadership, Hon Sir Charles Haddon-Cave contended that the existence of strong leadership, from the top senior management is fundamental. Top leadership must demonstrate active and constant commitment to aircraft safety and risk management. Echoing an earlier report by Cullen [28], Hon Sir Charles Haddon-Cave noted that the "the first priority for a successful safety culture is leadership".

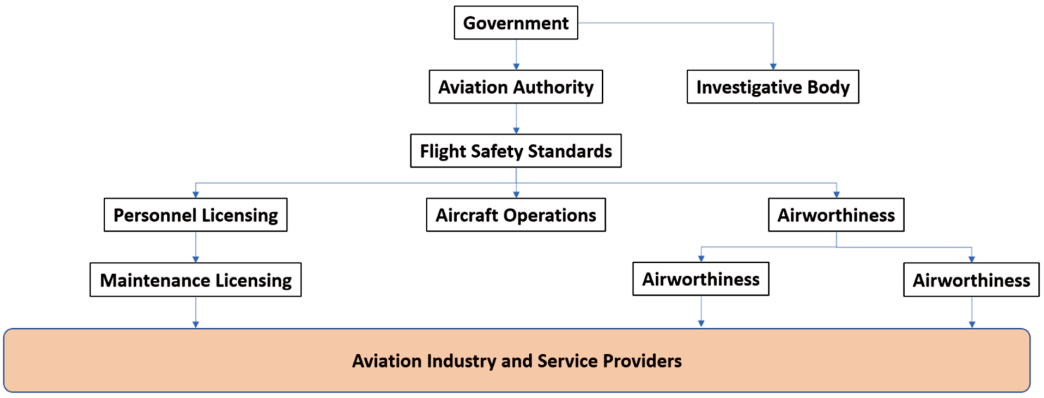

Figure 3. ICAO's example of an organizational structure for a civil airworthiness system.

Purton and Kourousis [29] noted that Military Aviation Authorities (MAAs) have established regulatory provisions that align with the principles developed by the International Civil Aviation Organization (ICAO). MAAs are also responsible for certification, approvals and inspection processes for the acquisition, operation, and airworthiness of air systems. To achieve these objectives, the Military Aviation Authorities have also adopted the four principles for a new airworthiness system outlined in the Haddon-Cave report.

Aircraft airworthiness can be regarded as a process that involves combined efforts of the use of technology along with efficient use of human efforts which is possible with a team of personnel that understand the importance of ensuring reliability, safety and efficacy for aircraft operations. Since aircraft maintenance personnel work in supervised teams, the importance of the effective leadership skills cannot be overlooked [30]. De Brito Neto [31] stated that with an increase in global air operations, the aviation

industry has witnessed a rise in multicultural work force which can be facilitated with the adoption of either the transformational leadership theory or the positive leadership theory. Mrusek [12] and Adams, Owen, Scott, and Parsons [32] emphasize on the need for collaborative leadership which encourages communication in the work environment as aviation maintenance management is an amalgamation of efforts of various departments.

Aerospace leadership is defined as that attribute that is practiced by all members of the aerospace community so as to achieve the needs of the organizations, of the aircraft fleets, as well as all those who depend on the safety of the aerospace industry. Aerospace leadership entails leading by example. This is achieved through applying responses to lessons that have been learned and nurturing unselfish cooperation in the community. Within organizations, leaders are committed to mentoring and developing stuff, encouraging the proactive utilization of existing knowledge and experience, and adopting a long-term approach towards driving the growth of individuals and the organization [33].

Leaders play a central role in the development of a safety culture. A safety culture arises from individual employee and group or organizational beliefs, values, attitudes, competencies, and behavior regarding safety. An organization can be said to possess a robust safety culture when communications are based on mutual trust and sharing is deemed important for building safety measures [34]. The call for building safety culture originated from the nuclear energy industry and the aviation industry because these industries must learn how to manage risk consistently and systematically so as to avoid costly accidents. To create safety culture in these industries, it has been determined that leaders must demonstrate high levels of commitment in their decisions as well as behaviors; they must lead the development of a systematic, rigorous, and thorough safety framework; they must encourage trust and respect across organizational hierarchies; they must pursue opportunities for learning multiple ways through which safety measures can be implemented and the safety of personnel, equipment, property and public ensured; they must demand early identification of issues affecting safety, fully evaluate them, and promptly address them; and finally, they must strive to nurture an environment where people feel safe to raise safety concerns without fear of discrimination [35].

The importance of leadership in the development of organizational safety culture was identified in Trew, Trigunarsyah, and Coffey research [36]. They surveyed seven Australian airworthiness management programs within airlines which were concerned with keeping aircraft in an airworthy state. Their factor analysis of the survey results sought to describe the organizational culture within the airworthiness sphere. Assurance was found to be he cultural trait that ensured the ongoing airworthiness of aircraft in the respective program. Within the trait of assurance “leadership has a role in establishing the organizational culture, practices and behaviors which optimizes the benefits sought from the program” (p. 164).

When leaders are competent and thoughtful, they positively contribute to continuous improvements in safety and organizational culture. This is because they have an in-depth understanding of all the systemic flaws that exist in the system and steps that can be taken to reduce the potential of failure, especially since the majority of failures can

be attributed to human mistakes. According to James Reason's "Swiss Cheese Model", systemic flaws are the hazards and weaknesses that increase the likelihood of an incident or accident. The identification of these latent hazards and weaknesses is the first step towards the development of solutions necessary for preventing errors from occurring, and more importantly, incidents and accidents that may lead to catastrophic loss of both personnel and equipment [37].

Effective leaders understand the need to inculcate teamwork in creating a safety culture. Such leaders deliberately adopt strategies and tactics that strengthen the safety culture by viewing safety issues as organizational system issues and not merely blame employees. They ensure that all employees understand operational hazards and collectively work towards reducing the likelihood of incidents and accidents. To successfully establish a teamwork approach towards safety, Reason identified three main components: just culture, reporting culture, and learning culture [38].

A just culture is where personnel are encouraged and sometimes rewarded for providing crucial information that can be used to improve safety, while ensuring that there is a clear differentiation between human error and risky reckless behaviors. Reporting culture is where all internal stakeholders recognize the responsibility of reporting errors and near-misses. On the other hand, a learning culture is where there is a willingness and competence to utilize quality data to analyze situations and reach conclusions that inform the development and implementation of safety measures. Data quality is also a component of airworthiness. For data to be deemed to be of high quality, it must be accurate in the sense that it must precisely report and record a specific attribute; it must be reliable in that it must identify and record the same event in the same way; and finally it must be valid meaning that represent only that which is to be recorded to be useful in decision-making. Organizations with strong safety cultures are characterized by staff who cooperate and share knowledge on how to improve the safety of the work environment. High perceptions of safety positively influence the culture while low perceptions directly or indirectly underline safety outcomes.

In analyzing leadership, it is crucial to identify the people who are responsible for providing leadership. Organizations should strive to ensure that sound leadership behavior is cultivated at all levels of the organization. Leadership culture teaches that leadership is the responsibility of every individual irrespective of their positions, whether one is an aircraft engineer, a maintenance technician, a logistics officer, a supervisor, a finance manager, or any other position in the organization [33]. While all employees are required to demonstrate leadership attributes, other employees have greater leadership responsibility than others. For instance, those in lower positions in terms or organizational hierarchy depend on those in senior positions for inspiration and motivation. Persons in senior positions should inspire respect as they mentor and develop their subordinates. How they share the vision of an organization influences the level of commitment subordinates will invest in pursuing the goals necessary for achieving the grand vision. Inspired, motivated, respected, and valued employees are more likely to use their knowledge, capabilities, and experience to drive organizational aspirations [33].

There are various step-by-step measures that leaders can undertake to enhance airworthiness. Leaders should support the development of systems which encourage

transparency and eliminate any form or punitive actions when it comes to reporting and learning from incidents and accidents. The importance of understanding maintenance errors alongside the promotion of a culture that identifies, reports and learns from maintenance errors for improving work quality and safety cannot be ignored [39, 40]. This calls for the development of a clear and efficient organizational reporting system that is accessible to everyone. Such a system encourages trust and accountability while also promoting a culture where unsafe conditions are identified and reported using appropriate channels without any fear of reprisals or punishment [39, 40]. In organizations where employees fear to report safety issues because of punishments or reprisals, it becomes difficult to institute proactive prevention systems.

Leadership should establish risk management processes that have the ability of recognizing risk elements and differentiating between human errors and risks that arise from poorly designed organizational systems. In normal organizational operations, mistakes, lapses, omissions, and errors occur. By broadly and specifically carrying out risk or hazard identification, organizations can avoid cases where an employee is punished or terminated for making a mistake without carrying out a full and thorough investigation so as to understand all the sources of unsafe conditions. A transparent risk management guideline helps to create an open, fair, and accountable safety culture. Leaders should build trust in the organization. This is demonstrated by how leaders interact with their subordinates, how they participate in organizational activities, and the programs they implement to enhance airworthiness. In doing that, there should also be a communication system with clear policies to support organizational-wide communication of all aspects of airworthiness.

Leaders should be good coaches [41, 42]. This implies that leadership is through example [43, 44]. By leading from the front, sharing skills, knowledge and direction with followers becomes more effective. Leaders should be active participants in safety briefings, planning sessions, debriefing, as well as safety rounds and walkarounds. Additionally, leadership provides guidance in establishing the airworthiness baseline and how to measure whether an organization is achieving airworthiness standards.

DISCUSSION

Findings

The Hawker Sidley Nimrod XV230 accident is an interesting case with a long history, with many lessons to learn. Previous work has highlighted technical and general safety lesson [45]. Looking inductively at the data presented, it is clear that a link between success in terms of airworthiness and the leadership responsible for that airworthiness and safety. The intricate case study shown here, is a classic example of what in systems thinking is called a “wicked problem”. That is, the complex interactions between all the elements in the system result in unintended complex problems. That is, the aircraft alone was not at fault, neither were the many engineering teams responsible for each and every modification to the Nimrod over its 30+ year service life, similarly the environment was not solely responsible, nor were the individual leaders. However, in a far more complex “game” of *who sank the boat*, the components of the system interact in unexpected negative ways to produce a failure. A great example of this, is

the fact that leaders saw the great safety record of the Nimrod as an indicator that it was capable of more and would continue to maintain its high level of safety. The key feature in the Nimrod case study, is that leadership does have an obligation and the ability to provide an overview to factor in all aspects. As shown in the case study, documents were provided to show that there were issues that needed to be considered by leaders and factored into any operational decisions made.

Future and Further Work

The positive result in terms of the case study confirming the underlying research hypothesis, suggest further research is warranted. Specifically, a grounded theory using a collective case study would be the ideal future work to be undertaken. This would enable an understanding of how leadership and management in safety critical (high stress) industries, specifically aviation, interact in unintended ways with the other components of that system, to result in various "wicked problems", and hence provide insight into potential systems innovation and systems change. A good basis for this would be commencing with the model from Ogbonna and Harris [46], as shown in Figure 4.

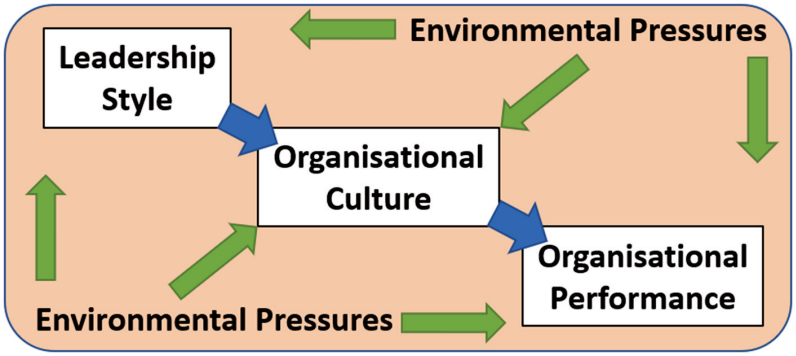

Figure 4. The flow on effect of leadership to the organization in terms of both culture and performance, and the external pressure influencing these relationships and elements.

CONCLUSION

The objective of this paper was to address the role leadership and culture play in maintaining aviation safety and aircraft airworthiness. The study concluded that leadership is an important aspect of any organizational entity. It was also found that leaders are responsible for articulating the vision of an organization, setting the strategic objectives, establishing activities that must be implemented to achieve stated objectives, and evaluating the level of achievement of objectives over time. Leaders also lead organizational personnel. Leaders lead by example. They inspire respect, trust, and commitment to organizational vision and mission, while also inspiring and motivating subordinates to give their best. The study has concluded that operational airworthiness is dependent on the ability of organizational leadership to provide effective direction, stimulate teamwork and organizational learning, and establish sound risk management framework necessary for not only isolating the hazards and risks as well as mitigate

against all aspects that may have a direct or an indirect effect on airworthiness. The study also finds the importance of incorporating all involved personnel in aircraft maintenance in leadership training programs so that the role of leadership is realized, accepted, and executed at all levels of personnel equally.

REFERENCES

[1] Senguttuvan, P. S. (2006). *Fundamentals of Air Transport Management*. New Delhi, India: Excel Books.

[2] Jarach, D. (2017). *Airport Marketing: Strategies to Cope with the New Millennium Environment*: Taylor & Francis.

[3] ICAO. (2019). *Presentation of 2018 air transport statistical results*. Retrieved from Montreal, Canada: https://www.icao.int/annual-report-2018/Documents/Annual.Report.2018_Air%20Transport%20Statistics.pdf

[4] Abeyratne, R. I. R. (2017). *Frontiers of Aerospace Law*: Taylor & Francis.

[5] Insley, J., & Turkoglu, C. (2020). A Contemporary Analysis of Aircraft Maintenance-Related Accidents and Serious Incidents. *Aerospace, 7*(6), 81.

[6] ICAO. (2020). ICAO iSTARS API Data Service. Retrieved from https://www.icao.int/safety/istars/pages/api-data-service.aspx

[7] Batuwangala, E., Silva, J., & Wild, G. (2018). The Regulatory Framework for Safety Management Systems in Airworthiness Organisations. *Aerospace, 5*(4), 117.

[8] De Florio, F. (2016). *Airworthiness: An Introduction to Aircraft Certification and Operations*: Elsevier Science.

[9] Bratton, J. (2020). *Organizational Leadership*: SAGE Publications.

[10] Niphadkar, C. (2016). *Building Organizational Leadership: Leadership through Learning and Effective Organizational Development Interventions*: Notion Press.

[11] Zaccaro, S. J., & Klimoski, R. J. (2002). *The Nature of Organizational Leadership: Understanding the Performance Imperatives Confronting Today's Leaders*: Wiley.

[12] Mrusek, B. M. (2017). The Application of Shared Leadership in an Aviation Maintenance MTS Environment. *International Journal of Aviation, Aeronautics, and Aerospace, 4*(3), 4.

[13] Anderson, M. (2017). Nimrod XV230—reflections on leadership, culture and priorities. *The APPEA Journal, 57*(2), 374-376.

[14] Rajib, M., & Fan, L. (2015). A study on the critical factors of human error in civil aviation: An early warning management perspective in Bangladesh. *Management Science Letters, 5*(1), 21-28.

[15] Onghena, P., & Struyve, C. (2015). Case Studies. In M. Davidian, R. S. Kenett, N. T. Longford, G. Molenberghs, W. Piegorsch, & F. Ruggeri (Eds.), *Wiley StatsRef: Statistics Reference Online* (pp. 1-5). Hoboken, NJ: John Wiley & Sons.

[16] Leedy, P., & Ormrod, J. E. (2013). *Practical Research: Planning and Design* (10th ed.). Boston, U.S.A: Pearson Education Inc.

[17] Haddon-Cave, C. (2009). *The Nimrod Review: an independent review into the broader issues surrounding the loss of the RAF Nimrod MR2 aircraft XV230 in Afghanistan in 2006, report* (Vol. 1025). London, UK: The Stationery Office.

[18] Haddon-Cave, C. (2014). Leadership and culture, principles and professionalism, simplicity and safety—lessons from the Nimrod Review. *The APPEA Journal, 54*(3). doi: https://doi.org/10.1071/AJ13143
[19] Kourousis, K. I. (2020). Special Issue: Civil and Military Airworthiness: Recent Developments and Challenges. *Aerospace, 7*(4), 37. Retrieved from https://www.mdpi.com/2226-4310/7/4/37
[20] Enders, J. H., Dodd, R. S., & Fickeisen, F. (1999). Continuing airworthiness risk evaluation (CARE): An exploratory study. *Flight Safety Digest, 18*(9-10), 1-51.
[21] DoD. (2011). *DI(G) OPS 02-2: Defence Aviation Safety Program*. Canberra, Australia
[22] Richardson, N. (2010). Defining 'Airworthiness'. *Aero Safety World, 5*(3), 14-18.
[23] Clothier, R. A., Palmer, J. L., Walker, R. A., & Fulton, N. L. (2011). Definition of an airworthiness certification framework for civil unmanned aircraft systems. *Safety science, 49*(6), 871-885.
[24] Dekker, S. (2004). Why we need new accident models. *Human Factors and Aerospace Safety, 4*(1), 1-18.
[25] Leveson, N. (2004). A new accident model for engineering safer systems. *Safety science, 42*(4), 237-270.
[26] Vaughan, D. (1999). The dark side of organizations: Mistake, misconduct, and disaster. *Annual review of sociology, 25*(1), 271-305.
[27] Moclair, T. (2016). Safety of Flight. *Australian Aviation, 40*(1), 42-45. Retrieved from https://www.defence.gov.au/DASP/Docs/Media/SafetyofFlightJanFeb16.pdf
[28] Cullen, W. (2001). *The Ladbroke Grove Rail Inquiry: Part 2 Report*. Caerphilly, Wales: HSE Books.
[29] Purton, L., & Kourousis, K. (2014). Military Airworthiness Management Frameworks: A Critical Review. *Procedia Engineering, 80*, 545-564. doi:https://doi.org/10.1016/j.proeng.2014.09.111
[30] Chursin, A., & Tyulin, A. (2018). *Competence Management and Competitive Product Development: Concept and Implications for Practice*: Springer International Publishing.
[31] de Brito Neto, J. F. (2015). Leadership approaches in multi-cultural aviation environments. *Aviation in Focus-Journal of Aeronautical Sciences, 5*(1), 38-43.
[32] Adams, R., Owen, C., Scott, C., & Parsons, D. P. (2017). *Beyond Command and Control: Leadership, Culture and Risk*: CRC Press.
[33] Gauntlett, R. (2016). *Aerospace Leadership - Simply "Leading by Example"*. Aircraft Airworthiness & Sustainment (Australia). Australia. Retrieved from https://www.ageingaircraft.com.au/images/Aerospace-Leadership---Simply-Leading-by-Example.pdf
[34] Chatzi, A. V., Martin, W., Bates, P., & Murray, P. (2019). The unexplored link between communication and trust in aviation maintenance practice. *Aerospace, 6*(6), 66.
[35] Leonard, M., & Frankel, A. (2012). *How can leaders influence a safety culture? Thought paper*. Thought paper. The Health Foundation. London, UK. Retrieved from https://www.hptinstitute.com/wp-content/uploads/2014/01/How-can-leaders-influence-a-safety-culture-thought-paper-Michael-Leonard-Allan-Frankel.pdf

[36] Trew, T., Trigunarsyah, B., & Coffey, V. (2013). Organizational culture in airworthiness management programmes: extending an existing measurement model. *Engineering Project Organization Journal, 3*(3), 154-167.
[37] Reason, J., & Hobbs, A. (2003). *Managing Maintenance Error: A Practical Guide*: Ashgate.
[38] Reason, J. (2016). *Managing the Risks of Organizational Accidents*: Taylor & Francis.
[39] Floyd, H. L. (2019, 4-8 March 2019). *Maintenance Errors as Cause for Electrical Injuries - What We Can Learn from Aviation Safety.* Paper presented at the 2019 IEEE IAS Electrical Safety Workshop (ESW).
[40] Hobbs, A., & Williamson, A. (2002). Skills, rules and knowledge in aircraft maintenance: errors in context. *Ergonomics, 45*(4), 290-308.
[41] Harkavy, D. S. (2010). *Becoming a Coaching Leader: The Proven System for Building Your Own Team of Champions*: HarperCollins Leadership.
[42] Wilson, J., & Gislason, M. (2009). *Coaching Skills for Nonprofit Managers and Leaders: Developing People to Achieve Your Mission*: Wiley.
[43] Chopra, S., & Fisher, D. (2012). *Leadership by Example: The Ten Key Principles of All Great Leaders*: St. Martin's Publishing Group.
[44] Sylvia, R. D. (2009). *Leadership through the Ages*: Waveland Press.
[45] Cockram, T. (2013). *The Loss of Nimrod XV230 and the Haddon-Cave Review—What Can We Learn?* Paper presented at the Safety and Reliability.
[46] Ogbonna, E., & Harris, L. C. (2000). Leadership style, organizational culture and performance: empirical evidence from UK companies. *International Journal of human resource management, 11*(4), 766-788.