

JUST CULTURE IN THE PORTUGUESE AIR FORCE¹

JUST CULTURE NA FORÇA AÉREA

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Abstract

Historically, accidents are often preceded by incidents, and / or by “predictable / foreseeable” failures in systems and safety deficiencies. To improve Safety Culture, it appears to be more effective to adopt preventive and predictive systems based on a Just Culture approach, instead of purely reactive systems. Furthermore, the complex, technologically avant-garde systems used in high-risk industries such as aviation, and in military aviation in particular, have led Organizations such as the Air Force (PoAF) to invest on their safety policies, as the recent implementation of Just Culture demonstrates. This study aims to “Propose measures to optimise the implementation of Just Culture in the PoAF's Safety Culture”. The study used inductive reasoning, a quantitative research strategy with qualitative elements and a case study research design, based on data collected from: a questionnaire delivered to 22 officers of the PoAF's intermediate leadership structures; semi-structured interviews to five officers of the PoAF's superior structure and two senior managers from comparable national organizations / counterparts; and a literature review on two foreign organizations / counterparts. The findings revealed that optimising Just Culture in the PoAF will entail four measures (regulations, education / training, internal and external communication and feedback) and a set of corresponding lines of action.

Keywords: Safety Culture, Safety Management System (SMS), Mistake, Violation (intentional), Just Culture, Perceived Usefulness.

How to cite this article: Rodrigues, S. R. R. C., & Fachada, C. P. A. (2021). Just Culture in the Portuguese Air Force. *Portuguese Journal of Military Sciences [Revista de Ciências Militares]*, May, IX(2), 399-432. Retrieved from https://www.ium.pt/?page_id=6461

¹ Article adapted from the individual research work carried out in the 2020/2021 Field Grade Officers Course. The defence took place in July 2021 at the Military University Institute. The full version is available from Portugal's Open Access Scientific Repositories (RCAAP).

Resumo

Historicamente, os acidentes são amiudadamente anteriorizados por incidentes, e/ou por “previsíveis/antecipáveis” falhas nos sistemas e insuficiências na segurança, afigurando-se mais eficazes, para potenciar a Cultura de segurança, a adoção de sistemas de índole preventiva e preditiva, alicerçados numa abordagem de Just Culture, em detrimento dos puramente reativos. Adicionalmente, sistemas complexos, tecnologicamente vanguardistas, presentes em setores de alto risco, como a aviação em geral, e a militar em particular, têm levado Organizações como a Força Aérea (FA), a investir crescentemente na sua política de segurança operacional, caso da recente implementação da Just Culture. Esta investigação, com o objetivo “Propor contributos para otimizar a implementação da Just Culture na Cultura de segurança da FA”, pautou-se por um raciocínio indutivo, uma estratégia de investigação quantitativa com reforço qualitativo e um desenho de pesquisa de estudo caso, e baseou-se em dados: de questionário a 22 oficiais da chefia de estruturas intermédias da FA; das entrevistas semiestruturas a cinco entidades da estrutura superior da FA e a duas de congéneres nacionais; documentais de duas congéneres internacionais. Dos resultados, concluiu-se que a otimização da Just Culture na FA traduz-se pelo emprego de quatro medidas (normativos, formação, comunicação interna e externa e retroalimentação), operacionalizadas em associadas linhas de ação.

Palavras-chave: *Cultura de segurança, Safety Management System (SMS), Erro, Violação, Just Culture, Utilidade Percebida.*

1. Introduction

As the European Parliament and the Council of the European Union have acknowledged, when analysing occurrences, incidents and accidents in aviation, History has shown that

[...] accidents are often preceded by safety-related incidents and deficiencies revealing the existence of safety hazards. Safety information is therefore an important resource for the detection of potential safety hazards [and] purely reactive systems have been found to be of limited use [and] should therefore be complemented by proactive systems [...] (Regulation [EU] No 376/2014 of 3 April, pp. 122/18-122/19)

The same document states that the Union, its Member States and other organizations, can improve aviation safety by introducing “[...] more proactive and evidence based safety systems which focus on accident prevention based on the analysis of [...] relevant safety information [that has been] reported, collected, stored, protected, exchanged, disseminated and analysed” (Regulation [EU] No 376/2014 of 3 April, p. 122/19).

This decision reflected the position taken by the International Civil Aviation Organization’s (ICAO) (2018, p. 1-1) since 2006, that all States and Organizations should develop a Safety

Management System² ([SMS]), i.e. a systematic approach that they can use, continuously and proactively, to mitigate safety risks before they degenerate into aviation accidents or incidents.

An effective SMS is establishes connection through which Organizational Culture, Safety Culture and Just Culture interact. The latter is seen as the top level of Safety Culture and the success of its implementation depends on the organization's senior leaders explaining its benefits and how the changes will occur (Creber & Drew, 2019).

Thus, a "zero accidents" policy cannot be achieved through an approach in which the main goal of an accident investigation is to find those responsible for it (Flaherty, 2011), but rather through a Just Culture that encourages voluntary reporting without fear of punishment. This type of culture fosters learning and is essential in preventing certain recurrent events that may result in accidents (Dekker, 2009). The challenge in this approach is in knowing where to draw the line that distinguishes acceptable from unacceptable behaviour in the Organization, and in identifying who is responsible for drawing that line and for establishing rules and procedures (Dekker, 2009).

The importance of this issue is stressed in the Annual Planning Directive on Accident Prevention 2021, in which the Portuguese Air Force (PoAF) recognises the complexity and risks of its mission and states that, in order to eliminate or mitigate accidents, it would be necessary to conduct "[...] Accident Prevention activities, using systematic processes to ensure safety and a deep rooted Safety Culture, [...] sustained by a Just Culture atmosphere" (Directive No. 03/CEMFA/2021, pp. 1, 10-11, 15).

This would entail looking at the risk management system as a whole, that is, as the sum of Human and Organizational Factors, as advanced in the mid-1990s by Reason (1995, p. 80), who noted (after analysing the result of several accident investigations carried out between 1960 and 1990) that human error is a relevant factor in complex and highly technological systems.

Human error does not imply a simplistic, single cause, such as the result of carelessness, negligence, recklessness or incompetence by a given group of employees, but refers to the fact that human resources are the key "pieces" in the design, construction, operation, maintenance and / or management of technologically advanced environments such as aviation (Reason, 1995, p. 80).

This study addresses Just Culture, and has the following delimitations (Santos & Lima, 2019):

- Temporally, it covers the period from 2014-2021 (from the year the European Parliament and the Council introduced the concept of Just Culture in civil aviation regulations to the present day);
- Geographically, it covers the flight operations of the PoAF and of similar organizations

² In the Portuguese aviation industry, the definition of *segurança* ("security / safety") depends on its application. Thus, there is a distinction between *Segurança Operacional* (Operational Safety) – "the state in which risks associated with aviation activities, which relate to, or directly support the operation of aircraft are controlled and reduced to an acceptable level" – and *Segurança da aviação / Segurança* (Aviation Security), "the combination of measures and human and material resources in order to safeguard civil aviation against acts of unlawful interference that constitute threats to its security" (Portuguese Civil Aviation Authority [ANAC], 2015, p. 165).

(national and foreign), and, in the case of the latter, analyses their Safety Culture practices and how they have implemented Just Culture;

– In terms of content, the study aims to optimise the implementation of Just Culture practices in the PoAF's Safety Culture "policy".

The study's general objective (GO) is *To propose measures to optimise the implementation of Just Culture in the PoAF's Safety Culture*, and the specific objectives (SO) are:

SO1: To analyse how the implementation of Just Culture in the PoAF's Safety Culture is perceived;

SO2: To analyse how similar organizations/counterparts have implemented Just Culture in their Safety Culture policy.

These objectives are operationalised through the following Research Question (RQ): *What measures can the PoAF take to optimise the implementation of Just Culture in its Safety Culture?*

2. Theoretical and conceptual framework

This chapter presents the state-of-the-art on the two key concepts (safety culture and Just Culture) and the analysis model that guided the investigation.

2.1. Literature review and key concepts

2.1.1. Safety culture

The approach to accident investigation initially focused on material factors and on analysing equipment failures, its focus later shifted to evaluating failures from the perspective of the human factor and the system's complexity (Kováčová, Licub, & Bálinta, 2019).

Therefore, before the concept of safety culture can be operationalised, this section will analyse what constitutes an error (emphasising its distinction from a violation), and the difference between incidents and accidents.

Error: Highly efficient organizations (such as the US Navy's nuclear-powered aircraft carriers, Nuclear Power Plants and Air Traffic Control Centres) operate based on the assumption that human beings are fallible – and that (human) error is to be expected as a consequence of the situational context in which individuals operate –, and that, while assigning blame may be emotionally satisfactory, a more functional approach "analyses" (or targets) the organization as a whole (Reason, 2000, pp. 768, 770).

Therefore, whereas the human condition cannot be changed significantly, the environment in which human beings work can. Reason (2000) argues that the purpose of safety is not to prevent isolated failures (both human and / or technical and material), but rather to make the system as robust, functional and resilient as possible, and, as in his Swiss Cheese model, enhanced with a set of defences / checks that aim to prevent errors or mitigate their impact (Figures 1 and 2).

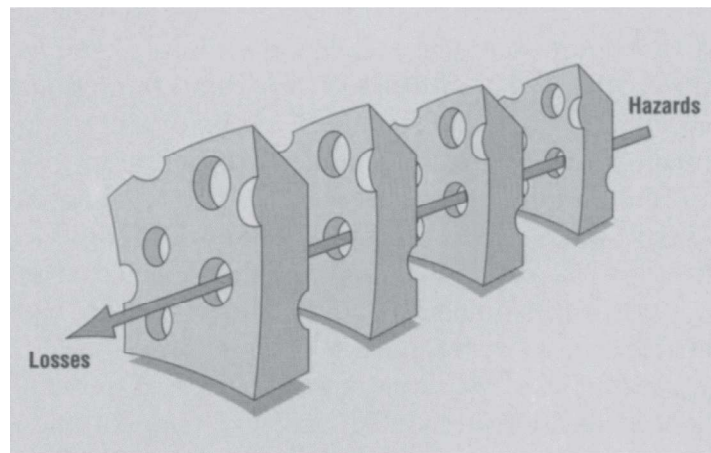


Figure 1 – Swiss Cheese Model

Source: Reason (2000, p. 769).

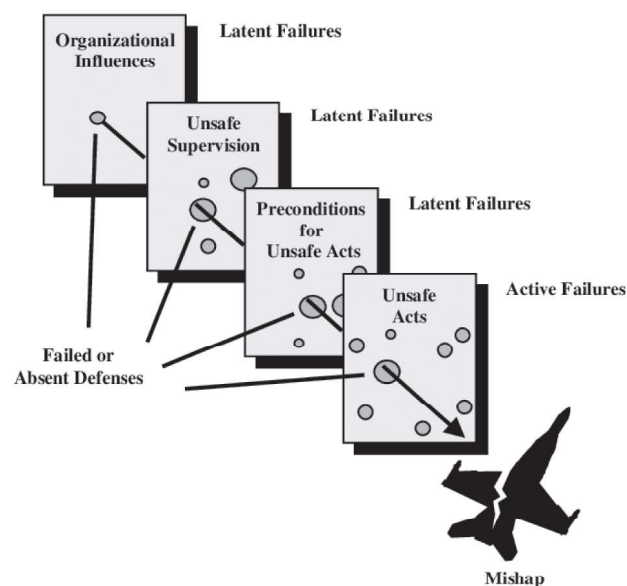


Figure 2 – Swiss Cheese Model adapted from Reason (1990) by EUROCONTROL

Source: EUROCONTROL (2006).

The systems outlined above (Figures 1 and 2) combine a set of defences – procedural, administrative, technical, etc. – arranged in several layers (defensive layers). These defences provide effective protection but may include some inevitable gaps (i.e., holes similar to the slices of a Swiss cheese, which, unlike them, are not aligned and are not permanent, as they appear and disappear in different locations) (Reason, 2000).

However, in certain situations, holes may arise at the same time in several layers of

defence (due to active failures³ or latent conditions⁴) and align (Figures 1, 2 and 3), creating an opportunity for an incident or mishap / accident to occur (Reason, 1990, 1995).

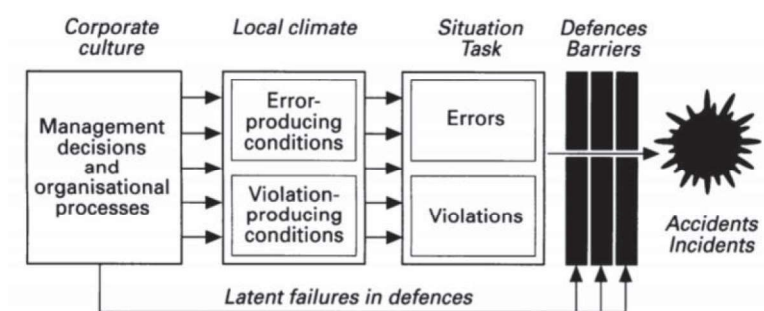


Figure 3 – Stages of development of an incident or accident

Source: Reason (1995, p. 83).

Thus, errors must be distinguished from violations (Figure 4). The main difference is that the latter are the result of intentional actions, unlike errors, which, like slips and lapses, are unintentional (Figure 5) (Skybrary, n.d.).

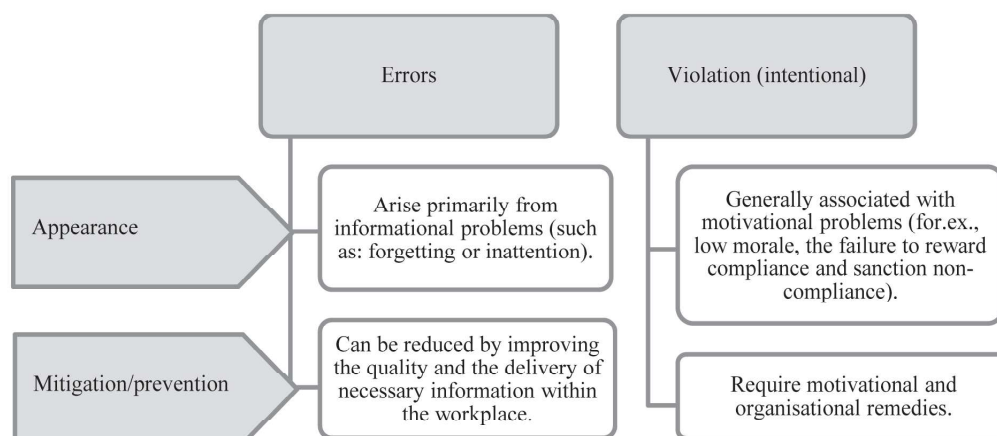


Figure 4 – Error versus violation (intentional)

Source: Adapted from Reason (1995, p. 82).

³ Unsafe acts – slips, lapses, mistakes and procedural violations – by individuals on the “front line”, who are in direct contact with the system, which have a direct and usually short-term impact on the integrity of defences (Reason, 1995, p. 82; Reason, 2000, p. 769).

⁴ Inevitable pathogens that lie (dormant) in the system, which can be traced to earlier decisions by those who designed, built and / or developed the system (Reason, 1995, p. 82; Reason, 2000, p. 769).

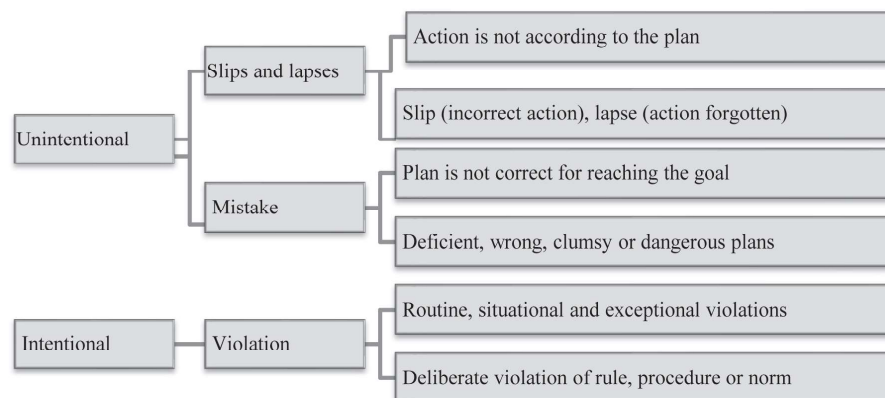


Figure 5 – Error versus violation

Source: Adapted from Skybrary (n.d.).

Although Reason's Swiss Cheese model has received some criticism since it was introduced, it remains relevant because it provides, among other advantages, a way to understand how the different components and defences of a complex system interact, and that an accident is not caused by a single human error or technical failure, but by the combined effect of several factors at different levels of the organization (EUROCONTROL Experimental Centre [EEC], 2006, p. 9).

Incident versus accident. Reason (1995, 2000, 2004) states that all complex systems contain a set of potential situations (latent vulnerabilities specific to the organizational culture) that can, under the right conditions (temporal and geographical), facilitate and trigger an incident or accident (EEC, 2006, p. 2).

Incidents and accidents are similar in the sense that they are unplanned events, but differ in terms of their impact. Whereas the former results only in property damage (but not in harm to individuals), the latter results in harm to people (serious injury, illness or death) and may result in property damage (Aaron, 2019; ICAO, 2016).

Thus, all accidents are incidents, but the opposite is not true, and organizations should ultimately have a zero accident policy and a proactive approach. This approach includes analysing past incidents, identifying possible patterns and defining accident prevention procedures and policies (Aaron, 2019).

Returnig to the topic of safety culture, according to Ma and Rankin (2014, pp. 13-14), in order to ensure it, when potential safety hazards are identified, organizations must adopt a "Reactive, Proactive and Predictive" approach (Figure 6) guided by four principles (Figure 7).

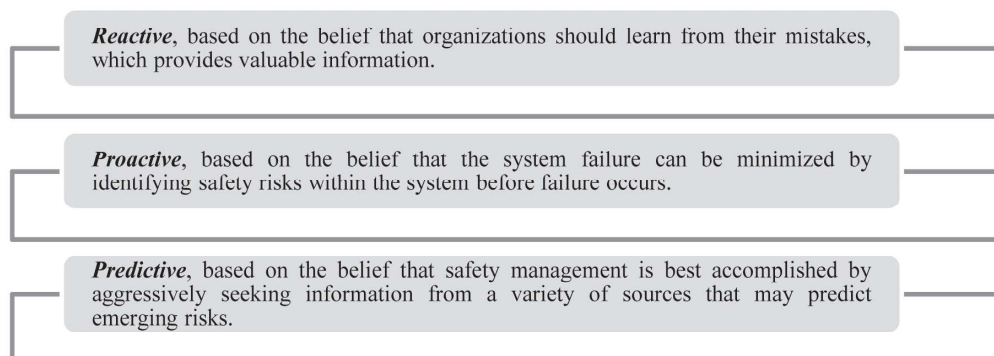


Figure 6 – Organizational approach to the identification of potential safety hazards

Source: Adapted from Ma and Rankin (2014, pp. 13-14).

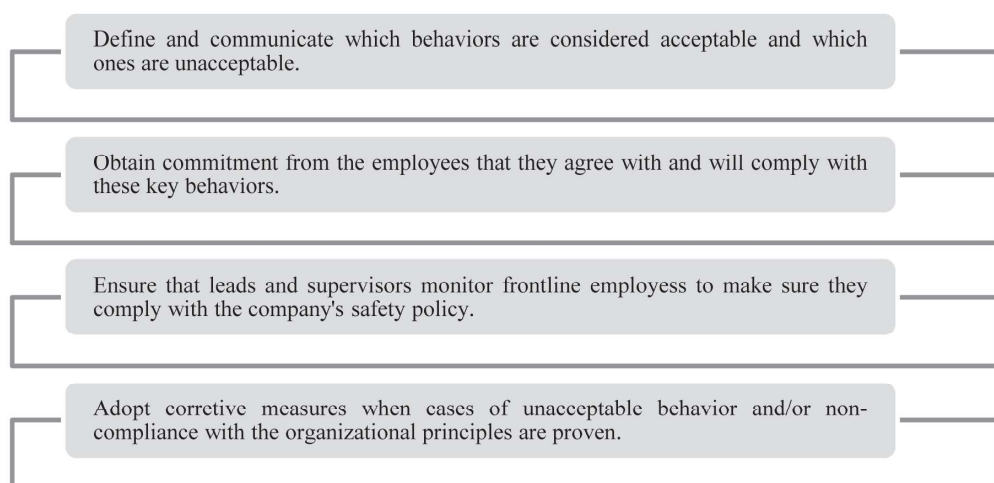


Figure 7 – Principles to be applied in the identification of potential safety hazards

Source: Adapted from Ma and Rankin (2014, p. 17).

Therefore, a successful safety culture depends on the distinction between unacceptable behaviour and unsafe act, and, simultaneously, on the creation of a reporting culture, which will, in turn, foster a learning culture (Reason, 2004, p. vi).

In fact,

The term 'no-blame culture' flourished in the 1990s and still endures today. Compared to the largely punitive cultures that it sought to replace, it was clearly a step in the right direction. It acknowledged that a large proportion of unsafe acts were 'honest errors' (the kinds of slips, lapses and mistakes that even the best people can make) and were not truly blameworthy, nor was there much in the way of remedial or preventive benefit to be had by punishing their perpetrators. But the 'no-blame' concept had two serious weaknesses. First, it ignored – or, at least, failed to confront – those individuals who willfully (and often repeatedly) engaged in dangerous behaviours that most observers would recognize as being likely to increase the risk of a bad outcome. Second, it did not properly address the crucial

business of distinguishing between culpable and non-culpable unsafe acts. [Therefore], a safety culture depends critically upon first negotiating where the line should be drawn between unacceptable behaviour and blameless unsafe acts. There will always be a grey area between these two extremes where the issue has to be decided on a case by case basis. [...] A number of aviation organisations have embarked upon this process, and the general indications are that only around 10 per cent of actions contributing to bad events are judged as culpable. In principle, at least, this means that the large majority of unsafe acts can be reported without fear of sanction. (Reason, 2004, p. vi)

As the outline in Figure 8 shows, a safety culture should be an informed, flexible, reporting, just and learning culture (Reason, 1997, cited in Global Aviation Safety Network [GAIN], 2004, p. 4).

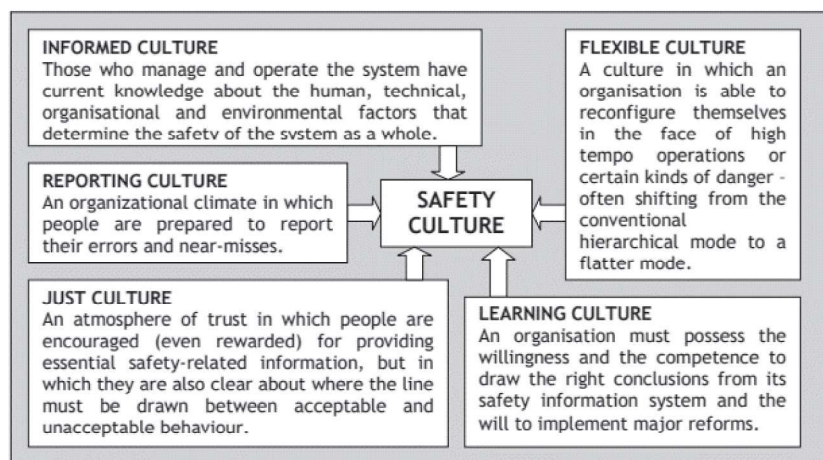


Figure 8 – The Components of Safety Culture

Source: Reason (1997, cited in GAIN, 2004, p. 4).

Furthermore, Just Culture should be both attitudinal and structural, that is, it relates to both the individual and the organization (GAIN, 2004, p. 4).

2.1.2. Just Culture

This section operationalises the Just Culture construct and analyses its perceived usefulness using Davis' (1986) Acceptance Model.

Construct operationalisation. To elaborate on the above, a Just Culture aims to instil a climate of trust that motivates and encourages all members of an organization to report any occurrence that may have an impact on safety without fearing they will be punished unfairly (Kováčová et al., 2019, p. 105). That is, a climate that aims to reverse the chain of events in which several incidents lead to an accident. When these incidents are duly reported and investigated, the problem may be identified in a timely manner and prevented (GAIN, 2001 p. 3-7).

Dekker (2009) defined six essential lines of action to successfully implement Just Culture (Figure 9).

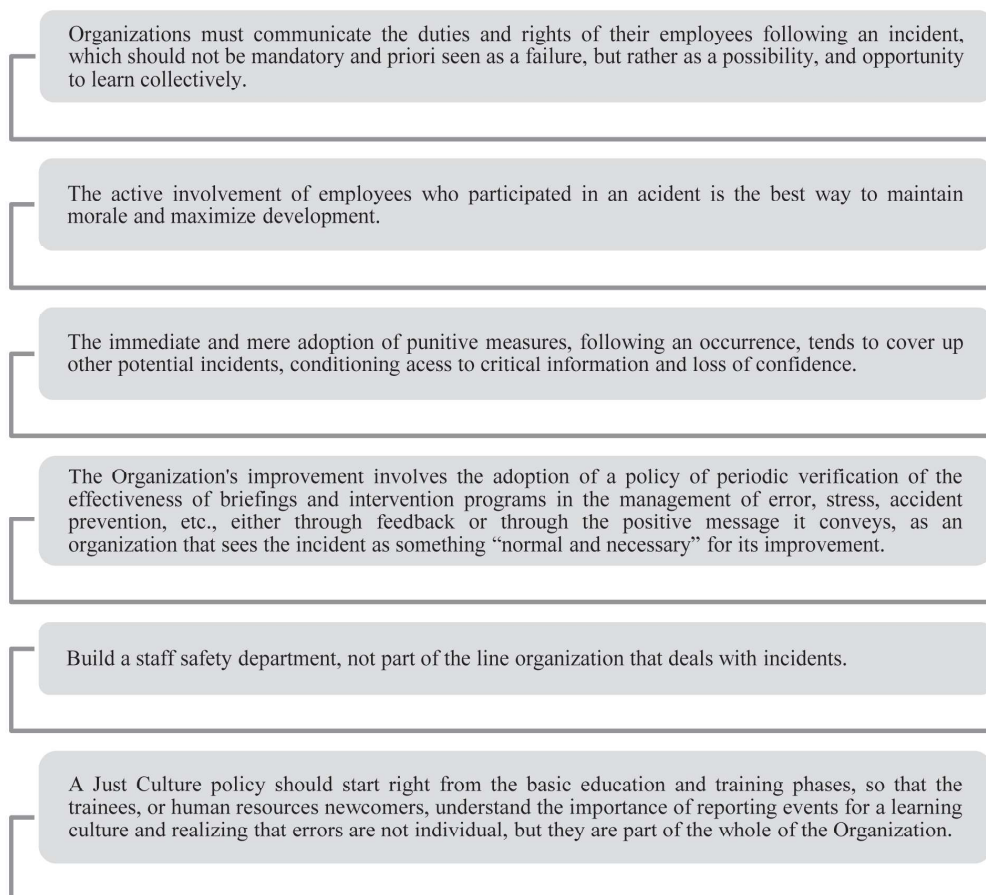


Figure 9 – Six lines of action that facilitate the implementation of Just Culture

Source: Adapted from Dekker (2009).

Pursuant to Regulation (EU) No. 376/2014 of 3 April 2014 (p. 122/22), Just Culture is an "essential element of a broader 'safety culture', [that fosters trust in employees by encouraging them to] report safety-related information [because they will] not be subject to any prejudice on the basis of information provided [...]", except in the cases described in Figure 10⁵, which describes the situations in which the reporter and the individuals mentioned in the report are not granted protection, as well as the right of third parties to initiate civil proceedings.

⁵ Underlining in the direct quotations in Figure 10 by the author of this study.

“Individuals may be discouraged from reporting occurrences by the fear of self-incrimination and the potential consequences in terms of prosecution before judicial authorities. [...] It is therefore appropriate to provide that unpremeditated or inadvertent infringements of the law that come to the attention of the authorities of the Members States solely through reporting pursuant to this Regulation should not be the subject of disciplinary, administrative or legal proceedings, unless where otherwise provided by applicable national criminal law.

(Regulation [EU] No. 376/2014 of 3 April, p. 122/23)

“[...] in the context of developing a ‘just culture’ environment, Member States should retain the option of extending the prohibition on using occurrence reports as evidence against reporters in administrative and disciplinary proceedings to civil or criminal proceedings.

(Regulation [EU] No. 376/2014 of 3 April, p. 122/23)

“Each organisation established in a Member State shall establish a mandatory reporting system [...] and a voluntary reporting system.”

(Regulation [EU] No. 376/2014, 3 April, p. 122/26-122/28)

Figure 10 – Regulation on occurrence reporting, analysis and follow-up in civil aviation

Source: Adapted from Regulation (EU) No. 376/2014 of the European Parliament and of the Council, 3 April (2014, pp. 122/23-122/28).

Perceived usefulness. Bearing in mind the general objective of this study, as well as the recent implementation of the Just Culture concept in the PoAF’s safety culture, it seemed pertinent to analyse how its “target audience” rates its perceived usefulness. To that end, based on the work of Ramos and Fachada (2019), the study uses the Technology Acceptance Model (TAM) proposed by Davis (1986) (Figure 11), who theorised that an individual’s acceptance, intentions and subsequent behaviour when presented with a novel procedure / process (Attitude Toward Using and Actual System Use) depends on two motivational factors, “Ease of Use” and “Perceived Usefulness” (Davis, 1986, 1989; Davis, Bagozzi & Warshaw, 1989; Ferreira, 2014; Hussain, Mkpojiogu & Yusof, 2016; Minakawa, Neto & Rodello, 2016; Oliveira & Ramos, 2009).

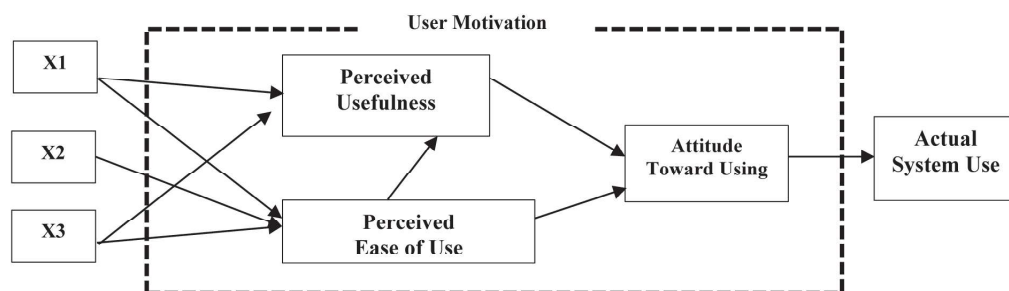


Figure 11 – Technology acceptance model

Source: Davis (1986, p. 24).

This model (Figure 11) is based on the assumption that people tend to use a new system, procedure, etc. (attitude towards using) if they perceive it as easy to use (ease of use) and, later, if they perceive it as useful (perceived usefulness) (Davis, 1986, p. 24). In other words,

an individual's attitude or behaviour towards a new system is influenced by its perceived usefulness, which in turn is influenced by its perceived ease of use, rather than by the system's actual characteristics (Davis, 1986, p. 24).

2.2. Analysis model

The study was conducted as outlined in the analysis model in Table 1.

Table 1 – Analysis Model

General Objective				
To propose measures to optimise the implementation of Just Culture in the PoAF's Safety Culture.				
Research Question				
What measures can the PoAF take to optimise the implementation of Just Culture in its Safety Culture?				
Specific Objectives	Subsidiary Questions\	Concept	Dimensions	Data collection
SO1 To analyse how the implementation of Just Culture in the PoAF's Safety Culture is perceived.	SQ1 How is the implementation of Just Culture in the PoAF's Safety Culture perceived?	Safety Culture	Error	Literature review, questionnaire survey and semi-structured interviews
			Incident and accident	
		Just Culture	Operationalisation	
			Perceived usefulness	
SO2 To analyse how similar organizations/ counterparts have implemented Just Culture in their Safety Culture policy.	QD2 How is Just Culture implemented in the Safety Culture of similar organizations/ counterparts?	Safety Culture	Error	
			Incident and accident	
		Just Culture	Operationalisation	
			Perceived usefulness	

3. Methodology and method

This chapter describes the methodology and method that guided the study.

3.1. Methodology

The study used an inductive reasoning methodology, a quantitative research strategy with qualitative elements and a case study research design (Santos & Lima, 2019).

3.2. Method

3.2.1. Participants and procedure

Participants. The study sample of the pre-test phase consisted of five officers (three Pilots / Captains and two Air Traffic Controllers [ATC] / Majors). The "field" phase sample included 27 officers (who hold management positions in the PoAF's intermediate leadership structure (middle management sample) [Table 2] and superior structures [Table 3]) and two civilians (senior management sample). The survey was delivered to 22 officers (captains and majors; n=91.7%) (Table 2), and the interviewee sample consisted of 5 PoAF officers⁶ (four general officers and one senior officer) and two civilians (Table 3).

⁶ The sample size is within the range advised by Rego, Cunha and Meyer (2018, p. 53) for "a group of respondents with some expertise [from a] homogeneous population".

Table 2 – Descriptive analysis of the survey sample⁷

Role	Potencial respondents (by role)	Actual respondents
Flight Squadron Commander	9	8
Airfield Squadron Commander or equivalent	8*	8
Head of the Accident Prevention Office (APO)	9*	6

* As two of these officers perform more than one role, there are 26 roles in a sample of 24 respondents.

Table 3 – Interviewees ^(*)

Position	Holder
Deputy Chief of Staff of the Air Force (VCEMFA)	Lieutenant General Rafael Martins
Commander of the Personnel Command of the Air Force (CPESFA)	Lieutenant General António Branco
Deputy Commander of the Air Command	Major General Rui Tendeiro
Inspector-General of the Air Force (IGFA)	Major General José Santiago
Deputy Head of the Office of the National Aviation Authority (GAAN)	Colonel Carlos Paulos
Head of the civil aviation unit of the Office for the Prevention and Investigation of Accidents in Civil Aviation and Rail (GPIAAF)	Investigator José Figueiredo
Head of the Safety, Operational Performance and Human Factors Division – Navegação Aérea de Portugal, Entidade Pública e Empresarial [Portuguese Air Navigation Service, Corporate Public Entity] (NAV. E.P.E.)	Air Traffic Controller (ATC) António Retorta

Procedure. The questionnaire was peer reviewed during the pre-test phase (on 05 May 2021). In the “field” phase (from 13 May to 22 June 2021), after analysing the feedback and obtaining the necessary authorisation from the military authorities, the questionnaire was sent to a sample of 24 potential respondents (who perform the roles listed in Table 2 in the Units attached to the Air Command and the Logistics Command) in a personalised email explaining the purpose of the study, which included the Google Forms link where the questionnaire could be filled out. The potential interviewees were contacted (in person or by telephone) to explain the topic, to inquire about their availability to be interviewed (all agreed), to inform them of their right to anonymity and confidentiality (which all interviewees waived), and to schedule the interviews (email or face-to-face; in the case of the latter, the interviewees were asked to validate the answers included here).

3.2.2. Data collection instruments

A three-part questionnaire survey was prepared for the heads of the intermediate structures of the PoAF. The first part of the questionnaire collected sociodemographic

⁷ The respondents were selected because they hold command / leadership positions that deal with flight operations, but also with other areas such as aircraft maintenance (Flight Squadron Commander), air traffic control, meteorological support and rescue (Airfield Squadron Commander or equivalent), and flight safety in ground operations with weapons and missiles – when applicable – as well as the environment (Head of the APO).

data. The second part analysed the perceived usefulness of the Just Culture concept. The third part analysed the implementation of the Just Culture concept in the PoAF using a version (translated and adapted by the author⁸) of the Just Culture Assessment Tool (JCAT) by Hinkin (1998, cited in Petschonek et al., 2013), which comprises 27 statements organized in six dimensions (Table 4), scored on a 5-point Likert scale (1 = Strongly disagree and 5 = Strongly agree).

Table 4 – JCAT Dimensions

Dimension	Definition
<i>Balance</i>	One's perceptions of fair treatment as it relates to errors, error reporting, and its systems approach to error.
<i>Trust</i>	The extent to which individuals trust the organization, their supervisors, and their co-workers.
<i>Openness of Communication</i>	The willingness of individuals to communicate event information upwards to supervisors and administrators (e.g., willingness to reveal events, share events information, and to make suggestions for improvement within the unit or the organization).
<i>Quality of the Event Reporting Process</i>	One's perceived quality of the event reporting system (which includes the process of entering reports and the ability to follow up on these reports), whether employees are given time to report, and to what extent the employees believe the reporting system is monitored and maintained.
<i>Feedback and Communication about Events</i>	One's beliefs regarding whether the organization does an effective job of sharing event information about the events and the outcome of evaluating events.
<i>Overall Goal of Continuous Improvement</i>	One's beliefs that the organization as a whole demonstrates a goal of continuous improvement, characterized by a willingness to learn from events and make improvement into the system.

Source: Adapted from Petschonek et al. (2013). (2013).

Two semi-structured interview scripts were prepared and delivered to senior managers of national organizations (GPAAAF and NAV E.P.E.)⁹; to analyse the foreign counterparts, a review of the literature on the Royal Canadian Air Force (RCAF) and the Royal Australian Air Force (RAAF) was carried out.

3.2.3. Data analysis techniques

The quantitative analysis, including the descriptive statistics, was performed using the free trial version of the software Statistical Package for Social Sciences (SPSS 28.0). The qualitative analysis of the semi-structured interviews followed the five steps advised by Guerra (cited in Santos & Lima, 2019, p. 122): transcribing, reading, summarising, descriptive analysis, and interpretive analysis.

⁸ The instrument adaptation study was conducted as in Fachada (2015, p. 43; 2019, p. 228, 271). First, it was translated (from English into current and fluent Portuguese), separately, by the author of this study and by an ATC who was also a potential respondent (both of whom have an ICAO language proficiency level of 5, in a maximum of 6). After comparing both translations, which were found to be similar, the combined version was back-translated (into English) by an English teacher (who is a native speaker of American English). This version was compared to the original, and the resulting version underwent a pre-test.

⁹ The Portuguese Aviation Authority (AAN), which could be considered a "counterpart", is not included here because it is under the authority of the Portuguese Air Force Chief of Staff (CEMFA).

4. Data analysis and findings discussion

This chapter will analyse the collected data and answer the subsidiary and research questions.

4.1. Implementing Just Culture in the PoAF's Safety Culture

This section will examine some of the Flight Safety (FS) indicators listed in the PoAF's Statistical Yearbooks, analyse the perceptions of the intermediate and superior structures of the PoAF, and answer SQ1.

4.1.1. Occurrences, reasons and causes of Flight Safety occurrences

The PoAF defines an occurrence¹⁰ as

[...] any situation resulting from acts, omissions, conditions or circumstances that presents a high risk of injury or property damage. Occurrences may arise during Operations, on or off-duty, in the areas of Weapons and Missile Safety, Ground Safety and Environment or [FS]. (PoAF, 2019, p. 10-8)

In this context, occurrence ratio refers to

[...] the number of occurrences (situations with an impact on FS) per 10,000 flight hours [FH]. The outline includes all reports received over the last 10 years, regardless of severity / classification. (PoAF, 2019, p. 10-9)

From 2014-2017 (Table 5), "the gradual rise in the occurrence ratio since 2014 was essentially due to the efforts to implement a 'Reporting Culture' in the Organization" (PoAF, 2017, p. 10-9). The increase in the number of occurrences in 2019, compared to 2018, is partly "[...] explained by the acquisition of a new aircraft, the AW-119 helicopter, which had an occurrence ratio of 443 per 10,000FH, and the fact that the ALIII was at the end of its operational life, and had a ratio of 353" (PoAF, 2019, p. 10-9).

Table 5 – Total of occurrences and occurrence ratio in the PoAF (2008-2019)

Year	Total of occurrences	Occurrence ratio
2008	99	43,902
2009	146	62,986
2010	246	102,028
2011	173	85,251
2012	160	109,876
2013	175	105,129
2014	174	98,039
2015	244	134,147
2016	245	145,643
2017	307	162,866
2018	271	154,473
2019	303	175,816

Source: PoAF (2017, pp. 10-8-10-9), PoAF (2018, pp. 10-8-10-9) and PoAF (2019, pp. 10-8, 10-10).

¹⁰ The definition used by the PoAF (in which an occurrence can refer to both an incident and / or accident) differs slightly from the definition of the European Parliament and the Council of the European Union (Regulation [EU] No. 376/2014 of 3 April, pp. 122/18-122/19), which describes it as the first stage of a series of events with increasing severity (occurrence, incident and accident).

One reason for the rise in the occurrence ratio over the last 10 years is that “reporting culture [is] becoming increasingly ingrained at all levels of responsibility” (PoAF, 2019, p. 10-9).

Human factors are among the top five causes of the 13 types of occurrences listed in Table 6 (n=21; 6.93%).

Table 6 – Causes of occurrences in the PoAF (2019)

Causes	n	%
Meteorology	3	0.99%
Fauna	34	11.22%
Maintenance	140	46.20%
Air traffic	13	4.29%
Human factors	21	6.93%
Organizational factors	5	1.65%
Ground operations	15	4.95%
Support	28	9.24%
Laser	5	1.65%
Armament	1	0.33%
Drone	0	0.00%
Operation	5	1.65%
Aerodrome	33	10.89%

Source: PoAF (2019, pp. 10-10).

4.1.2. Middle management perceptions

As shown in Table 7, only a few respondents (36.4%; n=8) stated that they are aware that Just Culture is a part of the PoAF’s Safety Culture, but added that it lacks a formal definition by the Organization, and that not everyone is aware of it (100%; n=8). Furthermore, what constitutes (or should constitute) unacceptable behaviour is not clear (37.5% [n=3] answered ‘no’, and 50% [n=4] did not answer).

Table 7 – Awareness and dissemination of Just Culture as part of the PoAF’s Safety Culture policy in the middle management sample

	Yes	No	No answer
Are you aware of the current PoAF Safety Culture policy that introduces the concept of Just Culture?	8 (36.4%)	14 (63.6%)	
Of the 8 “yes” answers...			
... do you consider that there is an explicit Just Culture policy in the PoAF, formally defined by the Organization and known by all?		8 (100%)	
...do you consider that this policy clearly defines what is considered unacceptable behavior?	1 (12.5%)	3 (37.5%)	4 (50%)

For the majority of respondents (Table 8), Just Culture is perceived as a very useful approach that improves the PoAF’s safety culture because (for average scores ≥ 4.50): it promotes voluntary reporting of highly dangerous situations that could lead to accidents

(M=4.59; SD=0.734); it provides a guarantee that, with the exception of intentional violations, voluntary reporting will not be punished (M=4.55; SD=0.858); it provides a clear definition of what constitutes unacceptable behaviour (M=4.50; SD=0.740); it entails the disclosure of an annual report on reported cases (M=4.50; SD=0.673).

Table 8 – Descriptive statistics of the “Perceived Usefulness” of Just Culture in the PoAF’s Safety Culture in the middle management sample

	N	Minimum	Maximum	Average	Standard deviation
2.1.1. ... the voluntary reporting of acts, omissions, conditions or circumstances, which, although they have not caused injury or damage, constitute a high risk, a dangerous situation, which can degenerate into an accident.	22	3	5	4.59	0.734
2.1.2... the safeguarding of guarantees that disciplinary action will not be taken as a result of the voluntary reporting of errors, omissions, considered honest, according to training and experience, except in cases where it is considered to be an intentional violation, an unacceptable behavior, and in these cases punishable.	22	2	5	4.55	0.858
2.1.3. ... a clear and unambiguous communication, distinguishing what is considered acceptable behavior versus unacceptable behavior.	22	3	5	4.50	0.740
2.1.4. ... the existence of a system that allows the exchange of information between the various bodies/services/sectors of the Institution, so that an identified error can be readily known to all.	22	2	5	4.45	0.858
2.1.5... the disclosure (feedback) of the error that was voluntarily communicated and promptly corrected, so that everyone knows that an occurrence was identified thanks to voluntary reporting, and collective learning is maximized.	22	3	5	4.41	0.666
2.1.6. ... access to the report of an occurrence, by the operational subject to an investigation.	22	2	5	4.14	1.082
2.1.7. ... the existence of a formal procedure, which informs the operational who reported an occurrence of the progress of the investigation.	22	3	5	4.32	0.780
2.1.8. ... the existence of an annual report, accessible to all, that provides statistical feedback regarding the number, type or other pertinent information resulting from the reported occurrences.	22	3	5	4.50	0.673
2.1.9. Overall, I see the existence of a Just Culture approach in the AF as very useful, because I believe it will improve the Institution’s safety culture.	22	2	5	4.45	0.858
Valid N (from the list)	22				

While none of the six dimensions of Just Culture in the PoAF was found to be clearly present ($M \geq 4$) (Table 9), respondents perceived it as generally positive ($M \geq 3.60$), with the exception of *Communication and Feedback* ($M=3.001$; $SD=0.897$).

Table 9 – Descriptive statistics of the six dimensions of Just Culture in the middle management sample

	N	Minimum	Maximum	Average	Standard deviation
Feedback and Communication about Events	22	1.33	5.00	3.00	0.897
Openness of Communication	22	2.00	5.00	3.66	0.769
Balance	22	1.80	5.00	3.70	0.780
Quality of the Event Reporting Process	22	2.60	4.60	3.73	0.561
Overall Goal of Continuous Improvement	22	1.50	5.00	3.65	0.801
Trust	22	2.40	4.60	3.61	0.713
Valid N (from the list)	22				

Note: To calculate the descriptive statistics of the dimensions, items 2.2.2, 2.3.1, 2.4.1, 2.4.2 and 2.4.5, 2.5.1 and 2.7.5 were reversed.

A more detailed analysis of each dimension revealed that the one that requires the most intervention, in the sense of optimisation (*Communication and Feedback*) (Table 10), obtained low scores due to the perception that the conclusions, outcomes and / or consequences of events are only disclosed occasionally (M=2.77; SD=1.110).

Table 10 – Descriptive statistics of the “Communication and Feedback” dimension of Just Culture in the middle management sample

	N	Minimum	Maximum	Average	Standard deviation
2.2.1. The management does a good job of sharing information about events.	22	2	5	3.09	0.811
2.2.2. We don't know about events that happen in our unit. ^(*)	22	1	5	2.86	1.207
2.2.3. I often hear about event conclusions and outcomes.	22	1	5	<u>2.77</u>	1.110
Valid N (from the list)	22				

^(*) Item formulated in the negative and answered with “Partially disagree”.

As shown in Table 11, most situations were perceived as generally positive, especially with regard to staff feeling comfortable approaching management with ideas and concerns (M=3.91; SD=0.868).

Table 11 – Descriptive statistics of the “Openness of communication” dimension of Just Culture in the middle management sample

	N	Minimum	Maximum	Average	Standard deviation
2.3.1. Staff feel uncomfortable discussing events with supervisors. ^(*)	22	1	5	2.86	1.167
2.3.2. Managements respect suggestions from staff members.	22	2	5	3.68	0.839
2.3.3. Staff can easily approach the managements with ideas and concerns.	22	2	5	3.91	0.868
2.3.4. If I had a good idea for making an improvement, I believe my suggestions would be carefully evaluated and taken seriously.	22	2	5	3.73	0.985
2.3.5. I trust managements to do the right thing.	22	1	5	3.86	1.037
Valid N (from the list)	22				

^(*) Item formulated in the negative and answered with “Partially disagree”.

With regard to the *Continuous Improvement* dimension (Table 12), the area which respondents consider the least optimised is the time / energy / resources provided by the PoAF to improve safety (M=3.14; SD=1.125).

Table 12 – Descriptive statistics of the “Continuous improvement” dimension of Just Culture in the middle management sample

	N	Minimum	Maximum	Average	Standard deviation
2.6.1. There are improvements because of event reporting.	22	1	5	3.64	0.953
2.6.2. The AF devotes time/energy/resources towards safety improvement.	22	1	5	<u>3.14</u>	1.125
2.6.3. By entering reports, I’m making the AF a safer place.	22	2	5	4.18	1.006
2.6.4. The AF sees events as opportunities for improvement.	22	2	5	3.64	0.902
Valid N (from the list)	22				

As Table 13 shows, staff perceptions regarding the fear of disciplinary action when they are involved in an event (M=3.18; SD=1.181) appears to be the area that most negatively affects *Balance*.

Table 13 – Descriptive Statistics of the “Balance” dimension of Just Culture in the middle management sample

	N	Minimum	Maximum	Average	Standard deviation
2.4.1. Staff members are usually blamed when involved in an event. ^(*)	22	1	4	2.45	1.101
2.4.2. Staff members fear disciplinary action when involved in an event.	22	1	5	<u>3.18</u>	1.181
2.4.3. When an event occurs, the follow up team looks at each step in the process to determine how the event happened.	22	2	5	4.00	0.756
2.4.4. I feel comfortable entering reports about events in which I was involved.	22	1	5	3.91	1.231
2.4.5. Staff members use event reporting to “tattle” on each other. ^(*)	22	1	5	1.77	1.232
Valid N (from the list)	22				

^(*) Item formulated in the negative and answered with “Partially disagree”.

Of the situations listed under the dimension *Quality of the event reporting process* (Table 14), the one that obtained the lowest scores is the time provided to enter a report during work hours (M=3.32; SD=1.323).

Table 14 – Descriptive statistics of the “Quality of the event reporting process” dimension of Just Culture in the middle management sample

	N	Minimum	Maximum	Average	Standard deviation
2.5.1. Coworkers discourage each other from reporting events. ^(*)	22	1	4	1.95	1.174
2.5.2. The event reporting system is easy to use.	22	1	5	3.55	1.143
2.5.3. Reports are evaluated and reviewed after they’re entered.	22	1	5	3.82	1.006
2.5.4. I’m given time to enter event reports during work hours.	22	1	5	<u>3.32</u>	1.323
2.5.5. The management encourages me to report.	22	2	5	3.91	0.921
Valid N (from the list)	22				

^(*) Item formulated in the negative and answered with “Partially disagree”.

In the *Trust* dimension (Table 15), the situations perceived as unsatisfactory were the fairness and balance of the system used by the PoAF to evaluate staff involvement in events (M=3.41; SD=0.796), and the perception that the PoAF adheres to its own rules and policies regarding Safety Culture (M=3.45; SD=0.739).

Table 15 – Descriptive statistics of the “Trust” dimension of Just Culture in the middle management sample

	N	Minimum	Maximum	Average	Standard deviation
2.7.1. The AF uses a fair and balanced system when evaluating staff involvement in events.	22	2	5	<u>3.41</u>	0.796
2.7.2. I trust that the AF will handle events fairly.	22	2	5	3.77	0.869
2.7.3. The AF adheres to its own rules and policies.	22	2	5	<u>3.45</u>	0.739
2.7.4. I feel comfortable entering reports where others were involved.	22	1	5	3.95	1.090
2.7.5. I am uncomfortable with others entering reports about events in which I was involved. ^(*)	22	1	5	2.55	1.299
Valid N (from the list)	22				

^(*) Item formulated in the negative and answered with “Partially disagree”.

4.1.3. Senior management perceptions

The five interviewees’ answers to the *Perceived Usefulness* questions were organized into three groups (Table 16): disagreement (answers: “totally disagree” + “partially disagree”); neutral (“neither disagree nor agree”); agreement (responses: “totally agree” + “partially agree”).

Table 16 – Descriptive statistics of the “Perceived Usefulness” of Just Culture in the PoAF’s Safety Culture in the senior management sample

	Disagreement	Neutral	Agreement
2.1.1. ... the voluntary reporting of acts, omissions, conditions or circumstances which, although they have not caused injury or damage, constitute a high risk, a dangerous situation, which can degenerate into an accident.			100% (n=5)
2.1.2... the safeguarding of guarantees that disciplinary action will not be taken as a result of the voluntary reporting of errors, omissions, considered honest, according to training and experience, except in cases where it is considered to be an intentional violation, an unacceptable behavior, and in this cases punishable.			100% (n=5)
2.1.3. ... a clear and unambiguous communication, distinguishing what is considered acceptable behavior versus unacceptable behavior.		40% (n=2)	60% (n=3)
2.1.4. ... the existence of a system that allows the exchange of information between the various bodies/services/sectors of the Institution, so that an identified error can be readily known to all.			100% (n=5)
2.1.5... the disclosure (feedback) of the error that was voluntarily communicated and promptly corrected, so that everyone knows that an occurrence was identified thanks to voluntary reporting, and collective learning is maximized.	20% (n=1)		80% (n=4)
2.1.6. ... access to the report of an occurrence, by the operational subject to an investigation.		20% (n=1)	80% (n=4)
2.1.7. ... the existence of a formal procedure, which informs the operational who reported an occurrence, of the progress of the investigation.	40% (n=2)		60% (n=3)
2.1.8. ... the existence of an annual report, accessible to all, that provides statistical feedback regarding the number, type or other pertinent information resulting from the reported occurrences.		20% (n=1)	80% (n=4)
2.1.9. Overall. I see the existence of a Just Culture approach in the AF as very useful, because I believe it will improve the Institution’s safety culture.			100% (n=5)

As Table 16 shows, most interviewees agree that implementing Just Culture in the PoAF’s safety culture policy is useful, and the only “disagreement” answers related to: dissemination (question 2.1.5), for one interviewee (20%) who did not object to the dissemination process itself, but rather to its timing; the existence of a formal procedure (question 2.1.7; 40%; n=2).

J.M. Santiago (email interview, 27 May 2021) also agreed that the PoAF has a Just Culture policy, which is more ingrained in the area of FS, but that, as M.F. Martins (face-to-face interview, 28 May 2021) stated, it is not present at all levels of the organization.

All interviewees (n=5) agree that the policy of reporting safety incidents is fully implemented in the area of FS, and that this is largely due to regular training / awareness-raising actions (C.P. Paulos, email interview, 22 June 2021; J.M. Santiago, op. cit.; R.P. Tendeiro, email interview, 17 June 2021) and to the fact that the organization encourages voluntary event reporting by implementing “[...] mechanisms that are easy to use and enable rapid reporting” (M.F. Martins, op. cit.), such as SIPA – Information System for Accident Prevention, a platform that has been widely promoted and disseminated in awareness-raising briefings held by the Units’ APOs [Accident Prevention Offices] (J.M. Santiago, op. cit.) and, possibly, by “[...] the publication of a regular newsletter by the IGFA” (C.P. Paulos, op. cit.).

Issuing “[...] safety newsletters, notices on message boards, safety briefings, distributing

bulletins and sending out emails related to the topic” are other actions that may foster organizational learning on Safety Culture (R.P. Tendeiro, op. cit.).

The five interviewees in the senior management sample generally agree that the current reporting model is satisfactory. However, as there is always room for improvement (A.J. Branco, face-to-face interview, 21 May 2021), the “[...] IGFA aims to update and expand the platform to increase its interoperability with other systems, in order to streamline processes [and improve the] overall perceptions of FS in the PoAF” (J.M. Santiago, op. cit.).

However, while appropriate mechanisms may be available, there is also an opportunity for improvement and organizational learning, as “[...] the military mindset still has to change a little in that sense” (A.J. Branco, op. cit.). One crucial measure would be to address “[...] safety in all its aspects, [from the outset] in basic and advanced military training, as well as in mandatory career courses” (R.P. Tendeiro, op. cit.).

Confidentiality is

[...] always guaranteed in FS processes, [however] this anonymity [sometimes] hinders the investigation of a reported situation because the report may be inaccurate and the investigator will not be able to contact the reporter to clarify any inaccuracies. (J. M. Santiago, op. cit.)

Overall, confidentiality and anonymity were perceived as advantages that foster “[...] a culture of safety” (R.P. Tendeiro, op. cit.).

With regard to *feedback*, described as “the closing of the cycle” by J.M. Santiago (op. cit.),

[...] creating a safety culture is particularly important because it conveys to the reporter that their actions mattered [and contributed] to prevent more serious events in the future. However, there is still some room for improvement in this area. The future system that will replace the current SIPA will address this relevant aspect [...], as it will provide follow-up at all stages [of an investigation] and, most importantly, when recommendations are issued, it can be used to check the status of their implementation.

With regard to culpability – a term that, when referring to “[...] incorrect, unpremeditated actions, has never been part of the [FS] lexicon” –, the PoAF is fully aligned with the European civil legislation (Regulation [EU] No. 996/10, of 20 October), which in turn follows the provisions set out in Annex 13 of the International Civil Aviation Convention (ICAO, 2020) regarding the purpose of accident investigations: “[...] to determine the causes and prevent their recurrence, never to assign blame” (J.M. Santiago, op. cit.).

A SWOT (Strengths, Weaknesses, Threats and Opportunities) analysis of the PoAF’s current safety model revealed the following

[...] strengths: a current, dynamic, widely disseminated policy; weaknesses: a strong cultural fear of admitting culpability; opportunities: there is a political will to [improve] the culture; threats: lack of resources and time for training, [and] while the PoAF does not have a formal definition of Just Culture, all its components and characteristics are present in our reporting processes, [and we are] taking great strides towards an organizational safety culture similar to [Just Culture]. (R.P. Tendeiro, op. cit.)

This culture “[...] should be [further] promoted and instilled in the PoAF staff from the moment of basic training [...]” and reinforced in subsequent courses (C.P. Paulos, op. cit.).

Furthermore,

[...] implementing a more formal and explicit Just Culture policy in the PoAF should be a priority, as this is the current trend in similar organizations. In today's society, and in an organization that is so technologically advanced, in which the various elements that contribute to the success of a mission are so interdependent (pilots, maintenance, [ATC], logistics), Safety Culture is not only essential, it must be rooted on an effective Just Culture policy. Thus, as the current international regulations are more recent than AFR [Air Force Regulation] 330-1, which dates back to 1999, this regulation should be updated. (J.M. Santiago, op. cit.)

4.1.4. Brief overview and answer to SQ1

The above analysis provided the answer to SQ1, *How is the implementation of Just Culture in the PoAF's Safety Culture perceived?* The findings revealed that it is perceived in a frankly positive way by both samples (middle and top management), both because a reporting culture (one of the basic principles of this approach) has become increasingly ingrained in the organization over the last ten years, and because its *perceived usefulness* is high. Among other advantages, this perceived usefulness is based on the fact that Just Culture promotes: voluntary reporting of highly dangerous situations that will likely degenerate into accidents if nothing is done; the assurance that someone who voluntarily reports a situation will not be punished, with the exception of cases of intentional violation; a clear definition of what constitutes unacceptable behaviour; the disclosure of feedback on the progress of the reported cases in an annual report, despite some disagreement as to the timing of this report.

The following actions can be optimised (if they are already underway) or developed (if they have not been taken yet), as they positively correlate with the fact that Just Culture is becoming more consolidated and explicitly defined in the PoAF's safety policy: extending it to areas other than FS; including it in basic training and in periodic training / awareness-raising actions; streamlining processes and investing in mechanisms that are easy to use and enable rapid reporting, such as the SIPA platform; issuing newsletters and / or notices on message boards; holding regular briefings; distributing bulletins; sending out emails related to the topic; and / or updating the national aviation regulations (such as the Air Force Regulation [RFA] 330-1, which was published in 1999), in order to align them with international regulations.

4.2. Just Culture in the Safety Culture of similar organizations / counterparts

"Counterpart" is used here in its broader sense – something that complements a being of a similar or analogous nature, which shares the same nature or essence (Dicionário Léxico, 2021). This section analyses two national counterparts, the GPIAAF and NAV E.P.E., and two international counterparts, the RCAF and the RAAF.

4.2.1. National counterparts

4.2.1.1. GPIAAF

The mission of the GPIAAF is to "[...] investigate accidents, incidents related to the safety of civil aircraft, [...] in order to prevent future accidents and incidents, and to identify their causes" (Decree Law No. 36/2017, of 28 March, p. 1634).

In Operational Security investigations,

[...] Just Culture is [...] without a doubt, [...] a key factor in identifying latent conditions [...]. GPIAAF investigators [learn] during basic training that discussion, teamwork and cooperation with management are essential [...] when handling external information or situations related to the internal management of the investigation project [as well as] personal issues related to workload management, technical resources, or trauma (J.A. Figueiredo, face-to-face interview, 11 June 2021).

For this attitudinal change to happen, several aspects must be clarified (Figure 12), such as the distinction between an (operational) safety investigation – in which analysing the past provides an opportunity to improve the future (Learning Culture) – and a criminal investigation, which examines the past strictly to apportion blame.

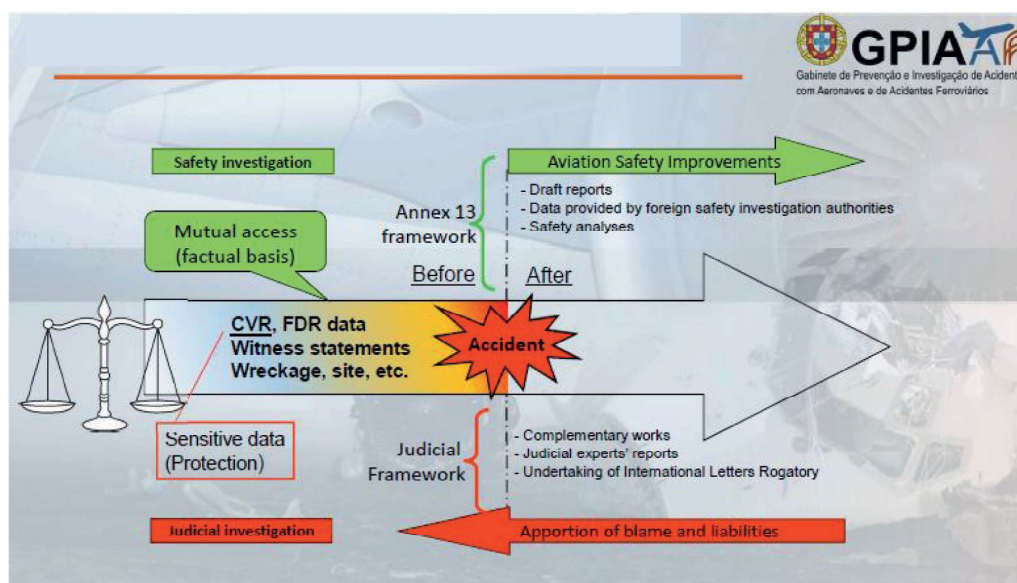


Figure 12 – Two different types of investigations conducted after an accident

Source: J.A. Figueiredo (email, 11 June 2021).

The GPIAAF responders stated that they “totally agree” that a Just Culture approach is useful because it improves the safety culture of organizations, and that they “partially agree” that the individuals involved in the investigation should be able to access the event report, adding it would be useful to provide access “[...] to the investigation findings, [but] not necessarily to the report” (J.A. Figueiredo, op. cit.).

According to J.A. Figueiredo (op. cit.)

The term proactive appropriately describes the preventive effect of a sound Just Culture that is successfully implemented in organizations. [As part of its tasks and responsibilities, the GPIAAF is making efforts to encourage reporting, both internally, in its own investigation processes, by promoting prevention through participation and “spreading the word” about the concept, [and] through the State Safety Programme (SSP) headed by the ANAC. However, there is a gap between the required training and an actual change in attitude and [culture; therefore, continuous] training [is essential].

Referring to confidentiality, the reporting system and feedback, J.A. Figueiredo (op. cit.) stressed the importance of

[...] ensuring that reporters may remain anonymous, if they so wish it. [...] there is no single correct process or model [...] to [achieve] the main goal, which is to disclose [events] in a timely manner [...]. The system should be as little bureaucratic as possible, as flexible as possible, and provide feedback on all reports [...].

Also with regard to feedback, the GPIAAF has conducted external and internal surveys to collect the opinions of

[...] all stakeholders [...] on the quality of the service provided, [...] reporting culture and [information] sharing [as well as to assess] the 'organizational climate', [in order to identify areas for improvement and to set] targets [for the] annual plan of objectives. (J.A. Figueiredo, op. cit.)

After the need to promote an informed, flexible and fair reporting culture was established, J.A. Figueiredo (op. cit.) stressed the importance of the GPIAAF, which, during the

[...] implementation of its Just policy, [showed that] intentional acts [have] disciplinary consequences. [This is particularly important as] inaction following an evaluation [will] always have a negative impact on reporting because it fosters a sense of impunity, in the case of intentional acts, or a "laissez faire, nothing will change attitude" in the case of events that constitute opportunities for improvement or honest mistakes.

4.2.1.2. NAV E.P.E.

The mission of the NAV E.P.E. is to "[...] provide safe and efficient Air Navigation Services" (NAV E.P.E., n.d.). Its reporting policy was implemented roughly two decades ago, and "[...] its safety policy includes a non-punitive policy [...]" that facilitates the implementation of Just Culture, which in turn helps to legitimate it (A.M. Retorta, email interview, 28 June 2021).

The implementation of a Just Culture policy is perceived as very useful, as it improves the organization's Safety Culture, and "[...] increases an organization's ability to learn from mistakes, which in turn improves its safety awareness, [and] is both a catalyst for and an indicator of a positive Safety Culture" (A.M. Retorta, op. cit.).

The NAV E.P.E. has prepared

[...] a document supporting and promoting its Just Culture Policy and Procedures to encourage reporting, published an article in the [NAV E.P.E.] Safety Newsletter [and] its Just Culture policy and procedures have been formally defined in a Service Order since 24 January 2019, [...] as recommended by Regulation (EU) No. 376/2014, [which states that] the conduct of an individual in a safety occurrence should be evaluated by [...] an Occurrence Evaluation Panel tasked with determining whether the act or omission under review is tolerable or intolerable, based on the reports, which are processed and analysed by the team in charge of the investigation. (A. M. Retorta, op. cit.)

Confidentiality and anonymity are considered essential "[...] to foster trust [...]", as is training, which should focus from the outset on "[...] the positive impact of learning from one's mistakes [...]" through continuous training. This includes feedback,

refresher courses, supervisor courses and others, in which the reporting platform [...] is fully explained and attendees are trained to use it, [as it is] as an essential tool [...] that provides a way to identify and mitigate the hazards of a given activity, to determine the resources required to take rapid appropriate measures to mitigate those hazards, and to disseminate the lessons learned in "Safety Letters" and provide feedback to the reporter. (A. M. Retorta, op. cit.)

A.M. Retorta (op. cit.) stressed that, in order to better explain the Just Culture policy the concept of Culpability must be clearly defined, and that

[...] the principle that no disciplinary action or detrimental measures will be taken [...] is not granted in the case of intolerable conduct, [in which case] the 'just culture' protection is removed and the people involved can be held accountable. At NAV E.P.E., if culpability is not established, there are specific follow-up actions that aim to restore the ATC's trust and provide education / training on the factors that led to the event, in order to prevent it from happening again.

Given the "[...] recent implementation of the Just Culture Policy and Procedure [...]" the process should be continuously monitored. To that end, NAV E.P.E. has scheduled awareness-raising actions, which had to be postponed due to the Coronavirus Disease 2019 (COVID19) pandemic, and conducts a procedure review every three years (the next review is scheduled for 2022) (A.M. Retorta, op. cit.).

A.M. Retorta (op. cit.) stated that the most important gap in improving operational safety "[...] refers to the fact that this key concept has not yet been formally implemented by some sectors of the aviation industry and by judicial authorities. "

4.2.2. Foreign organizations / counterparts

4.2.2.1. RCAF

In 2015, shortly after his appointment as Commander of the Canadian Air Force, Lieutenant General Hood referred to Just Culture as an airworthiness and safety philosophy for which all are responsible, in which everyone understands their role as part of the monitoring system, has an active, confident voice, complies with rules and regulations and works proactively to manage risk efficiently. However, the responsibility for Just Culture lies primarily with the organization's Leaders (Hood, 2015, p. 4).

Similarly, when assigned the position of Flight Safety Director (FSD) in 2017 (p. 4), Colonel John Alexander described the Operational Safety programme of the Royal Canadian Air Force (RCAF) as a fully developed prevention and investigation programme that evolved during the last years of the Second World War¹¹ and had an almost immediate impact, resulting in a drop in accident rates, which decreased even more with the adoption of Just Culture.

For Alexander (2017, p. 4), FS should be seen as not only a way to reduce incident rates, but as an effective tool that enables the clear identification of aviation risks (which have not yet led to accidents), which the operational commander can use to plan missions in an efficient manner. Furthermore, Just Culture is ingrained in the RCAF's Flight Safety Culture, in accordance with the policy of the Ministry of National Defence, which is applicable to all branches of the Canadian Armed Forces.

4.2.2.2. RAAF

In April 2015, the Civil Aviation Safety Authority (CASA) and the Australian Department of Defence signed a document in which they agreed to cooperate in the improvement of FS and Airworthiness (CASA and Defence, 2015).

¹¹ In mid-1942, the RCAF established the Aircraft Accident Investigation Board (AIB) under the Command of the Chief Inspector of Aircraft Accidents (Hood, 2015).

Thus, military Safety (Flight Safety Australia, 2015) should not focus simply on preventing risk – as this is not an option for the military –, but rather on implementing an effective risk management system, guided, as in civilian safety systems, by the three C's (Figure 13).

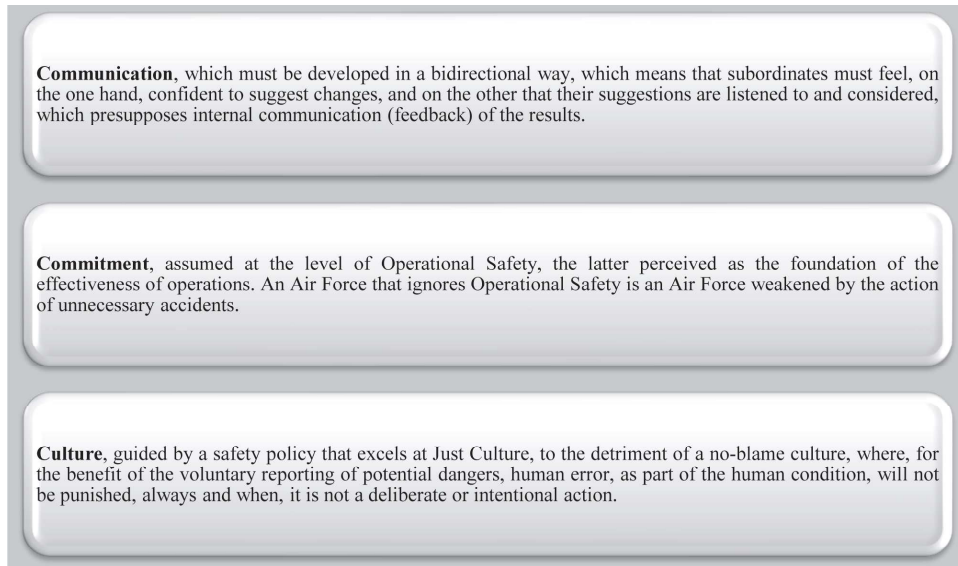


Figure 13 – The three C's of effective risk management

Source: Adapted from Flight Safety Australia (2015).

4.2.3. Brief overview and answer to SQ2

The above analysis provided the answer to SQ2, *How is Just Culture implemented in the Safety Culture of similar organizations/counterparts?* In the four national and foreign organizations analysed, Just Culture is rooted in a positive Safety Culture based on robust predictive Operational Safety Programmes, which regard human error as a consequence of situations that can occur at all levels of the organization and as an opportunity for organizational growth, in which senior management plays a key role in promoting an atmosphere of mutual trust and effective risk management.

Furthermore, these organizations emphasise the importance of explaining the goals and principles of Just Culture, clearly and continuously, both during basic training and on the job, through refresher courses, awareness-raising actions, the dissemination of lessons learned, and appropriate and timely feedback. They also encourage two-way communication and there is a commitment from senior management that unpremeditated errors will not be punished, unlike negligent behaviour and intentional violations, which are not tolerated and have disciplinary consequences. Most importantly, there is a clear distinction between an (operational) safety investigation – in which the past is seen as an opportunity to improve the future (learning culture) – and a criminal investigation, which examines the past strictly to assign blame.

The following measures were proposed to improve the implementation of Just Culture: collecting the opinions of stakeholders on the operationalisation of this approach in / by the Institution; producing support documentation and promoting the Just Culture Policy and Procedures, in compliance with the relevant legislation; and establishing an entity /

panel responsible for evaluating occurrences and defining, on a case-by-case basis, what constitutes tolerable conduct and intolerable conduct, and for following-up with the staff involved in an event, in order to restore their self-confidence and obtain feedback on the training policy. Another measure that should be taken in the near future is the formal recognition of the concept by the judicial authorities.

Finally, from a macro perspective, in addition to what has already been stated regarding Culture (that it should be based on a safety policy that embraces Just Culture, to the detriment of no-blame culture), implementing a risk management system based on the three C's will require focusing on Communication (which should be two-way; internal, and provide feedback on report findings) and making a Commitment (to Operational Safety).

4.3. Measures to optimise the implementation of Just Culture in the PoAF's Safety Culture and answer to the RQ

The above analysis provided the answer to the RQ, *What measures can the PoAF take to optimize the implementation of Just Culture in its Safety Culture?* This can be achieved by implementing four measures (regulations, education/training, [internal and external] communication and feedback) and corresponding lines of action, which are presented in the model in Figure 14.

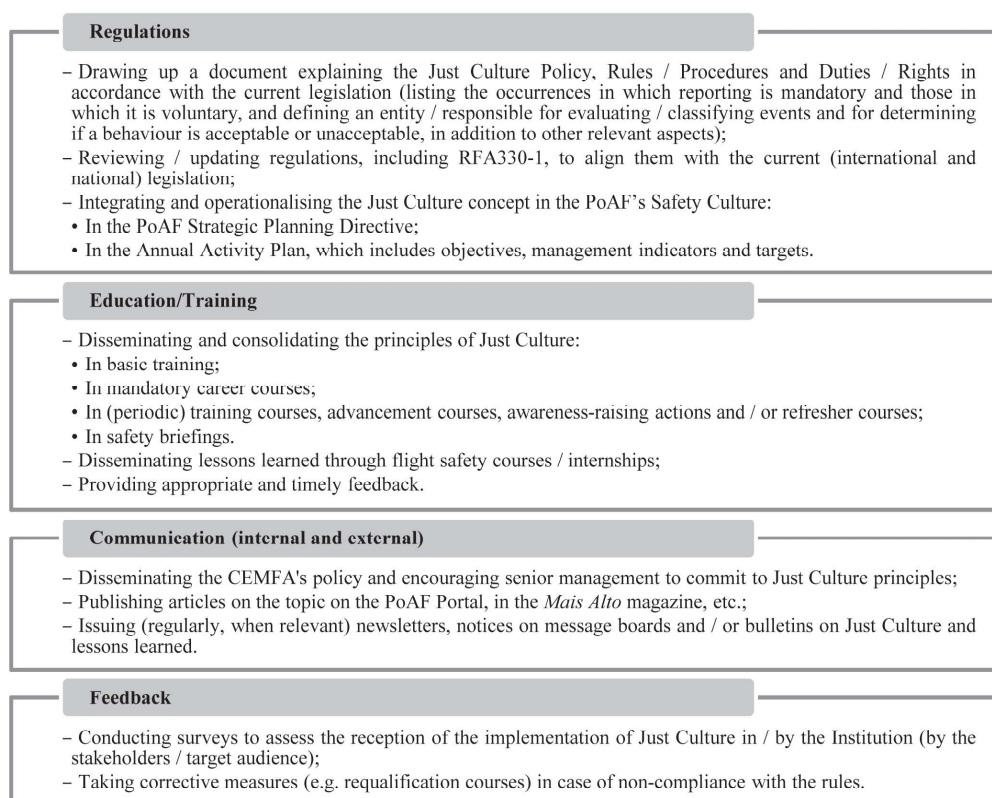


Figure 14 – Proposed measures to optimise the implementation of Just Culture in the PoAF's Safety Culture and corresponding lines of action

5. Conclusions

Throughout history, the topic of Safety Culture has been subject to some reformulations. Initially, it focused on the investigation of material factors, then on a more “isolated” analysis of human factors – and how they contributed to mitigate incidents / accidents –, and later on the impact of the combined influence of different factors (human, material, and others).

On the other hand, the fact that high-risk sectors such as the aviation industry use increasingly complex and technologically advanced systems has led Organizations to attempt to identify common patterns of organizational and management deficiencies and define procedures – which are improved through a feedback loop that integrates lessons learned and other relevant information – to understand what went wrong, and, consequently, to understand, and / or predict what could go wrong. That is, to design procedures that reduce (to levels that are reasonably feasible and tolerable, considering that human error is inevitable) the probability of recurrence of hazards with an impact on aviation safety and, consequently, on the Organization as a whole.

To address this issue, in 2014 the Parliament and the Council of the European Union published Regulation (EU) No. 376/2014 of 3 April on event reporting, analysis and follow-up in civil aviation, formally adopting the concept of Just Culture and changing the Reporting Culture paradigm.

This required: a clear distinction between unintentional errors and intentional violations; encouraging the sharing of experiences in a bottom up approach; promoting an environment of trust, openness, responsibility and accountability; and disclosing information on how spontaneous reports contribute to collective learning and to an effective safety environment (feedback).

Essentially, it addressed the issue identified by the ICAO in 2006: that Organizations would need to adopt a more effective SMS to encourage voluntary reporting, in order to prevent, detect and mitigate safety hazards and reduce their impact in the case of an incident or accident.

Because the PoAF is aware of this reality, it has made efforts to comply with the regulations issued by the Parliament and the Council of the European Union. Among other actions, it has published an Annual Planning Directive on Accident Prevention for 2021, which reinforces the need to conduct Accident Prevention activities in which staff are actively involved, and ensuring that they are comfortable informing their superiors about their concerns with the safety atmosphere (or lack thereof) and owning up to their failures (however, disciplinary action should be taken when necessary).

SO1, *To analyse how the implementation of Just Culture in the PoAF's Safety Culture is perceived*, was achieved, and the answer to SQ1 was obtained by analysing the answers to the questionnaire survey delivered to 22 officers from the intermediate structures (middle management sample) of the PoAF (n = 91.7% of the universe) and by conducting semi-structured interviews with five experts from the superior structure (senior management) of this branch of the Portuguese Armed Forces. The findings revealed that a Just Culture policy is perceived as highly useful by most participants because it fosters organizational growth in operational safety and improves the risk management practices that have already been implemented. This

perceived usefulness stems from the fact that, among other benefits, Just Culture: promotes voluntary reporting; guarantees that those who voluntarily report a situation are not punished, as long as it does not constitute a violation; clearly defines which behaviours are unacceptable; and facilitates the dissemination of feedback on the status of reported cases, providing a feedback loop. The study also found that it would be beneficial to extend the Just Culture policy, which has become increasingly ingrained and explicit in the area of FS, to other functional areas of the PoAF, and to the various stages of the training provided by the Institution (from basic training to awareness-raising actions, refresher courses and / or requalification courses, as well as mandatory career courses). The publication of bulletins and / or newsletters with information on new safety developments (when duly justified, periodically, and in clear, short and concise language), and streamlining the reporting processes were also perceived as advantages.

With regard to SO2, *To analyse how similar organizations / counterparts have implemented Just Culture in their Safety Culture policy*, and SQ2, the analysis of four counterparts¹² (two national organizations and two foreign organizations) revealed that all generally agree on the importance of a clearly defined Just Culture which all stakeholders understand, supported by predictive Operational Safety Programmes aligned with the principle that accidents can be prevented through the voluntary reporting of errors, failures and incidents. This culture entails a set of duties and rights that, when they are applied, disclosed and encouraged by senior management, positively correlate with an increase in organizational safety, and are reflected in the “operationalisation of the three “C’s”: culture, supported by a Just Culture policy; communication, in all aspects of its implementation; and commitment to Operational Safety. Furthermore, the study found that the success of Just Culture in similar organizations is based on: defining training contents to be provided at all phases of an individual’s “operational life”; investing on the dissemination of lessons learned; encouraging two-way communication, stressing the importance of feedback and intra / inter-organizational evaluation regarding the quality of Safety Culture; the Institution’s assurance that honest mistakes will not be grounds for disciplinary sanctions, but that intentional violations will not be ignored; and following up with the staff involved in an event, in order to re-establish trust and obtain feedback on the training policy. Finally, another factor that would improve the implementation of Just Culture would be its formal recognition by the judicial authorities.

The study found that Just Culture can be successfully implemented through four measures, which are operationalised through a set of corresponding lines of action. The GO, *To propose measures to optimise the implementation of Just Culture in the PoAF’s Safety Culture*, was thus achieved and the RQ answered. The following measures are proposed in terms of: *regulations*, producing doctrine that addresses and regulates the PoAF’s strategy to successfully implement *Just Culture*, reviewing RFA330-1 to align it with Regulation (EU) No. 376/2014, of 3 April, and defining the accident prevention approach and procedures that must be adopted; *education/training*, disseminating lessons learned in internships, flight courses and regular training sessions on how to report different types of events; *communication (internal and external)*, publishing information about Just Culture in the

¹² “Counterpart” is used here in the broad sense, cf. above (subchapter 4.2).

PoAF's digital platforms; *feedback*, which can be obtained by conducting surveys on how the measures that have been taken to implement Just Culture are perceived, in order to collect the opinions of the Institution as a whole, readjust and make effective improvements.

Therefore, the study's **contribution to knowledge** is the fact that the PoAF now has a set of empirical and scientifically validated data on how to optimise its Just Culture policy and align it with the recommendations set out by the Parliament and the Council of the European Union in Regulation (EU) No. 376/2014, of 3 April, on occurrence reporting, analysis and follow-up in civil aviation, adapting them to the context of military aviation.

This study had one **limitation** – which was unrelated to it and did not affect the findings –, which consisted of the fact that it was not possible to conduct face-to-face interviews in all cases due to constraints related to the COVID19 pandemic.

With regard to **future studies**, it would be useful to analyse both the legal provisions of Regulation (EU) No. 376/2014, of 3 April, and the national criminal law. That is, to determine the feasibility of granting individuals protection in the case of voluntary reporting of unpremeditated infringements and extending the “protection” granted by Just Culture to cases in which civil or criminal proceedings are initiated by third parties. Essentially, to understand the true extent of the protection provided by Just Culture, which determines that the event reports of honest mistakes that are submitted voluntarily cannot be used as evidence against the reporter or the individuals mentioned in the report. Furthermore, it would also be of interest to conduct a study to assess the impact of the implementation of the measures / lines of action proposed in this study (two years after its implementation).

The study's **practical recommendation** is that the GAAN and IGFA implement the four proposed measures and their corresponding lines of action.

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