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IDENTIFICATION OF IMPORTANT ORGANISATIONAL FACTORS INFLUENCING SAFETY WORK BEHAVIOURS IN CONSTRUCTION PROJECTS

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Abstract. Although the importance of organisational factors in human error has been acknowledged, the influence of organisational factors in the area of work behaviour in construction industry has rarely been examined. The first step of investigation should begin with identifying the relevant contributing factors affecting at-risk work behaviours. Thus, the aim of this research is to identify important organisational factors that will reduce at-risk work behaviours. The implications of these findings are further used to quantify and investigate the role of organisational factors as an integral feature of safety intervention. Case studies are used to identify and categorize organisational factors. This identification process begins with literature reviews as commonly performed. The literature related with organisational factors was used as a primary source to investigate the influences of organisational factors on at-risk work behaviours. Hence, semi-structured interviews and reviews of the company's documents were conducted involving safety experts and workers to gain experiential and practical knowledge. The obtained results identified seven important factors of Thailand construction industry: communication, culture, management commitment, leadership, organisation learning, empowerment, and reward system. The implications of particular applications from these factors are considered as critical features for handling work behaviours. In addition, empirical findings provide particularly insight factors from expertise in a practical way. Validations with previous publications of some factors are also discussed. The identified contributing determinants from empirical findings can be expected to be influential at different levels within an organization. Consequently, the proposed hypothetical casual models enables determination of disparity in their influences of organisational factors when considering interventions to reduce at-risk work behaviour or to promote safe work behaviours.

Keywords: organisational factors, safety work behaviour, Thai construction.

1. Background and problem statement

Delivery construction project does not emphasize merely time, cost, quality as performance criteria, client broaden their concern to advocate site safety as importance of human being (Plebankiewicz 2010). Thus, development and promoting occupational safety in construction industry have been conducted by cooperative endeavors from all stakeholders as intrinsic criteria (Plebankiewicz 2010; Zavadskas *et al.* 2010). In Thailand, both governmental and non-governmental agencies are responsible for encouraging and promoting the implementation of safety management system through enforcement of occupational safety regulation. Thus, every construction in Thailand has to be intergraded safety program into daily operations in order to improve safety performance. Although Thailand has cooperative agencies to promote occupational safety in construction industry, there is still a backlog to reach the desirable outcomes, even occupational accidents in downward trend (Siriruttanapruk, Anantagulnathi 2004).

To understand the causes of accidents, many researchers have investigated and developed scientific safety management and technical actions in order to reduce accident and injury in the workplace (e.g. Hale, Hovden 1998; Heinrich *et al.* 1980). A series of studies has indicated that people are the predominant reason for problems (e.g. HSE 2002; Mullen 2004). Thus, understanding the relevant determinants within an organisation that act upon workers with respect to safety is important to develop and guide an organisation in improving safety performance.

It is necessary to note that not only people are acknowledged as contributing factors. Since organisational factors shape the context that contributes to at-risk work behaviour, they are also significant contributors to human errors in safe work behaviour (Papazoglou, Aneziris 1999). Reason (1997) clearly indicated that in the most cases, unsafe practices are influence by latent conditions before producing a loss. According to Reason's Swiss Cheese model, latent conditions include major organisational factors and local workplace factors, which are recognized as the major contributors significantly leading to accidents. Several efforts have been made to define and determine the body of knowledge linked between management and organisation that are vital for organisation safety effectiveness.

The importance of organisational factors in safe work behaviours has been acknowledged. However, the influence of organisational factors in area of work behaviour in construction industry has rarely been examined. It could be stated that this study has an original contribution to the existing body of knowledge. For this reason, first step of systematic approach for assessing the influence of organisational factors must adequately identify the relevant organisation factors. Accordingly, the questions are what organisational factors should be taken into account and how these influence the behavioral enactions. The brief explanations of related mechanisms should be subsequently provided. Thus, our aim in this research is to identify important organisational factors influencing safe work behaviours. The implications of these findings will be further used to quantify and investigate the role of organisational factors as an integral feature of safety intervention. The research proposition which describes the underlying process for achieving the proposed objective is as follows: *"Certain phenomena, where underlying mechanisms and their structures interact within a built environment, explicitly and implicitly influence work behaviours in the workplace"*.

2. Identifying organisational factors

Authors aim to classify appropriate organisational factors. This can be done in terms of process or analysis approach (Osborn *et al*. 1983; Jacobs, Haber 1994). According to the analysis approach presented by Osborn *et al*. (1983), categories consist of 8 factors within two main dimension e.g. governance, context, environment, design, innovation, quality, efficiency, and compliance. This perspective is based on the development of organisational structure.

Apart from the organisational analysis approach, Jacobs and Haber (1994) introduced a viewpoint to determine valid relationships between organisational factors and safe work procedure. It attempts to determine how an organisation works, as opposed to how it is structured. The organisational process approach identified 20 factors within five main dimensions: culture, communication, decision making, administrative knowledge, and human resource administration. Since the success or failure of the whole organisation is dependent upon the interaction of all departments, what affects one part of the organisation at a particular time will also affect others. These parts function and are administered by a collection of 'systems' and 'sub-systems.' Therefore, this study uses the viewpoint of Jacobs and Haber (1994) to determine how an organisation and its people interact within their environment. Thus, this study uses the viewpoint of Jacobs and Haber (1994) to determine how an organisation and its people interact within their environment, since the success or failure of the organisation is dependent upon the interaction of all departments. This study proposes 22 organisational factors. These include organisational culture, ownership, safety culture, leadership, personnel selection, reward system, resource allocation, communication, management commitment, coordination of work, formalization, organisational knowledge, empowerment, cent-

ralization, goal prioritization, organisational learning, technical knowledge, time urgency, problem identification, role/responsibilities, performance evaluation, and training. Their definitions are presented in the appendix.

3. Methodology

3.1. Research paradigm and case justification

The realism paradigm and the case study approach are chosen to fulfill the stated objective (Perry, Sobh 2006). Additionally, it has been suggested that realism research is more suitable for exploring certain phenomena resulting from the interaction of underlying mechanisms and structures within certain complex matters for deeper understanding of its "how" and "why" situations (Healy, Perry 2000). However, the main concern of any research should be using the proper paradigm, and therefore the set of reliability and validity test should show the paradigm on which the research is based. This study will use the quality criteria proposed by Healy and Perry (2000).

3.2. Data analysis

Typically, data analysis for case study approach has not been well developed. Yin (1994) suggests two generic strategies for handling data analysis of case study, developing a case description and relying on theoretical propositions. Data analysis in this study is based on the latter approach. The propositions formulate the blueprint for examining its design. When using pattern-matching analysis, the empirical pattern bears comparison with a predicted result which is expressed in the proposition. The concurrence of the two reinforces the internal validity and the proposed propositions. The more cases are added, the more the strength will be (Yin 1994).

3.3. Unit of study

Construction organisations in Thailand were selected as our unit of study. There are 2 groups of respondents. First, authors interviewed 6 Health, Safety and Environment (HSE) managers from different organisations, who experienced risk management and risk work behaviour reduction intervention. Second, frontline workers from 3 high-rise building projects in Bangkok of selected organizations are also asked to join in-depth interview in order to reflect the reality from shop floor, especially 2nd and 3rd operatives involved in accidents on current projects.

4. Results and discussion

Identifying the key important organisational factors is vital to improving the efficiency of promoting safe work behaviours and intervention, by providing safety officers with fewer factors to watch over and the context in which they would appear. Based on interviews and reviews the company's documents, case descriptions, cross-case and within-case analysis are provided in Tables 1 and 2. The key variables are discussed below.

Table 1. The perceptions of implications and descriptions of organisational factors deployed in each case

Case	A	B	C	D	E	F
Organisational Culture	Clan	Market	Market	Market	Market	Hierarchy
Ownership	Almost fully	Partial	Almost fully	Almost fully	Partial	Partial
Safety Culture	Fully focused	Almost fully	Fully focused	Fully focused	Almost fully	Almost fully
Leadership	Transformational	Transactional	Transformational	Transformational	Transformational	Transactional
Personnel Selection	Diversify	Well defined	Diversify	Well defined	Diversify	Well defined
Reward system	Performance and Participation based	Performance based	Performance and Participation based	Performance based	Performance based	Performance based
Resource Allocation	Fully	Almost fully	Fully	Almost fully	Almost fully	Almost fully
Communication	Open	Almost open	Open	Open	Open	Formal and centralized
Management commitment	Fully	Almost fully	Fully	Fully	Fully	Almost fully
Coordination of Work	Standardization	Standardization	Standardization	Standardization	Standardization	Standardization
Formalization	Prescribed	Prescribed	Prescribed	Prescribed	Prescribed	Prescribed
Organisational Knowledge	Recognized	Almost recognized	Recognized	Almost recognized	Almost recognized	Partial recognized
Empowerment:	Almost fully	Partial	Almost fully	Partial	Partial	Very few
Centralization	Decentralization	Partial decentralization	Decentralization	Partial decentralization	Partial decentralization	Centralization
Goal Prioritization	Congruence	Congruence	Almost Congruent	Congruence	Congruence	Almost Congruent
Organisational Learning	Fully	Almost fully	Fully	Almost fully	Almost fully	Partially
Technical Knowledge	Documentation	Documentation	Documentation	Documentation	Documentation	Experienced Staff
Time Urgency	Not often	Not often	Often	Not often	Not often	Not often
Problem Identification	Employee involved	Partial involved employee	Employee involved	Employee involved	Partial involved employee	Partial involved employee
Role/Responsibilities	Well defined	Well defined	Well defined	Well defined	Well defined	Well defined
Performance Evaluation	Performance focus	Performance focus	Performance focus	Performance focus	Performance focus	Performance focus
Training	Mandatory	Mandatory	Mandatory	Mandatory	Mandatory	Mandatory

Table 2. Case profiles and implications of selected organisational factors from frontline operatives

Operative respondents	1	2	3
Employee Job Title:	Skilled worker	Electrician	Carpenter
Age & Gender:	36-Male 15 years of work experience.	22-Male 4 years of work experience.	32-Male 5 years of work experience.
Project profile	73-storey residential and commercial tower.	38-storey residential building.	30-storey residential tower.
Site accident	None.	1 LTA case of electrical shock during electrical installation.	1 LTA case of finger fracture during fall protection installation.
Perceived management commitment:	Management often participates in safety activities. Large amount of budget sufficiently allocates to safety-related activities, safety guard e.g. fall protection installation in this high-rise building project. Required and essential safety gears are provided. Full-time safety officers and safety staffs are available on site.	Limited budget allocates to safety tasks. At least, PPE are available. Even management demonstrates safety concerns. Safety priority often trade off with production goal.	Management is reluctant to participate safety-related activities. Only 2 safety officers are in charged for taking care safety of 300 workers Due to limited budget, overburden safety officer could not regularly inspect and monitor large-scale project.
Communication practices:	Importance of safety is reminded by daily safety talk. Specific hazard discussion of every work trade is conducted weekly. During regular site visit, management exhibits their safety concern and explains their expected results. Management gives constructive feedbacks to set the tone and provide expectation.	One-way communication is commonly utilized by using safety signs. Safety issues are communicated by weekly morning talk.	Safety messages are communicated by signs and posters. Reminding safety issues are weekly communicated during morning talk.
Leadership in Effect:	Commitment-based supervisory style is utilized. Operative are regularly motivate to involve in safety committee, report hazards and unsafe environment to supervisor and etc. Safety supervisors are approachable when required. Some operatives are nominated as safety gang leader that help safety officers monitor site safety. Good cooperation and support could be done through safety supervisors and gang leaders, who act as middleman.	Compliance-based supervisory style is adopted as main supervision scheme. Establishment of joint safety committee has been used to gain suggestion and encourage participation from frontline. However, limit number of staff is difficult to coverage many subcontractor personnel.	Supervisor does not emphasize on listening to the workers as well as taking their suggestions on board Also, supervisor does not express that workers value their contribution to safety of the team.
Development of Safety culture:	Most of workers think about their own safety rather taking risk for production target attainment. Operative illustrates safety conscious through their compliance with safety regulation, active caring between each other, participating report schemes and safety meeting. Gang leaders help and guide others, especially seasonal workers, perform task safely. Thus, only few violate and deviate safety standard for their convenience.	Supervisors turn an eye blind when scheduled overrun. Substandard practices often found due to careless enforcement. Many seasonal and inexperienced workers do not accept ownership of safety. They do not much care for their well-being. Most of them lack of skill and knowledge about safety. It is difficult to develop and maintain attitude toward safety.	Production target is the first priority. Safety policy is just the paper. Supervisors do not promote an open atmosphere for reporting accidents. It is hardly get workers to accept ownership of safety.
Empowerment:	Workers are principally involved in planning, implementation and monitoring of preventive and proactive measure on site. Management and staff provide support and guidance to work team but make few decision themselves.	Workers are not involved in planning, implementation and monitoring of any safety programs.	Similar to 2nd operative, workers just comply with provided plan.
Reward system in place:	Tangible rewards are periodically granted to person who is voted by supervisors. Safety staffs are success in making workers acknowledge their importance of well-being.	Tangible incentive encourage workers to participate safety activities.	Incentive scheme was not initiated.
Training and Education provided:	New arrival must be brush up on safety knowledge and introduce the safety regulation. Specific training for special work is given if required. Hands-on practice from experienced workers is mainly utilized as on-the-job training.	There is just only once safety training during orientation for new comers. Rehearsal of trainings has not been taken. On-the-job learning from coworkers is the main scheme.	Only informal training is provided for new worker. Refreshment has not been taken

4.1. Communication

Several HSE managers participants also strongly felt that such a two-way communication process constitutes trust from consultative safety activities among different stakeholders in projects, since it can create a mutual understanding of risk and help to resolve conflicts that may arise concerning risk management decisions (Choudhry, Fang 2008). To quote an HSE manager in Thailand: "*Keeping open and honest communication greatly supports the risk management in a cross-disciplinary team as well as consultative. By breaking down the conventional hierarchical style, we can gain the benefit of our people's ideas and knowledge sharing. Such open communication builds commitment to our safety goal as well as also establishing trust. These help support compliance with risk control and any safety initiatives*".

Most of operatives indicated that safety messages are mainly communicated by visual cues rather than verbal communications. They reveled that caution signs does not work well. Instead, the verbal communication from supervisor yields better motivation safe behavior rather than using visual cues. A manager communicates and sets a tone and expectation for an organisation by expressing the institutional vision through empowering the message as a corporate value (Kines *et al.* 2010). Hence, this is therefore a major challenge and responsibility of safety professionals. A frontline manager or supervisor should adopt a role as communication champion because their perception of the safe work behaviour and attitude may have a direct effect on subordinate's work behaviour and also an indirect effect by indicating management's commitment to safety (Choudhry, Fang 2008). To ensure the attainment of communication goals, such indicators as the status of the safety professionals, the importance of training, and the effect of safe work behaviour on promotion and reward should be determined with certain caution.

4.2. Safety culture

Most HSE managers agreed that safety culture is important for consistently handling work behaviours and sustaining safety awareness. Culture sets the tone for everything in the entire organisation as well as making a sense of identity and creating an essential link between members in organisation and its mission (Fang *et al.* 2006; Richter, Koch 2004). Moreover, culture strengthens commitment to attaining organisational goals and establishes direction through clarification and reinforcement of the standards of behaviour (Manzey, Marold 2009). According to case studies, operatives also revealed that they weigh the importance of safety value from meaningful actions of management. Such management participation helps them develop a sense of ownership (Lingard, Rowlinson 2005).

However, HSE managers explained that it is not easy to change the pre-set unique characteristics of individuals owing to differences of their own backgrounds. Nevertheless, most HSE managers felt that strong culture could gradually influence and make their values become harmonious through the perceived milieu and the way

people function in it. Workers perceive their social environment and surroundings as establishing a culture, so that an expression of the values and norms in the workplace makes them acknowledge the acceptance and standards of safety being performed (Vecchio-Sudus, Griffiths 2004). As its implication situationally exhibits the importance of safe work behaviors, employees will eventually recognize and foster the required safe work behaviours. An HSE manager in Thailand said: "*When our people take risks for production targets or for any reason, frontline management investigates and considers how and why they do not follow procedure. This management action explicitly states that risk is unacceptable. These practices could govern work behaviours. On the other hand, if frontline management turns blind eye or gives praise when people accomplish tasks by violating safety rules, it means that frontline management has non-verbally stated that it is OK. This risk work behaviour will continue*".

4.3. Empowerment

HSE managers revealed that decentralized controls are adopted for handling the competitive arena. Manipulation of values and beliefs still incorporates implication for safety as part of organisational motivation. Rather than attempting to control workers, empowerment is an approach that enables the individual to control his environment and accomplishes self-determination (Arocena *et al.* 2008). According to case, management include and allows team members to play a major role in planning, executing, and monitoring corrective measures while they give advice and support to the team on the shop floor. However, managers of HSE still make a few decisions themselves. The organisation acknowledges and values the importance of individual safety and competency as key assets for bringing competitive advantages to the organisation. Owing to empowerment and learning on board, workers will be more alert and have more confidence in their ability to perform work safely. Thus, it is apparent that the motivational effect of empowerment in safety will depend upon the features of the work environment (Hedlund *et al.* 2010). The workplaces with the high level of mutual commitment, delegation of authority and greater autonomy are more likely to be low-accident workplace (Zacharatos *et al.* 2005; Törner, Pousette 2009). However, in this study only 1ˢᵗ operatives reported the implementation of empowerment scheme. To quote an HSE manager in Thailand: "*Accordingly, workers are freely allowed to raise safety concerns, suggestions and has right to stop work whenever they found suspicious incidences. Peer-to-peer observations help us maintain safety awareness of workers. We also use the intrinsic rewards of meaningful work and the opportunity to learn and growth. Diversity of workforce on site will pool their area of expertise to achieve at procedures that are better than one could come up alone. Thus self control of employee's work behaviours at workplace and continuous learning will be arrived*".

4.4. Management commitment

It is apparent that perceptions of the manager's safety attitude and work behaviours directly affect workers' behaviors (Manzey, Marold 2009; Michael *et al*. 2005; Vecchio-Sadus, Griffiths 2004). Most HSE managers revealed that through visible and active activities, management commitment also has an essential symbolic function – both formal and informal actions show the workers how concerned management is about their safety and well-being, which will constitute the membership's perception of the importance of safety and dominant commitment to safety as an organisational value rather than as a priority, because a priority might change based on urgency, customer need, or other external factors, in which case safety will not always the most important priority. Similarly, frontline respondents expressed that they weigh the importance of safety concern from substantive action of management. Visible efforts from management exhibit deeper values and shared understanding held by management (Geldart *et al.* 2010; Fernández-Muñiz *et al.* 2007; Michael *et al.* 2005). Langford *et al.* (2000) found that when employees believe management cares about their personal safety, they are more willing to co-operate to improve safety performance. In addition, such meaningful management actions in support of safety help to create the positive working environment that motivates safe work behaviour and raises safety expectations (DeJoy *et al.* 2010; Mohaghegh, Mosleh 2009b). Under such circumstances, these will enable employees transform from only compliance-based behaviour to safety citizenship behaviour; that is intending to work more than what is simply prescribed by safety regulations (Gvekye, Salminen 2007; Mearns, Reader 2008). Langford *et al.* (2000) also reported that employees are more willing to co-operate to improve safety performance when they believe management cares about their personal occupational safety.

4.5. Leadership

Most HSE manager revealed that active role of leadership strongly influences the safe work behaviour of their subordinates. Safety performance will improve where the role of the leader is recognized and the leader makes employees acknowledge the importance of safety (Lu, Yang 2010; Clarke, Ward 2006). Thus, the more, the positive safety leadership (i.e. motivation and concern from senior manager), the better, the compliance behaviour and safety participations (Lu, Yang 2010; Tharaldsen *et al.* 2008). Most HSE managers of this study suggest using both formal compliance and value-based orientations to enrich both intrinsic and extrinsic employee motivations. According to case, operatives also expressed that they are more willing to participate and comply with safety-related issues when supportive and participative atmosphere are perceived. As commitment increases at the managerial and individual levels, this enables open communication and worker participation in which top-down communication integrates with bottom-up suggestions. Embracing compliance and commitment simulta-neously fosters a supportive and participative atmosphere across hierarchy. Leadership is important to success of the performance of construction projects (Enshassi *et al*. 2009). Leader may encourage participation of safety by using a combination of these influence tactics.

4.6. Organisation learning

HSE managers support the available findings that the employees who have requisite knowledge regarding to safe work behaviour have shown greater compliance with safety rules and regulations (Gyekye, Salminen 2009; Hodson *et al.* 2004). Cooper and Phillips (2004) also reported that the perception of employees on the importance of safety training could be applied as contributory in predictive model on the actual level of safety behaviour. According to frontline from case studies, operative revealed that hands-on practice from experienced workers is useful for seasonal and in-experienced workers. This approach is favorable to gain apprentice feedback (Kaskutas *et al.* 2010). Furthermore, case studies showed that HSE managers from organisation that pays high attention to continuous learning yields better performance. Operatives of this organisation are more likely engaged in identifying and solving problems. This important feature consistently sustains the membership's awareness and competency on a continuing basis as organisational learning. Several HSE managers strongly agreed that learning enables the creation of an organisational environment that supports human development to meet the expectation of organisational adaptability, and to avoid stability traps and complacency. HSE managers also suggested that boosting and maintaining safety awareness essentially requires organisational learning to encourage participation between the frontline workforce and the organisation through Behavior Based Safety or incident report scheme.

4.7. Reward system

Even frontline operatives from case study revealed that they felt more motivate when using tangible reward campaign on site, most HSE managers advised caution in using monetary incentives with respect to a reporting system. Such a reward scheme may encourage fewer incident reports with the aim of getting the best safety records, or it may encourage more inappropriate reports with the aim of getting a high number of reports (Nielsen *et al*. 2008; Sgourou *et al.* 2010). To overcome these potential problems, the incentive scheme must include a verification process.

HSE managers also argued that "the most important issue is how strongly the worker is intrinsically motivated rather than motivated by tangible benefit". They suggest a so-called "intrinsic safety motivation". When people realize importance of their own safety, which makes them better able to care for their own families, these motivated people will make different decisions from those who lack this desire (Hedlund *et al.* 2010). However, important concern with certain safety initiatives is that they may improve safety only temporarily. Difficulties arise in using rewards because behavioral modifications occur in

a finite period of time. This short-term improvement is not likely to the desired work behaviours (Lingard, Rowlinson 2005). An HSE manager of construction organisations in Thailand said:" *Using merely 'carrot and stick' seems like seducing workers into complying with safety regulations as well as participating in certain safety initiatives. This will hardly cultivate internal motivation or consistently maintain safe work behaviour. Instead, using intrinsic motivation coupled with extrinsic motivation yields better results. This makes workers recognize how important their well-being is to themselves and their families*".

As aforementioned, empirical findings of previous researches from various industry contexts reported that work behaviours are triggered by certain organisational factors such as inconsistent messages from management. According to this study, available evidences from previous findings, opinions and explanations from professional safety experts who are responsible for developing the safety management system of construction organisations and promoting safe work behaviours in workplaces in Thailand draw the conclusion of contributories. These seven factors are key organisational factor only in the context of construction organisation including communication, safety culture, empowerment, management commitment, leadership, organisation learning and reward system.

Apart from selected important factors, not all factors were identified as important factors for helping risk work behaviour reduction, promoting safety compliance or encourage safe work behaviours. Time urgency, centralization, goal prioritization and formalization were identified as less important in influencing risk work behaviours. In this context, most participants in our cases felt that every operation has adequate time for appropriate planning owing to severe consequences of risks, as well as centralization may be not capable for handling volatile workplace and complex situation. Previously discussed, safety is acknowledged as corporate value rather priority because priority might be changed based on urgency, customer need or other external factors and then safety will not always the most important priority. Therefore these were not identified as contributing factors. As supportive functions, such factors as coordination of work, organisational knowledge and personnel selection were recognized as a lower priority with respect to their influences on worker's behaviours. Their implications for safety might be considered as part of administration and received low priority with respect to safe work behaviour. In addition, not only the duty to perform the activity of worker has been assigned, but also worker's competency for fulfilling safety responsibility has to be ensured prior to commence work. To avoid redundancy, role and responsibility, technical knowledge, training and performance evaluation can be acknowledged as part of learning. And also ownership was excluded because it could be particular part of culture. Lastly, role of team building can be though of as part of empowerment. Thus, it was excluded from list.

5. Conclusions and recommendations

Results identified seven important factors: communication, culture, management commitment, leadership, organisational learning, empowerment, and reward system. These findings affirm and validate implications of factors from previous publications as well as providing the additional explanations of identified factors. Accordingly, the influences of organizational factors on safe work behavior of construction industry have never been determined. Empirical findings from case study show that contributing determinants can be expected to be influential at different levels. It is necessary to note that considering the influences of organisational factors could be perform as a multi-level mechanism (Klein, Kozlowski 2000; Mohaghegh, Mosleh 2009a). Thus, a majority of such investigations often breaks down the models into three main levels (organisational, workgroup and individual levels) with different viewpoints and underlying theories. It could establish that four contributing factors at the top level are associated with safe work behaviours: communication, safety culture, leadership, and management commitment. Since these factors are identified at the top level, they can describe motivational effects and supports within and between workgroups and individuals. At the workgroup level, such social characteristics as group norm, team autonomy, and group cohesiveness particularly affect and influence individual values and beliefs regarding safety (Kines *et al*. 2010; Törner, Pousette 2009). Hence, hypothetical causal model could be formulated by proposed constituent factors and then determined by using path analysis.

Disparity in the influences of causal relationships could be determined by quantitative approaches such as inferential statistic (e.g. Structural Equation Modeling, SEM) or probabilistic model (e.g. Bayesian belief network). For example, SEM determines regression for each variable as a dependent on others which the model indicates are causes, by comparing the observed correlation matrix of variables against proposed hypothetical casual model. Accordingly, selection of approaches is based on available data. Either deterministic or stochastic approaches allow researchers diagnose and quantify the influences of contributing factors to at-risk work behaviours. As consequences of mathematical model developments, differences of the influences of organisational factors will be taken into account when considering interventions to reduce risk work behaviour or to promote safe work behaviors. The obtained results and explanations should further enable the safety professionals provide strategy and guidelines to improve safe work behaviors by considering the certain implications of contributing factors.

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Appendix

Questions for semi-structure interview

1. To what extent do you agree that (each) organisational factors could influence the workplace (at-risk and safe) behaviours? Why?

2. Do you agree that proposed organisational factors are adequate for investigation of their influence on reduction of risk behaviour of workers? Why?

3. Do you agree that proposed organisational factors are adequate for investigation of their influence on promoting safe behaviour of workers? Why?

4. Do you agree that organisational elements are the important factors for success of behavioural interventions?

SAUGIĄ ELGSENĄ STATYBOSE VEIKIANČIŲ ORGANIZACINIŲ VEIKSNIŲ NUSTATYMAS

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S a n t r a u k a

Organizacinių veiksnių įtaka žmonių klaidoms buvo pripažįstama ilgą laiką, tačiau tų veiksnių poveikis saugiai elgsenai statybos pramonėje yra mažai ištirtas. Pirmasis tyrimo žingsnis turėtų būti veiksnių, darančių įtaką rizikingai elgsenai, nustatymas. Tyrimo tikslas – nustatyti organizacinius veiksnius, kurie leistų mažinti rizikingą elgseną darbo vietose. Tai leis tirti ir kiekybiškai vertinti organizacinių veiksnių vaidmenį užtikrinant saugą. Organizaciniai veiksniai nustatomi ir skirstomi kategorijomis nagrinėjant pavyzdžius. Apžvelgiama literatūra, kuri naudojama kaip pirminis informacijos apie organizacinius veiksnius šaltinis, atliekama pusiau struktūrinta saugos ekspertų ir darbuotojų apklausa, apžvelgiami įmonės dokumentai. Gauti rezultatai leido nustatyti septynis reikšmingus veiksnius, būdingus Tailando statybos pramonei: komunikacija, kultūra, vadybininkų įsipareigojimai, vadovavimas, organizaciniai mokymai, galių suteikimas, apdovanojimų sistema. Nagrinėjama šių veiksnių reikšmė užtikrinant saugią elgseną darbo vietoje. Teigiama, kad empirinės žinios, sukauptos straipsnyje aprašomame tyrime, leis nustatyti veiksnių įtaką skirtingais organizacijos lygmenimis. Straipsnyje siūlomi modeliai leis vertinti organizacinių veiksnių įtakos rizikingai elgsenai darbe nevienodumą ir skatinti saugią elgseną.

Reikšminiai žodžiai: organizaciniai veiksniai, saugaus darbo elgsena, Tailando statybos.

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