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Safety Leadership in Construction

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Abstract: This paper probes into safety leadership in construction and its impacts on site safety performance. A safety leadership model for construction is proposed. It contains two impacting paths of safety leadership, namely safety management and safety culture. By action research, safety improvement is achieved through leadership fulfillment on construction sites.

Keywords: Leadership; Safety management; Safety culture; Construction projects; Action research

I. INTRODUCTION

Leadership is proven as a key factor impacting safety while researchers and practitioners are fostering proactive approaches to preventing workplace injuries[1]. Safety leadership is a sub-system of leadership. It can be defined as "the process of interaction between leaders and followers, through which leaders can exert their influence on followers to achieve organizational safety goals under the circumstances of organizational and individual factors"[2]. Safety leadership is a significant antecedent of safety culture and worker safety behavior, and the majority of previous studies focused on the full-range model of transformational and transactional leadership behaviors[3]. Transactional leadership is related to monitoring and rewarding whereas transformational leadership is directed towards inspiring and genuinely motivating the workforce. They have become a widely accepted leadership behavior distinction in safety research. For those industries which are facing significant safety challenges and need transformational development, strong safety leadership should be the key for improvement.

II. SAFETY LEADERSHIP IN CONSTRUCTION

The construction industry is reported in many countries as having the highest occupational injury rates[4]. Although an increasing number of occupational health and safety provisions have been introduced in many countries, the accident frequency in construction still stays at a high level. This is mainly due to a misalignment of management commitment and subordinates' actions[5]. Safety remains a concept held by senior managers and is not fully disseminated to their subordinates, and management requirement cannot be fully implemented on construction sites. These problems are attributed to construction managers' lack of safety leadership, which has been shown to be able to enforce rules and regulations in highly hazardous and complex working environments[6]. However, leadership research within the construction industry is scarce compared with other industries[7], and the characteristics of safety leadership in construction projects are not well identified. Details of the underlying mechanisms by which safety leadership influences site safety are also not yet fully understood[8].

There are four dimensions of safety leadership in the construction industry[9]. They are safety controlling and performance management, safety influence and role modeling, safety motivation and coaching, safety caring and individual respect. Safety controlling and performance management, which belongs to transactional leadership, is the basis for other leadership behaviors because it can break institutional barriers and build fundamental mutual trust between leaders and subordinates. The other three dimensions, which are transformational leadership, can build on the initial levels of trust by establishing a deeper sense of identification and cohesion among subordinates (especially other stakeholders) with respect to projects' values, mission and vision. The four-dimension leadership structure, which corresponds to the widely used full range leadership model, interprets the core characteristics of safety leadership needed in the construction industry.

This paper proposes a safety leadership model for construction. It contains two impacting paths from safety leadership to safety performance in construction projects (Fig.1). The first is the direct path, namely "safety management", which means safety leadership enhances management of the lower-level personnel and worker safety behavior, and thus improve safety performance of construction projects. The second is the indirect path, namely "safety culture", which means safety leadership enhances project safety culture, so as to improve safety performance more profoundly and comprehensively.

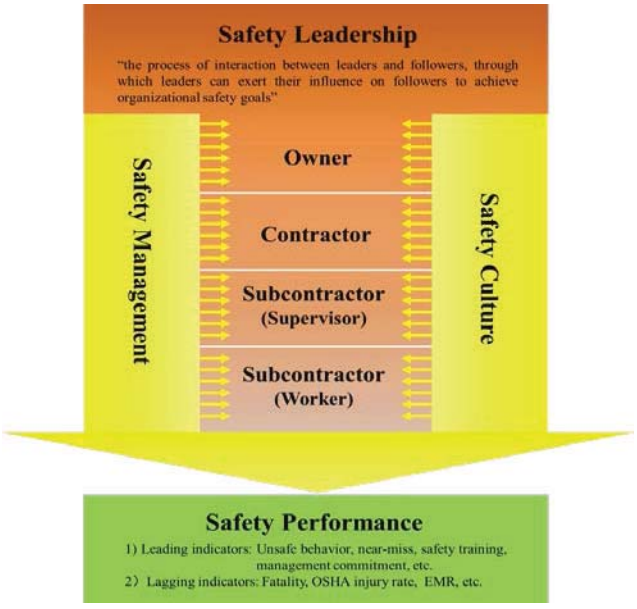

Fig.1. Safety leadership model for construction

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The short and horizontal arrow lines in Fig. 1 depict that the two impacting paths involves all project personnel levels in construction phases. This model shows that improvements in safety leadership and work behaviors of each project personnel level will ultimately result in safety performance enhancement.

III. An Action Research on Safety Leadership Improvement in Construction Projects

As shown above, it is vitally important to analyze the impacting mechanisms within the two paths in the safety leadership model for construction, and thus provide effective safety improvement suggestions for project managers. In view of this, a longitudinal study was undertaken on Chinese high-speed railway construction projects. Relationships between project senior leaders (owners), middle leaders (contractors) and frontline leaders (supervisors) were proposed, in which project safety culture plays as the mediator. Results showed that among all safety dimensions, safety influence and role modeling has the most holistic impact on the leadership and behavior of lower-level personnel. This finding confirmed that safety influence and role modeling is an "all-inclusive transformational leadership facet in influencing subordinates"[10]. Moreover, the safety culture path is more significant and robust than the safety management path.

Based on these findings, an action research was designed to enhance safety leadership on one of the Chinese high-speed railway construction project which is involved in the longitudinal study. The purpose was on one hand obtaining increased understanding of the impacting mechanism of safety leadership, and on the other hand helping practitioners improve safety leadership and in turn safety performance of construction projects. Periodical measurements of different levels of safety leadership and worker safety behavior were undertaken to assess the effects of the improvement actions. The action research includes two leadership improvement measures. The first is called "regular onsite visits by senior leaders", which is theoretically based on the holistic impact of safety influence and role modeling. Senior managers of the owner and the contractor keep their constant visibility on construction sites and communicate safety with supervisors and workers in amicable manners. Close interaction between leaders and subordinates can enhance safety management by shortening communication distance and leading by example. Its impacting way corresponds to the safety management path in Fig.1. The second is called "fixed safety & health session in regular meetings", in which the first session of all project meetings is fixed as occupational safety and health discussion. It conveys strong management commitment to safety, and in turn reinforces the first priority of safety among all project objectives. It corresponds to the safety culture path in Fig.1.

Periodic measurement results show that the action research has significant effects in improving safety leadership, safety culture and safety behavior in the project. Since the improvement measures were implemented, safety leaderships of the owner, the contractor and supervisors have improved by 10.2%, 13.0%, and 28.3% respectively Safety behavior of workers has improved by 21.4%. Moreover, it is found out that the three transformational leadership dimensions (especially safety influence and role modeling) improved more than the transactional leadership dimension (safety controlling and performance management), because the two improvement measures belong to transformational leadership. Among worker safety behavior, safety participation improved more than safety compliance, which is another validation of the effect of the transformational leadership improvement measures.

IV. Conclusion

This paper proposes a safety leadership model for construction which involves two impacting paths from safety leadership to safety performance, one is "safety management", and the other is "safety culture". An action research applied this model to improve safety leadership in a construction project and results in significant site safety improvement. The model need to be further elaborated and the impacting mechanism of safety leadership need to be further studied. A lot more questions need to be answered. For example, how does the safety management path and safety culture path interact each other? Is the upper-level safety leadership influenced by the lower-level one? How does the senior managers of the subcontractor influence supervisors' safety leadership and workers' safety behavior? Answering these questions will foster more effective safety leadership to improve site safety.

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