Just Culture, is it needed to the nuclear industry?

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1. Introduction

Both nuclear power industry and civilian flights are macro-technical systems and classified as ultra-safe systems that reached the risk of disaster is below one accident per 100,000 or even one million safety units[1] [1]. Both industries have same limitation on the number of disastrous accident that will be utilized for deriving lessons learned.

The most pervasive approach for safety improvement in past and current high-risk high-consequence industries is event following. That means, the organization tries to collect and investigate failure events, and take corrective actions to prevent the recurrence. This typical approach is called as Safety-I approach [2].

This safety approach derives lessons from failures. Although many analysis tools and cases exist, that can be a constraint in ultra-safe high-consequence industries because of the following reasons: Firstly, the incident occurrence rate of those is extremely low. Secondly, the personnel who is involved and pointed as the cause of human error will be taken disciplinary measures in many cases and so the person tries to hide his fault. Then it is very difficult to collect the event information which should be used to improve safety. Therefore ultra-safe high-consequence industries make efforts to set-up the work environment to collect the safety information from frontline personnel.

2. Implementation of Just Culture

In this section the concept, regulation basis and recent legal change trend of just culture in commercial aviation industry are described. And the related status of Korean nuclear industry is introduced.

2.1 Concept of Just Culture

The IAEA nuclear safety group pointed the deficiency of safety culture of operating organization as a critical cause of Chernobyl accident [3]. After the investigation report published, the safety culture was emerged as a key factor to safety in aviation field as well as nuclear industry.

Reason described just culture as one of components of safety culture and also explained the relationship between reporting culture and just culture [4]. He described as follows: Any safety information system depends crucially on the willing participation of the workforce, the people in direct contact with the hazards. … An effective reporting culture, in turn, on how the organization handles blames and punishment. That is, he suggested that just culture is a foundation of reporting culture. Dekker explained the ideal on just culture: A just culture approach recognizes that even competent professionals make mistakes and acknowledges that they can develop shortcuts, workarounds, routine violations - yet declares intolerance for reckless behavior [5].
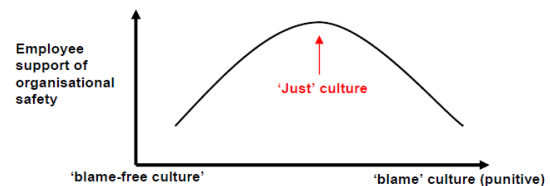

Fig. 1. The relationship between employee support of organizational safety and organizational culture.

The relationship between employee support and organizational culture is illustrated in Fig. 1, which is adapted from the model of D. Marks [6]. As in Fig 1 shows, the balance between blame-free culture and blame (punitive) culture is very difficult. So the borderlines of just culture are real concern and is illustrated in Fig. 2, which is derived from P. Stastny of 6th GAIN[2] World Conference [7]. ICAO[3] Annex 19 specified the cases of protection exceptions, like gross negligence, willful misconduct, or criminal activity [8].

Fig. 2. The borders of "bad behaviors" [7]

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[1] Safety units vary according to industry or transportation mode. Figures in this article use statistics published by different industries, expressed in their specific unit [1].

[2] GAIN: Global Aviation Information Network
[3] ICAO: International Civil Aviation Organization

Even though the necessity of just culture is agreed, there exists some obstacles to apply the concept of just culture into actual work environment. Dekker raised three essential questions: 1) Who draws the line between acceptable and unacceptable behavior? 2) What and where should the role of domain expertise be in judging the behavior? 3) How protected against judicial interference are safety data? [10] In relation to the second question, Reason and Hudson suggested the decision tree for determining the culpability of unsafe acts respectively [4, 11].

2.2 Regulation Basis and Trend of Just Culture

The definition of just culture in regulation was described in aviation field of EU. The first document was Regulation 691/2010 of EU. After that regulation, the current definition of just culture is specified as follows in Regulation (EU) 376/2014: '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 [9]. And the same Regulation also specifies that each organization established in a EU Member State shall adopt internal rules describing how just culture principles are guaranteed and implemented within that organization.

Notice No. 2015-138 of the MOLIT[4], State Safety Program specifies that the service providers shall develop and operate own Safety Management System (SMS) and have Safety Management Manual (SMM) for SMS, which is approved by the authority. And also specifies the conformance of MOLIT's Instruction No. 527 on Approval and Operation Guide of SMS [12].

The Instruction No. 527 specifies that SMM should include 'Just Culture Policy' and establish the internal safety reporting system based on just culture in order not to punish unintentional error or mistake without intention and sabotage. The information of safety reporting system shall be only used to investigate the causes and improve the incomplete system [13].

However, the implementation of just culture in aviation industry of Korea is 'just' declarative stage because the main reason is a lack of legal system backup for actual application, which is related to the above the third question of Dekker for a just culture. Therefore the preparation of MOLIT to implement the Annex 19 of ICAO can be a practical step for the application of just culture both legal and systemic frame.

The MOLIT recently finished a research project to adopt ICAO Annex 19, Amendment 1 and is now preparing the modification of regulation requirements for aviation safety data [14]. The main change in Amendment 1 of Annex 19 is to establish the formal protection of safety information which provides protection of mandatory reporter as a recommendation as well as voluntary reporter as a standard unless they are not the cases like reckless conduct, gross negligence or willful misconduct [8]. The previous one only specified protection for voluntary reporting. Therefore the approach of Annex 19 Amendment 1 and related MOLIT's regulation scheme can be a practical step and a breakthrough on just culture implementation in aviation industry.

2.3 Safety Culture and Just Culture in Nuclear Industry

In nuclear industry of Korea, the regulation requirement on safety culture was added to periodic safety review (PSR) in 2014 [15] and has applied into the PSR licensing of operating nuclear power plants (NPPs) since 2016.

Recently the NSSC[5] launched a plan to re-establish the regulation requirements for both construction and operating NPPs, which includes a requirement on safety culture. After the establishment of safety culture requirement, it is expected that just culture policy will be addressed in brand-new Notice of the NSSC.

On the other hand, the KINS has developed the nuclear safety culture oversight model in 2014 as a research product [16]. One of its five areas is Safety Conscious Working Environment that contains Just Culture as one of components which is described in Table I. The expectation on Just Culture is as follows: The organization implements a policy that evaluation and decision of disciplinary action for workers involved in accident, incident, or error in the workplace are made based on fairness principle. The KINS already raised the necessity of just culture as an essential element for enhancing the safety and was applied it during previous special inspections of NPPs.

Table I: Nuclear Safety Culture Oversight Model and Components

Area	Component
Human Performance Management	-Decision Making -Work Management -Work Practice -Resource Management
Management for Improvement	-Operating Experience Feedback -Problem Identification and Resolution -Diagnosis and Improvement
Safety Conscious Working Environment	-Employee Protection -Information Sharing -Just Culture
Leadership and Organizational Control	-Leadership for Safety -Organizational Competency -Change Management

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[4] MOLIT: Ministry of Land, Infrastructure and Transport

[5] NSSC: Nuclear Safety and Security Commission

Safety Culture Management System	-Management System -Implementation Organization -Implementation Framework

The need for applying just culture concept comes from front-line personnel at the sharp end of workplace. As the phrase of 'To err is human' represents, people makes mistakes but nobody wants to open it with frank confession. There also exists many other constraints to persuade people to file reports on safety occurrences [17] However, we need the information of safety occurrences and so we should try to make a successful reporting culture, that results from a just culture.

3. Conclusions

The nuclear industry had a leading role on the safety improvement of organizational viewpoint comparing with the other industries. This could be possible with the creation of concept and applications on safety culture after Chernobyl accident. However, in these days the aviation industry introduced the new concept of just culture in order to proactively collect the safety related event information. Annex 19 'Safety Management' of ICAO did a big step to remove the potential hindrance to event reporting by setting the implementation schedule until 2019. The movement with just culture policy will positively impact to the safety improvement of aviation industry because just culture can be a basis for successful reporting as Reason's description on safety culture. In this sense, McCall and Pruchnicki described that engineering a just culture is an essential early step in creating a safe culture [18]. Both nuclear and aviation industry are common in that they contain high-risk and high-consequence. Therefore it is a time for nuclear industry to consider the necessity and introduction of just culture in ways of pursuing the practical and proactive build-up of safety.

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