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Review

A Safety culture in construction business

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Abstract

Promoting safety management is always the top priority in construction business. Fostering safety culture will be one of the most effective ways. This paper is a case study, based upon the "Geller's 10 principles for achieving a total safety culture", to review how a construction companyin Hong Kong effectively promoting safety culture and enjoying pleasant safety records. Zero harmis not a "zero sum game", butit requires positive "top down" and "bottom up" actions from both employers and employees.

Keywords: Construction Business, Safety Management, Safety Culture.

INTRODUCTION

Business model of most construction companies are in project basis and successful deliveryof projects can be viewed as a three legged stools. These legs are defined as cost, schedule and quality (Gransberg and Molenaar, 2004). The success level of project delivery may well be measured by contained budget, timely completion and decent workmanship. However, poor safety consideration may adversely affect cost, time and quality of construction projects. Heavy fines upon safety offence becomes a burden to the budget; losing working hours as a result of safety incident impacts on the schedule, and compromising quality is always an indirect consequence when workers perform duties in an unsafe site environment. Most importantly, many serious incidents involve casualty. The construction industry accounted for one third of all work fatalities in UK (Nugraheni and Scott, 2008), and construction was Australian third most dangerous industry (Fraser, 2007). There are many research studies in the recent years about how and why to promote safety management (Cheung, Wong, and Wu, 2011; Hart, 2010; Zou, 2011).

Working safely will benefit construction project leading to profitable business. One of the effective way in safety management is to foster an organizational safety culture. According to asafety study in 2002, a company can change certain cultural characteristics to create a safer working environment. Evidence suggests that if these characteristics are improved, a higher level of safety culture and performance will result. Their findings also reveal that the company with the best safety record also had the most consistent safety culture. However, by comparing the opinions of upper management, middle management and field personnel, the authors also found the discrepancies between the beliefs, values and behaviors of employees.These discrepancies can result in a weak company safety culture(Molenaar, Brown, Caile, and Smith, 2002). The aim of this paper is to demonstrate how anorganizational safety culture is fostered and it is based upon the safety management philosophy of a Hong Kong leading construction firm which enjoys pleasant safety record over years.

Theoretical issues

Construction management approach should not just focus on its own issues of managing progress and budget for the building project, but it needs to understand and appreciate the other matters, like hygiene, and incorporate it into the management system. In fact, hygiene factors are the product of successful safety management which aims at managing all aspects of safety throughout the whole construction organization (Ho, 2003). Safety management provides a systematic way to identify hazards and control risks while maintaining assurance that these risk controls are effective. However, most safety management system, which is based upon safety standards and rules, may be ineffective (Lee, Lee, Park, and Kim, 2009); one of the effective ways for efficient safety management is creating safety culture within the organization (Yiu, 2003), so as adding value to safety management.

Culture involves what people think, what they do, and

what they produce(Bodley, 2000). In order to provide a safe working environment, one of the best ways is to create a safety culture within the organization, because organizational-cultural factors play an important role in safety management. Hampden-Turner (1990) satisfies corporate (organizational) culture to be “a pattern of basic assumptions invented, discovered or developed by a given group as it learns to cope with its problems of external adaptation and internal integration that has worked well enough to be valid and to be taught to new members as the correct way to perceive, think and feel in relation to these problems.” In such, safety culture is often seen as a subset of organizational culture, where the beliefs and values refer specifically to matters of health and safety (Clarke, 1999). Guldenmund (2000) viewed that people would do better to place organizational culture centrally and focus their measuring instruments on understanding that. Cox and Cox (1996) states that safety cultures reflect the attitudes, beliefs, perceptions, and values that employees share in relation to safety. Safety culture is viewed as a focused aspect of the organizational culture. Then, safety culture is the shared and learned meanings, experiences and interpretations of work and safetywhich guide peoples' actions towards risks, accidents and prevention(Richter and Koch, 2004). To conclude, safety culture does not operate in a vacuum, it affects and, in turn, is affected by other operational processes or organizational systems. Since an organization’s safety culture impacts on work methods, absenteeism, product quality, productivity, commitment, loyalty and satisfaction(Cooper, 2000), and the key indicators of the corporate safety culture are people, process and values(Molenaar, et al., 2002), safety culture is most likely to take hold when the safety concept is reinforced through positive means, and not just punitive actions(Moser, 2000).Geller (1994)categorizesten principles for achieving a “Total Safety Culture”that may measure if organizational safety organizational culture is fostered:

1. Organizational culture drives the safety process.
2. Behavior-based and person-based factors determine success in safety.
3. Safety focus on process not outcomes.
4. Safety behavior is directed by activators and safety desire is motivated by consequences.
5. Focus on achieving successful safety goals but not avoiding failure.
6. Good observation and feedback lead to safe behavior.
7. Follow “safety COACH” approach.
8. Promote observation of safety-related work and coaching are for key actively care process.
9. Importance of self-esteem, belonging and empowerment in safety policy.
10. Safety is value not priority.

In this paper, Geller’s principles are selected as the basis to examine the case studied organization in terms of safety culture.

The case study: safety management

Understand the background of the organization helps to interpret the case, this section provides the rationale of choosing the organization for this study which follows by the context of study.

Safety Performance Comparison

Zou (2011) studied a construction organization in Hong Kong and satisfies that organizations adopt a holistic strategy that focuses not only on improving the physical working environment, safety risk assessments, and employees’ safety knowledge, but also on shaping employees’ beliefs and attitudes that lead to safe behavior and ultimately to a strong safety culture. Therefore, it provides a sound background to research the safety culture in Hong Kong.

In the following Figure 1, a comparison of accidents statistics of the studied organization versus major contractors (from the Hong Kong Contractors Association) and the industry from 2002 to 2011 are shown. The accident rate of G-Force was only 8.5 and 6.7 in 2009 and 2010 respectively, compared to the industry in 54.6 and 51.2; they were far better result. Therefore, the safety practice of this leading Hong Kong construction organization is selected to demonstrate good safety management and policy.

Safety Background of Studied Organization

The studied organization (pseudonym = G-Force)has been operated over half century. As one of the leading construction companies,G-Force’s activities span the entire spectrum of building construction, civil engineering, foundation work, electrical and mechanical works; it maintains steadily approximately 11% of the market share out of the average HK$62.26 billion in the past three years.This organization employs some16,000 workforces in a wide range of construction projects and organization commits absolutely to striving for an accident-free working environment, because it believes that quality, technical excellence, progress and attractive financial returns are all outcomes of good safety.

In order to share the mission of safety leadership, safety conference was held annually since 2005. Business partners, representatives from employers, government officials, consultants and academics from UK and Singapore, have been invited to attend, and different good polices were shared. The latest conference was

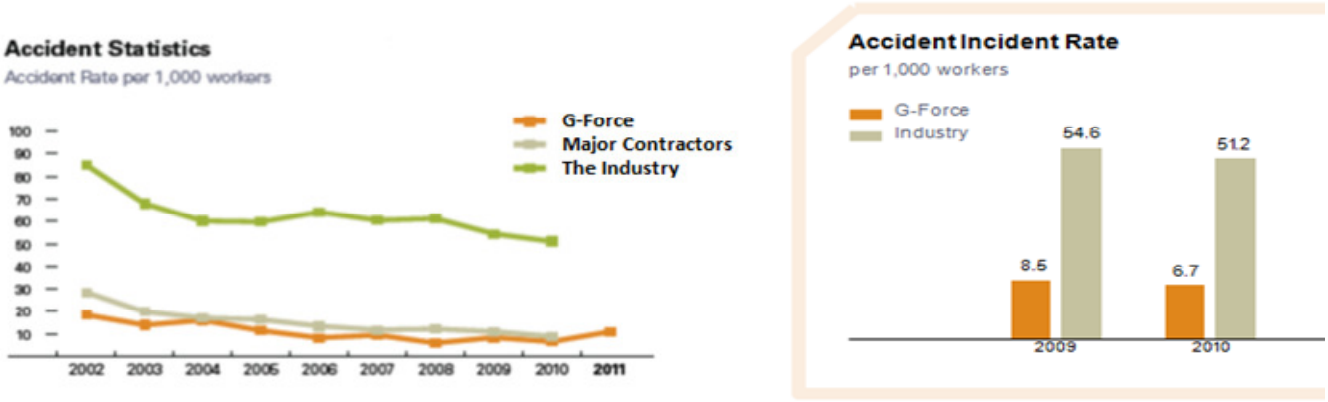

Figure 1. Accident Statistics and Accident Incident Rate (G-Force vs Industry)

would successfully promote safety through caring, trust, held in 2011 under the theme "Making Safety Personal: Fostering a Safety Culture" to explore how G-force communication and teamwork.

G-Force's organizational culture indicates that it values the importance of construction safety, and shows its concern for its staff and believes a good market leader always protects their followers. The most telling message, as repeatedly emphases by its top management, from G-Force is doing in leadership is that those who take safety leadership seriously and excel it in all aspects of their works. In 2008, they developed a "Six Point Safety Focus" action plan to achieving Zero Harm. At first, every leader within G-Force is committed to Zero Harm and inspires the people under his or her direction to make it a personal priority. Secondly, they plan the constructability of work by removing risk at source. G-Force uses new technology in virtual simulations to identify safety risks and as an interactive tool to promote safety practices. Thirdly, frontline staff will conduct near miss check and Audit to improve the safety awareness of our frontline workers and adopt best practices. The fourth focus is about care and engagement. As listening to and communicating with the frontline workforce is crucial, a frontline safety committee was established to gather more feedback and assist the organization to formulate safety policies. This follows by maintenance a strong belief that their ownsystems and policies can help to deliver safety on projects. Lastly, the role and responsibilities of the safety teams are clearly identified and developed. This team helps to fulfill their legal and moral duty to ensure the safety of workers.

Therefore, it is worth to analyze how this construction company's safety organizational culture is successfully fostered.

Case Study Analysis

Geller (1994)stated that in a total safety culture, everyone feels responsible for safety and pursues it on a daily basis and it is every safety professional's ultimate goal to achieve a total safety culture within his/her organization. In the following context, the research for the case study is analyzed under the same ten headings as categorized by the author.

Organizational culture

G-Force's culture drives the safety process because its corporate policy is to place health and safety as the number one priority over all business considerations. The organization's mission is "to build for a better quality of life and living environment in a safe and sustainable manner". G-Force believes that quality, technical excellence, progress and attractive financial returns are all outcomes of good safety management.

Behavioral and personal base

G-Force's behavior-based and person-based factors pull its success. G-Force believes that employee must understand relevant behavioral science principles and feel comfortable using them to prevent work injuries. Therefore, G-Force makes safety personal and meaningful and has put much effort into safety and promoted the "Safety Step Change" program since 2007, and "Zero Harm Induction Centre" in 2010. The responsibility for implementing "safety policy" is rested on each and every employee as it is their wellbeing. All staff are taught to "see and act"; and always maintain their focus on fully implementing safety at all levels. All workers are induced personal safety to achieve Zero Harm. Certain dispositions or moods influence an individual's propensity to help other workers.

Safety process

G-Force focuses on safety process but not the outcomes.

Staff are responsible to identify and address those significant new safety risks during site inspections or when preparing new method statements, such risks were then captured and transferred into the project safety registers to ensure awareness, communication and thorough reviews. When staff are held accountable for ongoing work practices that continue to the organization's safety, process improved and eventually injury rate is reduced.

Activators, motivators and consequences

G-Force believes safety behavior is directed by activators and motivated by consequences. Safety signs, memos, good practices, lesson learnt and safety alert statements are always introduced to the workplace in order to prompt safe work practices. These activators announce consequences for unsafe behaviors which can help to imitate and maintain safe work practices.

Emphasis safety success

G-Force focuses on its safety success but not failure. Not only significant poor safety outcomes are posted in the monthly safety newsletter, but pleasant and encouraging news will also be frequently updated. For example, there are various safety awards to uphold safety performance: monthly project "Safe Subcontractor Award", "Safe Worker Award" and also annual "Safe Foreman Award", "Safe Subcontractor Award", "Safe Worker Award". To pay tributes to the staff, prize presentation ceremonies will be held to honor their efforts in building Zero Harm sites. Another example is their internal newsletter in February 2012 highlighted that there was only one major incident within 5.2 million man-hours from Jan/2011 to Dec/2011.

Observation of safety practices and feedback

G-Force values observation and feedback which lead to safe behavior. These include the feedback and observation of safety improvement needs as identified by the top management after periodical site safety walk; constructive safety comment as provided by subcontractors and workers via regular project safety meetings. All safety participants, whether at senior leadership level, project operational level or front-line working level place safety who can supply safe working practices and processes, the observations and feedback on generic hazard identification are welcome. Analyzed and selected feedback will then be posted on the intranet.

COACH approach

Communication: G-force has established and maintains information, in paper and/or electronic form to describe the core elements of the safety practices. This safety information is posted on office / site / depot notice boards, as well as the intranet and company website.

Observation: Any significant safety risks observed and identified during routine site inspections by safety personnel will be reverted to the project immediately to ensure positive remedial reactions.

Analysis: Should there be any serious safety incident, G-Force's first thought and actions are with the victims, it follows by analysis of the root cause. "Panel of Enquiry" will be formed to ensure similar accidents will never happen again.

Change: G-Force developed a series of "Step Change in Safety" actions and key performance indicators for good changing progress is set and reviewed by top management periodically. This "Step Change" challenged the project teams and required them for a steady improvement.

Help: G-Force helps employee with updated safety information and knowledge, by maintaining central database of all safety information including those of external origin, required by its safety management system. Those current revisions are identified; and current versions of relevant documents are available at all locations which helps operations functioning effectively.

Active care process

G-Force promotes active care process. Since January 2010, G-Force's Zero Harm Induction Centre has been set up to train all staff and subcontractors on the elements of Zero Harm in order to make the organization a truly Zero Harm organization. A special safety team of senior managers are engaged in their "Care and Engagement" programme. Through home visits and social events that spread their safety message outside work and to workers' families, the top management to showconcern of workers' the feeling. Workers arevery inspired by these activitiesof caring behavior by the top management.

Self-esteem, belonging and empowerment

G-Force believes employees and workers need to feel good about them before they will act for the safety by adopting the following strategies to build up self-esteem:

- solicit and follow up employee suggestion in safety
- provide opportunities for personal learning
- increase and encourage management attention to the occurrence of safe behaviors

G-Force believes employees and workers will feel as part of a cohesive group and then will actively care on safety by adopting the following strategies to build up sense of belonging:

- sponsor celebrations for safety events held by reserving appropriate project's budget for safety
- use self-managed work team by continuing with the "one team approach" to implement safety
- project team is accountable for safety as an integral part of effective and efficient construction engineering management

G-Force believes employees and workers should be empowered to the safety process and then can positively contribute to safety outcomes by adopting the one team approach to implement safety in projects. Every project is empowered to:

- pay attention to process measures
- resolve risk and make it easy to build safely
- define subcontractor safety deliverables

Organizational safety value

G-Force's ultimate goal is to deliver a high level of quality to their customers and the quality of the way in which projects are delivered, reliably, safely and responsibly. G-Force believe that they can best deliver the level of quality to which they aspire by concentrating on three core values "safety, integrity and excellence". The organization places safety as it core values throughout a corporate culture. In a conflict of interest, safety always comes first.

DISCUSSION

To ensure the organization's growth, G-Force places "safety" as one of the integral parts of their business model.Under such positive safety leadership, there were 53% accident-free project in 2009 and the average accident rate is 8.5, which was significantly lower than the industry average. All these confirm that exemplary levels of safety performance can be achieved by appropriate "Safety Policy".

The ultimate results of safety reward are well beyond the time limit of this paper, and it may not be feasible to quantify the results in financial terms within a short time span. However, the following significantly positive contributionsto the business have been observed up to June2011:

- Winning the prominent project
- Receiving the safety dividends

Winning the Prominent Projects

In 2010 and 2011, G-Forcejoint-ventured with others and awarded twoexpress railwaycivil contracts, in HK$11.7 billion totally, to provide a world-class rail terminus and tunnel which serve as an international gateway from Hong Kong to China. Safety is always a matterin civil engineering project and health and safety issues are important, especially tunnelling is in high risk. When developing safety concepts for railway tunnels in determining the rail alignment, the contract has taken a number of factors into account. These include consideration of technical, operational, safety and geotechnical aspects, land requirements, effects on the community.The planning of the required safety measures is continuously developed in the individual phases of a tunnel project and is gradually elaborated in more detail as the design of the project progresses. As safetycontrol during construction of tunnels is one of the tender assessment criteria, the proven safety records lead G-Force successfully winning the packages.

Receiving the Safety Dividends

The organization's recordreveals that the following safety awards were received appraising and rewarding the efforts of G-Force in driving "safety":

International Awards

- One of their highway projectsrewarded the 2011 International Safety Award with Merit from the British Safety Council in May. The award is acknowledged by the UK Health and Safety Executive as a powerful motivator for achieving high safety standards, and applied for by more than 600 organisations from across the world each year.
- In Dongguan, G-Forcehas been recognised at the annual Safety Operation and Fire Safety Award Presentation as one of the ten outstanding corporations, out of 1000 participating companies. It was a well demonstration of the organization truly becomes Zero Harm.

Hong Kong Awards

- G-Force scooped a total of 12 "Railway" Quality, Safety and Environmental Awards for its outstanding performance at the express railway projects. Suchawards aim to encourage contractors on railway projects to seek continuous improvement in construction works.
- At the Labour Department's Construction Industry Safety Award Scheme 2010-11, G-force receiveda total of 16 awards, including the Building Sites (Private Sector) Gold Award, the Civil Engineering Sites Silver Award, and the Civil Engineering Sites (Subcontractors) Bronze Award. G-Force was also awarded Safety Team and Safety Workers Awards.
- At the 2010/11 Airport Staff Safety Recognition Award Presentation Ceremony, their staff received eight awards in the Role Model for Safety category and

Accident Prevention category.

- Other awards include the Best Site Condition Awards for 2 projects, the Lowest Reportable Accident Frequency Rate Award, the Highest "Det Norske Veritas (DNV)" Audit Score and Silver Quality Award, the 2nd Silver Safety Award and Gold of the Near Miss Report Award by their employers. These awards proved that G-Force have been taking the right approach to achieve our Zero Harm target.

It can be anticipated that safety is more demanding because it has been perceived as corporate social responsibility. In a business world which is moving ever faster toward social responsibility, it is perhaps exactly safety as ethical elements which will determine the success of construction businesses alike. Most construction companies know that the employer's impression of an organization is important. G-Force can use these safety awards to promote company image and reputation leading to better competitive advantage.

CONCLUSION AND LIMITATION

Construction industry is notorious and being criticized for poor safety record. This paper studied how safety culture is fostered and drive to a success. The evidence is that G-Force accident rate per thousand workers dropped to 6.1 in 2010, a 75% reduction from the new century baseline of 24.5 within 10 years.Safety culture positively contributes to safety management and directly improve negative image of a company. G-force creates a "quality brand" showing corporate social responsibility which enhances its competitive advantage and increase business viability.

However, there are some limitations of this case study and the result of the research cannot be generalized. Firstly, the levels of influence by trade unions of different countries are different, which may affect the safety culture differently. These differences should be reviewed, addressed and reflected in the national-organizational safety culture.Secondly, national cultures of different countries may impact on leadership and followership to the safety perception. Consideration must be made in future research when undertaking similar research in other countries.Thirdly, Geller's principles were discussed generally for all industries but safety professionals of construction engineering management should seek their own insights on achieving the safety culture and may establish different set of achievable goal according to those principles.

To conclude, zero harm is not a "zero sum game", all participants enjoy the success. Working safely leads to a "real" success. Providing a safer workplace can generate many financial benefits, including savings in direct and indirect costs, fewer penalty fines and litigation claims, lower insurance premiums, and reduced medical expenses, and subcontractor's costs, resulting from fewer accidents. Therefore, collaboration is the essence to realize the safety culture within an organization. This is the roadmap to achieve real zero harm in a safety by fostering the safety culture. Safety should be championed by top management. However, safety management is not merely a "top down" approach, but requires the positive "bottom up" actions from the other end.

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