

Perceptions of Just Culture Between Pilots and Managers

Evaluation of Airlines in the EU, Middle East, and Asia/Pacific Regions

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Abstract: Airline safety can be improved when errors and incidents by aircrew are openly reported and justly investigated. Trust and functioning of the reporting system are critical for the success of a just safety culture. In this study, interviews and surveys were used to investigate the similarities and/or differences in perceptions of pilots and managers within several airlines about perceived just culture. Results indicate that decisions about culpability, the line between acceptable an unacceptable behavior, and the result of introducing more consequences are perceived differently by pilots and managers.

Keywords: just culture, aviation, safety, reporting, pilots and managers

As aircraft and related systems have become ever more reliable over the past 20-30 years, human error is often considered an important factor when analyzing aircraft incidents and accidents (Allnutt, 2002; Amalberti & Wioland, 1997; Javaux, 2002; Nagel, 1988). Subsequent outcomes have resulted in many different approaches to dealing with and managing human error. For example, in a "blame culture," pilots who are believed to have caused an incident or accident are punished in the form of disciplinary action or even dismissal. This "negative" type of culture is widely acknowledged to be associated with fear of sharing errors (slips, lapses, mistakes), while precisely sharing errors has been found to be essential to their prevention (Courteney & Carmichael, 2018; Helmreich et al., 1999; International Civil Aviation Organization [ICAO], 2018; Kleeman, 2020). At the other end of the spectrum there is the "no blame culture," which suggests that as long as pilots report mistakes or near misses, they do not need to fear repercussions: "A fair and just culture improves safety by empowering employees to proactively monitor the workplace and participate in safety efforts in the work environment" (Boysen, 2013, p. 405).

Safety culture is defined as the way that an organization thinks about, plans for, and manages the safety of its employees and customers. It affects values, attitudes, and behaviors concerning safety within an organization. According to Pidgeon and O'Leary (1994) a "good" safety culture is characterized by the following four facets: senior management commitment to safety, shared concern for hazards within an organization, realistic norms and rules about hazards, and continual reflection upon practice through monitoring, analysis and feedback systems.

For the civil aviation industry, a just culture is described by ICAO as: "An atmosphere of trust in which people are encouraged for providing essential safety-related information, but in which they are also clear about where the line must be drawn between acceptable and unacceptable behavior" (ICAO, 2016, p. 1). It is based on Reason's five subcomponents of a safety culture (Reason, 1997):

- Flexible culture where decision-making processes vary, depending on the urgency of the decision and the expertise of the people involved, often shifting from the conventional hierarchical mode to a flatter mode.
- Learning culture where learning will occur from both reactive and proactive safety assessments and is promoted by an inherent organizational willingness to adapt and improve.
- Informed culture where individuals are knowledgeable about the human, technical, organizational, and environmental factors that determine the safety of the system.
- Just culture where individuals are confident (even rewarded) for providing essential safety-related information, provided there is a clear line that differentiates between acceptable and unacceptable behavior.

 Reporting culture – where individuals feel free to report their errors and experiences.

The key principles for a just culture as intended by ICAO, 2016 can be summarized to comprise a reporting system that is actively used by pilots because they know they are in the best position to identify safety hazards and risks. Organizations must understand that pilots occasionally make errors and mistakes of judgment and should not seek personal fault. Pilots should trust their management to only hold them accountable for errors or incidents when they deliberately commit unsafe acts.

The Global Aviation Information Network (GAIN, 2004) describes just culture as a way of safety thinking that requires a questioning attitude, personal accountability, resistance to complacency, and corporate self-regulation in safety matters. They further suggest that as personal attitudes and corporate style can facilitate unsafe acts that may lead to incidents, in a just safety culture it is vital to actively identify safety issues, and to respond with appropriate action. The latter is important, since if safety reports and suggestions are not acted upon by the organization, it gives pilots the impression that there is no commitment to safety (Helmreich et al., 2001). Employee empowerment (the idea they can help achieve a better safety standard) is a strong motivator for employees to report issues (Dekker & Laursen, 2007; Wiegmann et al., 2002).

In a reporting culture, identification of safety issues, initially at least, largely depends on the willingness of employees to report errors and near-misses, without reprisals (Lingard et al., 2014). An open and trustworthy reporting culture encourages reports on threats and hazards and allows appropriate and timely safety actions to be taken (Houston, 2015; O'Leary & Chappell, 1996). "Reporting errors within a trustful, reporting-orientated culture through established systems provides opportunities to prevent future similar, and perhaps even more serious, errors" (Wolf & Hughes, 2008, p. 339). Trust and justness within a reporting culture are therefore critical for the realization and success of a just safety culture.

According to Reason, just culture is an agreed set of principles for drawing the line between acceptable and unacceptable behavior (Reason, 1997). Although aviation authorities (such as ICAO and EASA) encourage member states to urge their aviation organizations to adopt and document just culture procedures, they offer no guidelines on how to draw the line between acceptable and unacceptable behavior. As an example, Dekker (2012) suggests that what matters in organizational justice is to what extent it is made explicit who draws the line and how it is decided upon. He recommends that organizations implement three steps:

• The first step is to design a process to deal with risky acts or adverse events, with clear steps that are to be

followed, which is consistent across professional groups.

- The second step is to decide who is involved in the process; including impartial staff and someone with domain expertise is important for a sense of justice.
- The third step is to involve employees in the process of deciding who will be involved, as this is likely to increase their participation and trust in the system.

Many airlines have adopted a just culture with written policy documents that meet the requirements demanded by their legislators. Yet despite this, it is often very challenging for airline operations, and pilots, to decide upon and accept accountability and culpability after potential occurrences. One method to address this challenge is with the use of a decision tree (Figure 1).

Since Reason designed the first decision tree, a number of airlines introduced variants of this tool to help managers with accountability and culpability determination of employees after an incident or accident occurred. An important step in the process involves the substitution test. This test was adopted to determine whether, "given the same circumstances and criteria, another person with the same training, competency and experience would have done exactly the same thing or made the same decision" (Hobbs, 2008; Johnston, 1995). Simply put, if peers would not do differently, a person should not be blamed individually. Other tests that were introduced to the tool by airlines are the routine test and the effectiveness test. A routine test determines whether an event has happened before within the organization or to this particular individual. An effectiveness test will help to decide whether possible disciplinary action will have safety value.

Dekker criticizes this type of "universal approach of a just-culture-by-algorithm." He writes that this type of justice offers the illusion of objectivity and evidence and can even be biased and used as a way to legitimize injustice (Dekker & Nyce, 2013). This advance is supported by others who suggest that culpability tools can only be employed if concepts of culpability are negotiated within an organization beforehand (Cromie & Bott, 2016; Karanikas & Chionis, 2017). More limitations with the methods of determining culpability have been highlighted by other entities. As an example, Hudson et al. (2008) criticize the notion that noncompliance can be managed by punishment and found that managerial accountabilities remain underexposed. In addition, they claim that top-down implementation of decision models can have an adverse effect on trust between the workforce and management. Bitar et al. (2018) and Liao (2015) supported this and found that judgment on culpability is wholly subjective and thus incongruent with the just culture principles; for example, they state that only applicably trained managers should be involved in



Figure 1. Decision tree for determining the culpability of unsafe acts (adapted from Reason, 1997).

the process. McCall and Pruchnicki (2017) further argue that the lines of accountability are not clear and are only defined in hindsight. It is even more perilous when considering the plethora of disciplinary measures that are available to managers in their accountability determinations.

Dekker and Breakey (2016) distinguish between retributive and restorative just culture. Retributive just culture is backward-looking accountability, imposing proportional sanctions to the person who is to blame, while restorative just culture is forward-looking accountability, identifying what needs to be done to help and heal the operator, the victim(s), and other parties involved in an incident, and who needs to do it.

The method for determining culpability of a pilot following an incident has often led to disciplinary measures. A number of outcomes are widely used, ranging from extra training to dismissal or demotion. Some airlines have procedures that describe in detail which measures are applicable after an incident, but in many cases, it is up to the Chief Pilot, the Head of Flight Operations, or a dedicated commission to decide upon measures. Especially when an incident was caused by an honest mistake, or when reasons for the incident were imbedded deeper in an airline's way of working, these outcomes are often difficult to understand and comprehend for those being affected and within the wider staff fraternity. For example, when a large commercial aircraft hit some structures at the end of the departure runway after the wrong aircraft weight had accidentally been entered, the flight crew involved was allegedly asked to resign a few days later. It should be kept in mind that disciplinary action as a reaction to voluntarily submitted safety reports often leads to less reporting (Hutter & Lloyd-Bostock, 2015; Leape, 1999; Nørbjerg, 2003; Schnitker, 2007).

Research by Ireland (2015) and by von Thaden et al. (2006) identified significant differences in perceptions of just culture between management and frontline operators. It is therefore essential to understand how employees and managers perceive the just culture concept within their own organization. Although many airlines measure their company's safety and just culture maturity by conducting surveys among their employees, within the airline sector little or no research has been attempted to establish whether airline managers and airline pilots have similar views and perceptions about just culture and accountability. In order to investigate this situation further, this research evaluates perceptions of pilots and managers across a number of airlines from the EU, Middle East, and Asia/Pacific regions. The present study aimed to examine:



Figure 2. Overview of the methods used.

- If there were significant differences in perceptions of just culture interpretation;
- If the line between acceptable and unacceptable behavior was clear;
- If there were significant differences in perceptions concerning the use of culpability tools; and
- If there were significant differences in perceptions of the effect of measures on safety reporting.

Method

First a number of interviews were conducted. During the interviews, participants expressed mixed opinions about he different topics. Although the general concepts about the purpose of a just culture were very similar, not everyone had the same view of how such a culture is achieved. Also, within the topics, importance was sometimes attached to different sides of the spectrum by pilots compared with managers. While interviews are a suitable means to gain a deeper insight into the mindset and argumentation of a smaller group of people, they do not provide quantitative data about opinions that are held. Therefore, a survey was developed from the outputs of the interviews to discover if the opinions held by the interviewees were consistent within a larger group of pilots and managers. Figure 2 provides an overview of the methods used for this research.

Five European airlines, selected by the demographic position of their home bases, were approached to participate in both interviews and a survey. One airline declined participation. One airline participated without restrictions, two airlines agreed to an interview with a manager only, and the fourth airline agreed to a survey only. Nondisclosure agreements were used to protect confidential information.

Interviews

Overall, 17 participants took part in 1-hr interviews with the objective of establishing opinions and methods of determining: just culture; the line between acceptable and unacceptable behavior; disciplinary measures; reporting; response and feedback; the effect of measures on safety reporting; and the way to decide about culpability. The open-ended questions were identical for each participant and were asked in the same order.

Seven airline managers with high-ranked positions in the Flight Operations Division, the Safety Division, or General Management of three different airlines were interviewed $(M_{age} = 50.7 \text{ years})$. Furthermore, five Captains $(M_{age} = 46.2 \text{ years})$ and five First Officers $(M_{age} = 36.4 \text{ years})$ from one airline were interviewed. Pilots were selected using the airlines' seniority list. This list is ranked by the date pilots joined the airline. The lowest numbers are held by the most senior Captains, and the highest numbers are held by the most junior First Officers. From every 10th part of the list, a number was randomly selected, and the person associated with that number was contacted to participate in the interview. This method assured a variety of age, rank, and experience within the airline among the interviewed pilots.

Prior to taking part, participants were given an information sheet that explained the purpose of the interview. All interviews were confidential and were recorded and transcribed. Resultant data were protected and stored on the university secure drive as per the university ethics criteria.

Results

During the interviews, all participants expressed how important they thought the topic of just culture is for achieving a better safety culture. The opinions of the participants per subtopic are summarized in the following sections.

Just Culture

Participants demonstrated confidence that just culture principles were adhered to in the airline they work for. Terms that were often cited by both pilots and managers were "trust," "openness," "learning from mistakes," and "if intention was good, there should be no repercussions after incident, except in case of malicious intent." Four managers stated that part of just culture is that it is always investigated if the organization was aware, or could have been aware, of situations or circumstances that were contributory or led to an incident or mistake. This will balance the focus between the organization and the individual.

A just culture means:

- "That pilots feel they can make a mistake and that when they report an incident the information will be used to learn from, and to improve the system; not to find who was guilty." (Manager)
- "The freedom to report safety issues or one's own omissions, without consequences for one's career." (Pilot)

The Line Between Acceptable and Unacceptable Behavior

Two managers described crossing a line as deliberately taking unacceptable risks. Four managers stated that defining unacceptable behavior is subjective, and there is never a clear line, since the circumstances dictate whether it was or was not unacceptable behavior. Context is very important, as there may even be a good reason to cross a line.

Overall, 20% of the interviewed pilots stated the line between acceptable and unacceptable behavior was clear to them. In total, 80% responded that standard operating procedures were good guidelines for determining acceptable behavior; however, they pointed out a number of gray areas. These are not the aircraft operational limits, or standard callouts; gray areas are, for example, interpretation of weather, decision-making, or making an estimate about a situation. The line is also shaped by company culture. An – unwritten – rule can be completely acceptable in one airline but would raise red flags in another airline (e.g., descending at a faster speed than prescribed by the company).

Deciding About Culpability

For this topic, candidates were given a decision tree (Figure 1) to be able to give feedback about its effectiveness. They were asked to reflect upon a safety incident they experienced or heard of and answer the questions in the flowchart. Except for two managers, both familiar with a similar, more comprehensive flowchart in their airline, all participants struggled when performing this task, for several reasons:

- "Categorizing behavior is not recommended by European Law, and I would not trust everyone with this tool; however, it is also an objective tool with clear steps, so people know what to expect." (Manager)
- "It is very difficult to imagine the frame of mind a flight crew was in at the time of the incident, and it is easy to judge in hindsight. There is no context, it is a judgmental tool, and we are no judges." (Pilot)

Disciplinary Measures

All pilots and managers declared that in certain cases, disciplinary measures are taken as a result of an incident. These range from compulsory extra training to a formal warning or dismissal. Participants agree that taking measures when someone made an honest mistake will not improve safety. In the event that disciplinary measures are taken by management, it often leads to misunderstanding among the pilots. Two managers explained that when a pilot is disciplined under just culture, due to discretion requirements, often a significant number of pilots are disappointed and assume that disciplinary measures are passed for errors and mistakes. Eight pilots, however, stated that disciplinary measures often depend on the manager(s) who determined them, leading to subjectivity or even arbitrariness, and said they did not agree with some disciplinary measures their colleagues had been subjected to in the past.

The Effect of Consequences on Safety Reporting

All pilots indicated that more measures (even positive measures such as a compliment) would certainly lead to less safety reporting. Pilots stated they are willing to report because it can make the operation safer; they do not report with the goal of receiving personal consequences.

Four managers believed a transparent and diligent system of consequences will not lead to less reporting; three managers thought there is fear of reprisals among pilots and therefore the number of reports will decrease. Comments included:

 "Some pilots seem to fear being called into the office to explain their decisions. They fear consequences. My view is that they should be happy to explain, because we can all learn something, and contribute to the safety standard in our company." (Manager) • "Pilots should not even be thinking about Flight Data Monitoring parameters when executing a visual approach; their attention should be solely given to flying a safe approach." (Pilot, referring to the fact that exceedance of certain FDM parameters may lead to a mandatory review of a flight with representatives from the safety department)

Reporting, Response, and Feedback

Participants indicated that the number of safety reports submitted is very high. Pilots stated that when an incident occurred within their airline, often a long time passed before safety-related details were provided by management. Managers reported that although the number of safety reports is very high, it is a challenge to give proper and timely feedback. Comments were:

- "People nowadays are used to immediate response; they take 5 min to order a product and it should arrive the next day, so this is the expectation we have to live up to. But response and feedback to safety reporting is a critical and delicate process." (Manager)
- "Years ago, a serious incident happened to a flight crew; until today no details about this event have been shared with us. We all want to know what happened and what we can learn from this incident." (Pilot)

Survey

The interview data were subject to thematic analysis (Braun et al., 2014). Opinions and quotes both from pilots and managers were analyzed and organized. Participants' responses were coded, and themes were derived from these codes. For example, the interview question, "What is just culture?" led to the response: "An environment of enough trust to share information to learn from mistakes." This answer was coded as "trust," "sharing information," and "learning from mistakes," and the theme was labelled as "just culture interpretation." With these themes and codes, a survey was constructed that allowed participants to express a range of different perceptions. The survey was reviewed and piloted by three pilots/managers and a university reviewer and adjusted according to their feedback.

The survey opened with a participant information sheet to obtain the participants' informed consent and consisted of three main sections. The questions were the same for all respondents and were presented in the same order. Section 1 collected basic demographic data (age, gender, years with airline). Section 2 contained questions constructed from the interviews. First, the definition of just culture to be used to answer the survey questions was given, followed

Table 1.	Demographics	of res	pondents
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	Managers	Pilots
Response		
Number of completed surveys	41	291
Age		
18–35	1	90
36-45	13	85
46-55	19	89
Over 55	8	27
Years with airline		
< 4	8	58
4-10	9	63
11-20	15	104
> 20	9	66
Location of airline		
Europe	35	265
Middle East	2	6
Asia/Pacific	4	20
Participating airlines		
Airline 1	23	189
Airline 2	6	42
Other airlines	12	60

by specific questions about participants' views on just culture in general and within the organization they worked for. Other questions addressed the use of a decision tree, disciplinary action and its effect on safety reporting, and the line between acceptable and unacceptable behavior. Where possible, participants answered *yes-no* questions, or I agree/I disagree. Chi-square tests were used to determine whether significant differences existed between groups. When more than two options were necessary, multiple statements (derived from the interview data and literature) were selected from a list. Section 3 comprised 20 questions that required a response on a 7-point Likert scale, ranging from strongly disagree to strongly agree with a mid-scale neutral point. This section consisted of a just culture measurement, based on earlier research in healthcare by von Thaden and Hoppes (2005) and von Thaden et al. (2006). For the purpose of this study the term "healthcare professionals" from the original survey was replaced by the term "pilots." Questions that were phrased negatively were recoded to allow for comparison with the questions that were phrased positively. One-way ANOVAs were performed to identify any significant differences between groups.

The survey was delivered using Bristol Online Surveys, designed to protect respondent anonymity, and was open to approximately 800 pilots and 100 managers all of whom had received a link and password through participating airlines or via direct invitation by the researcher.

Table 2. Answers to yes-no (agree-disagree) questions about just culture

	Pilots (%)	Managers (%)
Question/ statement	Yes/I agree	Yes/I agree
In your opinion, is there a just culture for pilots in your organization?	83	92
In the airline I work for, gross negligence, willful violations, and destructive acts are not tolerated	85	90

Table 3. The importance of elements of a just culture as seen by the responding pilots and managers

	Pilots (%)	Managers (%)
Our operation will be safer when we learn from mistakes and errors and good catches	60.8	73.2
We should all communicate openly, honestly, respectfully, and directly	56.5	61.0
We all make mistakes, so we should coach each other to make sure we don't drift into unsafe behavior	50.5	39.0
We should report all risks we see to improve safety in our organization	43.8	51.2
Blame should never be appointed	9.2	9.8
Punishment should never be given	5.3	4.9
For willful violations, punishment/ measures may be appropriate	32.9	22.0
Even for willful violations other measures are better (such as: extra training)	4.2	7.3
We should always assume good intentions	17.3	12.2
We are all accountable	19.4	19.5

Note. In bold are the three most frequently selected elements.

Results

A total of 332 completed surveys were returned (response rate of 37%). Table 1 shows the demographics of the participants. Almost one quarter of respondents left additional comments about just culture at the end of the survey. Of the pilots, 8.8% were female with 19.5 % having managerial status. The breakdown was Captain (57%), First Officer (41.9%), and Second Officer (1.1%). All managers were senior managers within the departments of Training, Operations, Cabin, Scheduling, Human Resources, Safety and Maintenance, or Head of Flight Department, Chief Pilot, or General Manager of the respective airlines. Overall, the managers were from nine different airlines based in six different countries (EU 85%, Middle East 5%, Asia/Pacific 10%). The pilots were from 25 different airlines based in 17 different countries (EU 91%, Middle East 2%, Asia/Pacific 7%). The high EU percentages can be explained by the fact that two European-based airlines (Airline 1 and 2 in Table 1) had given their consent and cooperated in the survey.

Just Culture

The definition used for just culture in the survey was:

Just culture means a culture in which front-line operators or other persons are not punished for actions, omissions or decisions taken by them that are commensurate with their experience and training, but in which gross negligence, willful violations and destructive acts are not tolerated.

A high percentage of pilots and managers stated that there was a just culture in their airline. A further high percentage from both groups believed that gross negligence, willful violations, and destructive acts are not tolerated in their operations (Table 2).

Respondents to the survey each selected three out of 10 elements as most important elements of a just culture (Table 3).

The Line Between Acceptable and Unacceptable Behavior

The data clearly indicate the difference between pilots and managers on the subject of acceptable and unacceptable behavior (Figure 3). Overall, 71% of pilots stated that it is clear to them where the line is drawn between acceptable and unacceptable behavior in their function, while just 49% of managers stated this line is clear to them, $\chi^2(1, N = 324) = 8.48, p < .05.$

Deciding About Culpability

Results indicated that three quarters of pilots (75%) and managers (76%) believe a decision tree would be a good method in their organization to decide on the culpability of a pilot after an incident has occurred.

Respondents to the survey each selected three out of nine statements as most important concerning the use of a decision tree (Table 4).



Is it clear to you where the line is drawn between acceptable and unacceptable behavior for pilots in your organization?

Figure 3. Clarity regarding the line between acceptable and unacceptable behavior.

Table 4.	The importance o	of the use	of decisior	n tree flow	charts as	seen by	/ the r	responding	pilots and	managers
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Statements	Pilots (%)	Managers (%)
These tools can only be used as guidelines for deciding on culpability	68.8	75.0
Clear instructions are needed on how to use these tools when they are used for analyzing an incident	51.4	45.0
Interpretation of these tools is difficult and subjective	39.0	25.0
These tools leave no room for context (no shades of gray)	32.8	17.5
These are valuable tools to help decide on culpability and possible measures	26.6	55.0
An independent committee only can be trusted with these tools	26.6	22.5
Only the pilots who were involved know why they acted as they did	21.4	15.0
These tools provide an objective way to look at events	21.4	40.0
If tools like these are used pilots will be less likely to report safety-related issues	12.8	5.0

Note. In bold are the three most frequently selected elements.

Disciplinary Measures

For the majority of pilots and managers, it is not clear which actions or behaviors could lead to repercussions for a pilot in their organization (Figure 4). There was no significant difference between pilots and managers, $\chi^2(1, N = 324) = 0.31$, p > .05.

A high percentage from both groups (pilots 83%, managers 85%) further stated that disciplining pilots in response to honest mistakes will do little to improve overall safety. Half of the pilots (49%) and managers (53%) agreed with the statement that standards of accountability are applied consistently to all pilots in their organization. No significant differences between pilots and managers were observed concerning disciplinary measures (Table 5).

The Effect of Consequences on Safety Reporting

Respondents were asked the following question:

If more action would be taken by your organization after every incident a pilot reports, or is involved in without reporting (the action could be, but is not limited to: a compliment, addressing errors through training, disciplinary action, or counseling), do you believe pilots would change the way they report safety matters?

Results indicate that most pilots (46%) believed that more consequences would lead to less reporting. Most managers (49%) on the contrary believed pilots would report more. The other pilots (26%) and managers (29%) thought there will be no change (Figure 5). The relation between these variables was significant, $\chi^2(2, N = 332) =$ 9.53, p < .01.

Respondents were then asked why they chose that specific answer. If they stated that they expected less reporting, according to more than half of them the reason was that "pilots fear repercussions." If participants answered that there would be more reporting, the reason they chose was "pilots appreciate the organization takes time to attend to safety related matters" (Table 6).

Reporting, Response, and Feedback

Although more than 80% of both pilots and managers stated that pilots report their own errors (also when no harm was done), half of the pilots (49%) indicated that they do not report errors that *others* make. Managers (58%) instead



Is it clear for pilots what kind of actions or behaviors could lead to a measure or repercussions for the pilot?

Figure 4. Clarity regarding which actions/behaviors could lead to measures or repercussions.

Table 5. Means (M), standard deviations (SD), and one-way analyses of variance of disciplinary measures/accountability

	Pilots		Managers			
	М	SD	М	SD	F(1, 329)	η^2
If pilots violate procedures, rules, etc. that cause danger to the aircraft/ passengers they are disciplined	4.36	1.64	4.30	1.65	0.04	.00
If pilots violate procedures, rules, etc. that cause danger to the aircraft/ passengers they are disciplined, even if no danger was caused to the aircraft/ passengers	3.37	1.52	3.58	1.71	0.60	.00
Disciplining pilots in response to honest mistakes does little to improve overall safety	5.79	1.59	6.15	1.46	1.80	.01
Standards of accountability are consistently applied to all pilots in this organization	4.18	1.60	4.60	1.52	2.42	.01

Note. *p < .05. **p < .01.



Figure 5. The effect of consequences on safety reporting.

stated that they believe pilots do report other people's mistakes, F(1, 329) = 6.25, p = .013.

More than half of the pilots (56%) compared with 83% of the managers indicated that in their organization appropriate action is taken when a pilot reports a safety concern, F(1, 329) = 11.77, p = .001. More than half of the pilots (55%) stated that lack of time prevents reporting of errors and incidents, as opposed to one third of the managers (33%), F(1,328) = 9.4, p = .002 (Table 7).

Discussion

Perceptions of Just Culture Interpretation

The results of this study show that learning from mistakes, open communication, coaching one another, and reporting risks are most often selected both by pilots and by managers as the main elements of a just culture. Important is not who is responsible, but what is responsible. Except for

Table 6.	Reason	managers	(%) and	pilots	(%)	selected	for	pilots	reporting	less/more/no	change
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		would rt less	Pilots would report more		There would be no change	
Reason		Pilots	Man.	Pilots	Man.	Pilots
Pilots fear repercussions	56	55	_	2	-	2
Pilots appreciate the time the organization takes to attend to safety-related matters	-	1	85	69	25	13
Pilots will only report if possible consequences are clearly described and fair	33	29	15	19	17	37
This organization already takes enough action when it comes to incidents	-	10	-	2	42	28
Other	11	5	-	8	16	20

Note. Man. = managers.

Table 7. Means (M), standard deviations (SD), and one-way analyses of variance of reporting, response and feedback

	Pil	ots	Managers			
	М	SD	М	SD	F(1, 329)	$\eta^2 \\$
Pilots report errors/incidents that others make	3.83	1.66	4.53	1.55	6.25*	.02
Pilots report their own errors/incidents	5.43	1.26	5.40	1.41	0.15	.00
Pilots report issues that could lead to errors/incidents, even when no harm has been done	5.29	1.34	5.35	1.39	0.82	.00
When a pilot reports a safety concern, appropriate action is taken	4.36	1.51	5.23	1.35	11.77**	.03
Lack of time prevents reporting of errors/incidents	3.69	1.88	4.65	1.64	9.4**	.03

Note. *p < .05. **p < .01.

cases of willful violations (Table 3). More than 80% of participating pilots and more than 90% of managers responded there is a just culture in their organization and willful violations are not tolerated (Table 2). The differences in just culture interpretation between pilots and managers were not significant. This illustrates that Dekker's view on just culture (2012), a culture of trust, learning, and accountability, is widely known and established within the airlines that took part in this research.

The Line Between Acceptable and Unacceptable Behavior

Contrary to what is recommended by ICAO (2016), the interviews and survey indicate (Figure 3) that for almost one third of the pilots and more than half of the managers it is not clear to them where the line is drawn between acceptable and unacceptable behavior for pilots. In addition, the group of managers who are unclear about the line is significantly larger than the group of pilots. This implies that an "agreed set of principles" as suggested by Reason (1997) perhaps does not exist, and that there may not be explicit guidance about who draws the line and who decides with regard to (un)acceptable behavior, as suggested by Dekker (2012). Pilots (and some managers) view standard operating procedures as indicators of the line, but both groups are aware that circumstances, context, and hindsight can shift or blur the line, consistent with the findings of McCall and Pruchnicki (2017). If there are consequences in the form of disciplinary action when a line is crossed, one would expect that line to be clearer, especially to those who decide about consequences, and that is predominantly management.

Perceptions Concerning the Use of Culpability Tools

Although the results indicate that three quarters of pilots and of managers are supportive of the use of a system that provides guidelines for deciding about culpability, Table 4 shows that managers attach more importance to the practical use of the tools (being valuable and objective), whereas pilots are more concerned about the interpretation of the tools (subjective, no room for context). This latter perspective is supported by findings from previous research; the illusion of objectivity found by Dekker and Nyce (2013), and the finding that judgment on culpability is subjective (Liao, 2015) Also, human performance is variable; no substitution test can account for that. To address these concerns, both the literature and the outcomes of this research suggest that if a decision tree is used, a wellworked out process should include definitions of behaviors for context, a substitution test, a reasonability test, an effectiveness test, as well as reflection on the role the organization and management had in the incident (Hobbs, 2008; Hudson et al., 2008; Johnston, 1995; Karanikas & Chionis, 2017). Even though a decision tree can make the process transparent and offers a standard approach to look into an incident, users should be aware that the tool can still be entered in a biased state of mind. Involving a committee

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and negotiating concepts of culpability beforehand will decrease the likeliness of a decision to be biased (Cromie & Bott, 2016; Dekker & Nyce, 2013).

If pilots have no faith in how culpability tools will be used, it is likely their willingness to report safety issues will decrease. Therefore, the advantages and disadvantages of the use of such tools should be carefully evaluated before implementation. The opinions both of pilots and of managers illustrate the importance of involving trained impartial staff and persons with domain expertise (Bitar et al., 2018; Dekker & Breakey, 2016; Liao, 2015; Trögeler, 2011).

Differences in Perceptions of the Effect of Measures on Safety Reporting

The fact that it is not clear to more than half of the participating pilots and managers which behavior of a pilot could lead to disciplinary measures shows that it is also unclear to a majority of participants where the line of accountability is drawn (Figure 3). This is supported by the outcome that pilots and managers believe that pilots are less likely to be disciplined for violating procedures when they *did not* cause danger to the aircraft or passengers, than when they *did* cause danger (Table 5). This seems to imply that the outcome of an incident is a reason to discipline pilots. In a just culture, understanding why a procedure was violated should be investigated, regardless of the outcome.

In addition to this, half of the respondents claim standards of accountability are not applied consistently (Table 5). For the interviewed pilots this claim stems from experiences in the past where, according to them, either colleagues were disciplined too harshly, or colleagues were not disciplined at all after an alleged willful violation. In 5% of the survey responses similar remarks were made by pilots (in a comment box) about inconsistent outcomes of incident investigations. Interviewed managers said it was sometimes difficult to sanction violators since reports are confidential and investigations are executed under strict rules, with limited possibilities to approach the crew involved.

Despite these findings, participants (both pilots and managers) agree to a great extent with the fact that disciplining pilots in response to honest mistakes will not improve safety (Table 5). This confirms that the intentions of EU regulations (2014a, 2014b), concerning no punishment unless gross negligence or willful conduct was demonstrated, have been embraced by the participating airlines. Implementation of consistent clear lines of accountability still awaits improvement.

Figure 5 illustrates that pilots and managers have different perceptions of the effects caused by introducing more action in response to incidents (Table 6). Interviewed pilots stated without exception that they do not expect pilots to report any safety items if this could incriminate them. They would rather protect themselves and their colleagues, even if the expected measure was a reasonable measure. This is in line with findings by several researchers (Leape, 1999; Lingard et al., 2014; Nørbjerg, 2003; Schnitker, 2007). It also underlines the importance of implementing a restorative just culture as opposed to a retributive just culture, since it is not sanctions that are needed in response to mistakes, help is needed (Dekker & Breakey, 2016). Managers expressed mixed views: Some believed that pilots are simply afraid of (disciplinary) measures and would consequently report less. Others believed that transparency and predictability of the process would ensure more reporting. One manager illustrated his viewpoint with the following example: As it is increasingly common, flight data are available at the end or even during every flight stretch, which sometimes leads to flight crew being taken of a flight halfway during their flight day (if an incident happened during the first approach to land of a return flight). The airline views this as a way of reducing the risk of the next flight sector. It is not a punitive measure. Nevertheless, for the flight crew involved, the result of that event, the investigation thereafter, and waiting for the final verdict can be extremely stressful. The fear of repercussions, from losing your job to mandatory extra training, is often present. Good communication about the intention of measures (to improve safety) from airline management to pilots is therefore essential, to establish faith in the system and trust in management.

Pilots are willing to report their own errors, and all errors that could lead to incidents (Table 7). Only on the subject of reporting errors that *others* make was there a difference in perceptions between pilots and managers. Pilots state they are less likely to report someone else's error compared with other errors. The reason for this is unclear. A possible explanation could be that *others* was not defined clearly enough, or pilots may prefer to give feedback to *others* directly instead of through a reporting system.

A significant difference was observed between pilots and managers about the statement that lack of time prevents reporting of incidents (Table 7). Overall, 16 pilots indicated in the comment box of the survey that this can be attributed to the fact that the reporting system they used was often not available due to a system or password error, or not available in flight (offline). The latter ensured that flight crew did not report after a long duty. The managers seemed to be unaware of these issues.

There was also a difference in perception between pilots and management regarding whether appropriate action is taken when pilots report a safety concern (Table 7). Pilots in both the interview and survey explained that feedback about incidents often takes a long time or there is even no response at all. Managers confirmed that providing timely feedback is a challenge. Since acting upon the supplied safety information is an important element of a learning culture (Mahajan, 2010; Reason, 1997), this is a vital area that needs improvement. Also, these results support the findings by Reason (1997), Mahajan (2010), and Helmreich et al. (2001) about the importance of proper and timely feedback as well as the findings by Dekker and Laursen (2007) and Wiegmann et al. (2002) concerning the motivation to report.

Limitations

Most participants in this research were from Europeanbased airlines or Western countries. Cultural differences are likely to influence perceptions of just culture, since there are, for example, different hierarchies between pilots and managers in other parts of the world. Reporting one's own mistakes may be more difficult in some countries. Furthermore, results indicate that just culture is influenced by company culture. It is therefore plausible that mixing results from different organizations may diminish the contrast there is between pilots and managers in a specific airline. In addition, a number of 332 participants is by no means representative of the global airline community. Finally, in an airline there are always more pilots than managers, which complicates making comparisons between those groups. If additional research is done within other airlines and in other parts of the world, it would be possible to establish whether the results that were found here are consistent across different countries and cultures.

Conclusion

Data from this research highlight the following about perceptions of pilots and managers involving just culture: both the pilot and the manager groups agreed to a significant level on the elements that they considered vital for establishing a just culture. However, the line between acceptable and unacceptable behavior for pilots was often unclear, both within the pilot group themselves and even more so for the managers who decide about the culpability of pilots after an incident. Although pilots and managers were both supportive of a system that provides guidelines to decide about culpability, pilots were more concerned about the interpretation of such tools.

There was a significant difference in perceptions of the effect of measures on safety reporting. The majority of pilots believed more consequences would result in less reporting, mostly for fear of repercussions, whereas most managers believed more consequences would lead to more reporting, out of appreciation for the time that is dedicated by the organization to safety-related matters. Perceptions of pilots and managers also differed concerning ease of reporting, appropriate (timely) response, and sharing adequate feedback during or after an incident investigation.

The safety culture of any airline aims for improvement on a continual basis. One way to achieve this is by implementing and overseeing a just culture approach to human error. Regularly evaluating just culture perceptions of pilots and managers may lead to interesting findings about a company's just culture maturity and will create the opportunity to address differences in perceptions. Understanding *why* there are differences can enable organizations to improve their just culture and can contribute to a higher safety level within an airline.

Suggested improvements based on this research are to carefully review the process used to establish whether a line was crossed and the utilization of culpability tools. Reviewers should be aware of the precariousness of subjectivity and (hindsight)bias, and the importance of context should be acknowledged. Furthermore, airlines should be clear and consistent about their policy regarding accountability; they should make it known that all reported errors and mistakes will be investigated for the sole purpose of improving the safety level of the airline through re-evaluating procedures, changing training objectives, or creating awareness about potentially challenging situations. Finally, reporting tools should be easy to use and accessible, and feedback to safety reports should preferably be given promptly and adequately.

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