

Basic study on relationship between SI, EI and human error characteristics

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Abstract— Recently, accidents or scandals due to organizational violation-based error frequently occur. One of the causes might be maladjustment to environmental changes surrounding organization from relief to global society. In this study, the following proposition was hypothesized: Social intelligence (SI), ability to evaluate appropriately the reliability of others, ability to carry out communication smoothly in organization, and emotional aspects (behavior on the basis of emotion or reasonability) are important factors and keys to prevent violation-based organizational error. A questionnaire which included items related to social intelligence (SI: social awareness and social facility), emotional intelligence (EI), ability to evaluate the reliability of others, ability to communicate smoothly in organization, behavioral characteristics (emotional- or reasonability-based behavior), and ability to make decisions and judge situations. An attempt was made to verify the hypothesis above by a survey using the questionnaire.

1. Introduction

Recently, accidents or scandals due to organizational violation-based error frequently occur. One of the causes might be maladjustment to environmental changes surrounding organization from relief to global society. The most critical human error is (intentional) violation. Different from other types of errors such as slip, lapse, and mistake which are committed without intention, the violation is committed intentionally.

As pointed out by Murata^[1], the human error management must be carried out not only within the framework of man-machine system but also in the framework of organizational design^[2] and social intelligence^{[3]-[4]}.

Although we know that the violation is not permitted, many wrongly underestimate the risk of violation and overestimate the benefit obtained by individuals or organizations. This is indicative of limited reasonability or cognitive bias of risk proposed by prospect theory^{[5]-[6]}. Without proper understanding of limited reasonability, interaction between IQ and EI (emotional intelligence) (We believe that this is promoted by the function of social intelligence (SI)), and human's cognitive bias in decision making, we cannot prevent

violation-based accidents or scandals. Therefore, the measures (c) and (d) above are intensively discussed in this paper. The main purpose of this paper is to approach the underlying mechanism of violation from multiple perspectives, and propose a model that can explain violations.

In this study, the following proposition was hypothesized to be closely related to the reduction of human errors and ability to cope with human error: Social intelligence (SI), ability to evaluate appropriately the reliability of others, ability to carry out communication smoothly in organization. Emotional aspects (behavior on the basis of emotion or reasonability) are also important factors and keys to prevent violation-based organizational error. We prepared a questionnaire which included items related to social intelligence (SI: social awareness and social facility), emotional intelligence (EI), ability to evaluate the reliability of others, ability to communicate smoothly in organization, behavioral characteristics (emotional- or reasonability-based behavior), and ability to make decisions and judge situations. How these items are related to the reduction of human errors and the ability to cope with human errors was explored. In other words, an attempt was made to verify the hypothesis above by a survey using the questionnaire.

2. Emotional intelligence (EI) and social intelligence (SI) toward prevention of errors and accidents^[1]

To construct an organization with high resistance to errors or accidents, it is important and essential to raise staff with both emotional intelligence (EI) and social intelligence (SI). Such an organization must be robust to errors, accidents, and scandals. With only IQ, errors or accidents cannot be prevented. IQ is, of course, necessary for attaining high efficiency or producing usable products. In order to produce a good product which rarely induce an error, engineers must have SI and EI as well as IQ. Moreover, the balance between IQ and EQ or SI is important.

Emotional Intelligence includes the following abilities:

- (a) Ability to recognize own emotion (self-recognition).
- (b) Ability to control own emotion to a moderate state (self-control).

(c) Ability to enhance own feeling to attain own purpose (motivation).

These abilities are the basis for the construction of human relation, communication ability, and sensitivity to errors which are described below as social intelligence.

Social intelligence (SI) consists of social awareness and social facility [12]. Social awareness refers to sensing another's inner state to understand their feelings and thoughts, and includes the following aspects.

- Primal empathy: Feeling with others, and sensing non-verbal emotional signal.
- Attunement: Listening with full receptivity, and attuning to a person
- Empathy accuracy: Understanding other's thoughts, feelings, and intentions.
- Social cognition: Knowing how the social world works. Social facility builds on social awareness to allow smooth and effective interactions, and includes the following aspects.
- Synchrony: Interacting smoothly at the nonverbal level.
- Self-presentation: Presenting ourselves effectively.
- Influence: Shaping the outcome of social interactions.
- Concern: Caring about other's needs and acting accordingly.

It is, of course, desirable that both IQ and EI are high, and the balance between the two is essential. This must lead to true intelligence, and it is proposed, in this paper, that social intelligence (SI) plays an important role to balance between IQ and EI and enhance reliability of organization or society.

3. Method

Social intelligence (SI), ability to evaluate appropriately the reliability of others, ability to carry out communication smoothly in organization, and emotional aspects (behavior on the basis of emotion or reasonability) are important factors and keys to prevent violation-based organizational error. Damasio [7] and Zajonc [8] pointed out that emotion plays an important role in decision making. Based on this discussion, the following proposition was hypothesized (In detail, See Fig.1).

Hypothesis (i): Higher reliability to others lead to higher EI and SI.

Hypothesis (ii): Higher EI and SI lead to smooth communication and sharing of information at workplaces.

Hypothesis (iii): Higher EI and SI lead to higher ability of situational judgment and decision making.

Hypothesis (iv): Behavior paying emphasis on emotional aspects lead to higher ability of situational judgment and decision making.

Hypothesis (v): Smooth communication and sharing of information at workplaces lead to fewer human errors and higher ability to cope with human errors. Higher ability of situational judgment and decision making lead to fewer human errors and higher ability to cope with human errors.

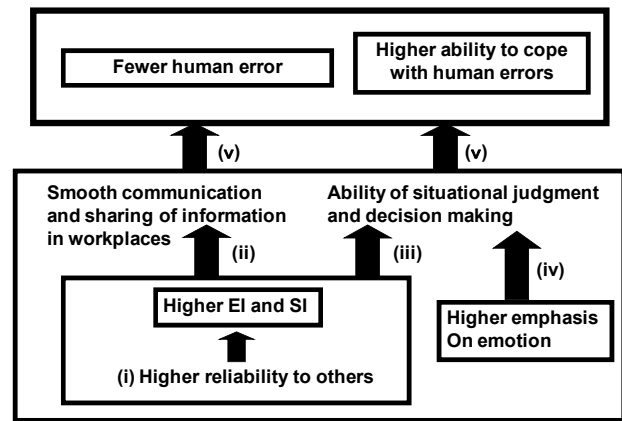


Fig.1 Research hypotheses.

The following questionnaire was prepared in order to verify the hypotheses above. The questionnaire included items related to (A).social intelligence (SI: social awareness and social facility), (B).emotional intelligence (EI), (C).ability to evaluate the reliability of others, (D).ability to communicate smoothly in organization and share information in workplaces, (E).behavioral characteristics (emotional- or reasonability-based behavior), (F).ability to make decisions and judge situations, (G).tendencies to human error, and (H).ability to cope with human errors. Each question had five categories. (A).SI and (B).EI questionnaires included 29 and 13 items. Questionnaires (C), (D), (E), (F), (G) and (H) had 7, 4, 1, 12, 7, and 6 questions. Each questionnaire (A)-(H) were scored according to the addition of points of each question. It must be noted that the maximum score differs among questionnaires (A)-(H), because each included different number of questions.

One hundred and seventy nine undergraduate students at Okayama University took part in this questionnaire survey. Their age ranged from 18 to 22 years old.

4. Results

The score of each questionnaire was analyzed using a correlation analysis technique. The correlation between (C) and (A) (social awareness) is depicted in Fig.2. The correlation coefficient R was 0.14. In Fig.3, the relation between (C) and (A) (social facility) is plotted ($R=0.3$). Three relationships were statistically significant (See Fig.4-Fig.6). The first was the relationship between (F) and (A) (social awareness). ($R=0.40$). The second was the relationship between (F) and (A) (social facility) ($R=0.56$). The third was the relationship between (F) and (B) EI ($R=0.64$). It seems that the hypothesis (iii) in Fig.1 was validated in the range of this study. On the other hand, the hypothesis (i), (ii) and (iv) was not validated.

The relationship between (G).tendencies to human error and (D) is shown in Fig.7 ($R=-0.01$). In Fig.8, the

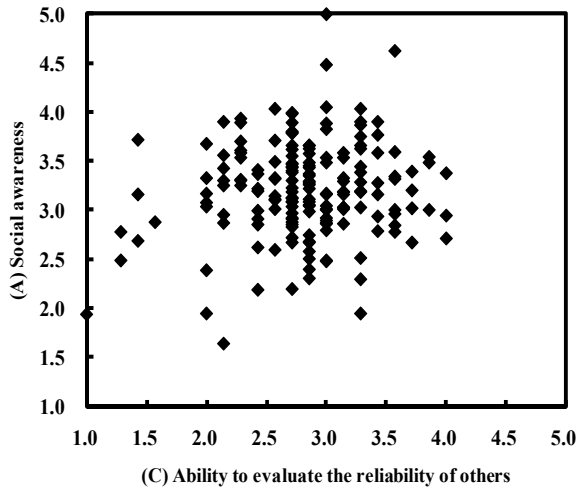


Fig.2 The relation between (C) ability to evaluate the reliability of others and (A) SI (social awareness) ($R=0.14$)

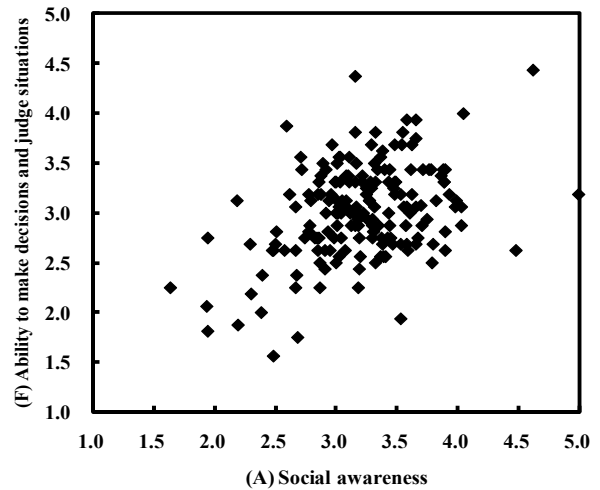


Fig.4 The relationship between (F) ability to make decisions and judge situations and (A) SI (social awareness) ($R=0.40$)

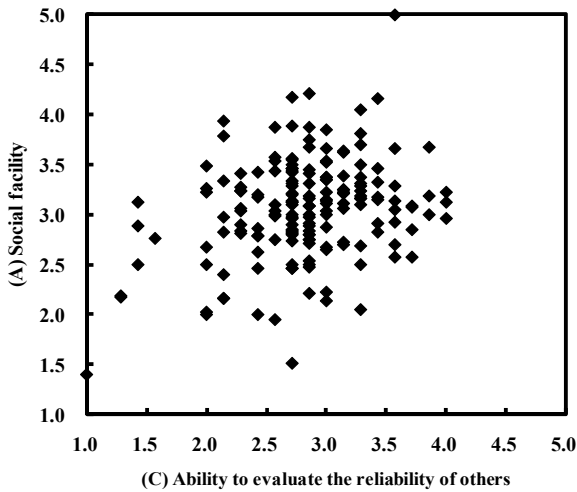


Fig.3 The relationship between (C) ability to evaluate the reliability of others and (A) SI (social facility) ($R=0.30$)

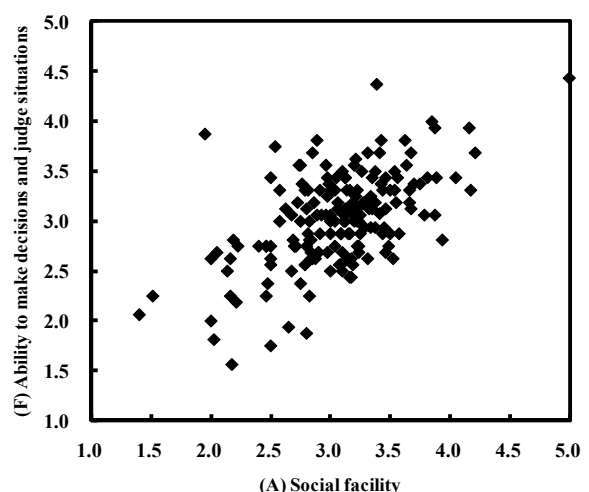


Fig.5 The relationship between (F) ability to make decisions and judge situations and (A) SI (social facility) ($R=0.56$)

relationship between (H).ability to cope with human errors and (D) is plotted ($R=-0.16$). In the range of this experiment, the hypothesis (4) was not established.

5. Discussion

From Fig.4-Fig.6, it seems reasonable to hypothesize that higher (B).EI and (A).SI lead to higher ability of situational judgment and decision making. As pointed out by Frank [4], Damasio [7], and Zajonc [8], emotion seems to play an important role in decision making. However, the hypothesis (iv) was not validated. The reason should be discussed in more detail in future research.

Although Yamagishi et al. [9]-[12] pointed out and suggested that (C) ability to evaluate the reliability of others is essential for enhancing social intelligence (SI), the hypothesis (i) was not validated in the range of this

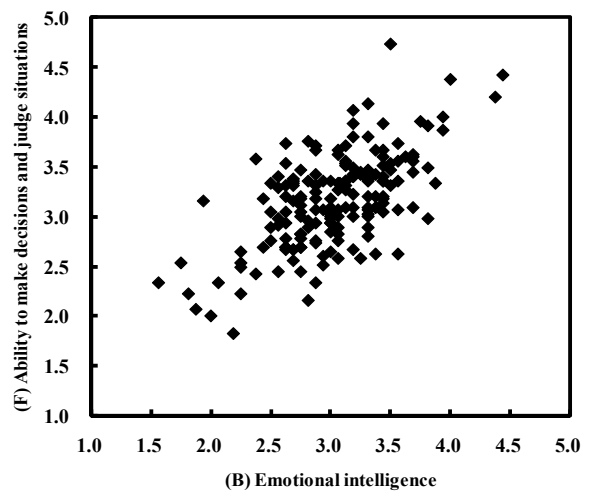


Fig.6 The relationship between (F) ability to make decisions and judge situations and (B) EI ($R=0.64$)

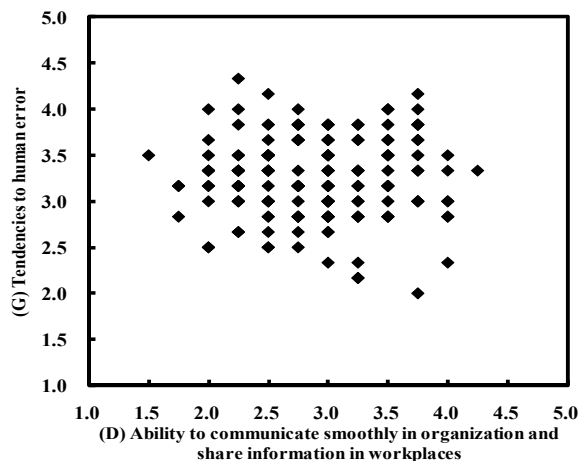


Fig.7 The relationship between (G) tendencies to human error and (D) ability to communicate smoothly in organization and share information in workplaces. ($R=-0.01$)

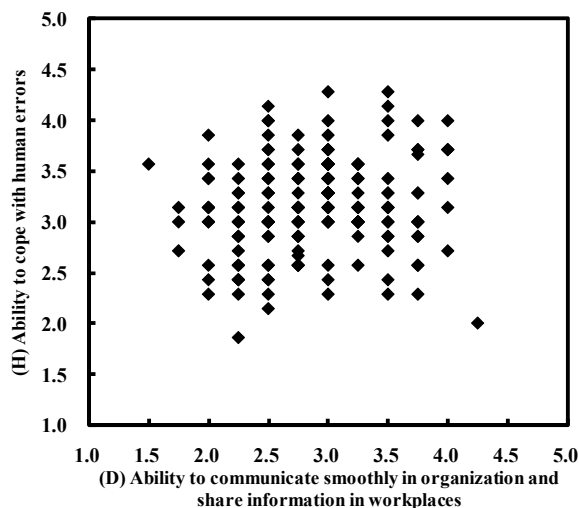


Fig.8 The relationship between (H).ability to cope with human errors and (D) ability to communicate smoothly in organization and share information in workplaces. ($R=-0.16$)

study. The hypothesis (ii) was not also validated in this study. Higher EI and SI did not necessarily lead to (D) smooth communication in organization and effective sharing of information in workplaces. This must be due to the characteristics of the survey population (University undergraduate students). Smooth communication and sharing of information at workplaces lead to fewer human errors and higher ability to cope with human errors. Higher ability of situational judgment and decision making leads to fewer human errors and higher

ability to cope with human errors.

In future research, the survey samples extended to industrial workers. Although (G).tendencies to human error, and (H).ability to cope with human errors were self-evaluated in this study, more objective method to evaluate these characteristics must be proposed.

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