

A Study on UAE Cultural Effects on Nuclear Power Plant (NPP) Operation

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1. Introduction

Several initiatives have recently been taken to provide international cooperation in technology transfer and supplying human factors resources to the nuclear industry worldwide. The aim of promoting international cooperation is for the safe operation of the nuclear power industry. In terms of international cooperation of the nuclear industry, nuclear power plants are now under construction in Braka, UAE.

However, with technology transfer and international cooperation, there needs to consider several potential problems due to the differences between two culture of the countries such as language, technical culture and expectation. Also, there is an evidence of remarkably wide effects of cultural interpretation of human-system interface even between what have been thought of as relatively homogeneous.

Hence, the purpose of this research is to draw attention to the degree to which culture, organizational, and even ergonomic differences have to overcome, if such transfer of knowledge and behavioral technology is to be successful. Of particular interest is the UAE's cultural effect on operating nuclear power plants.

2. Cross Cultural Effect

2.1 Cultural Stereotypes

There have been several papers investigating the extent to which there is agreement across cultures about stimulus-response cultural stereotypes for simple displays [1].

Two further examples are of similar interest, respondent were asked to use the letters A, B, C, and D to label the quadrants of Fig. 1. Respondent were asked to increase flow by turning faucet handles in Fig.2

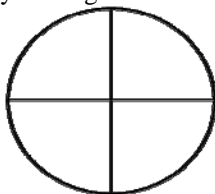


Fig. 1. Quadrants



Fig. 2. faucet handles

As shown in Table I and II, there are very marked differences between observers in terms of the quadrant-letter correspondence and movement of handles they take for granted [2].

Table I: The proportion of people from different cultures who choose the given sequence for labeling sectors

	USA	Japan	Netherland	Greece	Portugal
DA CB	0.25	0.50	0.28	0.17	0.67
AB CD	0.45	0.22	0.44	0.28	0.11
AB DC	0.10	0.17	0.28	0.55	0.11
other	0.20	0.11	0.00	0.00	0.11

Table II: The proportion of people from different cultures who respond with the different patterns of expected movements to the question

	USA	Japan	Netherland	Greece	Portugal
	0.40	0.58	0.07	0.30	0.22
	0.07	0.23	0.58	0.13	0.11
	0.07	0.13	0.21	0.52	0.67
	0.46	0.06	0.14	0.05	0.00

Thus, neither in perceptual expectancies nor in action expectancies is there much consistency cross cultures, even when all the cultures are familiar with high technology system [2].

2.2 Approach of Minimizing Cultural Effect

Above of all, minimizing of cultural effect is to analyze the representative UAE cultural characteristics. For example, human operators working in NPP Main Control Room (MCR) would possibly be multi-national due to initial lack of local human resource. And, the

cross-cultural factors should be analyzed to understand how these factors will affect NPP operation and how we can handle these. In order to do this step, we need to go over some standards such as 'Human-System Interface (HSI) Design Review Guidelines, NUREG-0700' [3]. Because accepted Human Factor Engineering (HFE) design principles, criteria and guidelines (ex. NUREG-0700) have been applied to the design of the BNPP 1&2 Man-Machine Interface (MMI) to assure safe operation of the plant. Then, finally it would be revealed what is affecting NPP operation with UAE culture and new design features in MCR with consideration of UAE's culture would also be suggested.

3. Key Facts of UAE Culture and Human-System Interface Design Review Guidelines

3.1 Key Facts of UAE Culture

Several key facts of UAE culture and their potential effects on NPP operation are identified in Fig.3 [4].

Key facts	
Official Name	United Arab Emirates
Population	4,440,000
Ethnic Makeup	20% Emirati, 50% South Asia, 22% Arabs and Iranians, 8% others, incl. Westerners
Terrain	Mostly desert, with rolling dunes and generally flat apart from eastern mountains
Climate	Desert climate, hot and humid on coast
Natural Resources	Petroleum, natural gas
Language	Arabic. English is widely understood
Religion	Islam is the state religion: 96% of population is Muslim, mostly Sunni, but 16% are Shi'a

Lack of local labor, Multi nationality, Stereotype, Communication

Communication, Procedure, Display, control

Work shift (Pray 5 times a day)

Fig. 3. UAE culture and potential effects on NPP operation

3.2 Human-System Interface Design Review Guidelines

HIS Design Review Guidelines provides the guidelines necessary to evaluate the interface between plant personnel and plant's system and component. Therefore, it is very important to provide proper guidelines for this evaluation. However, this guideline could be slightly different according to each country. In this study, basic HIS elements are reviewed if these guidelines are well-matched with UAE culture.

4. Results

Basic HIS elements in HIS Design Review Guidelines include information display, user interface interaction and management, and control. These three parts were investigated, comparing with UAE cultural fact. Most of all guidelines were well matched with UAE cultural factors. But several guidelines should be changed, considering UAE cultural factors especially in control part. Representative result was shown in Fig. 4.

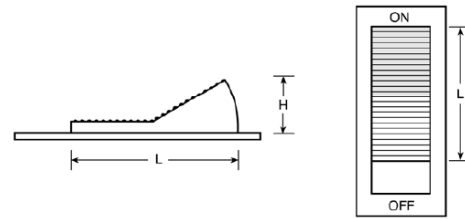


Fig. 4. Slide switch

As shown in Fig. 4, the position of 'ON' is up. However, UAE culture was opposite to this guideline.

5. Conclusions

Basic HSI elements (Information Display, User-Interface Interaction and Management, and Control) contain a lot of guidelines for NPP MCR design. This reference should be applied to NPPs, carefully considering local culture.

All these guidelines are needed to be checked whether these are well matched with UAE cultural factors. As a result, several guideline should be reconsider for safe operation of NPP in Braka, UAE .

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