

Difference of Human Error between Japanese and Indonesian Workers at Pipeline Construction

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Abstract : A big difference is seen in the perception of self-responsibility concerning safety, as a result of my survey on the safety measures taken in the pipeline construction at workers level between Japan and Indonesia. Specifically, when an accident occurs, a worker in Indonesia will think that the responsibility depends on the person who causes it. However a worker in Japan will think that safety is can only be protected by law and regulations. There is also another difference in the understanding of construction period. It is alright in Indonesia to take 5 times longer period than it takes in Japan if the cost is less. The idea of punctual delivery is very strong in Japan. Through this survey, points which construction industry in Japan could learn from Indonesia came to surface. In addition, over the recent years, several nasty accidents at Japanese sites were caused due to human error to disregard the law. Japanese should arouse the awareness of self-responsibility in this regard. Risk management should be upon self-recognition of each individual worker in both countries. What is important is the "work attitude education", "to grow sense of self-responsibility by thinking on one's own for one's self" in the education curriculum of man to man learning as in technical educational program.

Key words: human error, observance of law, self-responsibility, psychosomatic function characteristic, jam karet

1. Introduction

Number of occupational injuries is increasing in recent statistics report [1] regarding serious injuries in Japan. Accidents caused by ignoring legal regulations or caused by human error in the violation of engineering plans or engineering guidelines, seem to be eminent cause among various causes of industrial injuries. On one hand, study was done on how the Indonesian workers are securing safety at construction sites, in order to derive measures for Japanese workers to improve their perception of safety, from the difference between the two nationalities. By studying how safety measures are taken at construction sites in Indonesia on one hand, measures to increase Japanese workers' awareness of the importance of safety measures can be considered from the difference of workers' safety perception between the two nationalities.

2. Research Method

2.1 Questionnaire Survey

2.1.1 Investigation object

(1) The questionnaire executed on to the Japanese and Indonesian workers in groups of 100.

Term: Japan conducted from January 2006 to June 2008. Indonesian conducted from April 2006 to March 2007.

(2) The additional research of Incident was executed in Japan.

Term: September 2008 to December 2008.

(3) Addition Questionnaire survey

① Analyzed the Psychosomatic function of workers at pipeline construction.

Term: Conducted in both countries from April 2009 to December 2009. Result of psychosomatic function characteristic analysis was drawn from the answers "yes" or "no", to 3 questions for each characteristic category including, 1) Understanding of the situation, 2) Decision making, 3) Emotional state, and 4) Motional activity. (Table 1)

② AAll workers were male gender in both countries.

③ 219 were Japanese respondents and 242 were

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Table 1. Psychosomatic function Characteristic

Characteristic- category	No	Questions
1)Understanding of the situation	1	Did not perceive well
	2	Did not recognize
	3	Forgot about it
2)Decision making	4	Did not know
	5	Did not think enough
	6	Thought there is no problem
3)Emotional state	7	Felt hastened
	8	Felt impatience , irritated
	9	Felt tired
4)Motional activity	10	Moved hands unconsciously
	11	Had some difficulty moving
	12	Lost balance physically

Indonesian respondents.

④ Table-1was used for correspondence analysis.

2.2.1 Document research of Indonesia

(1) Occupational injuries and accidents caused by workers' unsafe working conditions and unsafe activities in Indonesia was referred to "Occupational Injury Statistics" by The Republic of Indonesia worker social insurance public corporation. (1995 to1997)

2.3 Research on-site

(1) Indonesian site: From April 2006 to March 2007. From May of 2008 and May of 2009.

(2) Japanese site: September 2008 to December2008. From January 2009 to December 2009.

3. Results

3.1 Comparison of Cause for Occupational Injuries by Type of Accidents

There was no difference between Japan and Indonesia regarding the types of accidents found in occupational injuries. (Table-2)

Table 2. Types of Injuries on the job [2], [3]

Ranking	Japanese	Indonesian
1	Crash/Downfall 20.1%	Crash/Tear & scratch 29.5%
2	Nip/Rolled 18.5%	Fall 16.7%
3	Fall 15.8%	Come flying/Fall/Crashed 15.6%

Table 3. Occupational injuries by causes [2], [3]

Ranking	Japanese	Indonesian
1	Temporary/Building/ facilities 21.4%	Machines(Pressing and Plates) 29.5%
2	Materials 15.1%	Condition of Plane 15.9%
3	Power machines in general 11.2%	Lift machines (Crane) 11.3%

Condition of Plane as the cause of occupational injuries is particular to Indonesia. (Table-3)

3.2 Comparison of Japanese and Indonesian workers' perception at work

Causes of the accidents and occupational injuries mentioned frequently in the answers by Japanese workers were 1) Delivery date, 2) Safety awareness, 3) Elderly workers, 4) Carelessness at work. (Table-4)

Causes of the accidents and occupational injuries mentioned frequently in the answers by Indonesian workers were 1) Geographical conditions, 2) Lack of maintenance of machines, 3) Insufficient number of inspectors on site, 4) Lack of training on safety measures.(Table-5)

Factors which both Japanese and Indonesian workers consider to cause accidents and injuries are: 1)Worker's own mistake, 2) Large number of new workers without sufficient knowledge, 3) Priority given to construction deadline or period, 4) Insufficient number of workers, 5) Insufficient knowledge, 6) Unclearness of sight due to darkness in the area. (Table-6)

Safety measures taken to avoid unsafe activities mentioned frequently in the answers by Japanese workers were 1) Written manuals for operation, 2) No hierarchical relationship structure in checking safety procedures,

Table 4. Causes of accidents and occupational injuries are mentioned frequently by Japanese than Indonesian workers [4]

Ranking	Cause of accidents and occupational injuries	Point difference
1	Delivery date stringency	64
2	Low level of safety awareness by the original contractor	61
3	There are many workers over the age of 60	60
4	No strict regulations regarding accidents and unsafe activities	47
5	Insufficient training for new workers	46
6	Carelessness in the ordinary procedure at work	42

Table 5. Causes of accidents and occupational injuries mentioned frequently by Indonesian workers than Japanese workers [4]

Ranking	Inviting cause of accidents and occupational injuries	Point difference
1	Geographical conditions such as swamps and steep slopes	75
2	Bumpy and rough geographical conditions	74
3	Machine out of order, not functioning	59
4	Insufficient number of inspectors on site for the scale of construction	37
5	Violation of Safety regulations	36
6	Work which was never done before	22

Table 6. Causes of accidents for both nationalities[4]

Causes of accidents and occupational injuries	JPN	IDN
There are many new workers	95	83
Priority given to construction period	94	82
The worker's own mistake	92	91
Unclearness of sight due to darkness in the area	79	69
Insufficient number of workers	75	68
Insufficient work knowledge	70	79

3) Activities for safety are taken on the site. 4) Frequent on-site inspections, 5) Evaluation of safety operations.

On one hand, Safety measures taken to avoid unsafe activities mentioned frequently in the answers by Indonesian workers were 1) Not using machines, 2) Dismissal of workers, 3) Delay in construction schedule, 4) Emphasis on tacit understanding. (Table-7)

Table 7. Comparison of prevention of unsafe activities

No	Preventive Measures for Unsafe activities	JPN	IDN
ÇP	Work operation are carried out as according to the principle in written manual.	89	9
ÇQ	No hierarchical structure in checking safety procedures.	88	12
ÇR	Activities for safety are taken on the site.	77	4
ÇS	The supervisor frequently inspects the site.	95	23
ÇT	Evaluation of safety operations	78	11
ÇU	Not using machines	0	67
ÇV	Dismissal of workers	0	39
ÇW	Allow delay in the work schedule to secure safety.	34	73
ÇX	Values knowledge & judgment of an experienced worker.	42	75

3.3 Characteristics of Japanese and Indonesian workers' psychosomatic function

Careful examination of an incident will lead to understanding of underlying claims, which will eventually lead to prevention of accidents. When an incident report is analyzed, there are much more factors that must be learned from OJT at workplace [7]. These factors obtained through OJT education are "knowledge", "technical skills" and "attitude". Relationship between incident report and OJT is modeled in Table-1 which divides in to the following categories; 1) Understanding of the situation, 2) decision making, 3)emotional state, and 4)motional activity. Table-1. From Table-1, difference in what needs to be strengthened in OJT education, according to their inter-relationship and individual characteristics, is shown. Correspondence analysis reveal that "First dimension is Decision making and Emotional state" and "Second dimension is Understanding of the situation and Motional activity". When Correspondence Analysis is conducted for both Japanese and Indonesian workers, Japanese incident cases applied to "Thought there was no problem" of "did not think thoroughly" and Indonesians incident cases applied to "Did not notice" of "had forgotten about it". On one hand, Japanese cases rarely apply to "Unconsciously moved the hands", "Lost physical balance" and "Could not see". Indonesians rarely apply to "Felt irritated", "Felt hastened" "Felt tired". Therefore Japanese workers tend to lack decision making capability. On the other hand Indonesian workers tend to lack understanding of the situation. Each axial contribution was, 0.786 for first dimension, 0.212 for second dimension and cumulative contribution of 0.998. (Figure-1)

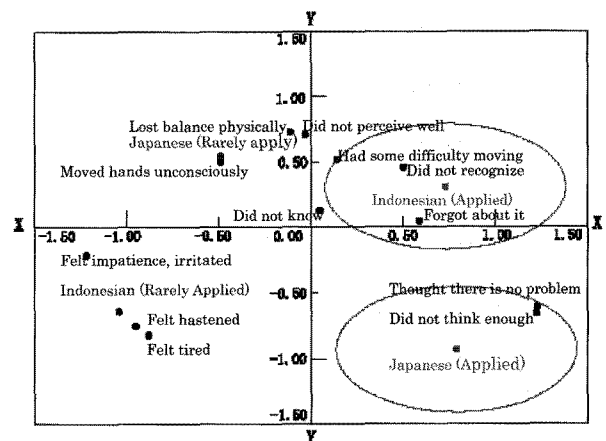


Fig. 1. Characteristics of Japanese and Indonesian workers' psychosomatic function.

3.4 Condition at construction

There is a big difference in consideration towards surrounding environment, during construction. In Japanese cases construction hours are clearly announced towards the residents in the surrounding area. On other hand Indonesian cases, the construction hours

are not clearly indicated, even when the traffic of the road is busy. (Photo-1)

4. discussion and Conclusions

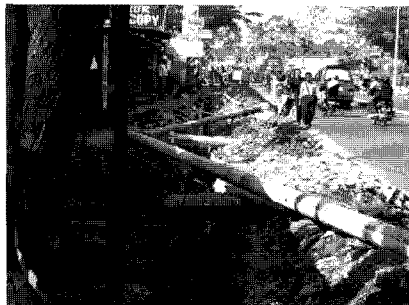
4.1 Fundamental cause underlying human error

4.1.1 Regarding time

Work schedule delay is often the case in construction in Indonesia. The underlying cause of the problem is due to “Jam karet”^{*1} conception. While Japanese tend to think “time” as something that passes by and something that cannot be regained, Indonesians think that “time” is something that is always present. Therefore, Indonesians think there are no comrades who annoyed by “Jam karet”. It is typical that they tend to think “why should one do something today that can be done tomorrow?” In that sense, they hold their strong sense of “their own responsibility”. They mean to say “injury and lunch is



Construction condition of Japan



Construction condition of Indonesia

Photo 1. Construction condition.

^{**1}: “Jam karet” means a rubber clock in Indonesian language. It is idea at time of a lot of Indonesian people and Life characteristic.

on their own”.

4.1.2 Manners

Japanese faithfully respond to reporting, informing and discussing their work procedures. However, “manners” in Indonesian terms is to say that, “person at higher rank will call if and when it is necessary”. “It is necessary to respond them only when asked, and listen to them only when there is useful information”. This is because Indonesians place great confidence in workers’ knowledge and judgment gained from their rich experience.

4.1.3 Regulations and Law

Regulations and law concerning occupational safety and hygiene exist in both countries ^{[5], [6]}, but the basic underlying concept is different. Japanese workers assume that there is no problem as long as they do not violate the law. On the other hand, Indonesian workers assume full self-responsibility not to cause accident and do not report injuries of less importance.

4.2 Characteristics of workers’ psychosomatic function

Thinking that “there would not be any problem” or “not thinking carefully” may have lead to an accident in the case of Japanese workers. In the Indonesian worker’s case, “forgetting” and “did not recognize” may have led to the accident. Moreover, motion activities which are typical to Indonesians, show similar results as in Table-5. From OJT, “Work habits due to assumption offer lead to accidents” is evident that self-recognition and should be strictly enforced as ” The FIVE S (Seiri, Seiton, Seisou, Seiketsu, Sitsuke)” has been enforced. In Indonesians case, it is likely that they “continue to work without understanding the situation” that KYT (Kiken Yochi Training) should be employed to related workers including supervisors. Furthermore according to incident report, both countries should implement risk management to increases worker’s self-recognition that “One should think of one’s self-responsibility” under the man-to-man training to encourage “One to prevent one’s own risk by one’s self” and “Work attitude education” is important as is the case with technical education programs.

5. Foresight

I would like to continue my studies on properties of the construction worker’s in different countries such as Asian countries, America, European countries while collecting data for Japan and Indonesia.

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