

## Review of Leadership for Safety and Role in abnormal situation

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### 1. Introduction

The role of leadership in emergencies, which has been reexamined since the Fukushima accident, is discussed with regard to the safety leadership presented in the IAEA GSR Part 2, "Leadership and Management for Safety". Based on experience and information from the Fukushima nuclear power plants accident, the role of leadership in an emergency and its future challenges is presented herein.

The concept of Leadership in organization normally consists of two elements – establishing vision and affecting people. Thus the Leadership is a concept relating to the interaction of people and human behaviors. So the leadership is a research field relating to how staffs of organization act and how humans and groups do with interest in many academic fields such as social psychology, organizational behavior, praxeology, business management and etc. From the results of previous studies it is suggested the leadership approaches and types that are effectively applied. But the Leadership should be considered with various factors such as national culture, social situation, organizational culture, task type and state of crisis in combination. Likewise, the leadership that is required in high-risk industries like operational organization of nuclear facilities has been raised in various.[1]

In the wake of an event in Fukushima, the importance of leadership that is able to increase responses and retain safety in unexpected accidents and disasters is emerged and it is increased interest in a systemic approach to leadership. Experts of international community urge to pay attention to humans and organizations because decision making, understanding the situation and communications affect the progress of accident significantly in the extreme condition. In particular, IAEA has started to emphasize the leadership for safety in the safety standard - GSR Part 2 - which revised and issued in June, 2016.[2]

The reason that the leadership is required in the extreme condition is because it is necessary to overcome the situation by setting up gradual (or innovative) solutions while maintaining all internal and external relations in the following difficulty.

- Existing training and procedure are not applicable due to unexpected situation progress
- Safety barriers are lost due to accidents such as exceeding design basis.
- Natural disasters are progressed dynamically so the situation expands rapidly and results accumulate.

- Because of uncertain information, the extreme condition has a characteristic of complexity that the decision of one moment affects the ending.
- It is possible to proceed for a long time and affect harmful influence to the health and life of the worker.
- Various stakeholders at the field, regional and national levels are affected to make decisions one another.

In this extreme situation, it is necessary to figure out future tasks about what roles leadership plays and what capabilities are needed to respond during taking a view of the Fukushima accident.

### 2. Two types of leadership in the Fukushima Accident

In this section two types of leadership that cause different results in Fukushima nuclear power plant (NPP) accident are described. One is a case of Fukushima Daiichi (the first) NPP and the other is a case of Fukushima Daini (the second) NPP.

#### 2.1 Leadership status at the Fukushima Daiichi (the first) Nuclear Power Plant

In order to identify the leadership and a role of leaders in the accident situation IRSN in France analyzed the Fukushima accident with the viewpoint of human and organizational factors and find out following several situations.[3]

First, in the situation that is impossible to check that the emergency cooling system of Unit 1 is operating normally Mr. Yosida who is responsible for operation of Fukushima Daiichi NPP should find out new methods. Direct injection of cooling water using fire truck that was attempted for the first time was the only alternative. Even the competence required for the work was with the contractor and the staff had to carry and search the design drawing in order to identify an exact location. In addition, the debris removal work of other teams had to be performed in parallel to reach the target point. If the existing emergency response system does not work, there is a situation in which a new attempt is not made in the procedure. The reason that was possible to carry out an innovative attempt was that the leader with experience and responsibility led to the cooperation of the concerned people through leadership-centralized coordination.

Second, the role, age, and position of employees are taken into account in deciding who will work and who

will be dispatched to emergency work on the site where will have a significant impact on the individual's life. The cooperation of contractors who have the technology is essential for carrying out the mitigation action of accident with radiation risk though it is out of the scope of contract. Ethical dilemmas have occurred in the selection of workers, negotiations with suppliers and judgment for workers' safety. Mr. Inagaki who was a maintenance manager of Daiichi NPP in TEPCO emphasizes to consider carefully whether can order colleagues to enter when the reactor building is melting and presents the following key lessons-learned from the leadership aspect.[4]

- In the normal time: The leader has to encourage employees to familiarize with NPP and develop continuously development of capabilities. The leader has to minimize the possibility of unexpected black swans and recognize that can happen at any time. The leader has to maintain questioning attitude and resolve any questions he/she has.
- In the accident situation: The leader has to cope with an accident in order to ensure that the operator is not in a serious situation. The leader has to make a common recognition for NPP status with operator, organization and emergency response center. The leader should establish the strong leadership and take the confidence through the protection of emergency response employees.

Third, when the accident occurred, problems arise in the system of smooth instruction and there has been a situation in which the trust relationship between organizations has been disturbed. Finally, when the prime minister could not decide to inject seawater with concern of re-criticality due to the difference of recognition for scene of NPP Mr. Yosida, director of NPP, in the scene ordered to inject seawater. In crisis situations, power and authority tend to be concentrated in political leaders or authorities.[5] In the case that operators, regulators, and stakeholders (technical or political) are affected, they may act as obstacles to rapid decision-making or make decisions separately. As a result, all performers at all levels would be in situation where they have to carry out roles as leaders.

## *2.2 Leadership in the case of Fukushima Daini (the second) Nuclear Power Plant*

The Fukushima Daini NPP operated by the same company (TEPCO) is located 10km south of the Fukushima Daiichi NPP. The leadership of NPP director is evaluated that has made a decisive contribution to preventing the bigger damage. The leadership of Masuda who had been working as a site superintendent was relatively not noticed due to the disaster of Fukushima Daiichi NPP at the time of accident but it has been being reviewed.[6]

Due to a tsunami that is three times the height of the design, the Fukushima Daiichi NPP lost the cooling system function of the three reactors out of four and only one diesel generator and only one power cable were available. Workers were obsessed with the fear of the subsequent occurrence of natural disasters such as what happened at the scene and whether the worst of the situation was over. So it was difficult that the normal rules was applied to decision making and organizational behavior in variable circumstances. Because human reactions are based on the individual's constructed reality, if unexpected and unexperienced accidents occur, they do not adapt to the environment that changes seriously.[7]

Masuda and the recovery team had to restore the cooling system by connecting the diesel generator, which power was only undamaged, to each unit but it is was very difficult to move employees in front of the risk of unpredictable natural disasters and radiation exposure. Masuda is considered to be an appropriate application of the "sense-making process" that quickly accepts extreme situation in progress and shares doubts and the uncertainty of reality with team members. He solved the problems by ensuring that employees understand clearly the situations they face through repetitive and continuous instructions and recalibrate processes. In other words, it increased the adaptive behavior of the crisis through interaction with the members.

In a harsh environment, Masuda's leadership allowed that 200 staffs took action without serious accidents such as core melting through connecting temporary power cables (about 9 km) to carry using helicopters and trucks. The cooling function was restored by successfully supplying power to the residual heat removal system (RHRS, RHRC) of units 1, 2 and 4 using radioactive waste building, heat exchanger building of unit 3 and portable power generator. Masuda created an environment for individual "sense-making" through explaining by understandable way than hopeful remarks or full instructions and providing information whenever possible. Through this, each individual objectively recognized and accepted the risks.

Masuda summarizes the lessons learned on leadership based on his experience as follows.[8]

- Normal: Working as a team so that team members are active and motivated has a big impact on the results. Because the only person who can understand the whole team is the leader, he (she) must have the ability to be aware of the situation. The goal of decision-making is to achieve the goal and personal safety must be a top priority, but if necessary, the leader should be prepared to take high risks. In an emergency the leader must keep in place, act as usual, and share information centralized.
- Instruction and Control: The leader must clearly deliver the detailed instructions to each sub-leader, speak loudly to all team members, and

inform to the subordinate / team member about receiving a report. The leader should answer immediately when asked for directions and should not hesitate to apologize and correct if you make a mistake. The leader should reprimand employees who did not follow instructions and should comfort them if they did not follow the plan despite proper follow-up. The leader must clearly instruct the team on what to do, sequence of the work and way to run, so that employees can effectively perform the task with limited time and man-power.

- Information sharing and recovery: The leader should share surely the fact including progress and improvement / deterioration status and give regularly an opportunity of information sharing daily. The leader should explain carefully and prudently considering the fear of employees who don't have any knowledge for nuclear or radiation and provide the community and residents with up-to-date information about plant conditions continuously. After the accident, the leader should have employees be able to feel that the situation is getting better through improvement of the lives.

As can be seen from the examples of Fukushima Daiichi and Daini Nuclear Power Plants, there are big differences in the results depending on how leadership is exercised in an emergency. It is also clear that emergency leadership should be different from normal.

### **3. Conclusions**

Dr. Charles A. Casto, who was a US government delegation at the time of the Fukushima accident and had provided technical advice to Japan, emphasized that preparedness is not enough and the outstanding capability of situational awareness is important in complex and unpredictable accidents caused by natural disasters such as the Fukushima accident.[9]

Therefore the individual as a leader should be able to carry out a central role to coordinate in the central, to take responsibility for ethical decisions, to earn the trust of employees by taking initiative, and to order by using empirical knowledge.

However it is not desirable to limit the flexible response of the organization to the individual role of the leader. It should also be emphasized that leadership is a characteristic of the organization that is required by all levels in order to achieve the goal and it is important to develop the ability in organizational level.

Therefore it is necessary to constantly modify situational awareness while interacting with the entire organization and all employees must carry out as a leader in the ever-changing field because the leader's recognition ability is limited. Also, leadership can function only through followership in ethical situations.

It is expected that a variety of issues will be raised in the future as the leadership and the characteristics of the organization is a field to ask new question contrast with the characteristics in the normal state. So various interdisciplinary approaches will be needed to deal with these issues. Although it is difficult to set the direction as it is related to multidisciplinary expertise, it will be important to pay attention continuously in connection with the technical aspect.

Therefore, the following challenges should be considered constantly.[10]

- Is it possible to develop the application-oriented capabilities needed for emergency situations in the process-oriented culture which is required under normal conditions?
- How will the leader control the abnormal behavior of an individual in an emergency
- How will leadership at each level of organization be cultivated?
- How is made the decision about how much to try and give up in uncertain situations and when to start a new trial?
- Does everybody need to be aware that in certain situations they are supreme determinants?
- Is there a unified approach to leadership in other national cultural and social relationships?

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