



Creative Construction Conference 2014, CC2014

Project team social capital, safety behaviors, and performance: A multi-level conceptual framework

Tas Yong Koh^{a,*} & Steve Rowlinson^a

^aDepartment of Real Estate & Construction, University of Hong Kong, 501 Knowles Building, Pokfulam Road, Hong Kong

Abstract

The current Hong Kong construction industry safety state of affairs are undesirable. While a myriad of safety approaches have been adopted in the industry through normative compliance, error prevention, and climate intervention, the situations remain dismal. One of the reasons for the ineffectiveness of these approaches to ensure construction projects' safety performance is the mismatch between the approaches' rigid and static formulations of construction operations that are put to use in the operations that are emergent and dynamic. We propose that the deficiency can be rectified through the project team adaptive inputs and interactions that are grounded in the project team social capital. We (1) explore such possibility by establishing the theoretical underpinning through extant literature and (2) propose a conceptual framework befitting a relational approach to ensuring project safety outcomes. To accomplish the objectives set forth above, we conduct literature search and review in the domains of social capital, construction safety, social psychology, and small team research. Through the process of convergent and refinement of the literary domains, we put forth a conceptual framework that can be put into empirical test. The framework reveals that project team social capital can be modeled as a multi-level phenomenon emanating from individual level network structure. These structural features, together with the relational and cognitive features at the group level, influence the individual safety behaviors, and in turn, their safety outcomes. The analysis through literature review and modeling have shown that project team members' safety behaviors are influenced by the interaction of both the individual and group level relational phenomena. This study enriches current safety research agenda by highlighting the effects of team dynamics in safety performance. In this respect, we also provide methodological suggestions to empirically test the framework.

© 2014 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/3.0/>).

Peer-review under responsibility of the Diamond Congress Kft.

Keywords: Construction project team; social capital; network structures; safety behaviors; human factors.

* Corresponding author. Tel.: +852-2857-8629 ; fax: +852-2559-9457 .
E-mail address: tasykoh@hku.hk

1. Introduction

The construction industry in Hong Kong is often characterised by poor safety performance. Because accident statistics tend to trail the volume of construction, the increase construction activities in recent years and the continuous rolling out of new projects in the coming years are likely to lead to further exacerbation of safety performance. For example, the number of construction industry accident has increased from 2,775 in 2009; to 2,884 in 2010; 3,112 in 2011; and 3,160 in 2012. In addition, although the number of industry fatality dropped from 19 in 2009 to 9 in 2010, the fatality increased sharply from 9 in 2010 to 23 in 2011; and 24 in 2012. In the first nine months of 2013, 2,328 industry accidents have been recorded with 10 fatalities [1]. The correspondent fatality rate per 1,000 workers also increased dramatically from 0.163 in 2010 to 0.367 in 2011 (although there is a slight drop in 2012 to 0.337) [2]. In addition, 82.76% (24 out of 29 in total) of all industry fatalities occurred in the construction industry in 2012 [3]. In this regard, despite a myriad of safety initiatives administered and implemented in construction projects, safety performance of the industry plateaus and in terms of fatality, deteriorates. Clearly, the state of safety affair is not sustainable and the fact remains that current safety management in Hong Kong construction industry is not effective.

In this paper, we argue that this ineffectiveness is due to the nature of the safety management regime. The current initiatives are largely based on the rigid formulation without attention to the dynamics and interactions among the production (construction) elements. Consequently, they are less effective in ensuring safety in the construction projects in the face of the dynamics, complexities, and continuous changing situations in construction operations. In this respect, because human operators and their interactions are vital in managing projects, there is a need of a social approach in the management of construction safety. Previous research has indicated that the relationships among project team members can facilitate the actions among participants in the management of project safety [4,5]. Specifically, the social norms that emerge from the relationships among construction team members influence a range of behaviours of the members, including their safety behaviours. As social capital is conceptualised as consisting of a focal group's network structure through the members' connecting ties among themselves and with those outside their group, and the quality of those ties [6,7], a question of both practical and theoretical relevance is how these social features can affect the members' safety behaviours.

In this paper, we first explore the relevance of the concept of project team social capital thereby establishing the need for relational and human factors concepts in construction safety management; and encapsulate and synthesise these concepts into forming a theoretical framework. We conclude by proposing methodological approach to empirically test this framework.

2. The human factors in managing construction safety – The relevance of team social capital

The relevance of team social capital is predicated on the structural and organisational features of construction operations. Construction operations are characterised by dynamics, complexities, and emergent interactions of components in the operations. These systems are complex and dynamic because of the presence of multiple goals (speed, quality, cost, and safety), multiple interacting parties (various trades and professional disciplines some of which have different mental models, and work packages, heterogeneous client organisation), complex social structures (hierarchical sub-contracting arrangements, multiple stakeholders), and the complex technology and operating environments (market pressures, political and institutional regulations) [8]. There is a high level of interdependence among these elements within the organisational environment that is continuously changing. In terms of organising for safety, the dynamics and complexity imply that operators continuously experience change in the form of adaptations in response to short-term productivity and cost objectives. In these situations, it is possible that safety defences degenerate as a result of the production pressures and changes. To keep the construction operation system within the safe limit and maintain system adaptation, human inputs are essential as it is through human that recognition, communication, socialisation, and improvisation of unexpected events, changes, and disruptions that system safety is achieved [9,10]. In this sense, human operators and their interactions are the catalysts in managing project safety.

The above conception implies that human and social factors are fundamental in the management of construction project safety. In a project team, team members can exert considerable influence among one another. This influence may also shape the attitudes and in turn behaviours of the members. For example, the team's expectations of members to adhere to safety rules create strong social control in ensuring members' safe conduct [11]. Indeed, previous research in the social-psychology domain of safety management indicates that team interaction, socialisation, and influence are important aspects in managing safety [12,13,14]. In this respect, the social conditions that are characterised by intensive work group interactions; cordial members' social ties and relations; mutual trust; and shared understanding are likely to encourage positive safety behaviours [14]. These social conditions are encapsulated under the concept of (team) social capital.

From the psychological model of industrial accident, workers' safety behaviours are the result of social influence processes. The social conditions (e.g. team social capital) have direct effect on both the supervisors and workers safety responses which in turn, affect the safety outcomes of the construction operations [15, cited in 12]. This assertion is corroborated by Choudhry and Fang's [16] findings that peer influence is one of the reasons Hong Kong construction workers engage in unsafe work behaviours. Hence, the concept of construction work team social capital offers a way of examining how safety behaviours can be achieved through relational approach within group members of single construction team and among interacting teams.

3. Team social capital, safety behaviours, and performance

3.1. Team social capital

Social capital is conceptualised as both the personal and impersonal linkages between individuals, the quality of these linkages, and the shared representations embedded within these linkages [17,18]. The project organisational characteristics of interdependence and intensive interactions, diffused authority, temporality, and relative closure of project membership make the application of the social capital concept relevant [17,19]. Social capital provides a means by which coordination and collaboration among project participants can be effected. As such, social capital can be appropriated and exploited to achieve project organisational objectives [17,20], including safety objectives.

Nahapiet and Ghoshal [17] propose a three dimensional model of organisational social capital – structural, cognitive, and relational dimensions. The structural dimension represents the impersonal configuration of linkages among persons or social units. Network ties and the configuration of those networks (e.g. network density, centralisation, range, etc.) are the main facets of the structural dimension [21,17]. The cognitive dimension refers to the aspects that involve shared representations and the system of meaning among members in the group [17] and the type of shared understanding that has been established among the members [22]. Relational dimension is characterised by personal relationships developed among group members through interacting with one another [23]. Trust that is developed among group members is an important facet of relational dimension [24].

As a primordial social condition [6], social capital is different from other social psychological concepts – e.g. safety culture and climate, and safety citizenship behaviours. Safety culture represents “the set of beliefs, norms, attitudes, roles, and social and technical practices” which are connected to minimising harms to both the organisational internal and external stakeholders [25, cited in 13]. Safety climate, a sub-set of safety culture, is the members' collective perception of policies, procedures, and practices concerning safety in an organization [26]. And, safety citizenship behaviours is characterised by members' actions that extend beyond mere rules adherence [14] into more positive and proactive safety behaviours [27]. While the three social psychological concepts are the framework and environment [12] that influence organisational members' safety behaviours through safety policies and practices, the primordial social condition – social capital – is the foundation on which the behavioural forms of these concepts are effected! In other words, social capital is the “technology” that supports the operationalisation of these social psychological concepts. The “technology” in question is the network structure [21] and the quality (trust and shared understanding) of the human connections within a social unit [7].

The combination of Nahapiet and Ghoshal's [17] three-dimensional conceptualisation and Burt's [28,21] structural perspective of social capital has informed on the utilitarian value of the concept. The basic utilitarian idea of social capital is that the configuration and the quality of social ties facilitate the flow of resources and influences that result in some level of performance [cf. 21,29]. The full realisation of the benefit of social capital, however, requires the complementarity of both internal and external network configurations. Burt [21] has conceptualised this idea as the alignment of network closure and brokerage. These are the internally and externally oriented network features of a group, respectively. Closure occurs when every member of a group is connected to one another in the way that everyone knows the affairs of everyone else. Such feature gives rise to a dense network [21]. Because members of a closed network have direct connections among themselves, it facilitates information flow and sanctions [20]. The feature of brokerage, on the other hand, argues for an actor's control of information diffusion among pockets of groups beyond his/her own network which are otherwise not strongly connected or not connected at all. Brokerage facilitates broad, early access, and control over information [21]. Besides informational benefit, the concept of brokerage signifies the external influence to the focal group. These network features, together with the cognitive and relational dimensions, can be brought to bear on the productive use of the concept. While closure enables within team communication and coordination, brokerage brought about external information and influence that add value to the focal team. Team shared understanding and trust further lubricate members' interactions. In other words, brokerage adds value but it is the network closure that realise the value for the team's work [21].

3.2. Safety behaviours

In construction setting, works are often organised around and performed by teams. Hence, teams, as opposed to individuals, have assumed increased importance. This phenomenon has called for the group and social normative factors to be investigated for work settings that involve teams. This assertion is equally applicable to construction safety management. The effects of group on individual's behaviours have long been established [12]. Compared to organisation, work groups exert greater influence in the interactions of group members and individual members normally feel closer to their group rather than their organisation [30]. In a typical work team in construction, the social influence or norms are emanated from the reference groups of supervisors and co-workers. Because of the proximity of the group members – i.e. the supervisor and co-workers within the group – the strength and relevance of the norms are likely to lead to the change of safety behaviours of the focal member [27]. In this social context, workers receive and act upon the cues they decipher from their interaction within the group on the overall importance of workplace safety from the reference groups in their supervisor and co-workers [12]. The focal worker typically attunes his safety behaviours to be in line with those demonstrated by the reference groups.

Two safety behaviours are relevant in construction - the compliance and proactive safety behaviours. Compliance safety behaviours are the behaviours of following formal work procedures and safety routines (e.g. adhering to safe work practices, etc.) [27,12]. These behaviours are the products of formal approaches envisioned within the safety management system which purportedly advocate compliance and rule adherence [31]. However, compliance approach alone has been proved to be insufficient in some occasions (e.g. Choudhry and Fang [16]) and there is a tendency that workers are more than ready to bend the rules rather than following them [31]. There is a need, therefore, to explore other dimension of worker safety behaviours. In addition, in the traditions of participative safety management and safety cultural-based intervention, a more proactive approach is advocated. Hence, workers proactive safety behaviours should be included in the model. Here, proactive safety behaviours refer to workers' actions that go beyond normal roles [32] involving, for example, giving safety recommendations, assisting fellow workers to perform safely, etc. In this respect, while safety compliance may be the hygiene factor in achieving minimum level of performance, proactive behaviour has the potential to leap frog the performance.

3.3. The multi-level propositions

Drawing on the studies on small groups [e.g. 33,34] and referring to the notion of social capital, it is possible to argue that both the internal and external social network structure and configuration, and the quality of the group members' connections affect the group safety behaviours, and in turn, safety outcomes. Team social capital,

conceptualised here as network structure and the qualities of members' connections, facilitate the flow of information and communication thereby giving rise to norms that are likely to affect members' behaviours. Hence, the examination of the ways the small group's (e.g. a carpentry trade small group led by a foreman in a construction project) team social capital affect the members' compliance and proactive safety behaviours is a plausible proposition.

The proposition above alludes to a multi-level conception of the phenomenon. The adoption of a multi-level conception highlights some contextual issues within which both individual and group behaviours occur and how these behaviours engender the nested levels of social interactions [35]. In this conception, individual group member is nested within a work group whereby the influences between the two levels – i.e. the individual and group levels - through social capital take effects. Individuals' social interactions give rise to group level social capital. This higher level social capital in turn influences individual's behaviours. Internally within a work group, an individual member occupies a certain position in the group network. From this position, the individual constructs shared cognition and establishes some level of relational attachment to the group. This individual-level social capital provides stimulus for a member of the group to engage in safe working within the work group [cf. 36]. In this context, an individual's influence on the team working is conveyed through the direct ties with other group members. At the same time, an individual develops cognitive capital in the interactions with other members in the work engagements through sharing of the same work practices and norms [17]. With relational attachment to the group, an individual is likely to engage with a sense of responsibility to other group members if a shared identity is perceived.

From the group level, a top-down influence process takes place. Group-level social capital is formed through the overall connectivity among the members of the group, the cognitive commonality, and the relational norms emerged within the group [cf. 36]. Because individuals are nested within the group, the situations that emerge from the individuals' interactions directly influence the individuals' actions and behaviours [37]. In addition, it is likely that a broader network exists such that a network comprises not only the group members' internal ties, but also external connections beyond the focal immediate network. These external connections introduce the influences from other groups.

The multi-level scheme and processes delineated thus far can be juxtaposed with the normative influences of safety advocated in the focus theory of normative conduct [38, cited in 27]. From this perspective, perceived norms impose contextual influence on the attitudes and behaviours of actors in social interactions. In the social interactions within a typical working group – e.g. a small work team in construction project – supervisors and co-workers are the referents under which the perceptions and behaviours of a focal worker are formed. The safety actions and norms that emanate from supervisors and co-workers are antecedents of the focal worker's safety behaviours. In group working, the focal worker observes the way supervisors and co-workers perform safety practices (or the performance of unsafe practices). These observations become sources of information for the focal worker by which norms are constructed. Through this mechanism, when a group of members perform certain safety practices and these practices are considered standard behaviours by the group, a shared recognition emerges among the group members. With this recognition, the behaviours become normative within the group. These safety norms affect group member's safety behaviours [27].

3.4. The measures

For the structural dimension, in line with extant literature, the focus is set on the task advice network instead of friendship network. This is because in work settings, task advice network is the channel by which work related information and influence are likely to be most relevant for the prediction of the focal group (safety) behaviours. We take "work group" to mean a group of individuals whose memberships are clearly defined and are responsible for a shared output [39, cited in 34].

The network measures that characterise the network cohesion (measured as network density), the central position of individual/s (measured as network centralisation), and network range represent the structural dimension of team social capital [18,34]. Internally within the work group, network density represents the number of advice ties group members have as compared to total number of possible ties [34]. As the number of ties increases, the density of the network increases giving rise to a tightly knitted group that exerts strong influence on individual member safety behaviours. Network centralisation measures the differences in the network ties of group members in such a way that when centralisation increases, individual/s within the group is more highly consulted thereby becoming more central and influential within the network [40,34, cf. 21]. This measure provides the indication of the leadership impact of a leading worker or supervisor within the group on the other group members’ safety behaviour. And, network range is an “external” network measure to the focal group. Network range measures the number of advice ties the focal group members have with those other groups. Because the other groups are likely to have different norms from the focal group, this measures the diverse influence exerted by external sources to the focal group. Hence, the structural dimension of social capital, through its various measures, can be expected to positively affect a group members’ safety behaviours.

The cognitive and relational dimensions of social capital can similarly be expected to affect members’ safety behaviours. The shared understanding developed through the social interactions among group members contribute to the development of joint perception of safe working norms. As safe work practices are socially constructed [12,41], shared understanding on safe working is likely to affect safety behaviours in a positive way. Similarly, trust has been shown to be an antecedent to safe behaviours. An environment imbued with trust promotes empowerment and the development of responsibility norms [14] which are likely to lead to safe behaviours. The safe behaviours – in terms of compliance and proactive behaviours – in turn, are likely to lead to positive safety outcomes. Overall, the conceptualisation of causal relationships among team social capital, safety behaviours, and outcome are shown in Figure 1.

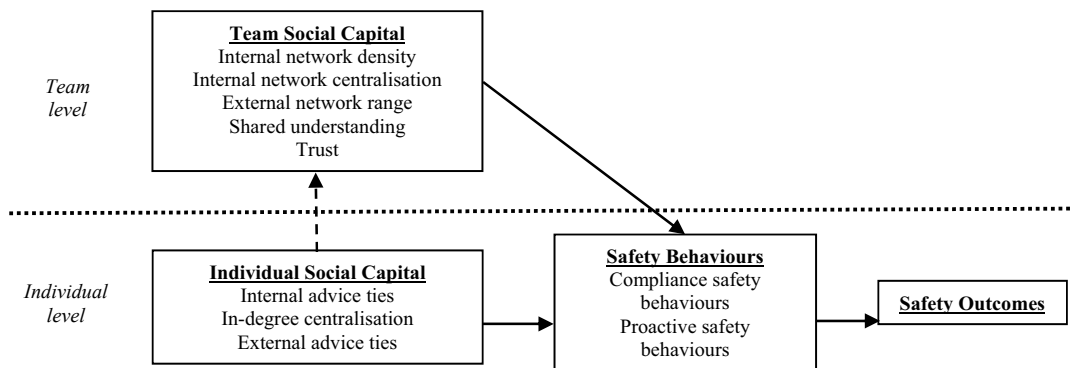


Fig. 1. Framework linking team social capital, individual safety behaviours, and outcomes

4. Conclusions and methodological suggestion

In this paper, we set out to explore the proposition and the associated underlying relational conception in achieving construction project safety. The proposed framework links the structural, cognitive, and relational aspects of social life through the concept of social capital to the safety behaviours and outcomes of individuals in construction project teams. The analysis and modeling have shown that project team members’ safety behaviors are influenced by the interaction of both the individual and group level relational phenomena. This exploration has enriched current safety research discourse by highlighting the effects of team dynamics and providing a more fine-grained exposition on the individual-team levels interaction mechanism.

Following Kozlowski and Klein [42], and Payne et al.'s [35] recommendations, configural multi-level approach can be used to present and analyse the network data. In this approach, lower level data (e.g. individual internal advice ties) is configured to tap the higher level construct (e.g. team internal network density) (the dotted arrow in Figure 1). To ensure that the lower level data can be aggregated to represent the higher level construct, within unit dispersion should be established (e.g. interrater agreement) [42]. That way, the measurement of the team level internal social capital [43], and the influence of this team level construct to the individual level phenomenon in safety behaviours and outcomes can be ensured (see Figure 1). A longitudinal approach should be adopted. A large scale survey can first be administered targeting the frontline work groups within construction projects (e.g. a steel fixing group). This is the first wave of data collection. After 5 months [cf. 44, of 6 to 7 months], the second wave of data collection will take place with the same groups of respondents. The quantitative data can then be analysed to establish the causal relationships among the constructs. Through this approach, not only causality can be established but the opportunity to examine the temporal development of social capital in project settings is also provided.

Acknowledgements

The authors acknowledge funding provided by The University of Hong Kong's to the first author (Project code 201301159001)

References

- [1] Labour Department. *Summary of Occupational Safety and Health Statistics of 1st Three Quarters of 2013*. Occupational Safety and Health Branch, Labour Department, Hong Kong Special Administrative Region (HKSAR); 2014.
- [2] Labour Department. *Occupational Safety and Health Statistics Bulletin Issue No. 13 (June 2013)*. Occupational Safety and Health Branch, Labour Department, HKSAR; 2013a.
- [3] Labour Department. *Occupational Safety and Health Statistics 2012*. Occupational Safety and Health Branch, Labour Department, HKSAR; 2013b.
- [4] Koh TY, Rowlinson S. Relational approach in managing construction project safety: A social capital perspective. *Accident Anal Prev* 2012; 48:134-144.
- [5] Koh TY, Tuuli MM, Rowlinson S. A relational approach to high reliability organising for construction project safety: A conceptual framework. In Smith SD, Ahiaga-Dagbui DD, editors. *Proceedings of ARCOM 29th Annual Conference (AR29)*, 2013, p. 369-379.
- [6] Adler PS, Kwon SW. Social capital: Prospects for a new concept. *Acad Manage Rev* 2002; 27:17-40.
- [7] Bartsch, V, Ebers M, Maurer I. Learning in project-based organisations: The role of project teams' social capital for overcoming barriers to learning. *Int J Proj Manage* 2013; 31:239-251.
- [8] Reiman, T, Oedewald P. Assessment of complex sociotechnical systems – Theoretical issues concerning the use of organisational culture and organisational core task concepts. *Safety Sci* 2007; 45:745-768.
- [9] Dekker SWA. *Ten questions about human error: A new view of human factors and system safety*. Mahwah, N. J.: Lawrence Erlbaum; 2005.
- [10] Mitropoulos P, Memarian B. Team processes and safety of workers: Cognitive, affective, and behavioural processes of construction crews. *J Constr Eng M* 2012; 138:1181-1191.
- [11] Lingard H, Rowlinson S. *Occupational health and safety in construction project management*. Oxon: Spon Press; 2005.
- [12] Fugas CS, Silva SA, Melia JL. Another look at safety climate and safety behaviour: Deepening the cognitive and social mediator mechanisms. *Accident Anal Prev* 2012; 45:468-477.
- [13] Torner M, Pousette A. Safety in construction – a comprehensive description of the characteristics of high safety standards in construction works, from the combined perspective of supervisors and experienced workers. *J Safety Res* 2009; 40:399-409.
- [14] Torner M. The "social-physiology" of safety. An integrative approach to understanding organisational psychological mechanisms behind safety performance. *Safety Sci* 2011; 49:1262-1269.
- [15] Melia JL. A psychosocial causal model of work related accidents. *Anuario de Psicologia*, 1998; 29:25-43.
- [16] Choudhry RM, Fang DP. Why operatives engage in unsafe work behaviour: Investigating factors on construction sites. *Safety Sci* 2008; 46:566-584.
- [17] Nahapiet J, Ghoshal S. Social capital, intellectual capital, and the organizational advantage. *Acad Manage Rev* 1998; 23:242-266.
- [18] Wei J, Zheng W, Zhang M. Social capital and knowledge transfer: A multi-level analysis. *Hum Relat* 2011; 64:1401-1423.
- [19] Jones C, Lichtenstein BB. Temporary inter-organisational projects: How temporal and social embeddedness enhance cooperation and manage uncertainty. In: Cropper S, Ebers M, Huxham C, Ring PS, editors. *The Oxford handbook of inter-organisational relations*, Oxford: Oxford University Press; 2008, p. 231-255.
- [20] Coleman JS. Social capital and the creation of human capital. *Am J Sociol* 1988; 94:S95-S120.
- [21] Burt RS. The network structure of social capital. *Research in organisational behavior* 2000; 22:345-423.

- [22] Bolino MC, Turnley WH, Bloodgood JM. Citizenship behaviour and the creation of social capital in organisations. *Acad Manage Rev* 2002; 27:505-522.
- [23] Granovetter M. Problems of explanation in economic sociology. In: Nohria N, Eccles RG, editors. *Networks and organisations: Structure, form, and action*, Boston, MA: Harvard Business School Press; 1992, p.25-56.
- [24] Inkpen AC, Tsang EWK. Social capital, network, and knowledge transfer. *Acad Manage Rev* 2005; 30:146-165.
- [25] Pidgeon NP. Safety culture and risk management in organisations. *J Cross Cult Psychol* 1991; 22:129-140.
- [26] Neal A, Griffin MA. Safety climate and safety behaviour. *Aus J Manage* 2002; 27:67-76.
- [27] Fugas CS, Melia JL, Silva SA. The “Is” and the “Ought”: How do perceived social norms influence safety behaviours at work? *J Occup Health Psych* 2011; 16:67-79.
- [28] Burt RS. *Structural holes: The social structure of competition*. Cambridge, MASS: Harvard University Press; 1992.
- [29] Maurer I, Bartsch V, Ebers M. The value of intra-organizational social capital: How it fosters knowledge transfer, innovation performance, and growth. *Organ Stud* 2011; 32:157-185.
- [30] Moreland RL, Levine JM. Socialization in organizations and work groups. In: Turner ME, editor. *Groups at work: Theory and research*, Mahwah, NJ: Erlbaum; 2001, p. 69-112.
- [31] Sherratt F, Farrell P, Noble R. UK construction site safety: Discourses of enforcement and engagement. *Constr Manage Econ* 2013; 31:623-635.
- [32] Clarke S. The relationship between safety climate and safety performance: A meta-analytic review. *J Occup Health Psych* 2006; 11:315-327.
- [33] Cummings JN. Work groups, structural diversity, and knowledge sharing in a global organisation. *Manage Sci* 2004; 50:352-364.
- [34] Wong SS. Task knowledge overlap and knowledge variety: The role of advice network structures and impact on group effectiveness. *J Organ Behav* 2008; 29:591-614.
- [35] Payne GT, Moore CB, Griffs SE, Autry CW. Multilevel challenges and opportunities in social capital research. *J Manage* 2011; 37:491-520.
- [36] Yu Y, Hao JX, Dong XY, Khalifa M. A multilevel model for effects of social capital and knowledge sharing in knowledge-intensive work teams. *Int J Inform Manage* 2013; 33:780-790.
- [37] Perlow LA, Gittell JH, Katz N. Contextualising patterns of work group interaction: Toward a nested theory of structuration. *Organ Sci* 2004; 15:520-536.
- [38] Cialdini RB, Kallgren CA, Reno R. A focus theory of normative conduct. *Adv Exp Soc Psychol* 1991; 24:201-234.
- [39] Hackman JR. The design of work teams. In: Lorsch J, editor. *Handbook of organizational behavior*, Englewood Cliffs, NJ: Prentice-Hall; 1987, p. 315-342.
- [40] Sparrowe RT, Liden RC, Wayne SJ, Kraimer ML. Social networks and the performance of individuals and groups. *Acad Manage J* 2001; 44:316-325.
- [41] Gherardi S, Nicolini D. Learning the trade: A culture of safety in practice. *Organisation* 2002; 9:191-223.
- [42] Kozlowski SWJ, Klein KJ. A multilevel approach to theory and research in organizations: Contextual, temporal, and emergent processes. In: Klein KJ, Kozlowski SWJ, editors. *Multilevel theory, research, and methods in organizations: Foundations, extensions, and new directions*, San Francisco: Jossey-Bass; 2000, p. 3-90.
- [43] Reagans R, Zuckerman E, McEvily B. How to make the team: Social networks vs. demography as criteria for designing effective teams. *Admin Sci Quart* 2004; 49:101-133.
- [44] Tholen, S. L., Pousette, A., & Torner, M. (2013). Causal relations between psychosocial conditions, safety climate and safety behaviour – A multi-level investigation. *Safety Sci* 2013 55:62-69.