

# Shaping of Safety Conduct of Construction Workers Through Psychological Contract of Safety



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## 1 Introduction

Construction industry plays a dynamic role in contributing to economic growth (Jefferies). Projects undertaken by this industry are dynamic and full of risk. It (Sunindijo) **contributes to 30–40% of fatalities (about 38 fatalities everyday)** by employing **3–5% of workforce** (Pti. 48 2017). Regardless of technological advancement and applications of strong safety control system level of fatalities, injuries (Jones) and other issues related to safety and health are resistant to change because of this awareness of company safety management increased the interest in safety climate (Fig. 1).

Safety climate shapes the construction worker conduct through their expectation toward company value and rewarding system. The correlation between safety climate and safety conduct in researches and their results are known as safety result. The existing researches proposed that characteristic of company nature can lead construction workers to respond differently in terms of safety. The person responsible for translating the principal employer obligation of safety to construction worker/workgroup is the first line supervisor. This has put some light on factor influencing social exchange between construction worker and first line supervisor, and it arises as argument that if one person acts to provide benefit to another person an indirect duty is generated for future interdependence. Thus, psychological contact arises as the prominence which is used to capture the momentum between construction worker and first line supervisor and their nature in terms of safety.

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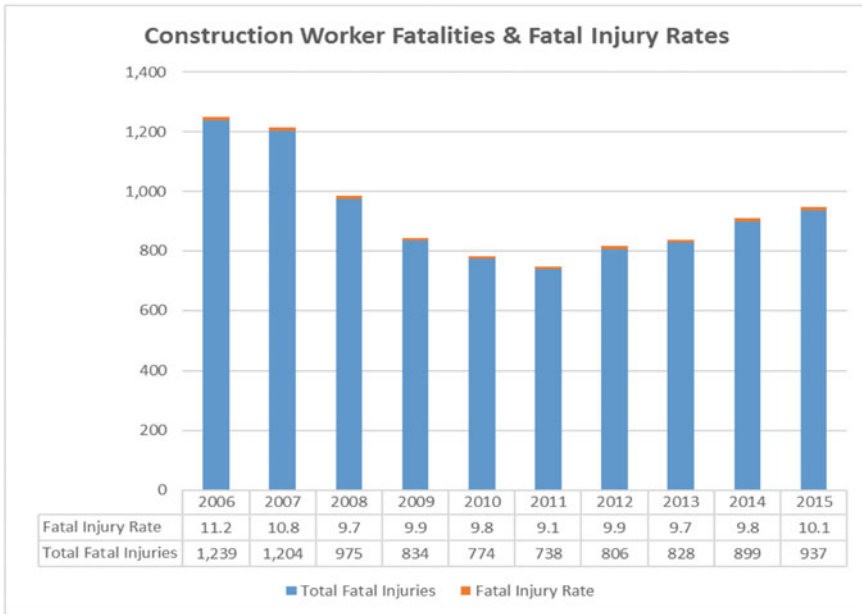


Fig. 1 Accident trend in construction industry

### 1.1 Psychological Contact of Safety (PCS)

PCS gives framework with respect to the view of people about corresponding safety duties and which it can be only achieved through promises (internal and external). Thinking about the impact of principal employer on construction sites, PCS could give the subjective hypothesis in the evolution of construction worker safety conduct emerging from first line supervisor safety conduct. This is a critical highlight of safety climate in evolution where first line supervisor plays the most crucial job to shape construction worker safety awareness. Consequently, a framework of the psychological contact, which explores the correlation between safety climate and safety conduct, is intermediated by the psychological contact of safety.

### 1.2 Safety Climate

As per (Dedobbeleer 1991; Zhang 2015), the study gives exact proof to establish constructive connection between safety climate and safety accomplishments of construction company. The connection between safety climate and safety conduct has likewise been well established in safety study, and its results are recognized as increased safety result, which are important measure for improved safety on

sites. There is a development to create construction-detailed safety climate determinant composition that empowers an understanding of practical and uncooperative results of safety vision. On going ahead, this distinguished factors surely impact the safety perception of construction worker existence, the principal employer (Heinrich)obligation, first line supervisor conduct, co-construction worker conduct, single construction worker participation, and safety guidelines.

As per researches done currently, safety climate included principal employer, sub-temporary construction worker, first line supervisor, workmate, and individual construction worker conduct. The acceleration of safety climate assessment depends on the job of safety personnel who assumes critical jobs in dealing with the suspicion of construction worker in regards to safety at construction sites. Thus, among the previously mentioned factors, thinking about the hypothetical foundation and point of the research, three factors (principal employer obligation of safety, first line supervisor safety conduct, and construction worker's safety conduct) are incorporated into study as parts of safety climate.

### ***1.3 Principal Employer Safety Obligation***

It plays an important role in maintaining safety performances, but this happens only in large companies as small companies lack monetary resources and management obligation. It is basically a level to which a contractor and safety professional place safety as top priority, communicate, and act on safety issues successfully. It is a main measure of safety climate as it increases safety conduct and decreases injury rate over a defined scope (extent). When managers have safety as his/her priority, then first line supervisor and construction worker have to meet their expectations by adopting safety in their everyday life.

## **2 First Line Supervisor Safety Conduct**

As construction industry is changing (non-routine activity), it is necessary for first line supervisor to interpret formal safety policies and procedures without offending anyone. Role of first line supervisor is to shape subordinates safety conduct which is of very importance in accordance with the routine production process as they are in frequent contact with the construction workers at different level and responsible for quality safety performances on site.

First line supervisor retaliates to safety as a key determinative in creating a construction worker's belief about the importance of safety. First line supervisor translates principal employer obligation into safety ethics and work practices among construction workers. This relationship between construction worker and first line supervisor is recognized more significant than other work activity setting.

### 3 Workmate Safety Conduct

Role of workmate is to significantly shape group-level safety climate. First line supervisor and workmate have close influence on safety climate as if these two are unsupportive to safety and safety issues, then there will be too many unsafe practices by construction worker. Group safety climate will show high safety performances in comparison with company-level safety climate. In large companies where construction worker have rare contact with the principal employer, they have immediate contact with their workmates or groups, and they are influenced with their immediate surrounding that includes workmates (first line supervisor, safety steward). Construction worker conduct is responsible for the fatalities up to a great extent as they are the one who conduct unsafe practices knowingly or unknowingly, and there are some images that will show construction worker's critical unsafe practice that may lead to fatality or severe bodily injury (shutterstock) (unsafe-worker-behavior) (Figs. 2 and 3).

#### 3.1 Safety Conduct

Conduct is something which is observable and measurable or in simple terms conduct that is what someone does or says. From accident investigation prospective, construction worker's unsafe practices are primary cause of accident/fatalities and are identified as 88% accident involves unsafe practices. Similarly, construction worker conduct with respect to safety can be predicted in similar way, and additional work conduct includes performances.

Earlier, safety performances are measured through lagging indicators (accident rate, TRIFR), and these measures are criticized as it includes reactive approach, but safety conduct predicts accident and injury rates.



**Fig. 2** Unsafe work behavior of worker



**Fig. 3** Unsafe work behavior of workers

### ***3.2 Psychological Contact of Safety***

The role that first line supervisor performs is distinctive considering the role of first line supervisor and their correlation with construction worker, and it is argued that psychological contact serves as moderator between safety climate and safety conduct. The theory of psychological contact of safety (PCS) (Newaz 2019) implies promises and reciprocates obligations which are fundamental component, but expectation plays a vital role in establishing psychological contact. In practical sense, psychological contact is at best board build that determines conduct of construction worker and first line supervisor and helps employer to control their employees. Psychological is proposed as means of exploring corresponding relationship, and safety based on correlativity involves duty of employer to protect, whereas employee has duty to follow safety standard. Employer's forms expectation about workplace safety, and these actions will be responded; this forms a psychological contact of safety, and safety climate, safety conduct, and safety result (injury and fatality) depend upon level of attainment and violations of psychological contact of safety.

## 4 Assumptions

There are some hypotheses which are made to determine which factor of safety climate affects the safety conduct on construction sites. There are three types of hypothesis, and they are

- PCS serves as a moderator between principal employer safety obligation and construction worker safety conduct and determines the factor lagging from either side.
- PCS serves as a moderator between first line supervisor safety conduct and construction worker safety conduct and determines the factor lagging from either side.
- PCS serves as a moderator between workmate safety conduct and construction worker safety conduct and determines the factor lagging from either side.

## 5 Methodology

### 5.1 *Sample and Procedure of Conducting the Survey*

The question were directly displayed on the screen read out by the facilitator only about 352 participants participates and completed the survey, and they all belong to construction sites which are advised by their employer and contractor to give their feedback (answer) in accordance with ethics, principle, and guidelines of authority conducting the survey (Table 1).

It was necessary to check the survey timely in accordance to safety point of view, so the safety experts viewed the content to maximize the content validity. These experts added some safety advisor with long experience of construction safety. All items or answer is given on the range of five point, except the other information. In range 1 = completely disagree to 5 = completely agree, here it was explained that 1 = completely disagree, whereas 5 = completely agree. The main facilitator of this survey ensured the understanding of the construction worker related to the psychological contract of safety range (Walker 2010) that this range is used to determine the degree of actuality of safety between the construction workers and the company in which they are working.

### 5.2 *Safety Climate Factor*

Safety climate factors are used to determine the safety climate at the construction sites. There were items for safety obligation, items for first line supervisor safety conduct, and items for workmate safety conduct for determining the consistency, and reliability Cronbach's  $\alpha$  (Cronbach's alpha: simple definition) is determined

**Table 1** Survey format

Elements of questionnaire		
Company factors	Personnel factors	Other factors
<ul style="list-style-type: none"> <li>• Work load</li> <li>• Inconsistent demands</li> <li>• Ways to monitor construction worker safety</li> </ul>	Personality—traits and characteristics	<ul style="list-style-type: none"> <li>• Gender</li> <li>• Age</li> <li>• Nationality</li> </ul>
Factor effecting supervisor performance	Psychological understanding—awareness and use of emotions	Employing company
Safety support—from colleagues or supervisors	Self-confidence of a personnel	Trade (type of work)
Visibility	Perception about the accident	Experience
Construction workers’ safety conduct and psychological contract of safety	Factors (internal and external) serve as motivators of safety	Responsibility of operations
Safety climate factor	How person is involved in an accident	–

$$\alpha = \frac{N \cdot \bar{C}}{\bar{v} + (N - 1) \cdot \bar{C}}$$

as

where

$N$  = the number of items (entries).

$\bar{C}$  = average covariance between item (entries)-pairs.

$\bar{v}$  = average variance of entries.

For survey related to principal employer safety obligation, it is 0.865, for first line supervisor safety conduct, it is 0.875, and for workmate safety conduct, it is 0.893.

### 5.3 Construction Worker Safety Conduct

Construction worker safety climate is measured by items, and they are according to the safety conduct range. The measure was associated for the better safe work practices and reduces exposure to environmental stressor, and the presence of more safety policies and positive attitude of construction workers toward workplace in a company decreased accidents (Fig. 4).

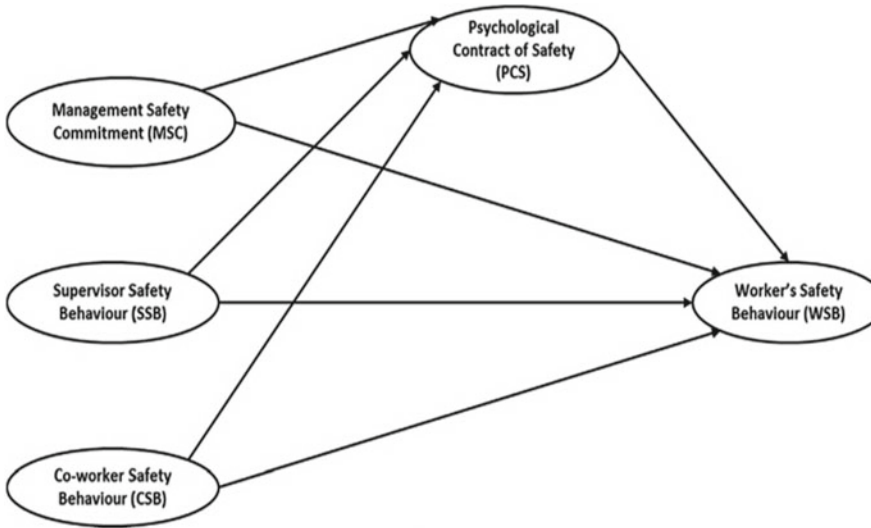


Fig. 4 Proposed model

#### 5.4 Psychological Contract of Safety

Psychological contract of safety based on correlative obligation between supervisor and the construction worker and employer while using this concept to consider safety. The safety conduct of construction workers is shaped by the psychological contract of safety between first line supervisors and construction workers which gives efficient safety outcome for example accident rates. The value of Cronbach's alpha is 0.923

## 6 Result and Discussion

The survey was completed among 352 participants out of whom 30 responses were not considered due to missing field after completion of survey. The reliability and consistency of data is tested using Cronbach alpha after that the data went to correlation and SEM process to decide the effect of safety climate factor on construction worker safety conduct directly or indirectly which one is more efficient in shaping the safety conduct of construction worker. Final result for safety conduct on construction site are achieved through obtained hypothesis. Hypothesis 1 concludes that there is no significant effect of principal employer obligation on construction worker safety conduct directly ( $\beta = 0.00$ ), but if the contact is made through psychological contact of safety, the effect will be significant ( $\beta = 0.44$ ), and it will determine the factor that are restricting to shape the construction worker safety conduct. Hypothesis 2 concludes that there is no significant effect of first line



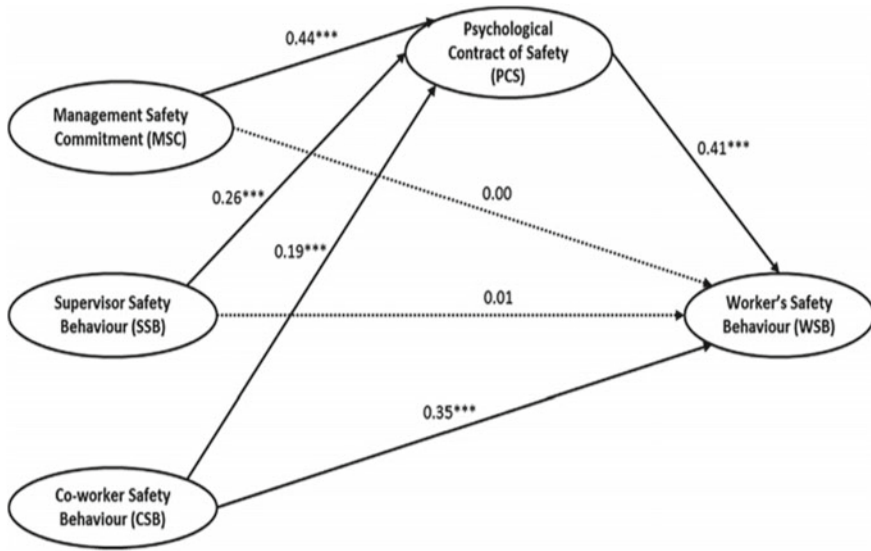


Fig. 5 Hypothesis testing

supervisor on construction worker safety conduct directly (beta = 0.01), but if the contact is made through psychological contact of safety, the effect will be significant (beta = 0.41), and it will determine the factor that are restricting to shape the construction worker safety conduct. Hypothesis 3 concludes that workmate safety conduct significantly affects construction worker safety conduct directly (beta = 0.35), but if the contact is made through psychological contact of safety, the effect will also be significant (beta = 0.41), and it will determine the factor that is restricting to shape the construction worker safety conduct (Fig. 5).

Although the correlation between safety climate and construction worker safety conduct using psychological contact of safety as a moderator (on supporting and determining factor that restricts shaping of construction worker safety conduct) are understood. If the positive relationship is established, construction worker conduct will be changed, but this relationship works on construction site will depends on site conditions. The reactive level of safety climate factor is undoubtedly related to common obligation between obligation construction worker & safety climate factor, high level of principal employer obligation and high psychological contract of safety that produces high safety outcome (by influencing construction worker safety conduct). Therefore, due to this, construction worker attaches safety perception to correlative obligation.

Due to this, relationship management knows how to translate management obligation into safety conduct. First line supervisor and managers through psychological contract of safety can easily determine the attainment correlative obligation and its impression on safety conduct of construction worker, and a better awareness of correlative obligation leads to safety conduct of construction worker. PCS also explains

that how conduct of first line supervisor affects the safety conduct of construction worker who is site-based representation of principal employer, and its conduct determines the degree of attainment of safety obligations (commitment). Workmate also influences the PCS as he is the one who is closest to construction worker as they are working in group, and if workmate have the sense of attainment of obligation, then he will shape the safety conduct of construction worker.

## 7 Conclusion

The construction worker safety behavior is one which can change the rate of fatalities at construction site, but for that the safety climate should be efficient enough to promote all the parameter that influences the construction worker safety behavior and removes the factor which are affecting construction worker safety behavior, and to determine this efficient, there should be psychological contract of safety between factors of safety climate and construction worker safety behavior. Psychological contract of safety will be proved to be a great medium to change the behavior of construction worker in terms of safety and reduce the unsafe practices that serve to be the cause of fatalities. Psychological contract explorations are used to do 'real-life inspections' that reveal the level of attainment of correlative obligations and its effect on construction workers safety conduct. Using structural equation modeling (SEM), different relationship between key safety climate factors and psychological contact of safety was analyzed to describe the effects that they have on each other. This technique disclosed that how safety management system can be changed to sustain a safe working environment for construction workers.

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