

A Study on the Organizational Components Affecting the Communication-Related Events in Nuclear Power Plant

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1. Introduction

It is important to communicate clearly and effectively in order to achieve and improve team performance, also in the view point of safety, in nuclear power plant (NPP). Researchers have studied on lots of accidents and incidents related to communication and analyzed the elements affecting communication fail in the side of sender-receiver communication process so that they have found which process was failed to communicate each other. [1]

But we cannot disregard on human cognition, level of understanding, and individual or team characteristic on the communication process, so we need to analyze the elements of communication-related events in the side of human and team components that we will find why operators could not avoid failing their communication.

In this paper we enumerate key organizational components, collect events related to communication in NPP and count the total number of components affecting communication fail. Finally we perform the pairwise-comparison using those values and understand major factors affecting communication-related events.

2. Selection of organizational component

Organizational components affecting communication-related work are selected through literature survey.

We can see the result of the selection of component in Table 1. These components have selected and simplified through the team performance process, team performance model, team behavior model, and so on.

3. Evaluation of relative importance

3.1 Pairwise-Comparison

To estimate how much each components are affecting communication, it is matched that what kinds of factors were linked with the organizational components, and then counted the number how often those components were checked.

To analyze the factors of events and collect those counted number, we referred about 20 communication-related event from 2000 to 2007 in Korea. [5]

Classification		Factors	
Individual Component	Expertise	Skill	
		Knowledge	
		Expertise	
	Personal Characteristic	Personality	
		Attitude	
		Preferences	
Safety awareness			
Organizational Component	Formal	Structure	Organization Structure
			Cooperation
			Different organization
		Environment	Noise
			Different working place
			Time pressure
	Informal	Leadership	Personality of leader
			Attitude of leader
			Experience of leader
		Organizational Characteristic	Membership
			Team Identity
			Safety Culture
			Forthrightness
			Trust
Mutual regard			
Reliability			

Table 1: The results of selection of key organizational components [2, 3, 4]

It is known that the nine scale of absolute number is the most popular way to use Analytical Hierarchy Process (AHP), but this has so wide flexibility that we can use the real counted number itself.

AHP has been used for decision making in various kinds of industries. We use AHP with the purpose that how often each component is linked with communication-related events. Therefore, we can remind us of those components to help us make attention and to reduce those events. [6]

The results of analysis are shown in Table 2.

3.2 Consistency Index

To prove whether the weight of components is well estimated and has confidence, we should calculate the Consistency Index (CI).

CI of this analysis is almost zero that satisfies the Saaty's suggested standard for reliability of results (less than 0.1).

Level 1	Level 2	Level 3	Weight
Evaluation on the factors affecting accidents and incidents in NPP 1.000	Expertise 0.193	- Skill - Knowledge	0.021 0.048
		- Experience on related work - Experience on similar events	0.055 0.069
		Character-istic 0.152	- Personality - Attitude - Safety awareness
	Structure 0.097	- Team structure - Adequacy of cooperation	0.076 0.021
	Environment 0.117	- Difference of work place - Deficiency of Communication Support Process	0.020 0.083
		- Deficiency of procedure about Communication process	0.014
Leadership 0.103	- Personality of leader - Attitude of leader	0.027 0.062	
	- Experience on related work - Experience on similar events	0.007 0.007	
	Team character-istic 0.338	- Safety culture - Membership - Team identity - Forthrightness - Trust	0.069 0.069 0.062 0.069 0.069

Table 2: The results of the evaluation of relative importance[7]

3.3 Results

From these results, we could find that individual expertise and team characteristics especially considered in emotional aspects as a team member are important factors affecting communication-related events.

But in spite of having low weight of level 2, attitude of leader and deficiency of communication support process could be predicated as considerably essential components.

These results provide the most frequently related components to communication-related events. And these also remind us to consider which the important components are so that these can reduce and prevent the related-events.

4. Conclusions

It has been performed that researchers analyze the elements affecting communication fail in the point of sender-receiver communication process. But in this paper, we analyze those elements in the point of individual human and organizational components.

To evaluate the factors affecting communication, we researched on the accidents data and performed the pairwise-comparison. We could get the weight of each component through AHP method with trustful value of CI.

The results of this analysis can provide major components affecting events and remind us to consider

the mentioned components to give attention and to reduce and prevent the communication-related events.

It is expected that we can study on this contents more detailed, as a further study, based on this research.

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