

# Investigation of Safety Divergences in Thai Construction Industry

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## Abstract

There are several unique characteristics that differentiate the construction industry from the other industries. Most of the construction projects are, for example, normally conducted outdoor and have relatively short durations. The construction final product is usually unique and differs from one to another. Construction owner is deeply involved in process, while the purchaser of manufactured goods is not. The industry also consists of many parties involved, ranging from top (management) to bottom (workers) levels. Base on these characteristics, the construction industry is considered, by many, as having a poor safety record. To improve this safety record, a better understanding of safety divergences among different working levels is desired to enhance and improve safety. This paper aims at investigating safety divergences among the two levels (management and workers) in Thai construction industry in five major areas, including Leadership, Policy and Strategy, People, Partnerships and Resources, and Processes. The analysis with ANOVA reveals that the two levels have different perceptions on three enablers, including People, Policy and Strategy, and Processes, but bear similar opinions on the two enablers, including Leadership and Partnerships and Resources.

**Keywords:** ANOVA, construction, enabler, safety divergences

## Construction Industry

The construction work site can be regarded as a work place without a roof, where all weather conditions have free access (Singh et al., 1999). The location of the work site varies continuously according to each building project. The physical workload is generally heavy and the psychosocial work stress is high, as operations often have to be undertaken in inherently hazardous environments, and within the confines of low margins (Lunt et al., 2008). These lead the industry as having a high number of accidents. To improve safety record and reduce number of accidents, safety culture must be considered (Dester and Blockley, 1995). A positive safety culture helps controlling and reducing the construction costs and increasing efficiency of operations (Fung et al., 2005). This paper, therefore, aims

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to examine the differences of safety culture's perceptions among the two groups, (management and workers) in Thai construction industry. The European Foundation for Quality Management (EFQM) Excellence model is used as a basic model for safety culture development.

## **The Five Safety Culture's Enablers**

The EFQM Excellence model is one of widely used quality models. The model focuses on five key enablers in improving safety, namely Leadership, People, Policy and Strategy, Partnerships and Resources, and Processes. It emphasizes Leadership as the most important factor in improving safety (Chinda, 2009). This is accordant with Aksorn and Hadikusumo (2008) who stated that the most influential factor to a successful safety program in Thai construction industry is management support. According to Pungvongsanuraks et al. (2010), the details of the five key safety enablers and their associated attributes are as follows:

- Leadership consists of six attributes, namely commitment (LCOM), consultative style (LCST), encouragement (LENC), role model (LROL), safety accountability (LACC) and work pressure (HPRE).
- The four composite attributes of People are peer review (HPRV), safety awareness (HAWN), safety empowerment (HEMP), and workers' competence (HWCO).
- Policy and Strategy comprises three attributes, which are national safety law (SNAT), rewards system (SRWD), safety audit strategy (SAUD).
- The four attributes associated with Partnerships and Resources are stakeholders' collaboration (RCOL), human resources (RHRS), provision of personal safety equipment (RPSE), and provision of safety document (RPSD).
- Processes consists of eight attributes to explain its construct, including accident investigation (PAIN), benchmarking (PBEN), job clarity (PJCL), housekeeping (PHKP), feedback (PFED), risk assessment (PRAS), safety data collection (PDCO), and training (PTRA).

These five enablers, together with their associated attributes, are confirmed with exploratory factor analysis. The reliability test also proves these five enablers with high alpha values, ranging from 0.83 to 0.91 (Pungvongsanuraks et al., 2010). These key enablers are next performed with analysis of variance (ANOVA) to investigate the similarities and/or differences of safety culture's perceptions among the two working groups, including management and workers.

## **Analysis of Variance (ANOVA)**

ANOVA is a general technique that can be used to test the hypothesis that the means among two or more groups are equal, on the condition that the assumption of normal distribution of the sampled population is defended (Sematech, 2010). One-way ANOVA is a statistical technique carried out to compare the means of more than two groups (UVM, 2010). This technique is used with this paper to investigate safety divergences among the two levels. The results are explained in the following section.

## **ANOVA Results of Five Enablers**

The five key enablers are tested with ANOVA to examine safety divergences among management and workers levels. The results are shown in Table 1. The significance values of People, Policy and Strategy, and Processes are smaller than the significance value of 0.05, while both Leadership and Partnerships and Resources report the significance values greater than 0.05. According to Brandvold and McLemore (1998), the significance values less than 0.05 indicate the differences among the samples. This can be explained that, the two working levels hold different safety's perceptions on three areas, namely People, Policy and Strategy, and Processes. They, however, take the corresponding viewpoint on the issues regarding Leadership and Partnerships and Resources. Milczarek and Najmiec (2004) concluded that the desirable organizational behavior and enhanced safety culture can be realized with the presence of managers' commitment (an attribute of Leadership) to safety and that substantial contribution and voices of workers, which are discouraged by cultural norms, are essential to minimize accident in workplaces and improve safety management (Hofmann and Stetzer, 1996; Barling et al., 2002). Moreover, Oxford University Careers Service (2007) stated that stakeholders' collaboration (an attribute of Partnerships and Resources) is considered as critical in achieving a particular goal in a workplace for almost every occupation. Apart from that, the survey's respondents, from both two groups, also suggest that the adequate 'provision of personal safety equipment' is crucial in improving safety performance.

Table 1. Significance values of five enablers

Enabler	Significance value
AVGL	0.282
<b>AVGH</b>	<b>0.004</b>
<b>AVGS</b>	<b>0.001</b>
AVGR	0.066
<b>AVGP</b>	<b>0.026</b>

*Note:* AVGL is average mean of Leadership, AVGH is average mean of People, AVGS is average mean of Policy and Strategy, AVGR is average mean of Partnerships and Resources, and AVGP is average mean of Processes.

A deeper analysis of attributes constituting People, Policy and Strategy, and Processes, in which both working groups hold conflicting opinions, is described next.

## ANOVA Results of People, Policy and Strategy, and Processes

### *People Results*

Table 2 illustrates the significance values of the five attributes associated with People. The results show that the 'peer review' (HPRV) and 'workers' competence' (HWCO) have higher alpha value than 0.05, indicating the similarities in the safety perception among the two groups. On the other hand, the 'safety awareness' (HAWN) and 'safety empowerment' (HEMP) present the smaller significance values, denoting that the two working groups do not agree on these two attributes. One of the reasons is due to the fact that Thailand is considered as a high power distance nation, giving rise to the clear separation between inferiors (workers) and superiors (management). This entails a concentration of power at the top of an organization, while from the workers' perspective; the empowerment has rarely been given

by the top level for fear of loss of power (Denham et al., 1997; Greasley, 2004; Usunier and Lee, 2005).

Table 2. Significance values of four attributes of People

Attribute	Significance value
HPRV	0.117
<b>HAWN</b>	<b>0.000</b>
<b>HEMP</b>	<b>0.008</b>
HWCO	0.168

*Policy and Strategy Results*

The ANOVA results of Policy and Strategy attributes are displayed in Table3. The results show that the significance values of ‘national safety law’ (SNAT), ‘rewards system’ (SRWD), and ‘safety audit strategy’ (SAUD), none of which, are greater than 0.05. Therefore, the harmonious perception of management and workers levels in these three attributes is not portrayed in the construction companies. This is supported by Hinze and Godfrey (2003) that rewards can generally be used as a tool to influence both groups’ behavior to increase safety performance, however, it might not be practical in real life, as the use of reward policy makes the workers reluctant to report the accidents as a fear of not getting the incentive.

Table 3. Significance values of three attributes of Policy and Strategy

Attribute	Significance value
<b>SNAT</b>	<b>0.006</b>
<b>SRWD</b>	<b>0.004</b>
<b>SAUD</b>	<b>0.005</b>

Additionally, the favorable attitude towards ‘national safety law’ is taken by both sides but management recognizes the role of such law more importantly than workers (Thailaws, 2010). Work of management, including engineer, is predominantly conditioned by the national laws and regulations, and is exercised more seriously than those of workers. This can be seen from strict rules under the Criminal Code B.E. 2499/ Section 227, which states that “whoever, having the profession of design, control or construction, reparation or removal of building or structure, failing to comply with the rule or method to be duly carried out in such undertaking in the manner likely to cause the danger to the other person, shall be imprisoned less than five years or fined up to ten thousand baht, or both” (Thailaws, 2010).

*Processes Results*

ANOVA results of Processes are shown in Table 4. Three attributes, including ‘job clarity’ (PJCL), ‘safety data collection’ (PDCO), and ‘training’ (PTRA), portray safety divergences among the two groups, while these two groups agree on the other five attributes.

Table 4. Significance values of eight attributes of Processes

Attribute	Significance value
PAIN	0.062
PBEN	0.127
<b>PJCL</b>	<b>0.011</b>
PHKP	0.096
PFED	0.765
PRAS	0.256
<b>PDCO</b>	<b>0.008</b>
<b>PTRA</b>	<b>0.038</b>

The different perceptions on training may be explained by Seppala (1995) and Langford et al. (2000) that management is optimistic about safety training, while the workers express such opinions to a lower degree, as they perceive that the safety training is immensely academic and lacks practical implications of what should have been improved. Workers also hold less optimistic opinions in the ‘safety data collection’ attribute. Workers tend to ignore rules, regulations, and procedures to achieve the production goal (Mearns et al., 2001). In other words, workers apparently pay little attention to the data collection procedures, since following such regulations inevitably come at the expense of a decline in productivity.

## Conclusion

Management and workers hold safety divergences in three areas (People, Policy and Strategy, and Processes). For People area, the discrepancy originates from different perspectives in ‘safety awareness’ and ‘safety empowerment’. It must be noted that, as far as the power distance is concerned in the organization, the unskilled workforce will place a lower value on ‘safety empowerment’.

Both groups do not agree on all attributes in Policy and Strategy enabler. Much of divergences in perception regarding ‘rewards system’ can be explained that rewards could trigger an unwillingness to report, due to fear of not providing incentives. The same truth goes with the ‘national safety law’, which can be expressed by management exerts a more noticeable positive effect on this attribute, since the management’s profession is highly subject to a more strict governmental supervision and severe imposition.

Among Processes attributes, the ‘job clarity’, ‘safety data collection’, and ‘training’ depict safety divergences among the two groups. The less optimistic opinions on ‘training’ have been casted from the unskilled-labors, as the complication of trainings content fails to demonstrate applicable knowledge related to work safety. Different perspective in ‘safety data collection’ roots in the long-standing productivity and breaches of rules dilemma. The preference of workers in keeping up their productiveness leads to the less favorable attitude on this attribute.

All in all, safety culture, the primary indicator of injury and loss, is disproportionately assimilated and variously appreciated by managements and workers serving the construction industry. In enhancing safety, therefore, it is important that both management and workers perceptions are aligned.

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