

# Understanding Cultural Characteristics Shared by MCR Operators in Korean NPPs



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# Introduction

- The safety of nuclear power plants (NPPs) often depends on the performance of human operators.
  - There are various factors that affect the performance of human operators and they are called performance shaping factors (PSFs).
- Among various team PSFs, the cultural characteristics of an operating team has been proposed as one of important factors determining team performance.
  - People engaged in a certain domain tend to share a similar culture according to the domain-specific traits such as internal operating rules, management style, expertise, training, etc.
- Before scrutinizing the relationship between team culture and performance in nuclear industry, it is crucial to understand the specific cultural profile shared by operator groups in depth.
- This study explains the cultural profile shared by MCR operator groups in Korean NPPs, and discusses the implications of the identified cultural characteristics.

# Hofstede's Cultural Indices

- This study employed Hofstede's cultural indices to identify cultural characteristics of MCR operators.
- Hofstede (1991) developed five indices to represent differences among national cultures based on questionnaire analysis.

Hofstede's cultural index	Meaning
Power Distance Index (PDI)	the extent to which the less powerful members of organizations and institutions accept an expect that power is distributed unequally
Individualism Index (IDV)	the degree to which individuals are supposed to look after themselves or remain integrated into groups, usually around the family
Masculinity Index (MAS)	the distribution of emotional roles between the genders, which is another fundamental problem for any society to which a range of solutions are found
Uncertainty Avoidance Index (UAI)	the extent to which a culture programs its members to feel either uncomfortable or comfortable in unstructured situations
Long-Term Orientation Index (LTO)	the extent to which a culture programs its members to accept delayed gratification of their material, social, and emotional needs

# Cultural Profile of MCR Operator in Korean NPPs

- A questionnaire survey was carried out to derive Hofstede's cultural indices of the operator groups from 4 Korean NPP units (called KR1, KR2, KR3, and KR4).
- Hofstede's indices of each MCR operator group

NPP unit	HMIs Type	# Participants	Hofstede's indices				
			PDI	IDV	MAS	UAI	LTO
KR1	Analog	27	23	61	21	74	50
KR2	Analog	25	11	83	26	59	46
KR3	Digital	126	1	64	-5	74	43
KR4	Digital	120	0	62	3	71	46

- Hofstede's indices of ordinary Korean people

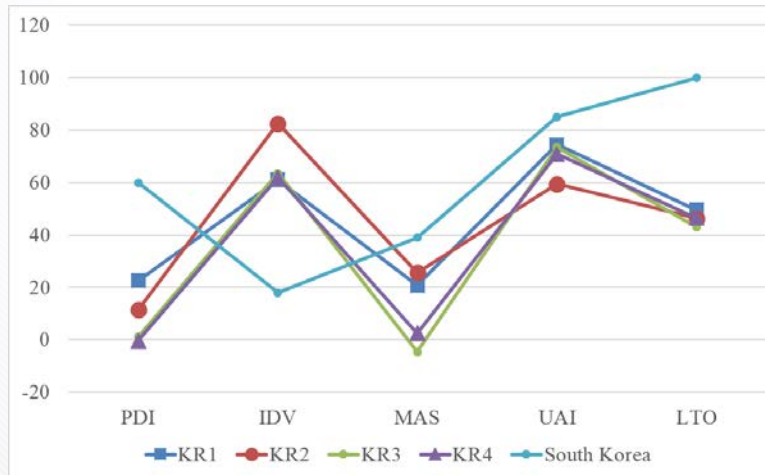
	Hofstede's indices				
	PDI	IDV	MAS	UAI	LTO
South Korea	60	18	39	85	100

(Hofstede Insights, <https://hi.hofstedeinsights.com/national-culture>)

# Cultural Profile of MCR Operator in Korean NPPs

## ➤ Cultural characteristics of MCR operators

- All the MCR operator groups have very similar cultural profiles.
- The cultural profiles of the MCR operator groups are very different from that of ordinary Korean people.



	MCR Operators	Ordinary Korean
PDI	Independent (equal rights)	Slightly hierarchical
IDV	Individualistic	Collectivistic
MAS	Feminine	Slightly feminine
UAI	Threatened by ambiguity	Threatened by ambiguity
LTO	Unbiased	Strongly long-term oriented

# Cultural Profile of MCR Operator in Korean NPPs

## ➤ Power Distance

MCR Operators	Ordinary Korean
Independent (equal rights)	Slightly hierarchical

- The MCR operator groups have very low values of PDI, which is very opposite of the characteristics of ordinary Korean.
  - Hierarchy for convenience only
  - Equal rights
  - Superiors accessible
  - Coaching leader
- Background of low power distance in NPPs
  - An MCR operating team typically consists of five operators, and their respective roles are very important to operate a reactor safely.
  - The relationship among the operators seems to be horizontal, which is in line with the characteristics of low power distance.

# Cultural Profile of MCR Operator in Korean NPPs

## ➤ Individualism

MCR Operators	Ordinary Korean
Individualistic	Collectivistic

- The MCR operator groups are characterized as individualism, while Korea is considered a collectivistic society.
  - Hiring and promotion decisions tend to be based on skills and rules only.
  - Employer-employee relationship is considered as a business deal in a labor market.
  - In business, task and company prevail over personal relationships.
- Background of individualism in NPPs
  - High IDV of the MCR operator groups might be related to a clear distinction between the roles of the operators.
  - IDV is significantly correlated to PDI.
    - The society with low PDI is more individualistic in nature.



# Cultural Profile of MCR Operator in Korean NPPs

## ➤ Masculinity

MCR Operators	Ordinary Korean
Feminine	Slightly feminine

- The MCR operator groups have very low value of MAS and more feminine characteristics compared to ordinary Korean people.
  - The softer aspects of culture are valued and encouraged such as leveling with others, consensus, independent cooperation, and sympathy for the underdog.
  - Incentives such as free time and flexibility are favoured.
- Background of femininity in NPPs
  - In general, the MCR operators value the cooperation among team members for reactor operation, and recognize the ability of other members in their areas.
    - A high masculine society considers the cooperation as a sign of weakness and has a lower appreciation of cooperative strategies.

# Cultural Profile of MCR Operator in Korean NPPs

## ➤ Uncertainty Avoidance

MCR Operators	Ordinary Korean
Threatened by ambiguity	Threatened by ambiguity

- The MCR operator groups have high value of UAI in common with ordinary Korean people.
  - They are uncomfortable in the face of potentially unforeseen outcomes in the future and take effort to minimize the likelihood of the same.
  - They encourage creation of rules and regulations so as to minimize ambiguity.
- Background of high uncertainty avoidance in NPPs
  - As safety is the first priority in NPPs, very strict regulations and procedures are applied to plant operation.
  - The MCR operator groups share the tendency to avoid uncertainty which can cause unsafe situations.

# Cultural Profile of MCR Operator in Korean NPPs

## ➤ Long-Term Orientation

MCR Operators	Ordinary Korean
Unbiased	Strongly long-term oriented

- The MCR operator groups does not represent a clear preference on LTO, while Korea is one of the most long-term oriented societies.
  - High LTO is oriented towards the future and low LTO is oriented more towards the past and the present.
  - The LTO corresponds to work values like self-discipline, accountability, and learning.
  - Cultures with relatively short-term orientation may feature potential conflicts between managers' and workers' aspirations and goals.
- The MCR operators seems to have an intermediate trait for long-term and short-term orientation.

# Summary and Conclusion

- As human operators play an important role in operating socio-technical systems, the culture of operators should be stressed because it entirely governs the behavior of the operators.
- Before scrutinizing the effect of team culture on the associated team performance in NPPs, this study focused on the implied meaning of the cultural profile shared by MCR operators working in Korean NPPs.
  - It was revealed the MCR operators have low PDI and MAS, high IDV and UAI, and intermediate LTO scores.
  - The cultural characteristics of the MCR operators associated with each index was explained and it was discussed how the domain-specific culture has been established differently from Korean ordinary people.
- Understanding the cultural characteristics will give a basis for analyzing the relationship between team culture and team performance, and accordingly, planning a domain-specific training strategy to improve the performance.